CYBER PAINT™

Pro Animation Studio

FOR THE
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Antic Publishing, Inc.

THE CATALOG

CYBER PAINT™

Pro Animation Studio

Now, you can create dazzling studio-quality computer animations.

A member of the Cyber family of desktop video products.
Color Monitor required
Requires one-megabyte RAM

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An Information Technology Company

CYBERPAINT™

Pro Animation Studio

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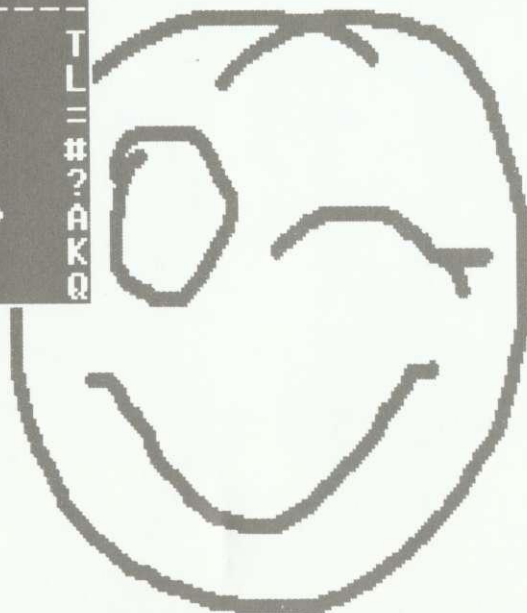
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INTRODUCING CYBER PAINT

You've probably sat in a darkened movie theater and watched, transfixed, as spaceships swooped across the cinematic void, spewing laserfire from their wing cannons. You've seen chrome-plated androids, with smoothly whirring joints and glowing eyes, stomp down stainless-steel corridors. And on television you've watched pixelized objects flying through digitized worlds; everything from electric shavers zipping down highways to the hottest new sports cars assembling themselves as if through magic.

Well, it *is* magic, of a sort – the magic of computer graphics. And if you have the imagination to create your own computer graphic films, CYBER PAINT will make your vision a reality.

CYBER PAINT is a powerful graphics paint program specifically designed for professional cel animation – with the added benefit that it works hand-in-hand with the CAD-3D 2.0 animations of the CYBER STUDIO. With CYBER PAINT alone, you can make your own computerized cartoons, moving greeting cards and animated storyboards. But combined CYBER PAINT with CYBER STUDIO, and you will create graphics animations that will rival those of a $100,000 system.

As you will soon discover, CYBER PAINT is a lot of fun just by itself. But, if you've been creating your own 3-D masterpieces with CAD-3D 2.0 and CYBER CONTROL, CYBER PAINT will enable you to:

- merge flat (cel) animation with 3-D animation; providing foregrounds and backgrounds for your CAD-3D objects
- add frame-by-frame detail to 3-D objects – laser beams, engine exhaust, surface shading, reflections and highlights such as the electrical arcs and interactive lighting in the Tesla sequence on your CYBER PAINT disk – file TESLA.SEQ)

- do precision "clean-up" work on your 3-D objects and animations, tweaking and touching-up your work until it's exactly the way you want it.

Getting Started

We know you're eager to begin making fish swim through a pixel sea and adding fiery exhaust to your favorite CAD-3D spaceship, but first, *make a backup copy of your CYBER PAINT disk and then store the original in a safe place.* You may copy the entire disk using the GEM disk copy procedure described in your ST Owner's Manual, or transfer only the files needed to run the program. (The only file needed to run CYBER PAINT is CYPAINT.PRG.) For purposes of starting out, we suggest you copy the entire disk.

CYBER PAINT requires a minimum of one-megabyte of RAM, and a color system. If you have a half-megabyte Atari, you might consider asking your dealer about a memory expansion. (See Appendix D for information about RAM expansions.)

NOTE: There may be one or more files on your disk titled README (on both the surface directory and in folders). These contain important update information which you should read before copying or running any program. Double-click on any README file, then choose to print it to Screen or Printer. Also, certain Antic disks have been formatted with David Small's Twister program, so that we may fit more files on the disk. Twister formatted disks may not be copied using the standard GEM disk copy procedure. Instead, you must drag your files from the CYBER PAINT disk to a blank pre-formatted disk. The README file will tell you if the disk is Twister format.

As long as you're copying disks, we suggest creating a couple of blank formatted disks to store your animation sequences. The more disk space the better. If you have a double-sided drive, format the disks as double-sided. Those with hard disks may place CYBER PAINT on any level of directory.

Now, place your copy of CYBER PAINT in whatever drive you wish to run it from, open that drive's directory, and double-click on CYPAINT.PRG. You can boot CYBER PAINT from either low or medium resolution, but its display will always be 16-color low resolution. CYBER PAINT does not work in monochrome.

After a few seconds, a white cross will appear on a black background. You're ready to begin.

CYBER PAINT TUTORIAL I: DRAWING

The following tutorials will introduce you to the key functions of CYBER PAINT: drawing, creating flat animations, and dressing up CYBER STUDIO animations. Detailed information is contained in the Reference Section in part two of this manual. Additional tips and information may be found in the Appendices in the back of the manual.

- Tutorial I: Drawing, will show you how to use CYBER PAINT's paint-program features – the backbone of the program.

- Tutorial II: Cel Animation, will explain what cel animation is, then introduce the animation features of CYBER PAINT, explain disk I/O, and "tweening."

- Tutorial III: ADO f/x, will demonstrate the powerful, automatic animation effects possible through the ADO f/x submenu.

Warming Up

Once CYBER PAINT stops loading, you should be looking at a white, cross-shaped cursor in the middle of a black screen. Click your right mouse button, and the CYBER PAINT main menu will appear at the top of your screen. At the bottom will appear the CYBER PAINT Playback Bar.

Pass the mouse cursor over the categories you see in the menu bar. You'll see the drop-down menus, containing the CYBER PAINT functions for each category, pop into place, then disappear. Don't be overwhelmed by all the command names you see. CYBER PAINT

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has many drawing and animation functions, but it's actually quite easy to understand and use. And you can produce many striking animations using only a few basic CYBER PAINT options.

If you're the adventurous sort, and want to learn CYBER PAINT through the Reference Section, instead of the Tutorials, that's fine. But first, read the remaining half-dozen paragraphs, please. The Reference section contains a list of each CYBER PAINT function and what it does. The following paragraphs contain some general information you will want to know before exploring CYBER PAINT "cold."

All of CYBER PAINT's functions are accessible, by mouse, from the main menu. CYBER PAINT also provides keyboard alternatives of almost every function contained in the drop-down menus. (See the Reference section for more on these.) The Playback Bar, at the bottom of the screen, is an icon-based strip designed to be similar to the controls of a pro videotape deck. The Playback Bar controls your *direct* manipulation of an animation sequence – playback, rewind, fast-forward, frame insert, etc.

The keyboard alternatives are displayed to the right of the functions listed in the drop-down menus. We've endeavored to make the key equivalents as mnemonic as possible. Pressing the key displayed is the alternative of selecting that particulary function.

NOTE: Keyboard alternatives will not work while in Text mode (see Text in the Reference section).

While CYBER PAINT's drop-down menu operates much like the familiar GEM menu bar, there are slight differences. To access a CYBER PAINT function from one of the drop-downs, move your mouse over a category in the menu bar (Menu, Clip, Draw, etc.) so that its menu drops down. Point at the desired item within the menu, and it will be outline. *While still pointing at the outlined item*, click the left mouse button to activate it. In the Draw or Mode menus, a double arrow will indicate which function you're currently using – or which mode is currently active.

NOTE: CYBER PAINT's functions work only if you deliberately click on them. Merely highlighting the function with the bracketing box, moving your cursor off the drop-down menu and clicking your mouse button WILL NOT activate that function. If you're using CYBER PAINT's default color palette, your choice will be outlined by a red box. Depending on the color palette you've set, the highlighted box may not be visible, but don't worry – you can still select the feature simply by clicking on its name.

There are a few terms we'll be using in this manual which you should be familiar with:

Click	Press and release the left mouse button.
Left-click	The same as above.
Right-click	Press and release the right mouse button.
Double-click	Click the left mouse button twice rapidly.
Drag	Press and hold down the left mouse button, then move – or *drag* – the cursor.
Select	Move the mouse cursor over a menu category so that its menu drops down, then move the cursor down to the indicated function until it is outlined, and click the left mouse button.

NOTE: The Playback Bar at the bottom of the screen will be covered later in the Tutorial Section. However, there are a few mouse-clicks and key-presses that might get you into a CYBER PAINT mode you won't know how to get out of. Over on the right side of the Playback Bar is the letter "f." Click once on it, and it changes to a red "s," click again, and it becomes a red "a," click one more time, and the "f" returns. During the earlier tutorials, make sure that the plain, black "f" is displayed in the Playback Bar. If the "s" or "a" appear, click on the box until the "f" is displayed. Also, note the number to the left of the "f" – it should be a "1." Press [Return] and observe that the number is now "11." Press [Return] again, and the number increases again. If you see a number other than "1" while working in the earlier tutorials, it means you've accidentally pressed [Return]. To clear this up, select Kill Sequence from the Menu drop-down, then select "Yes" from the alert box.

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The Draw Menu

```
Menu Clip Draw Modes Frame Brush Color
              ▷Draw      1
               Streak    2
               Stipple   3
               Airbrush  4
               Fill      5
               Line      6
               Polygon   7
               Circle    8
               Box       9
               Text      0
```

In order to create your own cel animation or "dress up" existing animations with CYBER PAINT, you should first familiarize yourself with the many paint tools you have at hand.

Point the mouse at the Draw menu and examine its contents. There are nine drawing features (or tools), one text option, and their keyboard equivalents. A double-arrow to the left of any one of the features will indicate the currently selected one. Only one item in the Draw menu may be active at any time. When you first boot CYBER PAINT, the Draw tool is active and the mouse cursor is a one-pixel-sized, cross-shaped brush.

Click on one of the other drawing functions (such as Line). The drop-down menu disappears, but the menu bar and Playback Bar are still on the screen. Click the right mouse button and the menu and Playback Bar disappear, leaving you with a blank screen. Right-click again, and the menu and Playback Bar reappear. Go back to the Draw menu and take another look: The function you selected is now indicated by the double-arrows.

Select Draw, move the cursor to the middle of the screen, hold down the left button and move the mouse around: nothing happens. This is because the menus are still displayed on the screen. Right-click to remove the menus, then hold down the left button and move the mouse: a one-pixel-wide line is drawn. Remember: *CYBER PAINT draw functions will not operate unless you are in*

full-screen mode! If you try a function and it isn't working, it's probably because the menu is still displayed. Just right-click to open the full workscreen, then try the function again.

In CYBER PAINT, clicking the right mouse button will toggle you between the menu and the full screen. It will also exit any submenus to the main menu.

NOTE: The keyboard alternative to right-clicking is the [Space] bar.

Play around with the Draw function a bit. Draw quickly or slowly; sign your name, if you want.

Try this: Scribble a line, then press [Undo] – the line is gone. Press [Undo] again – the line reappears. Draw a second line, then a third line, then press [Undo] – only the third line is removed. Undo works with most of CYBER PAINT's functions, but you may only Undo the *last* operation. If you go on to a second operation, the previous one is permanently set. (There is an exception to this, which we will get to later.)

You can also Undo a drawing action by returning to the main menu screen and left-clicking on Undo in the Frames menu.

Let's explore the other drawing options in the Draw menu. Right-click (or press the [Space] bar) to return to the main menu screen, and select Streak from the Draw menu. Return to your workscreen (right-click or [Space]) and draw. Streak seems to be exactly like Draw, but it isn't. Move your mouse quickly across the screen and you'll see the difference. Streak allows you to draw with a brush designed to "skip" if you are drawing quickly – creating a sketchy appearance. Draw, by contrast, will not skip, no matter what your speed.

Return to the main menu, select Stipple from the Draw menu, and then go back to your workscreen. Go to a clear area of your screen, hold down your left mouse button and move your cursor around. Stipple will spray out a randomly-distributed series of individual pixels in a small swath. (It will also use whatever brush you've selected from the Brush menu. We'll cover that in a bit.) Stipple is not user-definable.

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We'll be getting to color in a little while, but let's sneak ahead a change the color of our Stipple brush. Move the mouse to the Color menu. When it drops down, you will see the 16 default CYBER PAINT colors, plus a couple of options at the bottom. To select a new color for your current drawing tool, simply point the mouse cursor at the block containing the color you wish. An outline will surround the selected color. Left-click to select the color, then try the Stipple again.

NOTE: There's one more (hidden) way to select colors – directly from the screen. Place your mouse cursor over any color on the workscreen and press the [C] key. This will select whichever color your mouse is pointing at.

Now you can change colors at any time while continuing with the drawing tutorial. But, by now, your workscreen is probably getting a little cluttered. Let's erase it so we'll have a fresh working area between playing with these drawing options. Move your cursor up to Frame on the main menu, and select Clear Pic. Your workscreen is cleared of all previous work. Press [Undo] and everything returns. The keyboard alternative to Clear Pic is easy to remember, press the [Clr Home] key (over by the cursor keys). Your screen is blanked again. During the tutorials, you may want to clear your workscreen occasionally as you test the CYBER PAINT's drawing options.

Go back to the Draw menu, select Airbrush, and draw with it on your workscreen. Airbrush mode is similar to Stipple, spraying out pixels or brush patterns across your screen, but unlike Stipple, it *is* user-definable. You can set both the speed and the spread (or range) of your airbrush.

To do so, return to the main menu screen, go over to the Menu drop-down and select Air Speed. A menu box will appear, consisting of two slider boxes labeled *Speed* and *Spread*. Speed indicates the overall speed of your airbrush flow; from a slowly-distributed burst, like an dying aerosol can, all the way up to a firehose torrent of pixels. Spread stands for the range of screen area covered by your pixels (or brushes) when you are spraying with the Airbrush feature.

To adjust the slider controls, move your cursor inside the bars and click to the left or the right of the numbered slider boxes – the numbered boxes will move to where you clicked. You can also alter the settings by left-clicking on the arrows at either ends of the slider controls. The number boxes will move in the direction of the arrows. If you hold down your mouse button while clicking on the arrows, the boxes will "scroll" in the indicated direction. Alternatively, you may drag the boxes to any position by placing your cursor on them, holding down the left mouse button, and dragging them to the left or right.

NOTE: There are several slider bars used in various options of CYBER PAINT. They all work in the fashion described above. Take the time now to familiarize yourself with their operation.

While you're in this menu, play with the settings. Alter your airbrush speed and spread values, then right-click twice (to return to the main menu screen, then the workscreen). Draw around with the airbrush. Go back to Air Speed setting as often as you wish and play with the airbrush settings until you have a feel for exactly how they affect your airbrush.

When you're finished, clear your screen [Clr Home], then select Draw again from the Draw menu. Moving your cursor in loop-the-loop movements, scribble several overlapping circles on your screen.

Now, return to the Draw menu and select Fill. Fill allows you to fill, with whatever color you choose, any area of your screen or drawing composed of a single color of contiguous pixels. Isolated pixels, or those of the same color but touching on their corners – not sides – are not affected.

When you select Fill, a hollow cursor marked Fill will appear on your workscreen. Place the center of the cursor inside one of the enclosed areas you just drew (or whatever area you want filled), then press your left mouse button. As you do, you'll see a solid color expand and fill that area. (Did you remember to right-click to remove the menu?) Go ahead and fill every enclosed area you want, or even fill the entire screen. Again, you may undo the most recent Fill by pressing [Undo].

Now, clear your workscreen and select Line from the Draw menu. Line lets you draw a straight line, stretching from one point to another. Go to your workscreen, place the center of the cursor at the point where you want the line to start, then click and hold your left mouse button. While still holding down the button, move your cursor around on the screen. A rubber line will stretch out from your starting point. Move your cursor to the point where you want the line to end, then release the button to deposit the line. Repeat the above procedure to draw more lines.

Select Polygon from the Draw menu. Polygon lets you create straight-edged geometric shapes of any color – squares, rectangles, trapezoids. Place your cursor at any point on the screen, left-click, and move the cursor. A rubber line appears. Left-click a second point, and move the cursor again. As you move your cursor away from its second position you'll see a swath of color emanating from your initial starting point, sweeping out to your cursor in a triangular shape. By alternately moving and clicking your cursor, you can deposit patches of triangular polygons anywhere on your screen. If you double back over your new color, you will reveal the original background under the polygon. You can use this to create multiple polygons (with holes in them) and unusual star-shaped images. It's also a fast way to build the basic forms of an object.

Clear your workscreen, return to the Draw menu and select Circle. Circle is a very fast circle, or disk, drawing feature. Go to your workscreen, place your cursor where you want the center of your circle to be, hold down the left mouse button, and move the cursor outward from the centerpoint. Release the button to set the circle when it's as large as you want it. Move your cursor and do it again and again. Make several circles of different sizes.

Okay, clear your screen of the circles and select Box from the Draw menu. Box lets you draw outlined or solid squares or rectangles. Go to your workscreen, position your cursor, hold down the left mouse button, then drag your cursor. As you move it away, in any direction, you'll see a box, with right-angled sides, emanating from your starting point. You can move the cursor in any direction and make the box as small or large as you want. Release the mouse button to place your box.

Before we discuss Text, the last item in the Draw menu, let's explore some of the other features in CYBER PAINT that affect your drawing functions.

The Modes Menu

```
Menu Clip Draw Modes Frame Brush Color
                   Zoom         Z
                   Ping Pong    W
                  »Xray Copy    X
                  »Filled       F
                  _____
                  »Distinct
                   Connected
                   Concentric
```

Point to the Modes menu and examine its list of functions. The items in the Modes menu affect the various drawing tools, and, unlike the items in the Draw menu, more than one of the Modes may be active at any time. There are seven items, but, for now, we're concerned with only five of them.

Clear your screen, then draw something simple – such as a stick figure. Now, select Zoom from the Modes menu. Zoom is the magnify mode of CYBER PAINT, used for close-up work and fine detailing.

When you left-click on Zoom, your workscreen will appear, along with a white box. Move the box around your screen with the mouse. Place the box so that it surrounds an area you want to work on (your stick figure's head, possibly, or any other part of your drawing). Click the left mouse button and you workscreen now displays a magnified version of the area you chose.

The keyboard alternative to Zoom is [Z], and is easier to use than selecting from the drop-down menu. Press [Z], and your workscreen returns to normal. Press [Z] again, and the white box reappears. Click the left mouse button to return to Zoom mode on the workscreen.

You can pick and use any of your CYBER PAINT drawing tools while in Zoom mode. Go ahead, try out some of the drawing functions (Draw, Line, Airbrush, etc.) Use [Z] to toggle between Zoom and normal display mode. Make fine adjustments to your drawing; add details to your stick figure's face, if you want.

If you're doing detail work on an area of your painting, and find that toggling in and out of Zoom is disruptive, you can move the Zoom window by pressing various of the number keys on the numeric keypad to the far right of your Atari keyboard. The eight number keys surrounding the [5] key will move the Zoom window in the compass direction of that particular key from the central [5] key. For example, the [8] key is north of the [5]. Press [8] and watch the Zoom window move upward. Press [4] and the Zoom window moves to the left (or west). Those keys diagonal to the [5] key will move the window in a diagonal direction. Press [3] to move the window down and to the right (south-east). (See Zoom in the Reference Section for a detailed description of the numeric keypad function.)

Okay, turn Zoom off, and take another look at the Modes menu. We'll skip Ping Pong and X-Ray Copy. Let's examine Filled. Filled in the Modes menu is different from Fill in the Draw menu. At boot-up, Filled is active (as you can see by the double-arrow). This means that drawing tools, such as Box, Circle, and Polygon, automatically create solid images. When you turn Filled off, these same functions will create hollow images.

Let's try it. Click on Filled to toggle it off. Go back to the Draw menu and try out the Circle, Box, and Polygon functions that you used earlier. You will readily see the effect of an inactive Filled mode. Toggle Filled back on and draw some more. Leave Filled active, and clear your screen before proceeding.

The three features at the bottom of the Modes menu (Distinct, Connected, and Concentric) are slightly different from the other options in the menu in that only one of them may be active at any time – and, at least one of them *must* be active. These three modes affect the Circle, Line, and Box drawing tools only. We've seen how these tools function in Distinct mode, let's examine the others.

Select Connected, then draw several boxes and circles. As you can see, when Connected is activated, it takes the *starting* and *ending points* of your cursor and draws a circle, or box between them. The Line tool follows the same rule, but the mouse buttons are used a bit differently: left-click just once to set the starting point of the line, then left-click again to set the end point of that line. Your cursor will remain attached to each set point by a rubber line. Continue to move and left-click to draw connected lines about the screen. To remove your cursor from the series of lines, click the right mouse button. You can now left-click to set the point on another series of lines.

Now, go back to the Modes menu and select Concentric. When Concentric is activate, the first point that you set, by left-clicking, becomes the *center* point of all subsequent operations – until you right-click to clear the set point.

Before trying Concentric, click on Filled to deactivate it. This will make the Concentric effect more noticeable. Select Box or Circle from the Draw menu, go to your workscreen, press the left button to place your center point, and drag the cursor outwards. You'll see the box or circle appear. Release the mouse button to set the image, move the cursor elsewhere on your screen, then drag to create another Box or Cirle. Concentric will remember your original centerpoint and automatically draw a new box or circle, radiating outward from the original centerpoint to your new cursor position. Right-click to release the current center point and set another – or to select a different tool.

The Line tool works as a "ray" tool in Concentric mode. Select Line and left-click only once to create a center point. Move the mouse away, and a rubber line will emanate from the center point. Left-click to set the line, then move the mouse. The rubber line remains attached to the center point. Left-click to set several "ray" lines. Now, try this: hold down the left mouse button and sweep the mouse in a circle around the center point to make spiky dandelion-shaped images. Right-click to release the center point.

Now, select Distinct to turn it back on. We're going to do some more drawing, but this time, we're going to change our brush.

The Brush Menu

```
Menu Clip Draw Modes Frame Brush Color
```
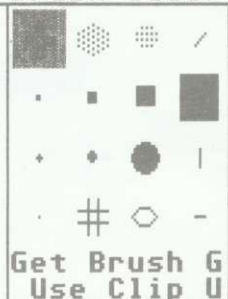
CYBER PAINT has an array of brushes you may select for most drawing functions – or, you may define your own brush. Move your mouse to the Brush menu and take a look at the drop-down menu. You'll notice an assortment of 16 brushes of various shapes and sizes, along with a couple of options at the bottom of the menu, which we'll describe in a moment.

Go back to the Draw menu, and select the Draw tool. Now, return to the Brush menu, and select any one of the brush shapes – the mouse cursor becomes the shape of the chosen brush. Return to the workscreen and draw a few lines.

Select another brush, go back to the Draw menu and try out some different drawing tools – such as Line, Airbrush, Stipple, etc. What happens when you use Circle, Brush, or Polygon? Because these tools are creating Filled images, the Brush shape has no effect. Move on over to the Modes menu and turn off Filled. Now, try your brushes again with Circle, Box, and Polygon. Experiment with Connected and Concentric. Set Airbrush to maximum Spread and Speed, and try a large brush.

Before we go on, return to Distinct, and activate Filled. Let's see how to define our own brushes.

The Get Brush option in the Brush menu lets you "grab" a small portion of your screen (16x16 pixels) as a brush. For it to work,

some part of the grabbed portion must have a little of the background color in it. (At default, the background color is black).

Clear your workscreen, then use any of the drawing tools to scribble a few different colors on the screen. In the Brush menu, select a brush shape that you want to change. (You may use any of the shapes except for brush #1, which is the default cross shape in the upper-left corner. Also, don't use the fat, round brush; we'll want that for later.)

Now, select Get Brush. Your workscreen will appear, along with a small, highlighted box. Move this box over the area of your drawing you want to grab as a brush, then click the left mouse button. The area you enclosed with the brush box is now your brush, and you can draw with it to your heart's content. Take another look at the Brush menu, and you will see that your new shapes is now included among the others. Zoom mode is particularly handy for creating detailed brushes.

We're going to skip Use Clip for now; we'll discuss it when we go over to the Clip menu.

The Color Menu

Menu Clip Draw Modes Frame Brush Color
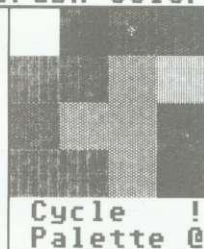
Cycle   !
Palette   @

We've already shown how to select any of the 16 colors from the Color menu. Let's take a look at the two options at the bottom: Palette and Cycle.

Using several brushes and colors, create a big, scribbled, multi-colored screen. Now, what if you want a *different* color palette?

What if you want all shades of blue, or red, or you simply want to tone down or enhance certain colors? That's easy enough to do with the Palette option.

Select Palette from the Color menu. The Palette submenu will appear at the bottom of your screen. At the top of the menu is a shortened version of the same Playback Bar which usually appears at the bottom of your screen when the main menu is displayed. We'll ignore this for now. For the moment, let's concentrate on changing our colors.

In the upper-right corner of the Palette submenu is the Color Bar, which displays the 16 colors currently in your palette (the same colors that are displayed in the Color menu). Look closely, and you will see a single pixel in one of the 16 boxes in the Color Bar to indicate the currently selected drawing color. Point at another color in the Bar and left-click. The pixel moves to this color, and it becomes the current drawing color.

Select a color from the Color Bar that you wish to change. To the left of the Color Palette are two boxes labeled: RGB and HLS, and to the right of them are three slider bars with numbered boxes in them. The RGB box is highlighted (as a default), which means that the slider bars will affect (from top to bottom) the Red, Green, and Blue values of the chosen color. When the slider bar is to the full right position, its color (Red, Green, or Blue) is at full intensity – or 7. The extreme left position is zero intensity. By mixing the intensity of the three RGB color values, you may create any of 512 colors.

The slider bars operate in the same way as the Airbrush adjustment slider bars. Try sliding all three number bars to the far right. Their numbered boxes now read 777, and the selected color is white. Move all three bars to the extreme left (000). Now, the selected

color is black. Slide only the top (red) slider bar all the way over (7). The selected color becomes pure red.

Try selecting different colors and adjusting the slider bars to different values. Notice the effect of the colors not only in the Color Bar, but in your workscreen. (For a full explanation of the theory of RGB color mixing, see the Reference Section.)

You've probably made quite a mess of your original palette by now. Click on the Restore box over in the right of the Palette submenu. All the colors are returned to their original values. Now, try this: Select a distinctive color from the Color Bar (remember its position and what it looks like), then alter its color with the slider bars. Exit the Palette submenu by right-clicking (remember, you can exit any submenu by right-clicking or pressing [Space]). Now, return to the Palette submenu by selecting it from the Color menu. Watch your altered color in the Color Bar while clicking on Restore – nothing happens. Use the slider bars to change the color some more, then click on Restore again – the color returns to its last value. This is to illustrate that Restore will only restore the colors which have been changed since the Palette submenu was last called. *Once you exit the Palette submenu, all colors changes are permanent.*

You're probably already familiar with RGB color adjustment, since its the standard used by most Atari paint programs. But how about HLS? HLS stands for Hue, Luminance, and Saturation, and is another way to adjust colors. Select a color from the Color Bar, and click on HLS so that it is highlighted. The number boxes in the slider bars change to vertical lines, and will now affect (from top to bottom) the Hue, Luminance, and Saturation of the selected color.

Slide the Hue bar (the top one) back and forth while observing its effect on the selected color. Hue is just another word for "color." When you adjust the Hue, the selected color changes, but maintains the luminance (intensity) and saturation (purity; or amount of gray) of the original color. Try the Luminance slider – the color remains the same hue, but changes in brightness. Now, adjust the third bar. This affects the purity of the color – or the amount of gray. (For a full explanation of HLS mixing, see the Reference Section.)

Go back to RGB mode by clicking in its box, and click on Restore
to restore some of our original palette values. Now, take a look at
the right side of the Palette menu. Below the Color Bar are two
dots connected by a line. This is the Color Range Bar, which
indicates the *range* of colors you wish to manipulate. The Color
Range Bar works with the Shift, Inverse, and Range functions
below it, as well as the Cycle mode in the Color menu.

You can adjust the Color Range by dragging the dots on either end
of the line so that they "bracket" the colors in the Color Bar above.
The range of colors affected will run from the color above on end
dot, to the color above the other end dot. You may affect only a
single color by dragging both dots to the same color.

At boot-up, the Color Range Bar is already arranged over several
colors. While watching the colors within the default range, click in
the Shift box. Click again. Shift lets you shift the selected range of
colors in either direction. The direction depends on how the Range
Bar is adjusted. At one end of the bar, the dot is diamond-shaped, at
the other, it's square-shaped. This is so you can tell which direction
it's been set in.

Try this: Reverse the direction of the Range Bar by dragging the
square dot over and across the diamond dot, then dragging the
diamond dot to the position the square dot was in; finally, drag the
square dot so that it is in the position the diamond dot originally
occupied. (Confused? Think of it this way: if the Range Bar was a
string, you would grab one end with each hand, then cross your
arms, reversing the string's direction. Since we only have one hand –
the mouse – we reverse first one end, then the other.)

Now that you've reversed the Range Bar, click on Shift. The colors
should shift in the opposite direction.

Watch the colors within the Range Bar, and click on Inverse. Click
on Inverse again. Inverse reverses the RGB values of all colors
selected in the Color Range Strip. (e.g., 522 becomes 255).

Below Shift is Range, which could also be thought of as "blend."
Range averages the colors between the two end colors in the Range
Bar. For example, if the color at the beginning of your range strip
is pure white (RGB 777) and the color at the end of your range strip

is pure black (RGB 000), clicking on Range would give you a blend of intermediate colors between those two extremes. In this case, they would range from white to light gray to dark gray to black. Range will also work on odd color combinations, such as purple and green, and will try to find the best palette of intermediate colors between them.

Copy presents a simple way to copy on color in the Color Bar to another. Click to select any color in the Color Bar as the *source* color. Now, click on Copy, then click to select and color in the Color Bar as your *destination* color. The destination color will become the same as the currently selected color. If you wish several copies of the selected color, simply click on Copy again, then click to select another destination color in the Color Bar.

Tint is the last option in the Palette submenu. It's a little more involved than the others – but not much. Tint will "tint" all the colors in a selected range with the color you are currently using. When you seleect Tint, you'll see whatever range of colors you've selected being altered by the value of your current color.

To test this out, set your Palette range strip to encompass four colors (it doesn't matter where they are). Then, using the RGB controls, set the RGB values, from left to right, of each color block as follows: Set block one at 004, block two at 005, block three at 006 and block four at 007. This will give you a range of four blues, from dark to light. Now, either click on a pure white color block or else select a block outside of your range and set its RGB values to 777.

Now, left-click on Tint. As you do, the red and green values of the range you've defined be increased by one increment. This is because CYBER PAINT is attempting to bring up (or down, as the case may be) the range-defined colors to the color you're currently using. If you click back through the range of blues, you'll see the RGB values of the blues have been altered to 115, 115, 116 and 117. You're lightening your original blue colors, much as you would lighten blue paint by adding ever-increasing amounts of white paint to it.

Select the white color again, click on tint once more, then click on the blues and see the progress. Tint may be selected more than once

to increase the tint effect. After three or four clicks, however, Tint
will have reached its limit on the chosen range.

Of course, Tint doesn't just work with blue and white, it works
with any combination of range colors and current colors. Your
current color can even be one of the colors within the Range strip.
Experiment with different ranges and colors and study the effect it
has on your artwork. When you're finished, click on Restore to reset
your Palette.

Remember the Cycle option in the Color drop-down menu? Let's
take a look at it. But, before leaving the Palette submenu, click on
Restore, then set your Range bar to encompass all the colors in the
Color Bar.

The Cycle option in the Color menu lets you cycle through a
selected range of colors *as* you are drawing.

Erase your workscreen, then select Cycle from the Color menu.
Now, select Draw from the Draw menu, choose a nice thick brush,
and begin drawing. Because the Cycle option is active (as indicated
by the double-arrow), your drawn line cycles through all the colors
in the Range Bar. The order of the colors cycled through depends on
the direction of the Range Bar (remember how to reverse its
direction?).

Play with the Cycle effect. Select different brushes from the Brush
menu, try different drawing tools. Set the Range control to
encompass a different number of colors. You can create a
particularly pretty effect by using the default cursor with Stipple
or Airbrush, giving you a kaleidoscopic storm of cosmic pixels.
(Don't forget that you can alter your airbrush spread and speed, too,
from the Air Speed command in the Menu drop-down.)

Experiment with Lines, Polygon, Circles, Boxes, and Fill. They all
react a little differently in Cycle mode. (For detailed explanation
of their effects, see Cycle in the Reference Section.)

When you're finished playing with Cycle, you can either toggle it
off by clicking on it again, or just choose select another color from
the Color menu – in which case, it will be turned off

automatically. At any rate, turn Cycle to off before proceeding. While you're at it, set Filled to active, and select Distinct.

Using Text

Now that we're finished with our drawing features, it's time to play with CYBER PAINT's text features. These enable you to label your artwork or provide spinning titles for your animated spectaculars.

You can load special GDOS fonts, or use the Atari system font with the Text option. Let's start with the default system font. Clear the screen, and select a color from the Color menu that you want your text to appear in.

Select Text from the Draw menu, then right click to the workscreen. The cursor becomes an "L" shape. Move the cursor to a position on screen at which you want your text to start, then left-click. The cursor changes to an outlined box indicating the size of your text. Okay, type in a word or two. You can use [Backspace] to erase errors, and the [Return] key will drop you to the next line. Right-click to return to the workscreen and the "L" cursor. Now, you may reposition and left-click again to add more text, or right-click to return to the main menu.

NOTE: While in Text mode, none of the CYBER PAINT keyboard alternatives will be operative.

You can easily set the size and style of your text, or load a different font. From the Menu drop-down, select Set Font. The Font submenu will appear featuring five different text styles (Outline, Bold, etc.), and a slider bar to adjust the text point size. (Points are a typographic term indicating font size. A point is 1/72 of an inch. 36-point type is half an inch tall.) To the right is an example box with the letters "Abc" illustrating the current font, size and style.

Outline	Underline	
Bold	Light	Italic
←	29	→	Custom

AbC
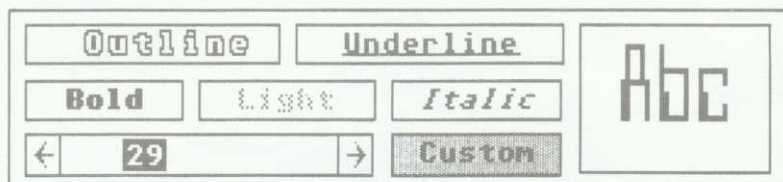
You can select a particular style by left-clicking on its box. To set the text size, drag the number box in the slider bar, or click on the arrow indicators. The left arrow will bring the text size down; the right arrow will bring it up. As you alter the size of your selected text, you'll see the final size of your type appear in the text example box on the far right, growing or shrinking, depending on how you're setting the point size box.

NOTE: Point size is limited by the available font – system or customized. After a certain size is reached, the numbers in the slider bar may change while the displayed font sizes remain the same.

Select one or more styles (yes, they are additive), adjust to a different point size, then right-click to exit the Font submenu. Right-click again to return to the workscreen, left-click to set your Text starting point, then type with your newly selected size and style.

Custom GDOS fonts may be used with CYBER PAINT, and there is no need to have GDOS loaded into memory. And, in fact, you shouldn't waste the memory with it. (You can use the GDOS fonts that come with the DEGAS Elite paint program, and there are several fonts in the CompuServe Informational Services libraries. Also, author Brad Christie has uploaded to CompuServe a public domain font editor called FED with which you may create your own custom GDOS fonts.)

We've included several GDOS fonts on your CYBER PAINT disk in a folder called FONTS. To load one, activate the Font submenu by selecting Set Font from the Menu drop-down. Click on the Custom box, and a file selector box will appear. Click on the folder name to open it, then double-click to select and load a font file. Now,

adjust your styles and point size, then exit the Font submenu, enter the workscreen, and type with your new font.

To return to the system font, reenter the Font submenu, and click on Custom once more to deactivate it. (If, instead, you were loading a second font, you would click once on Custom to deactivate it, then click a second time to bring the file selector back up.)

The Clip Menu

```
Menu Clip Draw Modes Frame Brush Color
     Cut       [Esc]
     Paste       P
     Move        M
     Clip     [Tab]
     Rotate      R
     Stretch     S
     Invert      I
     Fit Colors  N
     Mask        V
```

One of the nicest things about computer art is that it's infinitely mutable – you can change your colors, bend it, stretch it, cut and paste pieces of it to your heart's content before you commit it to disk.

The Clip menu contains some of CYBER PAINT's most important features, enabling you to grab either all or part of your workscreen and move it about, or distort it in various ways.

CYBER PAINT contains a special area of memory called *the clip buffer*. When a portion (or all) of the screen is *cut* or *clipped* into the clip buffer, it remains there for future use, until another image is cut or clipped into it. Only one image may be in the clip buffer at any time. CYBER PAINT functions such as Clear Pic have no effect on the clip buffer.

The first item in the Clip menu is Cut. But, before we use it, we need something on our workscreen to cut out. Clear out your screen, then draw some more multi-colored scribbles. Decide upon a small

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area of the screen you want to Cut out, then select Cut from the Clip menu. (Cut allows you to cut out the entire screen, but we'll just take a portion.) Your workscreen will appear, with a set of crosshairs and an X and Y coordinate readout in the upper left of your screen. (The X coordinate represents the horizontal direction, the Y represents the vertical, based on a coordinate system where 0,0 is in the upper-left corner of the screen. You can see this by moving the crosshairs to the upper-left of the screen. See the Reference Section for a detailed description of the CYBER PAINT coordinate system.)

To cut out your image, place the intersection of the crosshairs in the upper-left corner of an imaginary box around your image(s) or the screen area you wish to cut. Now, while holding down your left mouse button, move the crosshairs diagonally over the image. A box will form, and the coordinate numbers will change. While still holding down the left mouse button, examine the coordinates.

The first two numbers are the X and Y coordinates of the point set when you first clicked the mouse, the second two numbers are the size of the box (in pixels) along the X and Y axes, and the third pair of numbers show the current position of the mouse.

Move the mouse until the box completely encloses the image you wish placed in the clip buffer (for purposes of later demonstration, select a portion of the screen that contains some background color), then release the mouse button. The box disappears and the screen seems unchanged, but a copy of your clipped image has been stored in the clip buffer for later manipulation.

To demonstrate the your clipped image does indeed exist, let's look at Move. Move allows you to move your clip buffer image and position it anywhere on your workscreen, *without pasting it to the workscreen.*

Select Move, and the clip box outline will reappear. (Actually, the clipped image has also reappeared, but you can't tell that because it's sitting directly over the original image.) Point the mouse anywhere in the vicinity of the clip box, hold down the left mouse button drag the image. You can drag the clip box, containing a duplicate of your cut image, anywhere on your screen. The numeric coordinates display the X and Y position coordinates of the upper-left corner of

your clip box. Release the mouse button to deposit your image in its new location. Once again, the box and the image will disappear, leaving you with your original, unchanged screen.

Now that we've moved the clip buffer, we can really see the effect of the Move command. Select Move again, and, this time, the clip buffer image appears in its new place – and it's obvious that not only the box, but the image itself has appeared. Try dragging the box to a new location, but this time, click far outside the box before starting the drag operation. In CYBER PAINT, you don't need to be inside the clip box to drag it. This makes it easy to position a clipped image partway off the screen.

Notice that, as you move your image about, the portions of the clipped image that contain black (or whatever the background color is) remain transparent, and the colors on the main screen show through. This is because we are currently in X-Ray Copy mode. Release the mouse button, then go on over to the Modes Menu and turn off X-Ray Copy mode by clicking on it. Select Move again, and move your image about the screen. This time, the entire block is opaque. X-Ray Copy affects the transparency of the background color (color #1) in *all* clip buffer operations. Return to X-Ray Copy and turn it back on again so that the double-arrow is beside it.

Move only repositions the clip buffer. It does not paste the box down permanently. For that, we need to go to Paste.

Paste operates exactly the same as Move *except* that the image is pasted (or drawn) to the workscreen after you release it. Let's try it: Select Paste from the Clip menu. Our clip buffer box appears along with our image. Drag the image to some place on the screen, then release the mouse button – a copy of the image is pasted to the screen. Try it again, moving it and pasting it to another location.

Now, press [Undo]. The image disappears. Try this: Select Move and move the image to a precise location that you want it. (Don't worry about being too precise.) Now, select Paste, but, this time, *without dragging the image*, press the right mouse button – a copy of the image is pasted right where it was.

Thus, we can use Paste to first drag, then stamp the image in a new
location, or simply to bring the moved image into view before
pasting to the existing location.

Now, let's take a look at a variation of Cut – the Clip option.

Whereas Cut allowed you to cut out any portion of the workscreen
at any location, Clip is a form of automatic Cut that encompasses
and places in the clip buffer every part of your workscreen that is
not part of the background color. Thus, if you have a tiny squiggle
in somewhere on the screen, Clip will place only this squiggle in
the clip buffer; if you've painted a scene that covers your entire
screen, Clip will cut out and store the whole screen.

We'll demonstrate it in several steps. Clear your screen, select a
nice, bright color, then select the fat, round brush from the Brush
menu. Chose Draw from the Draw menu, return to the workscreen,
then click once to place a single, brush-shaped dot toward the
center-top of the screen.

Now, we could select Clip from the Clip buffer, but the drop-
down menu might obscure the effect, so let's use the keyboard
alternative of Clip – the [Tab] key. While closely watching the
single dot, press [Tab]. For just an instant, the white clip box
surrounds only the colored dot before disappearing. The easiest way
to check if it's there is with Move. Select Move, and move the
clipped dot around the screen. Yup, it's there.

Okay, release the clipped dot, then draw another dot several inches
below the first one. Press [Tab], and, this time the clip box outline
is just large enough to take in both dots. Let's try a third dot –
place this one to the left or right of the first two, as the third
corner of a large triangle. Press [Tab] again. This time, the clip box
is large enough for all three.

Erase the screen and try clip with various combinations and sizes of
images. You'll find it very handy.

There are a few more things we can do with our clipped images,
besides just moving and pasting them about the screen. Erase the
screen, then, using the same round brush and bright color, draw a

number "4" – about 1-1/2 inches high – in the center of the screen. Now, press [Tab] to place the "4" in the clip buffer.

We can rotate our clipped buffers any number of degrees about any of the three X, Y, and Z axes. The X axis runs horizontally through an image, the Y axis runs vertically, and the Z axis runs from front to back – it's the depth axis. To put it graphically: a pig rotating on a spit rotates about the X axis; a revolving gas-station sign rotates about the Y axis, and the hands rotating about a clock face rotate about the Z axis.

So, let's put this to practice: Erase the screen (we've already got our clipped image). Select Rotate from the Clip menu and our clipped "4" appears on the screen within its clip box. Place the mouse cursor just outside the *lower-right corner* of the box, hold down the left mouse button, and move the mouse around the box in either direction. Notice that our "4" rotates about the Z axis, and the degrees of rotation are displayed on the screen. Rotate clockwise, and the degrees run from 360 toward zero; counter-clockwise runs from zero to 360.

Release the mouse button, and the rotated image stays where it is, with the clip box still around it. We have only rotated the image, we have not yet pasted it to the screen.

Move the mouse to just outside the *right side* of the clip box, hold down the left mouse button, and move the mouse around the box. Notice two things: First, as soon as you pressed the left mouse button, the image returned to its original orientation. And, second, the rotation is now around the Y axis.

Release the mouse button, and repeat the above procedure by clicking just outside the *bottom* side of the box – this time the rotation is about the X axis.

Rotate the "4" to some position you like, release the button, then click the right mouse button to exit Rotate mode. The clip box vanishes, and the rotated "4" is pasted to the screen. (You could press [Undo] at this point to remove it, but don't.)

An important concept to understand is that only the pasted image has been rotated, the clip-buffer image remains in its original state.

To prove this, select Rotate again from the Clip buffer and – there it is.

Whenever the clip box appears on the screen, we can drag it elsewhere. Since it's now over our previous rotation, let's move it aside by placing the mouse *inside* the clip box, and dragging the "4" to one side. We're still in Rotate mode, so we can rotate our image as we did above. You may have noticed, above, that the rotational axes depended on where we set our cursor outside of the clip box – Z was at the corner, and X and Y were at the bottom and side. Actually, anywhere outside the *corners* will rotate about the Z axis; the sides will rotate about the Y axis; and the top and bottom will rotate about the X axis. Also, the positions we chose, above, perform rotations in 1-degree increments, whereas the other locations perform rotations in various increments such as 45 and 30 degrees. (For a detailed illustration of the various rotations, see Rotate in the Reference Section.)

Move the clipped image to various parts of the screen, and experiment with various rotation. (You may also drag a partially rotated image elsewhere, then continue the rotation.) At any time, feel free to clear the screen so you can see your rotations better. When you're ready, we'll look at Stretch.

Stretch works, generally, like Rotate, except that it performs a stretch (or shrink) operation on the contents of the clip buffer. Just like Rotate, the actual contents of the buffer are not altered, only the pasted image. Also like Rotate, when the clip box appears in Stretch mode, you may first drag the image anywhere by clicking and dragging *inside* the box; clicking and dragging *outside* the box performs the various Stretch operations. Unlike Rotate, the Stretch operations are performed along only the X and/or Y axes, and the Stretch operations are cumulative – as we shall see.

Clear the screen, and we'll use the same "4" as we did with Rotate. (If you've lost it, just make another.) Select Stretch from the Clip menu and the "4" appears in the clip box. Place the cursor outside the *bottom side* of the box, press the left mouse button, and drag the mouse either up or down – the "4" stretches and shrinks along the Y axis. The numbers in the upper-left portion of the screen represent, from left to right: the size (in pixels) of the X and Y axes of the stretched image, followed by the percentage of the

stretched axes (X then Y) compared to their original size. Thus, if the original Y axis is 120 pixels, and it has not yet been stretched, it will be 100 percent of its original size; if it has been shrunk to 60 pixels, it will be 50 percent of its original size.

While still holding the left button, stretch the "4" until it's a little larger than the original image. Now, release the mouse button, move the cursor to outside of the *right side* of the box, the press and hold down the left mouse button. This is what we meant by "cumulative." Unlike Rotate, when we select a different portion to scale, Stretch maintains the shape as previously altered. Now, move the mouse to the right and left to stretch or shrink the "4" along the X axis.

Okay, click the right mouse button to paste the new image to the screen. Select Stretch again, and drag the clipped image to a clear spot on the screen. Now, place the mouse near the outside of the *lower-left corner* and drag that corner in, out, up and down – the image is stretched along both the X and Y axes in either direction. Try the *lower-right* corner – the image maintains its original *aspect ratio* while being stretched along both axes simultaneously. Stretching from different corners and sides affects not only the axes, but the increment of stretching. (For a detailed illustration of the various Stretch modes, see Stretch in the Reference Section.)

Play around with Stretch for awhile. When you're ready, clear the screen, and we'll look at Invert.

Invert is fairly simple – it "flips" the image in your cut buffer about the X and/or Y axes. Like Rotate and Stretch, you may drag the clip box to any place on the screen before, or after an Invert operation. *Unlike Rotate and Stretch, the flipped image in the clip buffer remains in its inverted position.*

Select Invert and your "4" will appear within the clip box. The Invert operation follows a simple rule: the side of the image *away* from the mouse cursor will be flipped toward the side *closest* to the mouse cursor. Thus, to flip the four upside down (around the X axis), place the cursor outside either the bottom or top of the clip box, and left-click. To flip it about the Y axis, place the cursor outside either the right or left side and left-click.

You may flip the image about both axes simultaneously by simply clicking outside one of the corners. Thus, if you click outside the lower-left corner, the upper-right corner will be flipped to the lower-left, and vice versa. Note that any click operation is essentially a toggle – a second click from the same position will undo the previous flip.

Now that you have a flipped "4," click the right mouse button to paste it to the screen. Now, select move, drag the image away, and examine it – it's still in its inverted state.

Now, we'll skip over Fit Colors for now, and discuss Mask.

Mask changes all colors in the clip buffer (except the background color) to the currently selected drawing color. This is useful for cast-shadow effects, and to create complex masking objects from existing shapes. It's easy to demonstrate.

Clear the screen, keep the round brush and, using Draw, draw a diagonal line about 2-inches long in the center of the screen. Now, select a different color, and create an "X" by drawing a diagonal line in the opposite direction across the first. We now have a two-color image.

Press [Tab] to clip the image, then use Move to drag it over to the side of the original. Select a third, distinct color from the Color menu, then select Mask from the Clip menu. For an instant, the clip box appears, and you can see the image changing color. Select Move, and take a look at the image. The two-colored "X" is now one single color – the current drawing color.

For an interesting shadow effect, paste the Masked image to the screen, select Cut and cut out only the original two-color "X." Now, select Paste, drag the two-colored "X" over, but slightly offset of the single-colored "shadow," then release the mouse to paste the new image. You can now Cut the combined images and paste them anywhere you wish.

Oh yes! Almost forget to show Use Clip from the Brush menu. Have you still got that two-color, shadowed "X" in the clip buffer? If not, scribble some multicolored image, then Cut it into the clip buffer. Now, select Streak from the Draw menu, and activate Use

Clip in the Brush menu. Return to the main screen, and draw some
streaky lines – your brush is now the entire clip buffer. Use Clip
will work with Streak, Stipple, and Airbrush. For a wild effect,
try Airbrush at high Speed and Spread with a large clip buffer.

At any time, you may Cut a new section of the screen into the clip
buffer, and begin drawing again. You can deselect Use Clip by
clicking on it again, or by selecting any of the other brush shapes in
the Brush menu.

The Frame Menu

```
Menu Clip Draw Modes Frame Brush Color
                          Undo       [Undo]
                          Restore    [Back]
                          Separate      —
                          Blue Pic      (
                          Unblue Pic    )
                          Next Blue     /
                          Get Changes   *
                          Next Changes  +
                          Clear Pic  [Clr]
                          Defocus       D
                          Delete     [Del]
                          Scratch       \
```

We will now examine some miscellaneous, but nonetheless
important items in CYBER PAINT that pertain to its painting
capabilities. These will enable you to alter your artwork in various
ways, although they are also closely tied in with CYBER PAINT's
animation features, which we'll be addressing in the next tutorial.

Take a look at the Frame menu. Plenty of items there. We've
already covered Undo, and we'll discuss Restore when we talk about
CYBER PAINT's animation capabilities, so let's talk about
Separate.

Separate is a global color change that replaces every occurrance of a
specific color on your screen with the currently selected drawing
color. It's a fast way to knock out complicated images (by replacing

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parts of them with black) or to radically change the color of an image (or your entire screen) without having to alter your Palette.

Let's test it. First, let's set up a colorful screen. Select the biggest brush shape, activate Cycle, turn on the Airbrush and spatter the screen with color.

Now, pick a color from the Color menu that you want another color on screen changed to (say, red). Select Separate from the Frame menu, then find a color anywhere on your workscreen that you wish changed (say, puce). Click on that color and, wherever it exists on screen, it will be changed to the current color.

We'll skip down about seven items (we've already used Clear Pic to erase our workscreen) and look at Defocus. Defocus is a very simple *anti-aliasing* function, which smooths the stairstepping "jaggy" effect of low-resolution graphics. One of its uses in CYBER PAINT is to create a further illusion of depth by defocusing, or blurring, the screen.

Before activating Defocus, turn on Zoom and take a close look at some part of the screen that has diagonal edges. You can see the stairstepping effect. Now, get out of Zoom, and select Defocus. The full workscreen appears without the mouse cursor while the blurring effect proceeds down the screen. When it is completed, the mouse cursor will return.

Notice that the edges are just a little fuzzy. Turn on Zoom and take a closer look. See all those different colored pixels along the edges? Defocus works by averaging the pixels at color borders.

You can defocus your image several times, but after a point you will start getting diminished returns – your image will become blockier, and certain small details may drop out entirely.

Now, *don't erase your workscreen!* We're going to save it out to disk, because we'll need it later when we talk about CYBER PAINT's animation abilities. Yes, we're finally here – we're going to do our own computerized cartoons.

NOTE: If you already erased your screen, don't fret. Just make up another abstract screen with a lot of colors.

The Load/Save Submenu

Okay, it's the moment of truth – time to save your masterpiece to a disk. Don't worry if it's not an electronic recreation of the Mona Lisa; whatever you've drawn, even if it's a screen full of multicolored scribbles, will be fine for our purposes.

Place one of the blank, formatted disk you created earlier in whichever drive you wish to use as a data drive (double-sided, if you have one). If you have a single-disk system, replace your CYBER PAINT disk with the blank disk.

NOTE: Once CYBER PAINT is loaded, its disk no longer needs to remain in the drive.

Now, select Load/Save from the Menu drop-down. The Load/Save menu is filled with a variety of functions, only a few of which we're concerned with at the moment. For now, Load/Save allows you to load and/or save your work to disk in a variety of ST file formats, indicated by their particular file extender names.

↑	≪	←	⇥	←‖	1		‖→	⇤	→	≫	↓	1	f
Load	.NEO		.NEO	.COL	.CEL				.STR
Save	.DLT		.PI1	.PC1	.BL?				.ADO
	Normal			Overlay			Underlay	
Kill	A:	B:	C:	D:	E:	F:	G:	H:	I:	J:	K:	Patch

We'll be saving a single, static (non-animated) picture, so the file formats we're interested in are:

.NEO   NEOChrome picture format.

.PI1   DEGAS Elite uncompressed picture format.

.PC1   DEGAS Elite compressed picture format.

To save your picture out to disk, select the proper file format by left-clicking once on the extender filename box. If you commonly use Atari's NEOchrome as your usual paint program, then you might want to save your work out under .NEO. If you use DEGAS

or DEGAS Elite, then you might want to save it out as either a .PI1 or a .PC1 picture.

Next, go to the bottom of the Load/Save submenu and select the disk drive that you want to save your work to. Since many ST users own hard disk drives, CYBER PAINT provides 11 drive designators, allowing users to save their work to either a floppy drive or a hard disk drive partition. (Drives beyond K:\ can be accessed from the file selector.) Left-click on the appropriate drive path letter. Then, left-click once on Save – a standard GEM file selector will open.

We'll call our picture MONALISA. Type MONALISA in the filename field of the file selector box, then click on OK, or press [Return]. You don't need to type in a file extender, because you already set that from the Load/Save submenu.

The disk drive runs, and your picture is saved to disk.

Okay! You've completed the paint program portion of CYBER PAINT. It's a good idea, at this point, to go back an play with all the various drawing options we've discussed until you're familiar with them. When you're ready, move on to the next tutorial. If you wish, you may exit CYBER PAINT, then restart it any time you wish to begin the next tutorial.

CYBER PAINT TUTORIAL II: CEL ANIMATION

Okay, you've learned how to draw with CYBER PAINT, it's time you learned how to *move* your drawings. We're going to do a simple, *flat*(cel) animation sequence.

But first, let's talk about the Playback Bar at the bottom of the main menu screen. The Playback Bar also appears, in various forms, at the tops of the Time, Load/Save, ADO f/x and Palette menus. It's the heart of your animation control, allowing you to move through an animation sequence, either forward or backward, quickly or slowly. It also lets you insert frames, and move to any frame from your sequence. You'll be using it a lot.

| ↑ | ‹‹ | ← | ⊣ | ←‖ | 1 | ‖→ | ⊢ | → | ›› | ↓ | 1 | f |
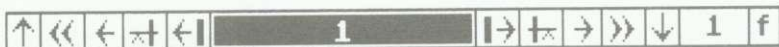
From left to right, the icons in the Playback Bar are:

First Frame	Click on this to move immediately to the first frame of your animation.
Fast Reverse	This fast-plays your animation sequence backwards.
Reverse Play	This plays your animation sequence backwards, using the speed set in the Time submenu.

Create Frame/Previous   This inserts a copy of the current
                         workscreen in the current frame position,
                         and pushes the remaining frames to the
                         right. Thus, if you Create Frame/Previous
                         while on frame #3, a copy of frame #3 is
                         placed in position #3, and frame #3 (plus
                         all subsequent frames) are shifted to the
                         right.

Move Frame Backward   Each click on this moves you one frame
                         backward in your animation sequence. You
                         may hold down the mouse button to
                         scroll backward.

Frame Counter Bar   The numbered in this box indicates which
                         frame of your animation sequence you are
                         currently working on. Clicking within the
                         bar on either side of the number box will
                         move you to a frame either before or after
                         the one in the box. Left will move to a
                         previous frame; right to a later frame.
                         You can move through your animation in
                         real-time by dragging the Frame Counter
                         Bar to the right or left. (There must be at
                         least two frames for there to be a slider
                         bar.)

Move Frame Forward   Each click on this moves you one frame
                         forward in your animation sequence. You
                         may hold down the mouse button to
                         scroll forward.

Create Frame/Next   This inserts a copy of the current
                         workscreen in the frame position *after* the
                         current one and pushes the remaining
                         frames to the right. Thus, if you Create
                         Frame/Next while on frame #3, a copy of
                         frame #3 is placed in position #4, and
                         frame #4 (plus all subsequent frames) are
                         shifted to the right.

Forward Play	This plays your animation sequence forward, at the speed set in the Time submenu.
Fast Forward	This fast-plays your animation sequence forward.
Last Frame	Click on this to move immediately to the last frame in your animation sequence.
Total Frames	This displays the total number of frames in your animation sequence.
	NOTE: If you left-click on this icon in the Playback Strip at the bottom of the main menu screen, it will add 10 frames at a time to the end of your animation sequence, all identical to your last frame.
Frame Mode	This displays a single letter indicating the current frame mode: To Frame (f), To Segment (s), or To All (a). Which frames are affected by certain CYBER PAINT operations will depend on the frame mode setting.

A Simple Animation

Now that we've reviewed the Playback Bar, let's try it out.

Click on the Create Frame/Next icon *five* times. With each click, you'll notice that the Frame Counter Bar shrinks as you subdivide the Counter strip into equal portions. Also, the number within the bar reflects the number of frames you're creating. Over on the right, the Total Frames box displays the total number of frames created.

Want to try it again? Simple – select Kill Sequence from the Menu drop-down, and reply "Yes" to the alert box. You've just erased all your frames, and you're back to one frame. Okay, use the Create Frame/Next icon to create five empty frames again.

Now that you have a real Frame Counter Bar, you can drag the numbered box right and left to place yourself at the different parts of your animation. But since we haven't created anything yet, there's no noticeable change. Drag the number bar back to frame #1, and let's create something.

Select a nice, bright color from the Color menu, and choose default brush #1 (the cross) from the Brush menu, and select Draw from the Draw menu. Now, go to the center of your workscreen and draw the number 1, about an inch high or so. That's it – nothing fancy.

Let's move on to the next frame. Click on the Move Frame Forward icon, just to the right of the Frame Counter Bar. This will bring you to frame #2. As you click, you'll notice your screen going black. This isn't surprising, since you haven't drawn anything on this frame yet. Right-click to return to the workscreen, and draw a number 2.

Let's take a shortcut to frame #3. Instead of returning to the Playback Bar, clicking, then returning to the workscreen, simply press the right cursor arrow key. The screen will be black, and you'll be working on frame #3. Okay, draw a number 3. Use the same technique to draw a number 4 on frame #4, and a number 5 on frame #5.

Now we're ready to play our animation. Right-click to bring up the Playback Bar, then click on the Forward Play icon. You'll notice that you're now moving at speed through this animated sequence, flipping very quickly from the first frame to the last, then starting again on frame one.

From tiny acorns come mighty oaks; what you've just done is the foundation upon which you can create truly impressive, animated ST graphics.

Right-click to stop your animation at any point. Now, try dragging the Frame Counter Bar back and forth for real-time control of your animation.

Next, select Ping Pong from the Modes menu, then click again on Forward Play. Your number animation will now move back and forth. (This feature is useful for certain rhythmic movements. For

example, if you have a dozen frames of a bird's wings flapping, moving down, then back up, Ping Pong would enable you to create a realistic movement in half the normal number of frames.) Turn off Ping Pong before proceeding.

Now let's try a more advanced animation. But first, let's examine how we can delete our current sequence. We showed you Kill Sequence earlier, which deletes *all* frames from memory. But what if we want to delete a chosen few?

Drag the Frame Counter so that frame #3 is displayed. Now, select Delete from the Frame menu. An alert box asks you to confirm the deletion. Go ahead and answer "Yes." Frame #3 is deleted from the middle of the sequence, and you now have a total of four frames containing the drawn numbers: 1, 2, 4, 5.

We can also delete a *segment*, or range of frames. Go to the Time submenu, by selecting Time from the Menu drop-down. From the Time submenu, you may alter the overall playback speed of an animation sequence, and you may determine which portion of your sequence is affected by various CYBER PAINT functions – such as Delete.

↑	⟨⟨	←	⤝	←⎮	1	⎮→	⤞	→	⟩⟩	↓	1
More		←	4				→		Tween		
To Frame				To Segment			To All				
←	1	→			✸				←	1	→
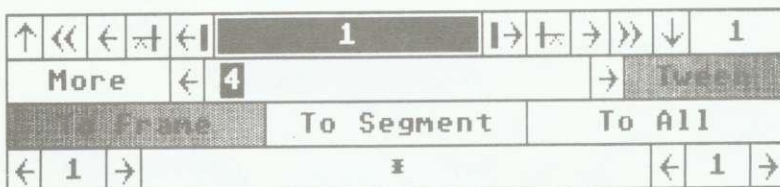
You'll notice the Playback bar duplicated on the top of the Time menu. Below it are boxes for More (which enables you to load in the remainder of an animation that, in its entirety, cannot fit into your ST's memory), the Animation Speed bar (from which you adjust the playback speed), Tween (which enables you to perform sequential movements on objects and paste them on some or all your frames), and the To Frame, To Segment and To All boxes.

On the bottom row is the Segment Range Bar, which allows you to set the *range* of frames upon which CYBER PAINT will perform certain functions. This bar is adjusted in exactly the same way as the

Color Range Bar that we used previously in the Palette submenu. We only have four frames in our animation, but let's adjust the range to include only the middle frames #2, and #3. Drag one range dot to the left, and the other to the right so that the number 2 appears to the left of the bar, and the number 3 appears to the right. (You may also adjust these by clicking on the arrows to either side of the Range Bar.) Notice, that if you reverse the direction of the bar, the numbers to the right and left will be reversed.

Above the bar, To Frame is highlight, indicating that our operations are being performed only on the single, current frame displayed. We want to delete our segment of frame #2 through frame #3, so click on To Segment. Now, right-click to exit the Time submenu, and select Delete again from the Frame menu.

This time, the alert box asks if your want to delete frames #2 through #3. Click on "Yes," return to the Playback Bar, and look at your frames. You only have two frames remaining, containing the drawn numbers 1 and 5.

Take a closer look at the Playback Bar. At the extreme right, in the Frame Mode box is the letter "s" against a red background. This indicates we're in To Segment frame mode. Click once on the "s," and it becomes an "a," for To All. This is a shortcut to selecting frame modes from the Time submenu. Click again, and it returns to the familiar "f," for To Frame. The red in the "s" and "a" boxes is simply to remind you that you are in a frame mode that will affect several frames, and cannot be undone.

Set the frame mode to To All (a), then select Clear Pic from the Frame Menu. An alert box appears, asking if you want to "do it (*clear*) over all frames?" Left-click on Yes. CYBER PAINT will move through all the frames in your sequence and clear them out.

Note the difference between using Delete to a range of frames, and Clear Pic to a range of frames. This time, we did not delete the frames – we still have two frames left – we simply cleared the images within the existing frames.

Okay, play around with what we've just looked at. Create some frames; draw on them; animate them; delete them individually, or by ranges; experiment with the different frame modes.

Blueing and Changes

Let's do another short, simple animation sequence – a winking face.

Kill whatever sequence you have in memory, put CYBER PAINT back in To Frame mode, and create five blank frames. Select the small round brush, pick a bright color from the Color menu, then go to frame one of your sequence. In the center of your workscreen, draw a face, similar to the one shown below.

Now, from the Frame menu, select Next Blue. A copy of your frame #1 face is placed in frame #2, then "blued." Blueing is a term taken from "non-repro blue" used in offset printing. In CYBER PAINT, we use it to line up – or register – our previous frame images so we can alter them slightly to create animations.

NOTE: The blueing color will always be whatever color is in color register #2. At default, this is dark blue, but will change with different palettes. If you're using a palette in which the blueing color does not show well, simply adjust color register #2 to a more contrasting color during your blueing operations.

The Next Blue command has conveniently left us in frame #2 to continue our cel animation. Trace over the face, as nearly as you can, but this time, alter one of the eyes to an oval shape – as though it's beginning to wink.
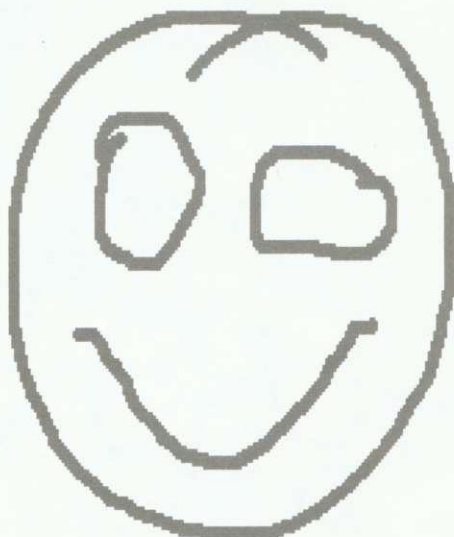
Now, let's do a Next Blue again, but this time, use the keyboard alternative, so you don't have to exit the menu screen each time – press [/]. (All the blueing keyboard alternatives are in the keypad area to the right of your Atari keyboard.)

Next blue not only copies and blues the previous drawing, it also replaces the blueing color in the previous frame with the background color, leaving our new details intact. We'll see this when we go back to replay our animation.

Now, repeat the procedure described above for the next three frames. Trace another face with more of a wink, press [/] for Next Blue, and repeat until you've reached frame five.
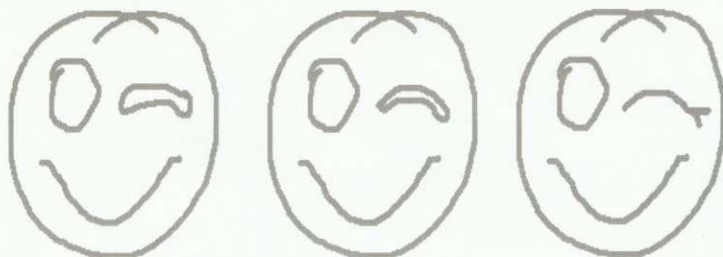
When you reach the last frame (the eye should be completely closed; a mere line), Next Blue will simply remove the blueing color. Now, play your sequence from the Playback Bar.

Voila! You've just created an even more interesting animation: a bit simple, again, but you're well on your way to mastering CYBER PAINT'S animation functions.

Well, this is fine, you say, but my face is jiggling all over the screen! Not only the eye is animated, but the entire head as well.

So, how do we animate only a portion of our sequence? Easy. Let's make the same animation, but only animate the winking eye. First, delete the entire sequence by selecting Kill from the Menu drop-down. When you have only one frame, draw your face again, *but this time, leave out the winking eye.*

So, okay, now we have a one-eyed face. Now, create four more frames by clicking on the Create Frame/Next icon in the Playback Bar (or press [Insert] four times).

Drag the Frame Counter Bar back and forth, and you'll see that all five frames contain identical, one-eyed faces. Okay, move back to frame #1, draw the first version of the winking eye where it belongs, then press [/] to Next Blue it.

This time, Next Blue only blues out the eye when it moves to frame #2. This is because Next Blue only blues the *changes* that have occured since first arriving at a frame. When we went back to frame #1 to draw the eye, the face already existed. Therefore, only

45

the drawing that we did in that frame *after having arrived there* was blued and placed in the following frame.

The rest is easy. Trace over the blued eye in frame #2, press [/] to move on to frame #3, and so on, until you've completed your animation. When you play it back this time, only the eye is animated, while the rest of the drawing remains rock-steady.

The procedures above are the main technique for creating cel animations in CYBER PAINT. But there are a few more options in the Frame menu to lend flexibility to the job.

When you selected Next Blue, it automatically went through the following steps: Go to next frame, copy image to next frame, blue the image, unblue the image in the previous frame. We can do these steps manually using the Blue Pic and Unblue Pic functions.

First, Kill all frames, then draw an image in frame #1. Next, press [Insert], or click on Create Frame/Next to copy the image to frame #2. From frame #2, select Blue Pic – the entire picture is blued. Trace a new picture in frame #2, then press [Insert] to copy it to frame #3. Go back to frame #2, and select Unblue Pic to erase the blueing. And, so on. Obviously, Next Blue is a lot easier, but there are times when you need the flexibility of using just one of the blueing tools.

Get Changes and Next Changes are similar to Blue Pic and Next Blue – except that they deal with the *changes* drawn within the current frame. The concept of what is considered a change is important. As we mentioned above, changes are any drawing that is done to a frame *since you arrived at that frame*. Once you leave the frame, the changes are part of the permanent image. If, for example, you draw in frame #2 (using different drawing tools, brushes, colors – or clip buffer pastes), then you move to frame #3, and *right back* to frame #2. The very action of moving out and back into frame #2 makes the previous changes permanent. Only those changes made now that you're back in frame #2 will be considered "changes."

To demonstrate the Get Changes and Next Changes features, first, Kill all frames, then press [Insert] to create four or more frames. Return to frame #1 and, using the Box function in the Draw menu, draw a red box, about 2-inches square, in the center of the screen.

We want this box to be permanent, and this is easily done: move over to frame #2, then back to frame #1. The box is now permanent. Now, we'll add some changes. Using the same color, select Circle from the Draw menu, place the cursor on one corner of the box (any corner) and create a circle that overlaps about halfway into the box. (Of course, you can't see the part that's inside the box because it's the same color.) Next, select a different color (like yellow), a thick brush, and Draw from the Draw menu. Draw a squiggly line across both the box and the circle, and into the background.

Okay, we're all set. We have a permanent red box, plus two changes: the red circle and the yellow line. Now, select Get Changes. Nothing much seems to happen, but what really occured was that all the changes were placed in the clip buffer. (Remember the clip buffer?) There are plent of ways to view the clip buffer, but first, let's move to a blank screen so we can really see what's going on.

Move to frame #2, select Paste from the Clip buffer, and paste it to frame #2 without moving it. Hmmm...the changes are there, but what's wrong with the red circle – there's a corner missing. The missing corner exactly matches the overlapping red box from frame #1. Flip back and forth between frames #1 and #2 to see the difference. The reason the corner is missing is because it is a part of the *permanent* image in frame #1, and, because the circle was the same color, there was no *change* of image in that area of the screen. The squiggly line was in a different color, so all of it was considered a change.

Let's try Next Changes. As we said, it's a little like Next Blue. Move to frame #3, and draw another red box, just like the one in frame #1. Make the box permanent by moving to frame #4, then back to frame #3. Now, create the same changes as we did before: the red, overlapping circle, and the yellow squiggly line. Now, select Next Changes. This time, CYBER PAINT automatically moves to the next frame in the sequence and pastes the changes to frame #4.

Now that you understand changes, we can demonstrate Restore. It's simply a more powerful version of Undo. If you'll remember, Undo only restores the last drawing function you did. Restore, on the other hand, restores all changes. (Actually, it erases all changes.)

Try this: You've already got several frames with images on them. From any frame, select another color, then scribble something. Change colors, tools, and brushes, and draw all over the screen – but don't leave the frame. Now, select Restore. Like magic, all your changes are gone.

It's important to note that Restore is not a toggle like [Undo]. If you select it a second time, your changes will not return. However, you *can* press [Undo] immediately after a Restore to get your changes back. If, however, you have already selected Restore a second time, [Undo] will no longer restore your changes.

There's only one more thing to cover in the Frame menu: Scratch. It's even simpler than Restore. Remember how you can move through your animation in real-time by dragging the Frame Counter Bar back and forth? Trouble with this is your Playback Bar is still displayed on the screen. Scratch lets you control your animation with the mouse – with a full screen.

Create a five-frame animation (the simple numbered one will do), then select Scratch. The full screen will appear. Now, left-click to activate Scratch, then simply move your mouse horizontally back and forth. That's it! Not too impressive with a simple-five frame animation, but more complex animations can be moved to external music, for example, and placed on videotape with rhythmic effects.

Overlays/Underlays & Disk I/O

Let's take a further look at the Load/Save submenu. Kill the sequence you now have in memory, then select Load/Save from the Menu drop-down to bring up the Load/Save submenu. We saw how to save our MONALISA picture earlier, let's load it back in. From the Load/Save submenu, select whichever filename extender you originally saved your MONALISA picture under (.NEO, .PI1, or PC1), then select Load. A GEM selector box will appear. Double-click on MONALISA to load the picture into frame #1 (the only frame in memory).

Take a look at it. We're going to use it for further demonstration, but first, we need to make sure there are some areas in it that contain the background color (color #1; probably black). If there

are, you can leave it the way it is. If not, select the largest brush you can find, and color #1 from the Color menu (it's the one in the upper-left corner). Now, draw a couple of black smudges here and there on the screen. Got it? Okay, save MONALISA to disk again. You've already got the filetype selected, so all you have to do is select Save from the Load/Save menu.

MONALISA is a *picture* type of file. Let's take a look at an animation file. There are two types: .SEQ, and .DLT. On your CYBER PAINT disk is a .SEQ file called FISH.SEQ. Here's how to load it: Select .SEQ, make sure Normal is selected, then click on Load. (Make sure your CYBER PAINT disk is in the drive you're loading from; you may need to click on a different disk path.)

Just before the FISH.SEQ file loads, the MONALISA picture is erase from memory. As FISH.SEQ loads, each frame is displayed on the screen (FISH.SEQ is a four-frame animation). Now that you have fish up there, animate it with the Playback Bar.

Okay, now that we've seen a couple of different file types, let's try Underlay and Overlay. First, let's Underlay our MONALISA picture to frame #3 of the FISH sequence. Move to frame #3, bring up the Load/Save submenu, click on the correct extender for MONALISA, click on Underlay, then click on Load and select the MONALISA picture from the file selector. Simple!

Go back and take a look at the animation now. As you move through, you can see that your background only appears in frame #3, and it's behind the fish. You may notice that your background isn't exactly the same color as it was originally. That's because it was probably made from a different color palette, and we're using the FISH.SEQ color palette now. When using Normal to load a file, CYBER PAINT changes to the color palette of the loaded file. When using Underlay or Overlay to load a file, CYBER PAINT maintains the palette of the image(s) in memory, but automatically trys to match the palette of the loaded file – as best it can – to that in memory. This may or may not be very successful, depending on the differences between the two palettes.

Let's try something else. Kill the sequence, then load MONALISA again. (Remember, select the correct file extender first.) Now, we want to load the fish as an Overlay, using MONALISA as a

background. But all we have is one frame. Well, we know how to create more – simply press [Insert] several times, or click on Create Frame/Next. *But let's try a different way.* The Playback Bar is right there on top of the Load/Save submenu. To the right is the Total Frames box, containing the number 1. Simply click on the number 1, and you instantly have 11 duplicate frames. (Drag the Frame Counter Bar back and forth to make sure). Now, press [Return]. Ten more frames!

Okay, we have plenty of frames to fit our little, four-frame FISH. Where shall we Overlay it? Adjust the Frame Counter to frame #4, click on .SEQ and Overlay, then click on Load and select FISH.SEQ.

When the fish appears on your screen, it's surrounded by a white box. CYBER PAINT is waiting for you to position him on the screen. At this point, you may simply right-click to continue the load at the given position, or you may drag the box elsewhere, and release the mouse button to continue the load. An alert box asks if you want to merge the file starting at frame #4; go ahead, answer Yes. Once the load is complete, look through the animation – the fish swims over the backgrounds in frames #4 - #7.

We can also Underlay the fish. Move to frame #10, click on Underlay, and load the fish back in. He still appears in his white box on top of the background, but this is only for positioning. Drag the fish to where at least a part of him is over a black (or background) color on the screen. This time, the fish sequence will be pasted on each frame *beneath* the background.

We have a few more tricks up our sleeves. Kill the sequence, the press [Return] a couple of times to create 21 blank frames. What we want to do is load three versions of the FISH sequence end to end. If we did a Normal load of FISH.SEQ right now, it would erase our 21 blank frames. (Remember, a Normal load erases and replaces anything in memory, even blank frames.) So, all we need to do is load FISH.SEQ as either an Overlay or Underlay. (It doesn't matter, since we're loading it to blank frames.) So, go ahead, load FISH.SEQ, beginning at frame #1 as an Overlay. Once it's in, move to frame #5, and load it again; then move to frame #9, and load it again.

So, now we have a sequence of 21 frames, but only the first 12 contain our fishies, so let's get rid of the rest. You already know how to do this: adjust the Segment Range Bar in the Time submenu to cover frames #13 - #21, select To Segment as the frame mode, then press [Delete]. Answer the alert box with a "Yes," and they're gone.

Now we're movin'! Okay, back to the Time submenu, adjust the Segment Range to cover frames #3 - #9, and leave the frame mode at To Segment. Return to the Load/Save submenu, and load MONALISA as an Underlay. You guessed it, CYBER PAINT loads the background to frames #3 - #9.

Before you go on, click the frame mode back to To Frame. It's always a good idea to keep the frame mode in To Frame to avoid accidentally changing a whole range of frames. Remember, there's no undo on a range change. It's also a good idea to place the Load option back to Normal after you're through with Overlays or Underlays. (By the way, did you know that Overlay and Underlay have no effect on Saves? Now you do.)

What else can we do in the Load/Save submenu? Well, a couple of options we'll just mention. The .COL file is nothing more than a color palette. If you have a particular color palette you like, save it as a .COL file. Load a .COL file to change the palette in memory. The .STR file format only works with Save – it's for creating Aegis Animator "Strip" files. The Reference Section has more on it.

The .CEL and .BL? files both work the same way – they use the contents of the clip buffer. Let's take a look. Move to a frame that has both the fish and the background. Let's put a small portion of the screen in the clip buffer; press [Esc] (same as selecting Cut), and clip out the fish's head, along with some of the background. Move and Paste the clipped image elsewhere on the screen (partly to confirm the contents of the clip buffer). Now, return to the Load/Save submenu, select .CEL, and Save. When the file selector comes up, enter the filename: FISHHEAD, and press [Return]. As with all CYBER PAINT file save operations, the .CEL extender will automatically be added.

What we've just done is save only the contents of the clip buffer to a disk file for later access. Before we load it back in, let's change

the contents of the clip buffer so we can be sure of the effect. Simply clip out another portion of the screen, then Move the clip buffer to be sure that it's different than the segment we just saved. Now, select Load (Overlay and Underlay have no effect on .CEL or .BL? functions), and choose FISHHEAD.CEL from the file selector box. When the drive stops turning, go back to the workscreen, and Paste your clip buffer anywhere on the screen. There's our old fish head!

And the .BL? function? It works exactly the same as .CEL, except that it loads DEGAS Elite .BL1, .BL2, or .BL3 blocks into the CYBER PAINT clip buffer. It also saves the clip buffer to a DEGAS Elite block format. Since the DEGAS Elite block format is the standard .IFF format used by the Amiga computer, this means you can load Amiga pictures into CYBER PAINT! Also, CYBER PAINT doesn't care about the resolution of the original block file. If you load a .BL3 file, created in high-resolution, the clip buffer image will be *four times* the size of the screen. Given enough memory, you can use this to create scrolling landscapes, among other things.

Way back when we were discussing the Clip menu, we skipped over an item called Fit Colors. Let's look at it now. Remember, just recently, when we described how CYBER PAINT, during an Overlay or Underlay, automatically tries to match the loaded file's color palette to the one in memory? Well, Fit Colors works the same way with the contents of the clip buffer. Unlike an Underlay or Overlay load of a sequence or picture file, when you load a .CEL file into the clip buffer, there is no attempt to match its colors with the current palette, so it can look pretty strange. At any time, however, you can select Fit Colors, and CYBER PAINT will attempt a color match.

Actions speak loader than...etc. Try this: You have a pasted image of the fish head as it looks in the clip buffer. Bring up the Palette submenu, adjust the Color Range Bar to include all but the two end colors, then click on Inverse. Pretty drastic color change! Next, go back to the workscreen, and Paste a copy of the fish head. Looks just like the other fish heads. Now, select Fit Colors – the clip buffer flashes briefly. Okay, paste your fish head again. Wallah! (as they say in illiterate computer publications).

Not much left to cover in the old Load/Save submenu. We'll talk about .ADO in the ADO f/x tutorial following this one. How about Patch? Patch is a sophisticated disk I/O function that lets you work load, edit, then save – all to the same file – sub-segments of .SEQ files. It only works with .SEQ files, and you should *never* use it without first backing up the .SEQ file that you're editing. To be especially safe, place your backed-up .SEQ file on a blank disk with plenty of room.

There should be plenty of room on the data disk we've been working on – and there's nothing valuable there anyway (is there?). On your CYBER PAINT disk is a .SEQ file called TESLA.SEQ. We'll be looking at it later as an example of what you can do using both CYBER STUDIO and CYBER PAINT. Let's do a sneak preview, and use it as our guinea pig with the Patch function. Copy TESLA.SEQ to your data disk.

Before we load a patch of TESLA.SEQ, load the whole sequence in and play it a few times. There are 22 frames to the entire sequence, we'll be patching in frames #5 - #12, to begin with.

Start	← 1	→
Frames	← 100	→
KBytes	← 255	→

A:	B:	C:	D:	E:	F:	G:	H:	I:	J:	K:	Load Patch

All right, Kill the entire sequence in memory, then click on Patch in the Load/Save submenu – the Patch sub-submenu appears. The top three slider bars let us determine which portion of the .SEQ file we want to load. Adjust the Start slider to 5 (frame #5 is where we want to begin); adjust the Frames slider to 7 (we're going to load 7 frames, starting at frame #5); adjust the KBytes slider to about 200 (more than enough). Click on Load Patch, and CYBER PAINT will load all of the TESLA sequence, but only place frames #5 - #12 in memory. The frame counter, however, will reflect the actual number of frames (#1 - #7).

Once it's loaded, take a look at the sequence. The electical charge has already started, at the first frame, and only goes part way up.

Now, let's do some quick editing. Make sure you're on the first frame, select the color white, the thick round brush, and Draw a squiggle about 1 1/2-inches around – up in the black area between the two towers. Cut out just the squiggle and place it in the clip buffer, then erase the squiggle on screen by drawing over it with the black brush. Now, for the magic. Select To All as the Frame Mode, Rotate from the Clip menu, place the mouse cursor just outside the lower-right corner of the clip box, and drag/rotate the clip image to 350 degrees before releasing the mouse. An alert box asks you if you know what you're doing. Sure, why not. Click on "Yes," and watch the fun.

Okay, play your newly edited sequence. The magic is a result of the Tween function, which we'll get into momentarily. (Before continuing, don't forget to return to To Frame.)

Now, bring up the Patch menu, and click on Save. CYBER PAINT will go through some disk I/O operations, and politely inform you of its progress. When finished, your edited segment will have been inserted into the old file. Right-click to return to the Load/Save submenu, then Load TESLA.SEQ again. Play the whole sequence, and there's your new stuff smack in the middle of the animation.

There is a form of Patch I/O for .DLT files on the Time submenu. It's called More. We won't demonstrate it here, but it's explained fully in the Reference Section.

Let's go on and see how we did that last effect – the Tween.

Tweening

Tween got its name from the early days of animated cartoons. Typically, a master animator at one of the major motion picture studios – Walt Disney, MGM or Warner Brothers – would draw only the primary positions of a figure. The expert artist would draw Mickey Mouse with his arm outstretched, then draw him with his arm bent up at the elbow, then draw him pointing at the sky. These three drawings represented the major movements of the figure. The artist would then let an apprentice animator take over to draw the "tweens" – the frames *in-between* Mickey's arm movements.

In CYBER PAINT, Tween works much the same way. The Tween box is in the Time submenu, and is active as a default. When active, Tween takes the beginning and end positions of your cut or clip buffer contents and copies the movements sequentially across your frames – either your entire animation sequence (if you've selected To All) or a specific range of frames (if you've selected To Segment). Tween works with the Paste, Rotate and Stretch functions from the Clip menu, and virtually all the image movement features in the ADO f/x menu.

Let's take another look at the special effect we did above. We'll test Tween with Rotate. Kill any sequence that may be in memory, select a large brush, a bright color, and draw the first initial of your first name in the center of your screen, about two inches tall. Clip the initial (press [Tab]), Clear the workscreen, then press [Return] to create 11 empty frames. Finally, set the frames mode to To All (a).

Now, go back to the Clip menu and select Rotate. As you do, you'll see your clip buffer appear, with your initial sitting inside. Place your cursor above the clip box, hold down the left mouse button, and drag the cursor around the clip box (it can be either clockwise or counter-clockwise). This will rotate the clip box about its X axis, in increments of 22.5-degrees. When you return to spot you originally started from (the top), release the mouse button, then right-click. An alert box will appear, asking: "Do it over all frames?" Select Yes.

When you select Yes, you'll see your initial being copied across all the frames of your animation sequence. Tween is taking the incremental movements from the Rotate command and spreading them across your entire animation sequence. (If you had selected a range of frames with the To Segment command, Tween would have spread, sequentially, the movements across that range.)

Now, play this forward. You'll see the letter rotating of its own accord.

You can also experiment with Tween and Paste, allowing you to quickly move an image across your screen. First, Clear your current animation sequence. (All you have to do is select Clear Pic, or press [Clr Home]. Since you're in To All mode, CYBER PAINT will clear all frames in your sequence.)

Make sure you're at frame #1, then select Paste from the Clip menu. Your initial will appear, sitting inside its clip box. Place your cursor inside the clip box, hold down your left mouse button and drag the box to one corner of the screen. When your image is where you want it, release your mouse button. An alert box will appear, saying: "Do it over all frames?" Click on Yes.

You'll see your clip box copied from its original position, moving from its starting position to its ending position across all the frames of your animation sequence. Again, if you had selected a range of frames with the To Segment command, Tween would have spread, sequentially, the movements across that range.

Click on the Forward Play button to see the results. You should be rewarded with your object moving from the center of your screen out to the edge.

What happens if we turn Tween off? Simple, the only image pasted is the one at the *end* of the movement. Let's look: Select Move and reposition your image elsewhere on the screen. Now, turn Tween off, select Rotate, and rotate the image to any number of degrees. Release the image, answer Yes to the alert box, and watch the results. The image is pasted to each frame, but only in its last rotated position.

Turn Tween back on, but don't erase this animation. We need it to demonstrate another thing in the Time menu – how to vary your animation speed.

Bring up the Time submenu, and take a look at the second row – to the right of the More box is the Animation Speed Control Bar, which allows you to increase or decrease the playing speed of your animations. The Reference Section offers complete details of what the number in the slider bar stands for. For our purposes, all we need to know is the higher the number, the slower the animation.

Set the animation speed control at 2, its fastest speed, then return to the main menu and play your moving initial animation. Try some higher numbers (slower speeds). Before continuing, reset the speed to 4, and make sure the frame mode is at To Frame.

CYBER PAINT TUTORIAL III: ADO F/X

We've saved CYBER PAINT's most powerful feature for last – the
ADO f/x (effects) menu. Go to Menu and select ADO f/x. As you
do, a menu box will appear, containing a wealth of image
manipulation functions.

↑ ≪ ← ⊣ ←❘ **1**		❘→ ⊢ → ≫ ↓ 11	
Preview ← 1 → ⊥———→		← 6 →	
Clear	**Turn** Center	Part Turns (Degrees):	
Render	Size	← **180**	→
	Axis	Full Turns:	
Motion	Move		
Clip	Path **Turns**	← **1**	→

The ADO (Antic Digital Omni-mover) allows you to manipulate
your CYBER PAINT work in very sophisticated ways, similar to
the functions of $100,000 video production tools like the Mirage,
the Quantel Paintbox, and the Abakus DDR. You can enlarge and
shrink portions of your animation, or even your entire animation
sequence and make your images describe extremely elaborate
movements and maneuvers.

The ADO f/x box has many features and options for you to choose
from, some of which we've already covered, such as the Playback
Bar, top row, and the Animation Segment Range Controller on the
second row.

Before we can use the ADO menu, we need an image. Either a still
image or an animation. If you haven't already, Kill any sequence in

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memory and make sure that you're in To Frame mode. Select a nice bright color (like red), and select the large, square brush from the Brush menu. Now, turn off Filled from the Modes menu, and select Box from the Draw menu. Place the square cursor in the upper-left corner of the workscreen, and drag it to the lower-left before releasing it. Now, you have a big, bright frame around your workscreen.

Now, go to Menu and select Set Font. When the Font menu appears, select Bold, and then scale up the text size to 100, using the text slider bar at the bottom of the menu. Return to the main menu screen and select Text from the Draw menu, then go to your workscreen. Choose a different bright color if you wish, then place your cursor where you want your text to start (say, in the center, a little to the left) and left-click. Type in your initials in the center of the screen. When you're finished, go back to the main menu screen, go up to the Clip menu, and clip your workscreen, saving it in your clip buffer. This will be our example ADO screen.

We don't plan on erasing our creation, but why not save our clip buffer to disk. Remember how? Click on .CEL in the Load/Save submenu, then click on Save, and give it any filename you like.

Okay, select Clear Pic, and we're ready to go to town. (Oh, yes, unless you want to perform your ADO operations with your text cursor, go back to the Draw menu and select Draw, then select your default cross-shaped cursor from the Brush menu.)

Turns

Select ADO f/x (or press [A]) to bring up the ADO f/x menu. The first thing we're going to do in the ADO is a simple turn. You can accomplish a similar effect with the Rotate function, but the ADO menu allows you finer control over your images.

Once the ADO f/x menu appears, press [Return] on your ST keyboard, which will add 10 blank frames to your work area. If they aren't already active, select All and Tween (at the far right of the ADO menu, in the upper-right corner). When the ADO f/x menu first appears, the word *Turn* is highlighted (if not, click on it). To the right, and below it is the word *Turns*. As we'll see,

selecting different words in the *Turn, Size, Move, Path* column affects what is displayed to the right.

Don't confuse the singular word *Turn* with the plural *Turns*. When Turn is selected, you are in a "Turn mode," and may adjust the *Center, Axis,* and *Turns*. The plural *Turns* is the *number of Turns*.

Move your cursor to the slider bar below the words "Full Turns," and click once on the arrow pointing *left*. The number in the slider bar should read -1, which means one turn in a clockwise direction.

Turn (singular) allows you to control exactly how you want the contents of your cut buffer or your entire sequence to rotate. With Turn, you can set abitrary rotation axes by using the slider bars on the left half of the ADO f/x menu.

Turn lets you arbitrarily set the Center (of rotation) of your animation, the Axis (X-, Y- and Z-coordinates, or the three-dimensional positioning of your work on the CYBER PAINT screen), and the number of Turns (gross rotational movement, either full or partial turns about the animation's center).

After setting your Turns, click on *Preview* in the upper-left of the ADO f/x menu. You'll notice a full-screen wire-frame outline of your clip box rotating clockwise about the Z axis (the clip buffer's center) across your range of 11 frames.

As you can see, when you select Preview (after setting the ADO motion controls) it will activate a wire-frame rendition of how the ADO will move your animation based on the current ADO settings. If you have not set any of the motion controls, the Preview function will show a stationary box sitting on your workscreen.

Now, let's *render* our animation. Move your cursor over to Render and left-click. You'll see your clip box appearing and disappearing as CYBER PAINT renders it across the 11 frames you have allocated (your first frame, plus the 10 frames you appended). Render actually creates the final ADO version of your animation, drawing it on all frames indicated by the frame mode settings. Render will typically take from one to five seconds per frame to execute.

NOTE: You cannot Undo a multi-frame Render after it has finished, although you can abort a multi-frame Render prematurely by pressing any key on your ST keyboard, or by pressing the right mouse button. An alert box will appear, asking if you want to abort the Render. Left-click on Yes or No.

Now, return to the main menu screen and play your animation. You'll see an 11-frame animation of your clip box rotating, full-screen.

This rotation is an example of the simplest, easiest way to manipulate an image in the ADO f/x menu.

Axis Operations

Before you return to the ADO menu, clear all frames with the Clear Pic command in the Frames menu. (Don't use the Delete Pic command, unless you want to create 10 more frames.) Since you are in To All mode, an alert box will appear, asking if you want to do it (clear) to all frames. Select Yes, the contents of every frame will be erased, then when your workspace is clear, return to the ADO menu.

Now, we're going to do something similar to the last movement, but we're going to add a twist. Click on Axis and you'll see three slider boxes appear on the right, with designator boxes beneath them. Axis lets you set which *plane* your clip box or screen will rotate about.

The top slider bar sets the X or *horizontal* axis, the middle slider bar sets the Y or *vertical* axis, and the bottom slider sets the Z or *depth* axis.

You can set the Axes with the three slider bars on the right of the ADO f/x menu. The three Axis sliders together represent a vector, or 3-D location in space, about which your artwork will be rotating. Altering a *single* axis value will not make a discernable change in rotation, but altering two or three axes will produce interesting multi-axis rotations.

Experiment with the axis sliders individually. We've already seen the Z rotaion. Select the X box at the bottom left, then select Preview. You'll see the wire-frame clip box rotating around the X axis. Now, select the Y box (bottom center) and then select Preview. You'll see the wire-frame clip box spinning about the Y axis.

Now that you've previewed the three single-axis rotations, let's look at a double axis rotation. Click on the Y box (if you aren't set there already), then drag the X axis slider to a setting of 10. Now, select Preview and take a look. As you can see, your clip box is now spinning about a diagonal axis. Select Render and view the completed animation. The rotation now has a diagonal vector since you've added one axis to another.

Center

Now we're going to explore the Center option. First, clear out your animation with the Clear Pic option from the Frame menu, then go back to the ADO. Click on the Y box (which zeroes the other axes), then select Center. Three slider bars will appear to the right of Center.

Again, from the top down, the three sliders represent the X, Y, and Z axes. This time, they represent the setting for the center of rotation. We're using the same coordinate system, where X and Y are at zero in the upper-left corner of the screen, and X increases with movement to the left, while Y increases with movement downward. The Z axis remains at zero at the center of the screen, increase on movement outward, and decreases on movement inward.

For purposes of this tutorial, we won't go into details about the coordinates. The Reference Section has a complete description of the slider coordinates. Besides, there's an easier way to set the center.

Without touching any of the axis slider bar settings, click on the *Mouse XY* box below them. A set of crosshairs and centerpoint coordinates will appear on your workscreen, along with a second cross indicating the current center position. Move the centerpoint to the upper-left quadrant of your screen (50, 50 or so, you don't have to be exact) – approximately an inch away from the left edge of

your screen, then left-click to set the new centerpoint position. As you do, you'll be dropped back to the ADO menu, where you'll see the new coordinates appearing in the slider bar indicator boxes.

Go up to Preview and select it. You'll see your clip box rotating about multiple axes, but now it's rotating about a new centerpoint – the one you just set manually with Mouse XY. After you've previewed the movement, go up and select Render, then, after the image has been rendered on all frames, play the animation and study it.

When you're finished, clear out all your frames and return to the ADO menu. Note: You can reset your center of rotation by selecting Default. Default will set your center of rotation to be the center of the clip box (if you are in Clip mode) or the center of your screen (if you are in Sequence mode).

Size

Now we're going to experiment with Size. Size allows you to shrink or expand your artwork, any or all of your frames. You can also select a specific vanishing point (Center) where you want your art to shrink to or expand from, and the Scale (the *amount* your artwork will shrink or expand).

First, left-click on Clear (and Yes in the alert box) to clear out all of your ADO settings, then select Size. As you do, two indicator boxes and two slider bars will appear on the right side of the ADO menu.

The Reduce and the Enlarge indicators work with the Size Ratio box (the box with the number, under *Scale*, when Size is activated). When you set a scale, the new size of your artwork is equal to the Reduce factor *divided* by the Enlarge factor. In mathematical terms, Reduce and Enlarge are the numbers that indicate multiply and divisor factors for an image size, such as your clip box.

Reduce starts out at 100. If you move it down without altering the Enlarge setting, it will reduce your artwork. Enlarge starts out at 100. If you move it down without altering the Reduce setting, it will enlarge your artwork.

Now, move your cursor down to Reduce and set it to 50. As you alter the setting, you'll notice the numbers changing in the box beneath the Scale indicator. At 50, your clip box is now at .50, or 50%.

Now, select Preview. You'll see your clip box shrink down across 11 frames until it's half its original size.

Now we're going to try something a little different. Move your cursor up to Tween and toggle it off. Then, select Preview. You'll see a stationary box. Now, select Render. As you do, you'll see your shrunken clip box reproduced on every frame of your sequence.

Okay, let's try something else. Clear out all your frames and return to the ADO menu. Toggle Tween back on, select Center, then select Mouse XY. Place your cursor back approximately where it was a moment ago – in the upper-left area of your screen, about one inch from the left edge, and set your centerpoint. Then select Scale and make sure Reduce is set at 50.

When done, select Preview and, after you've seen how the effect is going to look, select Render.

This illustrates several of the functions we've just covered – not only can you shrink or enlarge your image, you can make it shrink or expand to a specific center or vanishing point.

Move

Here's a way to do scrolling wipes or moving titles with CYBER PAINT. Select Move from the ADO menu. Move allows you to move your artwork in a path, from one point on your screen to another. The three slider bars that appear on the right side of the ADO f/x menu allow you to set the Move coordinate points.

The top bar lets you set the X axis, the number of pixels you wish to move *horizontally*. You set any of the sliders by left-clicking and holding on the direction arrows at the ends of the slider bars, or by dragging the numbered indicator box.

The middle bar lets you set the Y axis, the number of pixels you wish to move *vertically*.

The bottom bar lets you set the Z axis, the number of pixels you wish to move in *depth*. In this slider, a positive number is a position *farther away* from you, going into the screen; a negative number is a position *closer* to you, coming towards you.

After you've selected Move, move the top slider all the way to the right, then select Preview. You'll see your clip box move from its last centerpoint (on the upper left of the screen) off to the right across your 11 frames.

Okay, slide the middle bar all the way to the right, Preview it, then select Render. Now you know a nifty way to do a diagonal wipe, or image movement.

Onward! Clear your frames, go back and set the Y axis (the middle bar) back to 0 and slide the Z axis (bottom bar) all the way to the right. Preview, then Render it. You'll see your image flying off in the distance and to one side.

When you're finished, clear out your frames and return to the ADO, then click on Clear to erase your previous settings.

The Path Options

The *Path* options in CYBER PAINT allow you to move an image on a predetermined course, or path, about your screen.

Select Path, and four option buttons will appear in a column on the right side of the ADO f/x menu.

The first one we'll play with is Path of Points. This allows you to set a specific pathway on which you want to move your animation.

First, we're going to have to eliminate our venerable initials box. Don't worry; it's served us nobly, and we won't be needing it again. Return to the main menu screen, select a medium-sized brush from the Brush menu and draw a box or other simple (hollow) polygon shape in the center of your screen *using white, or whatever color is*

in the lower-right corner of the Color menu. Make it about an inch-and-a-half high. When you've finished drawing it, go to the Clip menu and Clip it, clear out this frame, then return to the ADO.

Select Path of Points and a blank screen will appear with your cursor sitting on it. To define a path, move your cursor around on the screen and click your left mouse button to define the path points, a series of connected line segments. Make a path going from one part of your screen to another (make it zig-zag) or else make it in the center area of your screen, starting at the bottom and working your way around, a rough diamond shape, say. Whatever your path shape, lay down about half-a-dozen points.

When you're finished defining your path, right-click to return to the ADO f/x menu and then select Preview. When you do, you'll see your clip box image moving along the path, starting from its original position. Render it and study the final results.

When you move your artwork along this type of path, it will take the same amount of time to travel between each point. Therefore, it will appear to travel faster between points that are far apart, and more slowly between points that are close together. Keep this in mind when you want your work to speed up or slow down at specific points.

Now, clear your frames, return to the ADO menu but do *not* select Clear Path – this will clear your path settings! Select Clocked Sampled Path. When you click on Clocked Sample Path, a blank screen will appear. When you left-click again, you will see a small representation of a spinning clock face. The clock acts as a timer for you to use while setting your path points. It runs exactly as long as your animation sequence will run. This is a true "real time" mode, which you may use to plot out your path points and impart a sense of "rhythm" to your artwork movement along its path. Since your current animation is only 11 frames or so, its value is negligible, but the Clocked Sampled Path option may help you plot out a path on longer animations of many frames.

Try this. Select Clocked Sampled Path, left-click again and, quickly, move your mouse. Preview the move before proceeding. (You don't need to Render it.)

Click on Sampled Path. A blank work screen will appear. To trace
out a Sampled Path, hold down your left mouse button and trace
out the path you want by moving your mouse cursor. Each pixel
represents an individual path point, and you can lay down a
maximum of 2048 path points in this mode. Keep in mind that, if
you lay down many more points than you have frames available,
your animation might be both fast and "jittery." When you release
the left mouse button you will return to the ADO.

If you want, lay down a path, making curlicue motions in the center
of your screen, then Preview it to see the effect. If you do a Render,
clear out your frames before proceeding.

First and Motion

You can set your ADO controls to perform a variety of wild
movements and bizarre image transformations, then save your
favorite ADO settings to disk. Thus, you can load them at any time
and use them with whatever you have in your clip buffer.

So, clear all your ADO settings, then leave the ADO menu. Place
your CYBER PAINT back-up disk in your drive, and bring up the
Load/Save submenu. Click on .ADO, and select Load. Look for the
file called FIRST.ADO, and load it into memory.

Return to the ADO f/x menu, and select Turn (to get out of the
Path submenu). Now select Preview and witness the effect of
FIRST.ADO. The wire-frame rendition of your clip box starts out
on one side of the screen, then goes flying off to the far right, and
off into the distance.

Let's examine the ADO settings we just loaded in.

On the left-hand side of the menu, is a box labelled *Motion*. This is
a toggle, click on it and it changes to First. Motion is the default
setting, and First is the optional setting.

If you are in Motion (as we have been all along) all of the special
movement settings on the right half of the ADO f/x menu will be
executed over the course of your entire animation or specified range
of frames. However, if you are in First, all of the special movement

settings on the right half of the ADO f/x menu will be used to position *only* the first frame – a very fancy, very precise way of placing your clip buffer at a particular location, *then* before moving it across your screen.

The first frame of FIRST.ADO is almost off-screen. Click on Motion to toggle it to First, then select Turn. Notice that on the first frame of our ADO animation, the clip box has been rotated 117 degrees about its Y axis. Now, select Size. You'll notice that the clip box starts out at 1.00 – 100%, or normal size. Now, select Move. The X axis is at -115, or the far-left of the screen. The Y axis is 0, or normal – the image doesn't move up or down. The Z-(depth) axis is at -115, or receding *into* the screen.

Click on First again to toggle back to Motion. Now you'll see that the image is moving to the right (+241 on the X axis). Select Size, and you'll see that the animation is being reduced down to 10% of its original size.

Now that you've explored these settings, you can better understand how that first frame was positioned, and why the animation looks the way it does. Render it and play it a few times. Afterwards, clear your frames, return to the ADO and alter your settings. Add partial turns to the clip buffer, alter the angle and axis, but be careful – it's quite easy to make your images fly off-screen. When you're finished, clear your frames and then go to the main menu screen.

Clip and Sequence

From the Load/Save submenu, load the TESLA.SEQ sequence from your CYBER PAINT back-up disk (not the one we edited in the Patch section, earlier). After it has finished loading, select .ADO from the Load/Save menu (instead of .SEQ) and Load the ADO file called TESLA.ADO.

Play the TESLA.SEQ again to remember what it's like, then return to the ADO f/x menu. In the lower-left corner is a box labeled *Clip*. This is another toggle, like Motion/First. Click on it, and it changes to Seq.. If you are in Clip mode, the motion settings in the slider boxes on the right half of the ADO f/x menu will be applied

to the contents of your clip buffer *only*. If you are in Seq(uence) mode, the motion settings in the slider boxes on the right half of the ADO f/x menu will be applied to your entire animation sequence (either All or a Segment) on a frame-by-frame basis.

The primary difference between Clip and Sequence is that, when in Clip mode, the ADO will perform specified animation movements, or transformations, on stationary images (what is in your clip buffer) while Sequence performs transformations on an already-existing animation. In Seq mode, you are ADOing each frame of your animation sequentially, whereas in Clip mode, you are ADOing only the contents of your clip buffer.

Make sure Seq. is selected, then, select Preview to examine the TESLA.ADO effect. Now, select Render. The 22-frame Tesla animation will be copied across the entire range of frames, *using the ADO settings,* and replacing the existing frames.

After rendering the sequence, play through it to see the final effect. As the final version illustrates, you can use Sequence to produce an additional layer of movement on already-moving images (the animation segment filling your entire screen), an effect equivalent to a movie screen with images being projected on it spinning through space – or in this case, a *Twilight Zone*-type image falling into an abyss.

Return to the ADO menu, we've got one last thing to do.

Click on Seq. to toggle it back to Clip, then go to the Load/Save menu and load TESCLIP.ADO from your CYBER PAINT disk. After the settings have loaded, return to the ADO menu and select Render. Don't even bother selecting Preview. When the rendering is finished, go to your main menu screen and play it.

Surprise! You'd probably forgotten about that box you had sitting in your clip buffer. But CYBER PAINT didn't – it rendered it on top of your existing Tesla animation, imparting a wild, multiplanar effect to your work. Play through this sequence, then return to the ADO menu and examine individually the motion settings, as you did before.

The value of this latter effect can't be understated. You could make your own full-screen animations, save them out, then load them back in with multiple ADO settings and have a storm of zipping, scrolling, *moving* images. Make multi-level two-dimensional backgrounds, save them out to disk, then convert CAD-3D 2.0 delta animation files to CYBER PAINT sequence files and load them in as overlays to your multi-layer backgrounds. The effects are limited only by your imagination and, realistically, the amount of memory you have in your ST.

Now Okay, we're finished with the ADO f/x menu – but I doubt you will be. For you, its possibilities are only dawning.
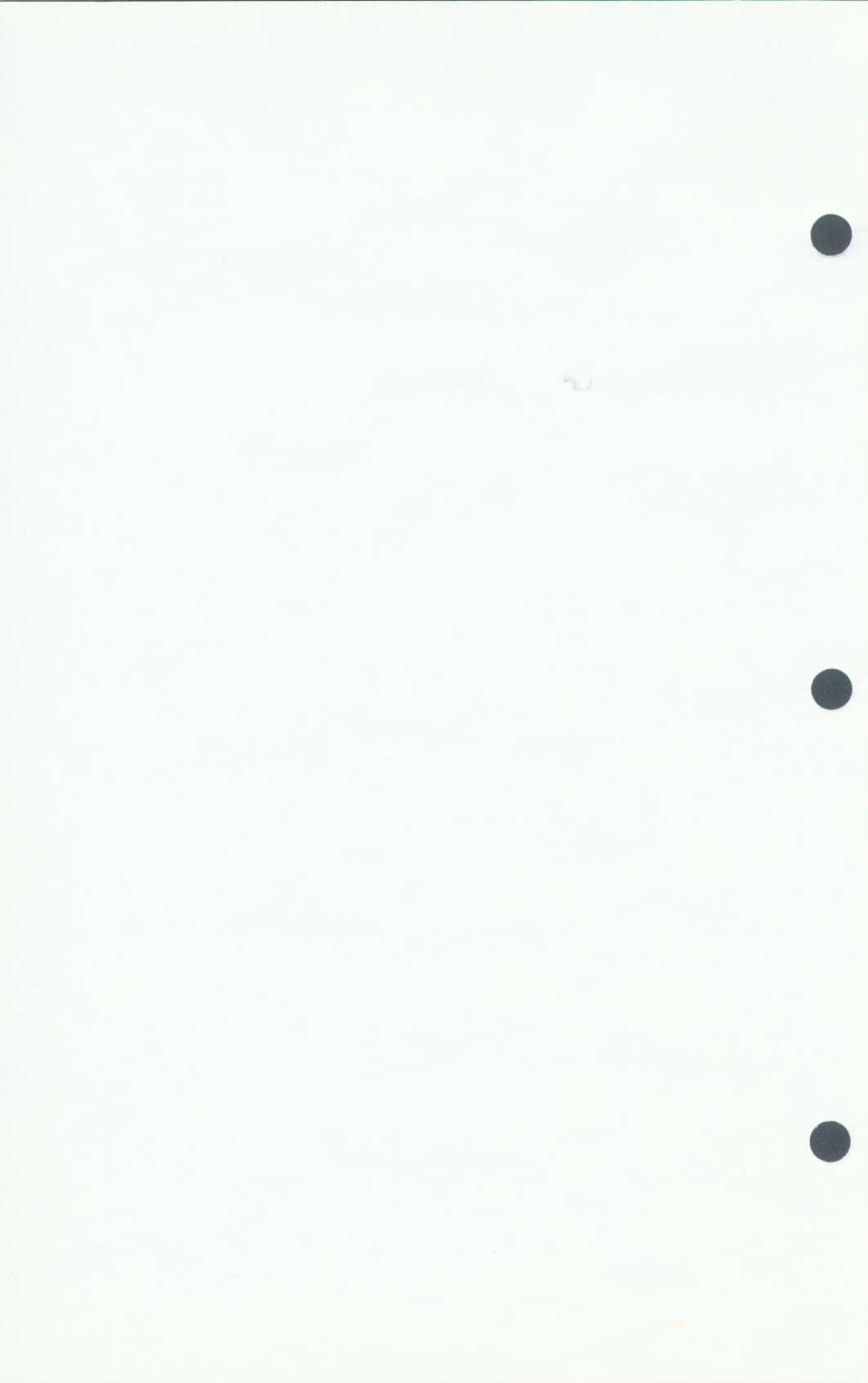
CYBER PAINT REFERENCE SECTION

All of CYBER PAINT can be controlled by selecting either the function names in the drop-down menus and submenus, or the icons in the Playback Bar. In addition, the function names in the drop-down menus are followed by letters or other keyboard symbols representing the keyboard equivalents for CYBER PAINT functions. While you are working with CYBER PAINT, pressing one of your ST's keys will automatically bring up that function (except when you are in Text mode). We've endeavored to make the key equivalents as mnemonic as possible, particulary for the most-used functions.

NOTE: In CYBER PAINT, whenever alert boxes appear offering "Yes" or "No" options, you may point and click on the word to select it, or you may press the corresponding keyboard key: [Y] or [N]. Alert boxes which offer only "Continue" may be exited by clicking either mouse button, or by pressing any key.

To activate any of CYBER PAINT's functions with the mouse, point at the icon, or the function name in the menu, and click the left mouse button. Clicking the right mouse button will, generally, remove you from any submenu into the main menu. From the main menu, clicking the right mouse button "toggles" you between the blank screen (or picture), and the main menu. (Keyboard alternative: [Space Bar].)

NOTE: For most CYBER PAINT drawing functions to operate, all menus must be removed, and you must be drawing on the full screen. If you find a particular function stubbornly refusing to work, look to see if a menu is present. If so, click the right mouse button until you have a full screen to work with.

To activate a CYBER PAINT function from the drop-down menus, point the mouse at any of the menu titles – Menu, Clip, Draw, etc. The menu for that title will drop down. Point to the desired function so that it is outlined, then click the left mouse button. The menu box will disappear, and you will be in whichever drawing or picture-manipulation mode you've chosen. (CYBER PAINT's default color palette, will create a red outline box on selected functions. Certain palettes may render the outline box invisible, but you can still select any function by clicking on its name.)

NOTE: CYBER PAINT's menu functions will only be activated if your mouse pointer is actually on some part of the selected title when you click the mouse button. If you highlight the function, then move your mouse to main screen and click, the function will not be activated.

In certain menus (such as Draw or Mode), a double arrow displayed to the left of a function name indicates that the function is currently active. Some functions are "toggles," and may be turned either on or off by clicking on the function name. Other functions (such as the three at the bottom of the Modes menu) are "radio buttons," which means that only one – but at least one – must be selected.

The Playback Bar

| ↑ | 《 | ← | ⊣ | ←| | ▐▬▬▬▬▬▬ 1 ▬▬▬▬▬▬▌ | |→ | ⊢ | → | 》 | ↓ | 1 | f |

The Playback Bar is the icon-based strip which appears at the bottom of the CYBER PAINT screen whenever the upper menu bar appears. The Playback Bar also appears at the top of the Time, Load/Save, and ADO f/x menus (and, in shortened form, in the Palette menu). The Playback Bar icons are similar to those found on videotape recorders. By clicking on the icons, you may move through an animation sequences forward, backward, fast-forward, or fast-backward (rewind). You may also insert frames or easily view any frame within a sequence. Reading from left to right, the Playback Bar icons operate as follows:

NOTE: In CYBER PAINT, all of the direction arrows controlling movement are auto-scroll. Left-clicking on them will perform one increment of that arrow's function every time you click. For continuous movement, hold down the left mouse button. Also, the keyboard alternatives listed below operate whether or not the Playback Bar is displayed.

⬆ – First Frame. Go to first frame of animation sequence. Left-click on this icon to move immediately to the first frame of the sequence. (Keyboard alternative: [F1].)

⟪ – Fast Reverse. Left-click on this icon to play your animation sequence in reverse (last frame to first frame) at high speed. Click the right mouse button to return to the main menu. (Keyboard alternative: [F2].)

⟵ – Reverse Play. Left-click on this icon to play your animation sequence in reverse (last frame to first frame) at Time speed. (See Time.) If you hold down your left mouse button, your animation will play twice as fast. Click the right mouse button again to return to the main menu. (Keyboard alternative: [F3].)

⊼ – Create Frame/Previous. Left-click on this icon to copy the current frame appearing on your workscreen and add backwards to sequence, duplicating the frame *before* the current frame. For example, if you are on frame #5 of a 10-frame animation sequence, left-click three times on this icon to insert three identical images of frame #5. The original frame #5 will become frame #8, and three identical frames will become frames #5, 6, and 7. In addition, your total animation sequence will have increased by three frames. (Keyboard alternative: [F4].)

⟵▮ – Move Frame Backward. Left-click on this icon to move backwards one frame at a time in your animation sequence. (Keyboard alternative: [F5] or left cursor arrow.)

1 — Frame Counter Bar. The numbered box within this bar indicates which frame of your animation sequence you are currently working on. Its position within the bar corresponds to the current frame position within the sequence. Clicking within the bar on either side of the number box will "jump" you to a frame position relative to the sequence. (Click to the left to go backwards; right to go forwards.) You may also play your animation manually by pointing at the numbered box, clicking and holding the left mouse button, and dragging the numbered box in either direction.

|→ — Move Frame Forward. Left-click on this icon to move forward one frame at a time in your animation sequence. (Keyboard alternative: [F6] or right cursor arrow.)

|+× — Create Frame/Next. Left-click on this icon to copy the current frame appearing on your workscreen and insert the copied frame after the current frame. For example, if you are on frame #2 of a six-frame animation sequence, left-click three times on this icon to insert three identical images of frame #2. The original frame #2 will remain frame #2, and three identical frames will become frames #3, 4, and 5. In addition, your total animation sequence will have increased by three frames. (Keyboard alternative: [F7].)

→ — Forward Play. Left-click on this icon to play your animation sequence forward (first frame to last frame) at Time speed. (See Time.) If you hold down your left mouse button, your animation will play twice as fast. Click the right mouse button to return to the main menu. (Keyboard alternative: [F8] or down cursor arrow.)

» — Fast Forward. Left-click on this icon to play your animation sequence forward (first frame to last frame) at high speed. Click the right mouse button to return to the main menu. (Keyboard alternative: [F9].)

⬇ – Last Frame. Go to the last frame of your animation sequence. Left-click on this icon to move immediately to the last frame of the sequence. (Keyboard alternative: [F10].)

1 – Total Frames. Displays the total number of frames of your animation sequence. You may click on the Total Frames box to append 10 frames at the end of your sequence, which will all be identical to the last frame. (Keyboard alternative: [Return].)

f – Frame Modes: To Frame, To Segment, To All toggle. Left-click on this box to cycle through the frame modes: To Frame (f), To Segment (s) and To All (a) modes. The frame modes determine which frames will be affected by various CYBER PAINT operations, and are set within the Time submenu. To Frame operations affect only the frame currently displayed, To Segment operations affect only the range of frames set in the Time submenu, To All operations affect all frames in the sequence. To Segment and To All operations may not be reversed by pressing [Undo]. Thus, an alert box will appear allowing you to proceed or cancel the operation. (See Time, below, for details.)

NOTE: Although you may not undo multiple frame operations, such as To Segment and To All, you CAN abort them at any time by pressing any key on the keyboard. An alert box will appear displaying the number of frames already affected, and asking if you want to continue. Click on Yes to proceed, or No to halt the operation at the frame it is on. If you choose to continue the operation, CYBER PAINT will pick up where it left off, and proceed to the end of the designated frame range. If you decide to halt the operation, only those frame already affected by the operation will be changed; they cannot be undone.

The Main Menu

The main menu bar contains the following seven menus: MENU, CLIP, DRAW, MODES, FRAME, BRUSH, and COLOR. We will describe each of the menus in the menu bar, from the left side of the screen to the right. Each function, or command within each drop-

down menu will be described in the order listed in the menu – from top to bottom.

Menu

The MENU contains global, generalized functions affecting your entire animation sequence; including such things as disk I/O (input/output), playback time, and ADO effects. MENU also contains information about CYBER PAINT and the status of your animation, and it allows you to exit the program and return to the desktop.

NOTE: CYBER PAINT is not totally GEM-based and does not permit desk accessories. Author, Jim Kent, offers two reasons: First, GEM drop-down menus make it extremely difficult to draw on the top scan line of the ST screen. Second, Jim wanted a faster and more responsive mouse control than GEM allows.

About Cyber Paint
Displays program specification information: Title, program version, the name of the author, publisher and copyright.

Time [T]
Activates the Time submenu, which allows you to alter the overall playback speed of an animation sequence, and set the frame mode (which frames are acted upon) to individual frames (To Frame), to a range of frames – or segment (To Segment), or to the entire animation sequence (To All).

↑	⟨⟨	←	⊣	←┃	1	┃→	┼	→	⟩⟩	↓	1
More		←	4					→	Tween		
To Frame			To Segment			To All					
←	1	→			ⅉ				←	1	→

Playback Bar – The Playback Bar makes up the top row of the Time submenu. Its functions are the same as when it is displayed from the main screen, with the one exception that the frame modes are not displayed. (See Playback Bar, above, for details.)

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<u>More</u> – Left-click on More to load the latter part of a .DLT file that will not fit entirely into your ST's memory. (See Load/Save.) If your .DLT disk file is too large for memory, CYBER PAINT will load as much of the first part as it can, leaving 10 percent of the loaded file free for editing. It will then display an alert box saying: "File too large to fit into available memory," and will highlight the More box in the Time submenu. Click on Continue to exit the alert box and resume CYBER PAINT functions. When you are through editing the first part of the animation, you may save your changes under a different file name, then select More from the Time submenu to load the next portion of the original file. (It is recommended that you save the changes as a .SEQ file.) An alert box will appear, saying "Advance to next part of A:\FILE.DLT? This will destroy frames in memory." Left-click on either Yes or No (or press [Y] or [N]). If you select Yes, everything currently in memory will be replaced with the next part of the animation.

NOTE: The More option is primarily designed for breaking up .DLT files into manageable chunks, and converting them to .SEQ files. The More option will work with .SEQ files, but there will be no free RAM for editing with each loaded section of .SEQ file. Also, More does not alter the original, oversized animation file, and does not append edited changes to that file upon saving. You will be alerted should you try to save edited segments using the original, oversized file's name. But it's essential that you keep a backup copy of non-edited animation files. (See Patch, below, for .SEQ file division.)

<u>Animation Speed Control Bar</u> – The bar to the right of More allows you to increase or decrease the CYBER PAINT playback speed of your animations. Click on the left arrow to increase playback speed, click on the right arrow to decrease playback speed. You can also drag the numbered box left or right to set your animation speed.

The Animation Speed Control indicator number displays how many ST *video frames* are used to display each *animation frame* of an animation segment. One ST video frame is the period it takes your monitor to scan and *refresh* the screen once. The video-frame refresh rate is measured in *jiffies*, which are 1/60th of a second. The default CYBER PAINT animation playback speed is four (4). Thus, each frame of your animation, at default, is displayed for a period of

four jiffies – 4/60, or 1/15th of a second. If you set the box at 60, each frame will be displayed for one second (60/60). CYBER PAINT's fastest animation speed is two (2) – or 30 frames per second.

Tween – Tween is a mode which affects CYBER PAINT clip-buffer and ADO operations. It can be either active or inactive. When Tween is active (or highlighted), the beginning and end positions of your clip-buffer contents and ADO *as well as the intermediary positions* are copied to the range of frames indicated by the frame modes: To Segment, or To All (Tween has no effect on To Frame). When inactive, only the final, altered position of the clip buffer or ADO is copied – identically – to the chosen range of frames.

For example, given 10 frames, and a vertical clip-buffer image that is Rotated 90 degrees to horizontal: with Tween on and To All – frame #1 will contain the vertical image, frame #10 will contain the horizontal image, and frames #2-9 will contain images in varying degrees of rotation between vertical and horizontal. Given exactly the same situation with Tween off, each frame would contain an identical image in the final, horizontal position.

Left-click on Tween to toggle it on or off. Tween works with the Rotate, Move, Scale, Paste, and ADO f/x functions.

The third row of the Time submenu contains the three *frame-mode* functions: To Frame, To Segment, and To All. These allow you to select the range of frames affected by time-oriented functions. Click on any one of the three boxes to activate that mode. Only one mode may be active at any time. (Frame modes may also be selected from the Playback Bar by clicking on "f" for To Frame, "s" for To Segment, and "a" for To All.)

To Frame – Left-click on To Frame to activate it. When active, time-oriented operations will be performed only on the currently displayed frame and will affect no other frames in the animation sequence.

To Segment – Left-click on To Segment to activate it. When active, time-oriented operations will be performed on the range of frames specified by the Segment Range Bar (see below).

To All – Left-click on To All to activate it. When active, time-oriented operations will be performed on all frames in the animation sequence.

The following operations are affected by the frame mode settings:

Clip: Paste
                    Rotate
                    Stretch

Frame: Separate
                    Blue Pic
                    Unblue Pic
                    Clr Pic
                    Defocus
                    Delete (To Seg. only)

Load/Save: Save .DLT/.SEQ (To Seg. only)
                    Underlay/Overlay .PI1/.PC1/.NEO

ADO f/x: All

The fourth row of the Time submenu is the Animation Segment Range Controller, which allows you to set the *range* of frames affected when the To Segment frame mode is active. The Segment Range Controller is duplicated in the ADO f/x menu (see below).

Segment Starting Frame – The first three boxes in the row consist of a frame number displaying the starting frame in the segment, bracketed by left and right arrows allowing you to adjust the starting frame number. Click on the left arrow to move the starting frame backwards, click on the right arrow to move it forwards.

Segment Range Bar – You may drag the dots within the Segment Range Bar to dynamicaly set the starting and end frame of your Segment Range. The beginning and end frame numbers will be indicated in the Segment Starting and Segment Ending Frame boxes. When first displayed, the Segment Range Bar will display only one dot. Drag it to the left or right to reveal the second dot. Both dots will be connected by a line. The box-shaped dot will represent the starting frame, and the diamond-shaped dot will represent the ending frame. Note that the Segment Range order may be reversed

(i.e., the starting frame number higher than the end frame number) by dragging one dot across the other. Thus, in a 20-frame segment, you could have a range running from 1 to 20, or from 20 to 1. By reversing the Segment Range numbers, time oriented operations will, in effect, be reversed.

Segment End Frame – The last three boxes in the row consist of a frame number displaying the end frame in the segment, bracketed by left and right arrows allowing you to adjust the end frame number. Click on the left arrow to move the end frame backwards, click on the right arrow to move it forwards.

Load/Save [L]/[S]

Left-click on Load/Save to activate the file selection menu. Load/Save allows you set drive paths, and to load or save a variety of ST file formats. The Playback Bar appears at the top of the Load/Save menu permitting a last-minute run-through of your work before you save it to disk, or before you load in another file (effectively erasing your current work), or to let you set the point at which you want to load in an Overlay or Underlay file.

↑	《	←	⇥	⇤	1		⇥	⇥	→	》	↓	1	f
Load	SEQ	.NEO	.COL		.CEL		.STR						
Save	.DLT	.PI1	.PC1		.BL?		.ADO						
Kill	Normal		Overlay			Underlay							
	A: B: C: D: E: F: G: H: I: J: K:						Patch						

NOTE: For a detailed description of the various file formats used by CYBER PAINT, see Appendix C.

In addition to the Playback Bar, the CYBER PAINT Load/Save menu includes the three possible I/O functions on the left: Load data from disk to memory, Save data to disk from memory, or Kill (delete) a data file on disk. The second and third rows contain the ten possible types of files (file formats) which may be affected by the I/O functions. Below these are three types of I/O "compositing" modes – Normal, Overlay, or Underlay – which are available with certain of the file formats. The bottom row contains the drive-path selection buttons, followed by the Patch function.

In a typical file I/O operation, you first select the file format by clicking in its box (e.g., .DLT). Next, select the type of I/O operation (e.g., Normal), the drive path containing your data disk (e.g., B:), and, finally, the I/O action (e.g., Load, Save, or Kill). Following this, a standard GEM file selector box will appear from which you may select your file.

CYBER PAINT uses the following types of file formats – as indicated by their three-character extenders:

.SEQ   CYBER PAINT animation sequence format. This is a new file format designed for CYBER PAINT that has many of the same qualities as a CAD-3D 2.0 delta (.DLT) file, except a .SEQ file takes up almost 50% less disk space than a .DLT. However, .SEQ files take longer to load and save, and each frame is displayed during the load or save operation. Also, .SEQ files also do not have an initial frame stored as a .PI1 file, as .DLT's do. .SEQ files may be loaded as Overlays or Underlays (see Overlay and Underlay, below).

.NEO   NEOChrome picture format as used by the paint program available through Atari Corp. NEOChrome pictures may be loaded as Overlay or Underlays (see Overlay and Underlay, below).

.COL   Color palette files. You may save the current color palette in CYBER PAINT, then reload it at a later time to effect whatever palette is currently in memory. Whichever color palette is in memory affects all frames of an animation.

.CEL   Aegis Animator block format. You may load and save Aegis Animator blocks into the CYBER PAINT clip buffer using this option.

.STR   Aegis Animator ST strip. Creates an Aegis Animator "strip" file, plus one "cel" file for each frame in memory.

.DLT   CAD-3D 2.0 (delta) animation format. .DLT files are compatible with CYBER STUDIO products and may be

edited with CYBERMATE. CYBER delta animations are saved as two files: The initial frame is a .PI1, low-resolution DEGAS file, and the delta information describing the animation is saved as a .DLT file. Both files must be present in the same drive path for a successful load. .DLT files may not be loaded as Underlays or Overlays.

NOTE: While loading a .DLT file, you may abort the process at any time by pressing any key.

.PI1   DEGAS Elite uncompressed, low-resolution picture format. .PI1 files may be loaded as Overlay or Underlay files (see Overlay and Underlay, below).

.PC1   DEGAS Elite compressed, low-resolution picture format. .PC1 files may be loaded as Overlay or Underlay files (see Overlay and Underlay, below).

.BL?   DEGAS Elite block format. You may load DEGAS Elite block directly into the CYBER PAINT clip buffer using this option. Because DEGAS block files are in a standardized graphics format called .IFF which is used by Amiga computers, you may also load Amiga .IFF files with this option.

NOTE: Using the above option, you may load DEGAS Elite .IFF blocks of any resolution, only the aspect ratio may change. High-resolution pictures will create blocks four times the size of the screen – good for scrolling landscapes.

.ADO   Allows you to load or save the motion settings from your ADO f/x menu (see ADO f/x.)

NOTE: You may easily convert file formats by selecting one format to load, and then switching formats before saving. For example, to convert .DLT files to .SEQ files: Select .DLT, load the delta animation, select .SEQ, and save the animation. Or, you may save individual frames of either .SEQ or .DLT animations by first loading the animation, displaying the frame you wish to save, then selecting the picture format (e.g., .PI1), and saving the frame.

You may composite (or merge) additional animations and/or stationary graphics on top of or underneath your existing work (memory permitting). These functions are represented by the Normal, Overlay and Underlay buttons.

Normal – Left-click on Normal for standard I/O operations. Loaded animations (.DLT, .SEQ) will replace the animation currently in memory. Loaded stationary graphics (.NEO, .PI1, .PC1) will replace whichever frame is currently displayed and will change the color palette to that of the loaded file.

Overlay – Left-click on Overlay to merge an animation (.SEQ file format only) or a stationary graphic (.NEO, .PI1, .PC1) from disk on top of the animation currently in memory. Overlay operations will maintain the current color palette, and the background color (color #1) will remain transparent so that existing images will appear beneath the transparent portion of the overlayed data. CYBER PAINT will automatically remap the color palette of the loaded file to approximated the closest match of colors, given the current palette selection (see Color; Palette). .SEQ Overlays will begin at the frame currently displayed; .NEO, .PI1, and .PC1 Overlays will load according to the frame mode (To Frame, To Segment, To All). You can load in as many Overlays as your ST's memory will allow.

Underlay – Left-click on Underlay to merge an animation (.SEQ file format only) or a stationary graphic (.NEO, .PI1, .PC1) from disk *underneath* the animation currently in memory. Underlay operations will maintain the current color palette. The background color of the existing animation (color #1) will remain transparent so that images from the Underlay will appear beneath the transparent portion of image data previously in memory. CYBER PAINT will automatically remap the color palette of the loaded file to approximated the closest match of colors, given the current palette selection (see Color; Palette). .SEQ Underlays will begin at the frame currently displayed; .NEO, .PI1, and .PC1 Underlays will load according to the frame mode (To Frame, To Segment, To All). You can load in as many Underlays as your ST's memory will allow.

A: – K: – Select your I/O drive path by clicking on the desired drive path button (A: to K:). All subsequent disk I/O operations will

access that drive. Since many ST users own hard disk drives, CYBER PAINT provides 11 drive designators, allowing users to save their work to either a floppy drive or a hard disk drive partition. (Drives beyond K:\ can be accessed from the file selector.)

Patch – Patch allows you to work on "patches," or sub-ranges of .SEQ files. (Patch does not work with .DLT files. See More, above, for .DLT file segmentation.) This feature can be used for animations that are too large to fit in memory. When you click on Patch, a menu box appears with four rows of functions, described below:

Start	←	1								→
Frames	←	100								→
KBytes	←				255					→
A:	B:	C:	D:	E:	F:	G:	H:	I:	J:	K:	Load	Patch

- Start – Start designates the first frame of the animation segment you wish to load. To the right of Start is a numerical slider bar that lets you specify a frame, from one to 2048. To select the first frame of an animation segment, left-click on either the left or right arrows on the Start slider bar until you reach the desired frame. You can also quickly select the desired frame by manually dragging the frame number box right or left. You must select a frame number which exists in the animation file for this function to work properly.

- Frames – Frames represents the *total* number of frames you wish to load (beginning with the designated Start frame). To the right of Frames is a numerical slider bar that lets you specify the number of frames you wish to load (see KBytes, below). To select the number of frames you wish to load, left-click on either the left or right arrows on the Frames slider bar until you reach the desired number of frames. You can also quickly select the number of frames by manually dragging the frame number box right or left.

- KBytes – KBytes represents the amount of memory in your ST you want to allocate to an animation segment before you attempt to load it (reserving the remainder for editing changes). The numbered box indicates how much memory you have currently

allocated. If you drag the box to its far-right position, you will be using the total amount of memory available in your ST. To select the amount of memory you wish to allocate, left-click on either the left or right arrows on the KBytes slider bar until you reach the desired amount of memory. You can also quickly select the amount of memory by manually dragging the frame number box right or left.

Note: When you Patch-load an animation segment, you can only load in either the number of frames you've specified, or the maximum number of frames that will fit into the memory you've specified – whichever comes first.

- A: – K: – Left-click on one of these icons to select the desired disk drive you want to patch-load your work from and/or save your work to.

- Load Path – Left-click on Load to actually load the patch of animation file. A GEM file selector box will appear from which you may select your filename.

Once your patch file is loaded, the bottom row of icons in the Patch menu will change to the following:

- New – Left-click on New to load in another patch *without* saving the one currently in memory. When you click on New, it brings back up the original Patch menu.

- A:\PATCH.SEQ – The second box in the lower Patch menu displays the name of the file you are currently patching.

- Page – Left-click on Page to save the currently edited patch, then automatically load the next patch from the full animation file. After selecting Page, CYBER PAINT will overwrite and replace the original frames in the disk file of your animation with those of the patch range in memory. It will then automatically load in the segment of frames from the animation file immediately following the segment you've just completed editing.

NOTE: The new segment loaded will conform to the frame length and/or memory limitations of your original Patch settings. For example, if you originally specified 10 frames to work on, edited them, then saved them out to disk, Page will load in the next 10 frames of the animation sequence you wish to work on. (See Start, Frames and KByte, above.) After the second segment has loaded into your ST's memory, the frame settings will changed to represent the new segment.

- Save – Left-click on Save to save back out to disk the edited animation seqment patch. The edited frames will overwrite and replace the original frames in the disk file of your animation. When your edited work has finished saving out to disk, the original Patch menu will reappear.

WARNING: Do not switch data disks once you have started a Patch operation, as CYBER PAINT looks for the original file to overwrite the new information. Also, always make sure you've made a backup of your animation before using Patch. It should be your standard practice to never work on your only copy of anything.

Set Font [=]
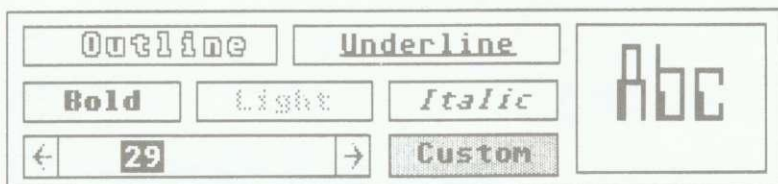
Left-click on Set Font to alter the subsequent appearance of whichever text font is currently in memory. (This affects only the text printed with the Text option of the Draw menu, describe below.) A Font menu will appear showing five different text styles. The styles are illustrated by their appearance of their titles: Outline, Underline, Bold, Light, Italic. To the right of the style titles is the Text Example box which displays the letters "Abc" in the currently selected font and style. At the bottom of the menu is a Point-Size slider bar from which you may adjust the size of your text. The last item on the Font menu is the Custom button which allows you to load GDOS .FNT files or .FED files. (.FED files are

font file created with early versions of Brad Christie's public domain GEMFED font editor.)

As a default, CYBER PAINT uses the system font in standard style. To activate any style, click on the desired text-style button. To deactivate a style, click on its button once more. Text styles are cumulative. Thus, you can combine several text styles, such as Bold Italic Light, Underline Italic, Bold Outline, etc., by activating more than one style button. To return to standard text style, deactivate all active text-style buttons.

You may load standard GDOS or .FED fonts by clicking on the Custom button. A GEM file selector box will appear, from which you may select a font to load. After selecting the font, it will be loaded in memory and will affect the text displayed in the Text Example box, as well as any text subsequently entered using the Text function from the Draw menu. When a custom font is loaded, the Custom box will be highlighted. To return to the system font, click on the Custom box to deselect it. Click on the Custom box once more to load another custom font.

NOTE: All that is needed to load GDOS fonts is the font file itself. You do not need GDOS auto-loaded in memory – and we would advise against it. We've included a number of fonts on your CYBER PAINT disk, in a folder called FONTS.

The Point-Size slider bar will first display the default point size of whichever font is in memory. You may adjust the size by clicking on the left or right arrows, or by dragging the Point-Size number box. Note that, although the slider bar will display a smooth range of numbers, available point sizes are dependent upon the font in memory. The displayed point size of the text will appear in the Text Example box.

Air Speed [#]

Left-click on Air Speed to set the speed and the breadth of the Airbrush (see Airbrush in the Draw menu, below). An Air Speed adjustment box will appear with two slider bars labeled: Speed and Spread.

The Speed of the Airbrush flow (or intensity) may be adjusted from 1 to 100 by either clicking on the left and right arrows in the slider

bar, or by dragging the number box. The Spread (or breadth) of the Airbrush may be adjusted in the same way. Click the right mouse button to return to the main program.

Status [?]

Left-click on Status and a box will appear indicating the current status of your computer's RAM (random access memory):

Total Free	Displays the total bytes of free RAM currently available.
Initial Free	Displays the total bytes of RAM available at boot-up.
Largest Block	A memory diagnostic number used by the programmer only.
Total in Frames	Displays the total bytes of RAM used by all frames of your animation.
Last Frame Update	Displays the number of bytes of delta information used between the current frame and the previous frame.
Next Frame Update	Displays the number of bytes of delta information used between the current frame and the next frame.

NOTE: The amount of delta information required between two identical frames is 8 bytes, no matter how complex the image.

ADO f/x [A]

Left-click on ADO f/x to access the ADO f/x menu. The ADO f/x (Antic Digital Omni-mover effects) menu contains many of the most powerful features of CYBER PAINT. You can scale, move, and rotate about three axes the Clip buffers, or entire animated sequences – tweened over any range of frames.

↑	⟨⟨	←	↦		←	1				↦		↤	→	⟩⟩	↓	11	a
Preview		←	1	→	✗————➤									←	6	→	t

Clear	Turn	Center	Part Turns (Degrees):		
Render	Size	Axis	←	180	→
Motion	Move		Full Turns:		
Clip	Path	Turns	←	1	→

The top row of the ADO f/x menu includes the Playback Bar (see Playback Bar, above). Since all ADO f/x require more than one frame to work properly, the frame mode should be set to either To All (a), or To Segment (s). If you attempt an ADO f/x while in To Frame, nothing will happen. (See Time; To All, To Segment.)

The second row contains a duplicate of the Animation Segment Range Controller bar (see Time, in the Menu section). With this, you may set the range of frames affected by your ADO f/x (assuming you are in To Segment frame mode). To the right of the Range Controller bar is the Tween indicator (t). Click on this letter to toggle Tween on or off. The letter box will be highlighted when active.

The remainder of the ADO f/x menu contains functions specific to the operation of ADO rendering.

The large box on the left side contains the five main ADO f/x commands: Preview, Clear, Render, Motion, and Clip:

Preview – Left-click on Preview to activate an empty box which will represent how the current ADO settings will move your animation. The box will be as large as the current Clip Buffer box, if you are animating a clip, or as large as the screen, if you are animating an entire sequence.

NOTE: If you have not set any of the ADO motion controls, or your frame mode is at To Frame, the Preview function will display a stationary box.

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<u>Clear</u> – Left-click on Clear to clear *all* of the ADO settings. Upon selecting Clear, an alert box will prompt you to continue with the operation or cancel it.

<u>Render</u> – Left-click on Render to actually create the final ADO version of your animation – replacing what is in memory. During a Render operation, each affected frame of the animation (depending on frame mode) will be redrawn using the ADO f/x settings. Render will typically take from one to five seconds per frame to execute, depending upon complexity.

WARNING: You cannot Undo frames affected by an ADO rendering. However, you can abort a multi-frame rendering prematurely by pressing any key on your ST keyboard, or by clicking the right mouse button. An alert box will appear, asking if you want to abort the Render. Left-click on Yes or No (or press [Y] or [N]). If you select Yes, only those frames not yet rendered will remain unaffected. Any frames already rendered may not be undone.

<u>Motion/First</u> – Motion is the default setting of this command; First is the optional setting. Left-click on Motion to toggle to First, and vice-versa.

If you are in Motion, all of the special movement settings on the right half of the ADO f/x menu will affect the course of your entire animation, or the specified range of frames (see Time; To All, To Segment).

If you are in First, all of the special movement settings on the right half of the ADO f/x menu will affect only the position of the starting frame. ADO settings adjusted while in Motion have no effect on those adjusted while in First. Thus, you may adjust your Clip image (or screen) to a particular setting while First is active, then switch to Move and use different settings for the tweened ADO movements. During the Render process (or Preview), the image will begin at the First setting, then move *from* that setting using the Move settings.

<u>Clip/Seq</u> – Clip is the default setting of this command; Seq is the optional setting. Left-click on Clip to toggle to Seq, and vice-versa.

If you are in Clip mode, all ADO settings, plus the Preview and Rendering will affect on the contents of your clip buffer.

If you are in Seq(uence) mode, all ADO settings, plus the Preview and Rendering will affect you entire animation sequence (either All or a Segment).

The primary difference between Clip and Sequence is that, when in Clip mode, the ADO will perform specified animation movements, or transformations, on stationary images, while Sequence performs transformations on an already-existing animation. Thus, you can use Sequence to produce an additional layer of movement on already-moving images – an effect equivalent to a movie screen with animated images moving through space.

The second column of ADO f/x functions affect the functions of the slider bars on the right half of the menu screen. To illustrate them properly, we will discuss both what the function does and how to set it.

Turn – Left-click on Turn to activate. Turn lets you set the rotation options of your Clip Buffer or animation sequence. These include the placement of the Center of rotation about the X, Y, and Z axes; the Axis (or axes) about which the rotation will take place, and the number of Turns (either full or partial) which will occur over the range of frames.

Once Turn is selected, the following options become available:

Center – Left-click on Center to position the center of rotation. Once activated, the three slider bars to the right will represent (from top to bottom) the X, Y, and Z axes. You may adjust any of the slider bars by clicking on the arrows on either side, or by dragging the number in the slider bar. The direction of the arrows represents the direction of movement along the chosen axis. Thus, the X axis is horizontal from left to right, Y is vertical from top to bottom, and Z is depth from back to front.

The number in the slider represents, in pixels, the position of the Center on your workscreen. The CYBER PAINT coordinate system is based on the low-resolution Atari ST screen, which is 320 pixels wide, by 200 pixels high. The X axis runs from 0 on the left edge

to 319 on the right; the Y axis runs from 0 on the top edge to 199 on the bottom; the Z axis, for the purpose of CYBER PAINT, begins at 0 at the surface of the monitor, and runs forward to 320, or back to -320. At default, the X, Y, and Z slider bars are set to 160, 100, and 0, which is the center position on the screen. Because CYBER PAINT allows you to position images *outside* the borders of the screen, the X axis has an overrun of 160 pixels, and the Y axis has an overrun of 220 pixels. Thus, the X slider bar runs from -160 (160 pixels off the left edge of the screen), through 0 (the left edge), past 160 at the center, through 319 (the right edge), to 480 (160 pixels off the right edge). The Y slider bar runs from -220 (220 pixels off the top edge of the screen), through 0 (the top edge), past 100 at the center, through 199 (the bottom edge), to 420 (220 pixels off the bottom edge).

You may alternatively set the center position along the X and Y axes by using the two indicator boxes beneath the slider bars, described below.

Mouse XY – Left-click on Mouse XY to manually set the centerpoint on your workscreen. A full workscreen will appear, along with a movable crosshair and an X and Y coordinate readout in the upper-left of your screen (see Center, above). Use your mouse to move the cursor to the point you want defined as the center, then left-click to set your new centerpoint. Note, that you may not set the Z axis with this option.

Default – Left-click on Default to set your center of rotation to the center of the clip box (if you are in Clip mode) or the center of your screen (if you are in Sequence mode). The Z axis will automatically be set to zero.

Axis – Left-click on Axis to select the axis (or axes) around which your clip buffer, or sequence, will rotate. When Axis is selected, the three slider bars on the right will represent, from top to bottom, the X, Y, and Z axes. The bottom row will now display "X," "Y," and "Z."

If you wish your rotation to be performed about a horizontal, vertical, or depth axis, click on the X, Y, or Z box in the bottom row. The slider bar representing that axis will move all the way to

the right and become 100, and the other two axes will return to the middle and become zero.

If you wish your rotation to be performed about a diagonal axis, you may adjust the slider bars representing the axes. The three slider bars are adjusted by dragging the numbers, or clicking on the arrows to the right or left of the bars. The arrows represent the direction of the axis: X axis is horizontal, Y axis is vertical, and Z axis is depth (represented by diagonal lines).

The numbers in the bars run from -100 on the far left, to zero in the middle, to 100 on the far right, and represent the axis as a vector in three-dimensional space. Negative numbers create movement in one direction, and positive numbers create movement in the opposite direction. (These directions are dependent on the Turn settings, described below.)

Other than the directional effect created by negative or positive numbers, you must set more than one axis for the ranges to have any effect. Thus, if both X and Y are set to zero, any Z setting from 1 to 100 will create identical rotations about the Z axis. (-1 to -100 will create identical rotations in the other direction.) However, when two or more axes are set for rotation, the ratio of rotation about any set axis will be affected by any other set axis.

NOTE: None of the rotations mentioned above will operate unless a Turn has been set, as described below.

Turns – Left-click on Turns to adjust the number of whole and/or partial turns of your clip buffer or sequence. A 360 degree rotation is one complete Turn.

When you click on Turns, two labeled slider bars appear on the right: Part Turns (Degrees), and Full Turns. Part Turns lets you adjust any portion of a single rotation – from no rotation (0), to one complete rotation (360), to anything in between a single rotation. Full Turns lets you select the number of full rotations you wish (from -16 to 16). Either bar is adjusted by clicking on the left or right arrows, or dragging the number box. Positive numbers create the rotation in one direction and negative numbers create the rotation in the opposite direction. (These directions are dependent on the Axes settings described above.) Thus, to a rotation that is 3 1/2

turns, set the Part Turns bar to 180 (degrees), and the Full Turns bar to 3.

NOTE: A great number of turns in a limited number of frames may produce undesirable strobing of your artwork. As a rule, avoid setting more than one turn per every 10 frames.

Size – Left-click on Size to affect the scaling of your clip buffer or sequence over a segment of frames. Once you've selected Size, the selection area immediately to the right changes to offer a selection between Center, and Scale. Center positions the center of expansion or shrinkage, and Scale adjusts the amount of expansion or shrinkage.

Center- – Left-click on Center and three slider bars will appear representing, from top to bottom, the X, Y, and Z axes. Below these, a fourth row will display two boxes containing the labels: "Mouse XY," and "Default." Through using these icon boxes, you may place the center from which your art will expand, or to which it will shrink.

You may adjust any of the three axis slider bars by clicking on the arrows on either side, or by dragging the number in the slider bar. The direction of the arrows represents the direction of movement along the chosen axis. Thus, the X axis is horizontal from left to right, Y is vertical from top to bottom, and Z is depth from back to front. A zero setting for all three axes is in the center of the screen at the screen's surface. Positive directions for the three axes are: X axis right, Y axis bottom, and Z axis inward.

Mouse XY – You may alternatively set the scaling center – along *only* the X and Y axes – by clicking on Mouse XY. A movable crosshair will appear, plus X and Y coordinate readouts in the upper-left of your screen. Drag the crosshairs to the point you want to define as the X,Y center, then left-click to set it. This will become your new scaling center. This operation will have no affect on the current Z-axis setting.

Default – You may automatically set your scaling center to the center of your clip buffer (or screen, in Sequence mode) by clicking on Default.

<u>Scale</u> – While in Size mode, click on Scale, and two labeled slider bars will appear: Reduce and Enlarge. You may adjust the slide bars by either clicking on the arrows to the right and left of the bars, or by dragging the numbers themselves. The slide bar numbers represent the *multiplier* (above), and the *divider* (below) of a fraction which, in turn, represents the ratio of scaling that will be put into effect. Underneath the Scale box is the Size Ratio number, which is the result of dividing the Reduce number by the Enlarge number.

When Scale is first selected, both Reduce and Enlarge will be set to 100, and the size ratio number will be 1.00, meaning no scaling will occur. To reduce the scaling, set the Reduce number to be less than the Enlarge number (e.g., Reduce=25, Enlarge=75, Size Ratio=.33, or one-third). To enlarge the scaling, set the Reduce number to be greater than the Enlarge number (e.g., Reduce=100, Enlarge=50, Size Ratio=2.00, or double).

<u>Move</u> – Left-click on Move to create a straight-line path along which your clip buffer, or sequence will move. Three slider bars will appear representing, from top to bottom, the X, Y, and Z axes. Below these, a fourth row will display the label: "Mouse XY". Through using these controls, you may set the coordinates of the end point of your path.

You may adjust the coordinates of any of the three axis slider bars by clicking on the arrows on either side, or by dragging the number in the slider bar. The direction of the arrows represents the direction of the chosen axis. Thus, the X axis is horizontal from left to right, Y is vertical from top to bottom, and Z is depth from back to front. A zero setting for all three axes is in the center of the screen at the screen's surface. Positive directions for the three axes are: X axis right, Y axis bottom, and Z axis inward.

<u>Mouse XY</u> – You may alternatively set the end point – on *only* the X and Y axes – by clicking on Mouse XY. An outline will appear around your clipped image (or screen), and you may then drag the image to the end point of your choice. Release the mouse button to set the end point. This operation will have no effect on the current Z-axis setting.

Path – Left-click on Path to create a path along which your clip buffer, or screen will move. Path is different from Move (above) in that you may create a path other than a straight line, and there are three different types of paths. When you select Path, four options will appear in the area to the right: Clear Path, Path of Points, Clocked Sampled Path, and Sampled Path.

Clear Path – Left-click on Clear Path to erase any predefined paths from memory.

NOTE: Clear Path is used to delete any path that may currently exist. Although there are three types of paths, only one path may be used at any time. Thus, the selection of a new path will clear any predefined path in memory.

Path of Points – Left-click on Path of Points to activate. Path of Points allows you to set a pathway along which images may change their rate of movement.

When activated, your full screen will appear along with the cursor. Create your path, point-by-point, by left clicking to set each point. A "rubber" line will appear between each set point to indicate your path. When finished defining your path, click the right mouse button to return to the ADO f/x menu.

When your clip buffer, or screen moves along the Path of Points, it will take the same amount of time to travel between each point. Therefore, it will appear to travel faster between points that are far apart, and more slowly between points that are close together. Thus, the Path of Points can be used to alter rate of movement of the image along the path.

Clocked Sample Path – Left-click on Clocked Sample Path to activate. The Clock Sample Path uses a "real-time" clock while recording your path. This makes rhythmic movement possible.

Select Clocked Sample Path and the full screen will appear. When you click a second time a small representation of a spinning clock face will be displayed on the screen. While the clock is spinning, create your path by moving the mouse (you do not have to press the buttons). When the clock "time" runs out, your path will be automatically completed and you may not draw any more. The

amount of time you have to create your path depends on the number of frames in your animation (or segment), and the setting of your Animation Speed Control bar (see Time, above).

For example, if you are in To All mode on a 60-frame animation that you are playing back at 30 frames per second, the clock will count out two seconds, or exactly how long your animation sequence will run. The speed of the movements you impart in the mouse will be accurately recreated by the ADO Rendering (or the Preview).

Sampled Path – This is the simplest method of creating a path. Click on Sampled Path and the full screen will appear. To trace out a path, hold down your left mouse button and trace out the path you want by moving your mouse cursor. You can lay down a maximum of 2048 path points in this mode.

Kill Seq [K]
Left-click on Kill Seq to erase the entire animation sequence from memory. An alert box will appear asking if you want to clear all frames from memory. Select either Yes or No (or press [Y] or [N]).

WARNING: Kill Seq will erase all of your current animation sequence from computer memory. There's no way to undo this command – unless you've saved a copy of your animation on disk.

Quit [Q]
Left-click on Quit to exit the CYBER PAINT program and return to the GEM desktop. An alert box will appear asking if you want to leave CYBER PAINT. Left-click on either Yes or No (or press [Y] or [N]).

WARNING: Make sure that you have saved any changes to disk before Quiting Cyber Paint. All work in memory will be lost at that time.

Clip

The operations in the Clip menu all relate to an area of memory called *the clip buffer*, which is used for block "cut and paste" operations, such as those described in this section. The clip buffer

may also be used as form of brush in Streak, Stipple, or Airbrush drawing modes (see Use Clip in the Brush menu, below); in ADO f/x operations (described above), and the clip buffer may be accessed by disk I/O (see Load/Save, above).

Only one image may be in the clip buffer at any time, and the image currently in the clip buffer will remain there until replaced by another, either through a Cut or Clip operation, or by loading a .CEL or .BL? file.

Cut [Esc]
Cut allows you to cut out and copy all or part of an individual frame into the clip buffer.

Left-click on Cut and crosshairs will appear on your screen. In the upper-left corner of the screen will also appear the X and Y coordinates of the center of the crosshairs. Left-click to set one corner of a "rubber" box, then drag the box (without releasing the button) to create the opposing corner, and release the button to place in the clip buffer whatever image is within the box.

NOTE: Further screen coordinates will appear while the clip-buffer box is being drawn. The screen coordinates are in pixels, and are based on a low-resolution ST screen, which is 320 pixels wide by 200 high. The X, Y coordinates are numbered, starting at zero, from the upper-left corner of your screen. The group of numbers, which appears during the creation of the clip buffer are: (X starting point, Y starting point) X box-size, Y box-size (X current point, Y current point).

Paste [P]
Paste allows you to move *and* deposit the contents of your clip buffer on the screen. Depending on the setting of your frame mode (see Time, above) you may paste the clip buffer to the single frame currently displayed (To Frame); to a sequential range of frames (To Segment); or to all frames in memory (To All). Pasting the clip buffer while using To Segment or To All is irreversible, so an alert box will warn you before you may proceed. A single-frame paste may be erased by pressing [Undo].

When you left-click on Paste, your full workscreen will be activated, and the contents of the clip buffer will appear inside the

clip box. You may, at this point, click either mouse button to paste the clipped image where it appears; or you may hold down the left button and drag the clipped image anywhere on the screen, then paste it by releasing the mouse button. If the frame mode is set to single-frame, [Undo] will reverse the operation; otherwise, an alert box will prompt you before you may proceed. Multiple-frame pastes will step frame-by-frame through the selected frames and paste the clipped image on each frame. If Tween is active (in the ADO or Time menu), and the pasted image was first moved, the multiple-frame pastes will increment the image along the path of the movement. If Tween is inactive, the multiple-frame pastes will place the image in the same position on each frame. You may press any key during the multiple-frame operation to abort the process.

As you drag the clip buffer, X and Y position coordinates, plus X and Y delta coordinates will appear on the screen. The low-resolution ST screen is 320 pixels wide by 200 high. The X and Y position coordinates are numbered from the upper-left corner of your screen: X runs horizontally from 0 to 319; Y runs vertically from 0 to 199. The first group of two numbers indicate the starting coordinates of the upper-left corner of the clip buffer. The second group represents the *deviation* from the clip box's original starting coordinates. As you move the clip box to the left, the X-coordinate increase in negative value; to the right, in positive value. As you move the clip box up, the Y-coordinate increase in negative value; down, in positive value.

Move [M]

Move allows you to move a clip buffer image and position it anywhere on your workscreen, *without pasting it to the workscreen*. It works in similar fashion to Paste (above), but the frame modes (To Frame, To Segment, To All) have no effect.

When you left-click on Move, your full workscreen will be activated, and the contents of the clip buffer will appear inside the clip box. You may, at this point, hold down the left button and drag the clipped image anywhere on the screen, then leave it in its new position by releasing the mouse button. After you release the mouse button, the clipped image will vanish, but will appear in its new position at the beginning of subsequent clip buffer operations. Using the clip buffer as a brush (see Use Clip, below) will not alter the position which has been established by a Move operation.

As you drag the clip buffer, X and Y position coordinates, plus X and Y delta coordinates will appear on the screen. The low-resolution ST screen is 320 pixels wide by 200 high. The X and Y position coordinates are numbered from the upper-left corner of your screen: X runs horizontally from 0 to 319; Y runs vertically from 0 to 199. The first group of two numbers indicate the starting coordinates of the upper-left corner of the clip buffer. The second group represents the *deviation* from the clip box's original starting coordinates. As you move the clip box to the left, the X-coordinate increase in negative value; to the right, in positive value. As you move the clip box up, the Y-coordinate increase in negative value; down, in positive value.

Clip [Tab]

Clip automatically cuts and places in the clip buffer all images on the current frame which are not part of the background color.

Clip is similar to Cut (above), except that it is automatic, and it places in the clip buffer *all* images not made of the background color (color #1). When you select Clip, you will see a clip outline flash briefly on the screen defining the perimeters of your clipped image (or images). If you have only one small image on screen, Clip will create a box just large enough to encompass that image. If there are two or more objects scattered on the screen, the Clip boundary will be large enough to encompass all images present. If your entire screen is painted, Clip will cut and store the whole screen in the clip buffer.

Rotate [R]

Rotate lets you rotate your clip buffer image about any one of the three axes. Rotate is affected by the frame mode settings (To Frame, To Segment, To All) and the Tween setting in the Time submenu (See Time, above).

When you left-click on Rotate, your full workscreen will appear containing your last clip-buffer image. You may now rotate, or move this image. To move the image, place the cursor anywhere *inside* the clip box and drag the image to its new location. Release the left mouse button to release the image; you will remain in Rotate mode. To rotate the image, place the mouse cursor *outside* the box and hold down the left mouse button. A line will appear from the center of the box radiating out to your cursor. By rotating

your cursor around the clip box, a radius line will follow your
cursor around the image (like hands on a clock). You'll also notice
three other things: Your initial cursor starting point has a line
stretching from it to the center of the clip box, the clipped image
will start to rotate, and in the upper-left hand corner of your screen
is displayed the degrees of rotation from your initial starting point.
When you release the left mouse button, the image will remain in
its new position. To paste the rotated image and exit Rotate mode,
click the right mouse button.

*NOTE: Rotation operations do NOT alter the orientation of the
original image in the clip buffer.*

There are eight ways to rotate your clip image, depending on *where*
you place your cursor outside the box. The cursor may be placed
outside any of the four corners, or any of the four sides.

Z–AXIS (30)	X–AXIS (22.5)	Z–AXIS (45)
Y–AXIS (22.5)	R	Y–AXIS (1)
Z–AXIS (22.5)	X–AXIS (1)	Z–AXIS (1)

As you can see in the diagram, the clip box is represented as the
center box of a 9-box grid, surrounded by eight zones. We'll use
compass directions to refer to the zones. Thus, in a clockwise path,
the zones are: north, north-east, east, south-east, south, south-west,
west and north-west. Placing your cursor in one of these zones will
enable you to rotate the clip box around various axes, in various
increments:

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North: Rotate about the X-axis (22.5-degree increments).
North-east: Rotate about the Z-axis (45-degree increments).
East: Rotate about the Y-axis (1-degree increments).
South-east: Rotate about the Z-axis (1-degree increments).
South: Rotate about the X-axis (1-degree increments).
South-west: Rotate about the Z-axis (22.5-degree increments).
West: Rotate about the Y-axis (22.5-degree increments).
North-west: Rotate about the Z-axis (30-degree increments).

Counter-clockwise rotation is from zero to 360 degrees, clockwise rotation is from 360 to zero degrees.

As an example, if you want to rotate your image 57 degree around the Z axis, point the cursor just outside the south-east corner of the box (lower-left), hold down the left button, and move the mouse so that the image rotates in a counter-clockwise direction. Release the left mouse button and the image will remain in its rotated position. To actually perform the operation (and exit Rotate mode) you must click the right mouse button.

If Tween is on, and you are performing the rotation To All or To Segment, an alert box will first ask for your permission, since the operation cannot be undone. Choose Yes to proceed, or No to exit Rotate. If you proceed, the original position of the image will be pasted to the first frame, intermediate positions will be pasted to intermediate frames, and the final rotated position will be pasted to the last frame. If Tween is off, an identical copy of the final rotated position will be pasted to all selected frames.

Notice that after rotating an image from outside a particular corner or side of the clip box, you may release the left button, select a different corner or side, and begin rotation again. The clip box will immediately return to its original orientation.

NOTE: Rotations from the Clip menu are only done in one direction (counter-clockwise). The ADO f/x menu is used for multi-directional rotations.

Stretch [S]

Stretch lets you to stretch or scale the image in your clip buffer along the X and Y axes, elongating and distorting it. Stretch is affected by the frame mode settings (To Frame, To Segment, To All) and the Tween setting in the Time submenu (See Time, above).

Left-click on Stretch and your full workscreen will appear containing your last clip-buffer image. You may now stretch or move this image. To move the image, place the cursor anywhere *inside* the clip box and drag the image to its new location. Release the left mouse button to release the image; you will remain in Stretch mode. To stretch the image, place the cursor anywhere *outside* the clip box, hold down the left button, and move the mouse. Drag the mouse outward to enlarge the image, drag the mouse inward to shrink the image. When you release the mouse, the image will remain stretched. To paste the stretched image and exit Stretch mode, click the right mouse button.

NOTE: Stretch operations do NOT alter the size of the original image in the clip buffer.

During a Stretch operation, two sets of numbers will appear in the upper-left corner of your workscreen. The first set of numbers, in the parentheses, indicate how many pixels wide (X-axis) and high (Y-axis) your clip box is. The following two numbers represent the percentage, along the X and Y axes, of the stretched image as compared to the original image.

There are eight ways to stretch your clip image, depending on *where* you place your cursor outside the box. The cursor may be placed outside any of the four corners, or any of the four sides.

X / Y (INT.)	Y – AXIS (INT.)	X / Y (INT.)
X – AXIS (INT.)	**S**	X – AXIS (PIX.)
X / Y (PIX.)	Y – AXIS (PIX.)	X / Y (PIX.)

As you can see in the diagram, the clip box is represented as the center box of a 9-box grid, surrounded by eight zones. We'll use compass directions to refer to the zones. Thus, in a clockwise path, the zones are: north, north-east, east, south-east, south, south-west, west and north-west. Placing your cursor in one of these zones will enable you to stretch the clip box along various combinations of the axes, in various percentages:

North: Stretch along the Y-axis (integer increments).
North-east: Stretch along the XY-axes (integer increments).
East: Stretch along the X-axis (one-pixel increments).
South-east: Stretch along the XY-axes (one-pixel increments).
South: Stretch along the Y-axis (one-pixel increments).
South-west: Stretch along the XY-axes (one-pixel increments).
West: Stretch along the X-axis (integer increments).
North-west: Stretch along the XY-axes (integer increments).

Note that the side zones stretch the image along a single axis, whereas the corner zones stretch the image along both X and Y axes. Also, the south-east and north-west corners stretch both axes equally, maintaining the proper aspect ratio of the original image; the north-east and south-west corners permit flexible change of either of the two axes.

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The integer increments of the Stretch function work on the basis of a percentage of the last stretched size after the release of the mouse button. If you are in one of the integer move zones (see above) and you move (or left-click) your cursor outward without releasing it, you will stretch your clip box in percentages of 100 (1X), 200 (2X), 300 (3X) and so on. If you are in one of the integer move zones and you move (or left-click) your cursor inward, you will compress your clip box in percentages of 50 (1/2), 33.3 (1/3) and 25 (1/4).

One-pixel increments stretch the image one pixel at a time.

If you are performing the stretch To All or To Segment, an alert box will first ask for your permission, since the operation cannot be undone. Choose Yes to proceed, or No to exit Stretch. If you proceed, and Tween is on, the original position of the image will be pasted to the first frame, intermediate positions will be pasted to intermediate frames, and the final stretched position will be pasted to the last frame. If Tween is off, an identical copy of the final stretched position will be pasted to all selected frames.

Unlike the Rotate function (above), multiple Stretch operations are cumulative. That is, after stretching an image and releasing the left mouse button, you may select a different corner and continue to stretch or alter the previously stretched image.

Invert [I]
Invert "flips" whatever is in your cut buffer. It will rotate images about their X or Y axes 180 degrees, resulting in a mirror image of the contents of your clip buffer. Invert is not affected by frame modes or Tween.

Left-click on Invert and your full workscreen will appear containing the last image in your clip buffer. You may now move or invert this image. To move the image, place your cursor anywhere *inside* the clip box and drag the image, releasing the left button to release the image. You will remain in Invert mode. Left-click anywhere outside the clip box to invert the image. The image will be flipped so that the side (or corner) directly opposite your cursor becomes the side (or corner) nearest the cursor. Thus, click outside the left or right sides to invert about the Y axis; click outside the top or bottom sides to invert about the X axis. Click outside any

corner to invert about both axes. Right-click to paste the image and exit Invert mode.

NOTE: Unlike Rotate and Stretch operations (above) Invert DOES alter the original image in the clip buffer. After clicking to invert an image, however, you may left-click again in the same position to restore the image.

Fit Colors [N]

Left-click on Fit Colors to adapt the colors in the clip buffer with those of the currently active palette.

When the CYBER PAINT palette has been altered (either directly through palette changes, or by loading a file containing a different palette), a previously clipped image will take on the colors of the new palette. Fit Colors will compare the old clip buffer colors with those in the new palette, then remap the color registers in the clip buffer to match, as closely as possible, its original colors. The success of this effect will depend largely on the variance of the colors between the original clip-buffer palette and the new palette.

As an example: Given a yellow clipped image, and an original palette containing yellow in color register #3; when a sequence file is loaded with a new palette containing red in color register #3, and yellow (or near-yellow) in color register #7, the clip-buffer image will become red. Select Fit Colors, CYBER PAINT will match the yellows for a near-fit, and the clipped image will now use register #7 and become yellow once more.

Mask [V]

Select Mask to change all colors in the clip buffer (except the background color) to one overall color – the color you have currently selected to draw with (see Color).

Draw

The Draw menu contains a list of ten drawing tools and their keyboard equivalents. Only one drawing tool may be active at any time, and the currently active tool will have a double-arrow indicator to the left of its name. Left-click to select any of the ten

tools. The default drawing tool at boot-up is Draw with a one-pixel-sized brush enclosed in an outlined cross-shaped cursor.

The operation of the drawing tools will be effected by varying items in the Frame, Brush, and Color menus, and all drawing tools will be affected by Cycle in the Color menu. (See Frame, Brush, and Color, below).

NOTE: Pressing [Undo] will delete the last continuous drawing operation, no matter what drawing mode you're in or what brush you're using. Pressing [Undo] again restore the last thing you drew.

Draw [1]
Select Draw to freehand draw a continuous, solid line using any of CYBER PAINT's colors or brushes. To use the Draw tool, hold down the left mouse button while moving the mouse. A line will be drawn in the current brush shape, using the currently selected color. (See Brush, Color.)

Streak [2]
Streak is identical to Draw, above, except that the line drawn may not be solid – depending on the speed of your mouse movement. By using swift movements, the Streak tool will skip pixels, giving a "sketchy" look to the line. As with Draw, Streak uses the current brush shape and selected color. Unlike Draw, Streak will operate with the Use Clip function in the Brush menu. (See Use Clip, Brush, Color.)

Stipple [3]
Stipple sprays a small, randomly-arranged pattern of brush shapes in the selected drawing color. Unlike Airbrush (below), Stipple is not adjustable, but it is functional with Use Clip. (See Use Clip, Brush, Color.)

Airbrush [4]
Airbrush sprays a randomly arranged pattern of brush shapes in the selected color. Airbrush is similar to Stipple (above), but is adjustable both in intensity of flow and in breadth of pattern. Airbrush is functional with Use Clip. (See Air Speed in the Menu, above, and Use Clip, Brush, and Color, below.)

Fill [5]

Fill allows you to fill, using the selected color, any area of your screen composed of a single color – including the background color. The fill will alter all contiguous pixels of the same color, stopping when it reaches a different color. *Contiguous pixels* may be defined as those pixels whose *sides* are touching.

Upon selecting Fill, a hollow cursor labeled "Fill" will appear. Place the center of the cursor over the area you want filled, and press the left mouse button. Your selected drawing color will fill that area. (See Color.)

Line [6]

Line lets you draw a straight line, in the selected color and using the selected brush, stretching from one point to another. The Line tool will function differently depending on the Distinct, Connected, and Concentric settings in the Modes menu. (See Brush, Color, and Modes.)

Distinct: Hold down the left mouse button while moving the mouse, and a line will stretch from the first point in the selected color and using the selected brush. Release the mouse button to draw the line. You may now move the mouse cursor to a new position and repeat the above procedure to draw another line.

Connected: Click once on the left mouse button to set the first point, move the mouse to stretch the line, left-click again to draw the line and set a second point, move the mouse again to stretch a line from the second point...continue in this fashion until you wish to exit the operation, at which point you click the right mouse button.

Concentric: Concentric lets you create rays. Click once on the left mouse button to set the center point of your rays. Move the mouse away from the center and a thin "rubber" line will appear. Left click to draw the first ray, move the mouse, left click to draw the second ray...continue in this fashion until you wish to exit the operation, at which point you click the right mouse button.

Polygon [7]

Polygon lets you create straight-edged geometric shapes in the selected color – squares, rectangles, trapezoids, etc. . The Polygon tool functions identically in the Distinct, Connected, and Concentric modes, but differs depending on the Filled setting in the Modes menu. (See Brush, Color, and Modes.)

Click once on the left mouse button to set the first point (or polygon vertex), move the mouse and a line will appear, left-click to set the second point, move the mouse a third time and a line will stretch from the cursor to both the original point and the second point, click to set this point, then move the mouse again... Each time you set a point then move the mouse, a line will stretch from the cursor to both the original point and the last point set. Right-click to exit the operation.

If Filled is active in the Modes menu, a solid polygon will be created and the selected brush shape will not be used. If Filled is inactive in the Modes menu, a hollow polygon will be created whose lines are made up of the selected brush shape.

Circle [8]

Circle lets you create circles in the selected color. The Circle tool will function differently depending on the Distinct, Connected, Concentric, and Filled settings in the Modes menu. (See Brush, Color, and Modes.)

Distinct: Hold down the left mouse button and drag the mouse away. A circle will be created, using the original mouse position as the center. Release the mouse button to draw the circle. If Filled is active in the Modes menu, a solid circle will be created and the selected brush shape will not be used. If Filled is inactive in the Modes menu, a hollow circle will be created using the selected brush shape.

Connected: Hold down the left mouse button and drag the mouse
               away. A circle will be created, using the original
               mouse position as the center. Release the mouse
               button to draw the circle. Now, repeat the above
               procedure to create a second circle. This time, the
               center of the circle will automatically be placed at the
               position the mouse cursor was at when it was released
               after drawing the first circle. A third circle will use,
               as center, the release point of the second, and so on. If
               Filled is active in the Modes menu, solid circles will
               be created and the selected brush shape will not be
               used. If Filled is inactive in the Modes menu, hollow
               circles will be created using the selected brush shape.

Concentric: Hold down the left mouse button and drag the mouse
               away. A circle will be created, using the original
               mouse position as the center. Release the mouse
               button to draw the circle. Now, repeat the above
               procedure to create a second circle. This time, the
               center of the circle will automatically be placed at the
               center of the previous circle. All subsequent circles
               will continue to use the same center, no matter where
               you click the mouse. If Filled is active in the Modes
               menu, solid circles will be created and the selected
               brush shape will not be used. If Filled is inactive in
               the Modes menu, hollow circles will be created using
               the selected brush shape.

*NOTE: Concentric circles will be most effective when used with
Cycle, or in non-Filled mode.*

Box [9]
Box lets you create squares or rectangles in the selected color. The
Box tool will function differently depending on the Distinct,
Connected, Concentric, and Filled settings in the Modes menu. (See
Brush, Color, and Modes.)

Distinct: Hold down the left mouse button and drag the mouse
away. The position where the mouse was first clicked
becomes one corner of the box, while the current
mouse position creates the opposing corner. Release
the mouse button to draw the box. If Filled is active
in the Modes menu, a solid box will be created and
the selected brush shape will not be used. If Filled is
inactive in the Modes menu, a hollow box will be
created using the selected brush shape.

Connected: Hold down the left mouse button and drag the mouse
away. A box will be created, as described above.
Release the mouse button to draw the box, then repeat
the procedure to create a second box. This time, the
initial corner of the box will automatically be placed
at the position the mouse cursor was at when it was
released after drawing the first box. A third box will
use, as its corner, the release point of the second, and
so on. If Filled is active in the Modes menu, solid
boxes will be created and the selected brush shape
will not be used. If Filled is inactive in the Modes
menu, hollow boxes will be created using the selected
brush shape.

Concentric: Hold down the left mouse button and drag the mouse
away. A box be created. Release the mouse button to
draw the box, then repeat the procedure to create a
second box. This time, the center of the box will
grow, concentrically, from the center of the previous
box. All subsequent boxes will continue to use the
same center, no matter where you click the mouse. If
Filled is active in the Modes menu, solid boxes will
be created and the selected brush shape will not be
used. If Filled is inactive in the Modes menu, hollow
boxes will be created using the selected brush shape.

*NOTE: Concentric boxes will be most effective when used with
Cycle, or in non-Filled mode.*

Text 0

Text enables you to place, on your screen, text of the selected
color, in varying fonts and point size. To pick a specific size and
type of font, use the Set Font option, as described in the Menu
section, above. At default, CYBER PAINT will use the Atari
system font.

When you select Text, the cursor will change to an "L" shape. Point
the cursor to the position you wish to start typing, and click the
left button. An outline box will appear that is the size of the
selected point size. Type in the text you desire, either upper or
lower-case (press [CapsLock] to maintain all upper-case). As you
type, the text will appear on your screen in the selected color.
Click the right mouse button to return to the L-shaped cursor. You
may now reposition the cursor, and left-click to begin new text in
another position.

If you mistype a character, simply backspace over it. If you change
your mind, and do not want the text to appear in that position,
either right-click and press [Undo], or backspace over the entire line
of text to eliminate it, then click the right mouse button.

*NOTE: CYBER PAINT keyboard alternatives will not function while
typing in Text mode.*

Modes

The Modes menu contains a list of modes which may be turned on
or off, and which affect various of the functions in CYBER
PAINT. Selected functions will have a double-arrow displayed to
the left of their name. The first four functions: Zoom, Ping Pong,
X-ray Copy, and Filled, may be either all active, or all inactive – or
selected and deselected in any combination. Of the last three
functions: Distinct, Connected, and Concentric, only one may be
active at any time, and at least one must be active.

Zoom [Z]

Zoom turns the workscreen into a magnified window of a selected
portion of the workscreen. All tools in CYBER PAINT will
operate properly in either Zoom or normal view mode.

Select Zoom and a box will appear which represents the magnify window. Move the mouse to whichever portion of your screen you wish magified, and click the left mouse button. The area within the box will be magnified to fill the entire workscreen. You may use any of CYBER PAINT's functions while in Magnify. To return to the normal workscreen, select Zoom again from the Modes menu.

While Zoom is active, you may move the position of the Zoom window within the workscreen by pressing various of the number keys on the keypad at the right of your Atari keyboard. The number [5] represents the current position of the Zoom window, and the eight keys surrounding it represent the directions you may move the window.

North: [8]
North-east: [9]
East: [6]
South-east: [3]
South: [2]
South-west: [1]
West: [4]
North-west: [7]

Remember that the keyboard alternatives are active while in Zoom mode, so to move forward or backward through an animation sequence, one frame at a time, just press the right or left cursor-arrow keys. [F1] will place you at the beginning of your animation, [F10] will take you to the last frame, and the up and down arrows will run the animation forward or backward.

Ping Pong [W]
Ping Pong plays your animation sequence back and forth, going from the starting frame to ending frame, then backwards through the sequence, repeatedly. For example, a five-frame animation sequence would play as 1-2-3-4-5-4-3-2-1 etc.

Left-click on Ping Pong to toggle it on or off. When active (as shown by the double-arrows to the left of the word), you will be in Ping Pong mode.

Xray Copy [X]

When X-Ray Copy is active, the background color (color #1) of the clip buffer is transparent during clip-buffer paste operations. When X-Ray Copy is inactive, all colors in the clip buffer, including the background, are opaque. Left-click on X-Ray Copy to toggle it on or off.

X-Ray Copy affects any operation where the clip buffer is drawn to the screen, including Tween operations and ADO f/x. It does *not* affect the Text drawing tool.

Filled [F]

Left-click on Filled to toggle it on or off. Fill affects the operation of three tools in Draw menu. When Filled is active, the Circle, Box, and Polygon tools in the Draw menu will create solid shapes. When Filled is inactive, the Circle, Box, and Polygon tools will create hollow shapes – and will use the selected brush for their lines. (See Circle, Box, and Polygon in the Draw menu, above.)

The three Modes below affect the operation of the Line, Circle, and Box tools in the Draw menu. They do not affect the Polygon drawing tool. (For details, see Line, Circle, and Box, in the Draw menu, above).

Distinct

When Distinct (the default) is active, you may define starting points or centerpoints of lines, circles, and boxes anywhere on your workscreen. (For a detailed description of Distinct, see Line, Polygon, Circle, and Box in the Draw menu, above.)

Left-click to activate (if you were in Connected or Concentric mode).

Connected

Connected works slightly differently for either Line, Circle, or Box. When drawing lines with Connected active, the end points of the lines remain connected with each set point. If drawing multiple circles, the end point of the drawn circle (on the circumference) becomes the starting point of the next circle. When drawing multiple boxes, the end point of the drawn box (the opposing corner) becomes the starting point (corner) of the next box. (For a detailed description of Connected, see Line, Circle, and Box in the Draw menu, above.)

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Concentric

Concentric works the same with Box and Circle, but differently with Line. When drawing lines in Concentric mode, the lines become "rays." The first point set is the center, and all remaining lines emanate in rays from that point. If drawing either boxes or circles, the first point set becomes the center for all remaining boxes or circles. (For a detailed description of Concentric, see Line, Circle, and Box in the Draw menu, above.)

Frame

The Frame menu contains options which effect either a single frame, or a range of frames, as indicated by the frame mode (To Frame, To Segment, and To All).

Undo [Undo]

Select Undo to eliminate the last change made to your frame. Selecting Undo again restores the change. Undo will only eliminate the *last* change. Thus, if you draw a line, release the mouse button, then draw a second line, you may Undo the second, but not the first line. Undo does not work with multiple-frame operations.

Restore [Backspace]

Restore is a more powerful form of Undo – it eliminates *all* changes you've made to your current frame since you got to that frame. Unlike Undo, you may not reverse the procedure by selecting Restore again – though you may reverse the procedure by pressing [Undo]. Also, you may not restore work that was done on the frame prior to going to the frame, nor may you restore work on a frame once you leave that frame.

Separate [-]

Separate is a variation on Fill that replaces every occurrence of a specific color in a frame – or range of frames – with the currently selected color. Separate is affected by the frame mode settings: To Frame, To Segment, and To All.

Choose your color from the Color menu, left-click on Separate, then click on the color you wish to change on the workscreen. Separate will replace all occurances of that color with the selected color. If the frame mode is set to To Frame, only the colors in the

displayed frame will be affected; if the frame mode is set to either
To Segment, or To All, the colors in the entire range of frames
selected will be affected.

Blue Pic [(]

Blue Pic allows you to "blue out" the images on your workscreen,
turning them into a mask. This allows you to make changes to the
original details, then eliminate the original and leave only your
changes (see Unblue Pic, below). Its name is derived from the "non-
repro blue" color used in making blueprints or offset printing.

Blue Pic is affected by the current frame mode. If the frame mode is
set to To Frame, only the current frame will be affected; if set to
To All, Blue Pic will blue out every frame in the sequence; if the
frame mode is set to To Segment, Blue Pic will blue out all frames
in the selected range. Blue Pic is primarily designed to be used in
single frame mode.

You can use this feature (and/or Next Blue, below) to trace over
previous artwork and make incremental changes between frames. In
CYBER PAINT, Blue Pic knocks out the details of everything on
your workscreen with a single color (Color #2 on your Color
palette – see Color, below). In the default mode, Color #2 is a dark
blue.

*NOTE: In some palettes, color #2 may be difficult, if not impossible,
to see. During "blueing" operations, you might want to temporarily
brighten color #2 using the Palette, then later restore the color to
its original value.*

Unblue Pic [)]

Unblue Pic erases anything "blued" on the current frame by
replacing it with the background color (color #1). It does not erase
any changes you've made to the original, previous blued frame.
Unblue Pic may by used with the three frame mode settings. You
may erase the blue from the displayed frame in To Frame, from a
range of frames in To Segment, or from all frames in To All.

Next Blue [/]

Next Blue automatically takes whatever changes you've made to your current frame, copies them to the next frame, unblues the masked image from the original frame, then displays the next frame with the changes blued.

For example: Frames #1 through #4 contain identical pictures of, say, a mountain which was drawn previously. In frame #1, you draw a red and yellow flower, then select Next Blue. Your red and yellow flower is copied to frame #2 as a blue mask and CYBER PAINT advances to frame #2 so that you may continue. You draw another red and yellow flower in frame #2, then select Next Blue again. The blue mask is erased from frame #2, the new red and yellow flower is copied to frame #3 as a blue mask, and frame #3 is displayed so you may continue. If, at this point, you were to select Next Blue without having made any further changes, the blue mask in frame #3 would be erase and frame #4 would be displayed.

Get Changes [✻]

Get Changes grabs whatever *changes* you've made to your workscreen (since you began work at that particular frame) and places them in the clip buffer. It is used to copy your changes – intact – from frame to frame. (See Next Changes, below.)

Next Changes [+]

Next Changes is equivalent to Get Changes, above, with the addition that it automatically advances to the next frame, and pastes the contents of the clip buffer (the changes from the previous frame) onto the new frame.

NOTE: Get Changes and Next Changes only sense the changes you've made to a frames. If, for example, you draw a new, white circle overlapping a previously drawn white mountain, the piece of the circle overlapping the mountain won't be placed in the clip buffer, since that area was already white.

Clear Pic [Clr Home]

Clear Pic erases your workscreen(s) without deleting the actual frame from memory (see Delete, below). This command operates with the To Frame, To Segment, and To All frame modes. If you are in To Frame mode, select Clear Pic and the image on the current frame will be immediately erased; press [Undo] to restore the

image. If you are in To Segment or To All, select Clear Pic to erase
the images over the chosen range of frames. Using Clear Pic over a
range of frames cannot be undone, so an alert box will warn you
before you may proceed.

Defocus [D]

Defocus is a blurring function. It is similar to, but less
discriminating than, antialiasing, which appears to smooth the
stairstepping effect of raster-based screen graphics. Defocus does
pixel averaging on the contents of your cut buffer.

Left-click on Defocus to activate. When you do, your work screen
will appear, and after a few moments you'll notice Defocus blurring
the images on your workscreen. When it's finished, it will
automatically bring up the main menu screen. You can use Defocus
with To Frame, To Segment and/or To All (See Time.)

Delete [Delete]

Delete removes your frame(s) from memory. This command
operates with the To Frame, To Segment, and To All frame modes.
While in To Frame mode, Delete snips out the single frame
currently displayed, then renumbers your animation sequence from
that frame forward. For example, if you have four frames of
animation, and you Delete frame #2, frames #3 and #4 become #2
and #3, and your Animation Frame Counter displays a total of three
frames. If you are in To Segment, select Delete to erase the chosen
range of frames. Delete in To All mode works the same as Delete in
To Frame. If you wish to delete all your frames, select Kill Seq
from the Menu drop-down. Delete cannot be undone, so an alert
box will warn you before you may proceed.

Scratch [\]

Scratch enables you to play an animation sequence back and forth in
real time with the mouse – without any menus displayed on screen.
Select Scratch, and you will be presented with a full workscreen.
Click once on the left mouse button, then move the mouse left and
right to "scratch" the animation. Click the right mouse button to
exit Scratch.

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Scratch can be used in a live video performance environment similarly to the way rap musicians use scratch record effects. Or, it could be used while recording on video to syncronize your animation to music.

Brush

From the Brush menu, you may select the brush shapes that will be used by the various tools in the Draw menu (see Draw, above). There are 16 predefined brush shapes in the Brush menu – 15 of which may be redefined. In addition, by selecting the Use Clip option, you may use the contents of the clip buffer to draw with the Streak, Stipple, and Airbrush tools in the Draw menu.

The default brush shape in CYBER PAINT is called "Brush One." It is a single pixel in size, and represented by a cursor shaped like a hollow cross. This is the only brush that may not be redefined. To select any brush shape from the Brush menu, point to the shape you want, and left-click. The mouse cursor will become the shape of the brush, and subsequent brush-drawing operations will use that shape.

Get Brush [G]
Get Brush enables you to redefine the existing brush shapes by "grabbing" a small portion of your workscreen.

First, draw a shape on the workscreen that you wish to use as your brush (or decide on a shape that already exists). Now, select a brush shape that you wish to redefine (you may not use Brush One in the upper-left corner). Next, click on Get Brush, and the mouse cursor will become a small box representing the maximum size of the brush (16x16 pixels). Move the box over the place on the screen where you want to grab your brush shape, then left-click. Your mouse cursor will take on the shape you just captured, and the new shape will appear in the Brush drop-down in place of the previously selected shape.

NOTE: The design you capture from the screen must contain some amount of background color, or your brush will appear solid. After a brush capture, the background color becomes the transparent part of the brush, and all other colors take on the current drawing color. If you grab a portion of the screen containing all background color, CYBER PAINT will do nothing – to avoid an invisible cursor.

Use Clip [U]

Select Use Clip, and a double-arrow will appear to its left signifying that it is active. While Use Clip is active, the Streak, Stipple, and Airbrush tools in the Draw menu will use the contents of the clip buffer as a brush. If the clip buffer is empty, Brush One will be used instead. You may deactivate Use Clip by reselecting it, or by selecting any of the brush shapes from the Brush menu. While Use Clip is active, you may change the clip buffer contents at any point, then continue to draw with the new contents.

NOTE: Because Use Clip uses multi-colored clip buffer contents, Cycle will not work while it is active. Also, the X-Ray Copy setting in the Modes menu will affect the Use-Clip brush.

Color

The Color drop-down menu offers 16 blocks of color to choose from, a color cycling mode, and a palette submenu, from which you may adjust any or all of the 16 colors in your palette.

To select your current drawing color, point your cursor at the desired color block, and left-click. When you point at the color block, it will be outlined. The selected drawing color will be indicated by a small cross in the center of the color block. The selected color will be used by all tools in the Draw menu (see Draw menu, above).

NOTE: You may also select colors directly from the workscreen by placing the mouse cursor over any color, and pressing [C].

Cycle [!]

Cycle is a mode which lets you cycle through a selected range of colors *as* you are drawing. Select Cycle to activate it, select it again to deactivate it. A double-arrow will indicate that Cycle is active.

Cycle works differently with the various tools in the Draw menu:

Draw	Creates a multi-colored line in the shape of the chosen brush.
Streak	Same as draw, except that the multi-colored brush lines may be broken if the mouse is moved quickly enough.
Stipple	Creates random, multi-colored brush shapes.
Airbrush	Creates adjustable random, multi-colored brush shapes.
Fill	Each fill will be a different, solid color.
Line	In Distinct mode, each new *line* will be a different color; in Connected mode, each new *group of connected lines* will be a different color; in Concentric mode, each new *ray* will be a different color.
Polygon	Each new polygon will be a different color.
Circle	Each new circle will be a different color.
Box	Each new box will be a different color.
Text	Using a monospace font (such as the system font), each new letter will be a different color; using a proportional font, the color of all the entered text will change with each letter typed.

NOTE: While Cycle is active, your current selected color will be ignored. As soon as you select another color from the Color menu, Cycle will automatically be deselected.

The range of colors that Cycle will display are selected with the Color Range Bar in the Palette submenu, described below. (See Shift, below, for another form of color cycling.)

Palette [@]

Select Palette and a submenu will appear that lets you alter the colors in your color palette, and adjust the range of colors affected by the Cycle function. You may exit the Palette submenu at any time by pressing the right mouse button.

↑	←	←|	1	|→	→	↓			
RGB				6		Shift		Inverse
				7		Range		Restore
HLS	0					Copy		Tint

The Palette submenu includes an abbreviated Playback Bar in the upper-left corner. To the right of the Playback Bar is the Color Bar, representing the 16 color registers (#1 on the left through #16 on the right). A single pixel indicates which color is currently selected. Directly below the Playback Bar is the Color Adjustment area, featuring three slider bars to adjust the colors, plus two mode-selection boxes – labeled RGB and HLS – which alter the effect of the slider bars. Below the Color Bar, is a Color Range Bar, similar to the Segment Range Bar in the Time submenu (see Time, above). Below the Color Range Bar are six selection boxes labeled: Shift, Inverse, Range, Restore, Copy, and Tint.

Color Bar – The Color Bar displays the 16 available colors currently in the palette. Any color changes which are made, using the other features in the Palette submenu, will be reflected in the Color Bar. You may select any color by pointing and clicking on it. A single highlighted pixel will indicate the selected color.

NOTE: The color at the far left of the Color Bar is color #1, and is always the background color. Color #1 will be the transparent color when X-Ray Copy is active in the Modes menu. The second color in the bar is color #2, and is the "blueing" color used for the various options in the Frame menu. If you can't see your "blueing" color, adjust this color register. CYBER PAINT uses various color registers for displays such as menus, drop-down menu outlines, and so on. If the color register used for, say, outline becomes too dark to read, CYBER PAINT will automatically switch to a better color in the palette.

Color Adjustment – There are two modes of color adjustment in CYBER PAINT: RGB and HLS. RGB is the standard Atari method, and stands for Red, Green, Blue – the three colors available on the Atari monitor which are blended in intensity to create the full possible range of 512 colors. HLS stands for Hue, Luminence, Saturation, and is a special method of adjusting colors available with CYBER PAINT.

There are three steps to adjusting a color. First, select the color you wish to adjust by clicking on it in the Color Bar; second, select the adjustment mode by clicking on either RGB or HLS; finally, drag the three slider bars to adjust the color.

RGB Mode RGB color adjustment is a matter of mixing the colors of Red, Green, and Blue by altering the intensity level of the three colors. There are seven levels of intensity, from 0: no light, to 7: full light. Black, for example, would be 000, white would be 777, and pure red would be 700. When RGB is selected as the adjustment mode, the slider bars represent (from top to bottom) Red, Green, and Blue, and the sliders contain numbers indicating the intensity value of each color. To adjust the selected color to red, for example, you would slide the top bar all the way to the right, and slide the bottom two bars all the way to the left, so that the slide numbers read, from top to bottom: 700.

HLS Mode HLS color adjustment is excellent for making slight alterations to existing colors. When HLS is selected as the adjustment mode, the slider bars represent (from top to bottom) Hue, Luminence, Saturation, and the sliders become vertical bars. Hue really means "color," and may be thought of as the position of a color in the overall spectrum of colors – irregardless of its intensity or saturation. Luminance is the color's intensity, or how dark or light it is. Saturation is the purity of a color – or how vivid it is. Moving the Hue slider will change the hue of the selected color without altering its saturation or intensity. Moving the Luminence slider will increase or decrease the intensity of the selected color without changing its hue; at the left extreme, any color will become black, and at the right extreme, any color will become white. Moving the Saturation slider will change the amount of saturation of a chosen color without affecting its hue or intensity; at the left extreme, any color will become some shade of gray. A color modified with Saturation might go from a grey to a pastel-pink to a bright red.

Color Range Bar – The Color Range Bar is used to select a range of colors to be affected by some of the selections boxes (described below), including: Shift, Inverse, Range and Tint. To adjust the Color Range Bar, drag one of the dots to below a color in one end of the desired range, then drag the second dot to below a color at

the other end. If you wish to affect only one color, you may drag both dots to below a single color. In addition, the Cycle function in the Color drop-down menu uses the range of colors indicated by the Color Range Bar.

Shift – Each time you click on Shift, the colors indicated by the Color Range Bar will be shifted one color in the direction that the diamond-shaped dot of the Color Range Bar is pointing. (See Cycle in the Color drop-down menu for a different form of color shifting.)

Inverse – Click on Inverse to reverse the RGB values of all colors selected in the Color Range Bar. For example, if the first color in the range is 181 (a bright green) Inverse will reverse the values to 818 (a bright purple).

Range – Click on Range, while RGB mode is active, to average the colors between the two end colors selected in the Color Range Bar. For example, if the color at one end of the Color Range Bar is pure white (777), and the color at the other end is pure black (000), clicking on Range would give you a swath of intermediate colors ranging from white to light gray to dark gray to black. Range will also work on odd color combinations, such as purple and green, and will try to find the best palette of intermediate colors between them. While HLS mode is active, click on Range to create a rainbow of colors. The most effective rainbows are created by using a wide range, and by placing identical, pure colors at both ends (such as 700; red).

Restore – Restore will return your palette to the values in contained when you first activated the Color Palette submenu. Once you exit the Palette submenu by right-clicking, all color changes are set and may not be restored.

Copy – Copy may be used to copy a color from one position in the Color Bar to another. First, left-click on the Color Bar to select the source color that you want to copy *from*; second, click on Copy; finally, click on the destination color in the Color Bar that you wish the color copied to. As soon as you click on the destination color, it will become the same color as the previously selected source color.

Tint – Tint uses the values of a single, selected color to tint the colors indicated by the Color Range Bar. To use, first adjust the Color Range Bar to include the range of colors you wish to tint; second, left-click to select the color in the Color Bar that you wish to use as a tinting color; finally, click on Tint, and the chosen range of colors will be tinted – to the extent that they can be – by the selected color. This is a cumulative effect, each click on Tint will continue to tint the color range, until it is no longer logically possible. The Tint effect is limited by the RGB mixture of any color in the chosen range. Thus, a pure red (700) within the color range, will not be affected when another pure red is the tinting color.

CYBER PAINT™ KEYBOARD COMMAND CARD

Menu:

T	Time
L	Load/Save
L	Load
S	Save
K	Kill
A–J	A:–J:
=	Set Font
#	Air Speed
?	Status
A	ADO f/x
K	Kill Seq
Q	Quit

Clip:

Esc	Cut
P	Paste
M	Move
Tab	Clip
R	Rotate
S	Stretch
I	Invert
N	Fit Colors
V	Mask

Modes:

Z	Zoom
W	Ping Pong
X	Xray Copy
F	Filled
(no alternative)	Distinct
	Connected
	Concentric

Frames (keypad):

Undo	Undo
Backspace	Restore
—	Separate
(	Blue Pic
)	Unblue Pic
/	Next Blue
*	Get Changes
+	Next Changes
Clr Home	Clear Pic
D	Defocus
Delete	Delete
\	Scratch

Brush:

G	Get Brush
U	Use Clip

Color:

!	Cycle
@	Palette

Alert boxes:

Y	Yes
N	No
Any key	Continue

Miscellaneous:

Space Bar	Right mouse button
Return	Append 10 frames
(Period)	Toggle frame modes

Draw Streak Stipple Airbrush Fill Line Polygon Circle Box Text

! 1	@ 2	# 3	$ 4	% 5	^ 6	& 7	* 8	(9	) 0
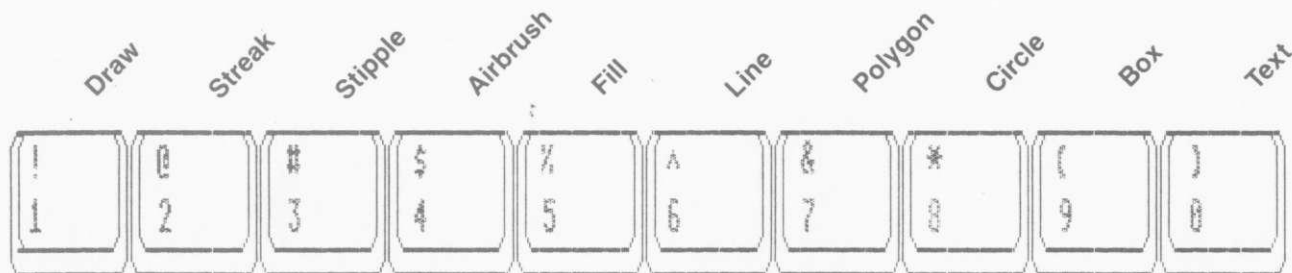
CYBER PAINT™
Do-It-Yourself Playback Bar Template
(Just cut out and tape to your ST.)

F1	F2	F3	F4	F5
↑	≪	←	⊢	⇤

F6	F7	F8	F9	F10
▷	⊦	→	≫	↓
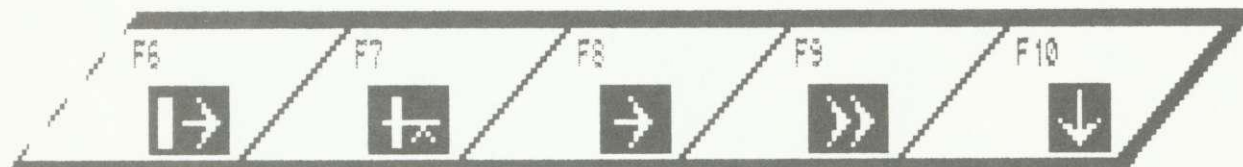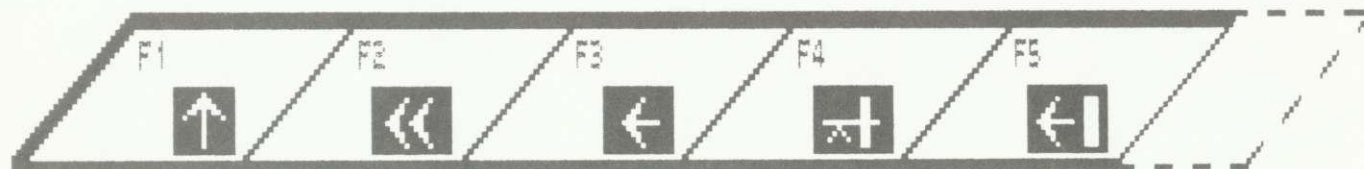
Appendix A

USING CYBER STUDIO AND CYBER PAINT

By Jon A. Bell

If you're reading this appendix, we assume that you own a copy of CYBER STUDIO (CAD-3D 2.0 and the CYBERMATE animation control language, available through The Catalog, PIC# ST0236), and that you're familiar with CYBER PAINT's drawing and animation functions. This appendix examines how to use CYBER PAINT in conjunction with CAD-3D 2.0, and will be of primary use to CYBER STUDIO owners. But if you don't own CYBER STUDIO, you can still get some tips here on how to get more out of CYBER PAINT.

Brainstorming

Weeks before I had even begun to work on this manual, I was playing with an early version of CYBER PAINT, drawing crackling lightning bolts and laser beams over the screen and playing them back and forth. The early copy of CYBER PAINT didn't have Ping-Pong, Text or many other capabilities; it was simply a bare-bones, alpha version of the program.

But even with this early version, my artistic sense was piqued, and I wanted to produce something that was visually striking yet still relatively simple. I also had to be able to produce it in a single evening, because an Atari Computer Fest was the next day, and I wanted to show off an interesting ST demo – letting CYBER PAINT help me produce an animated advertisement for itself.

That night, after four hours with CYBER PAINT and Tom Hudson's CAD-3D 2.0, I had produced the Tesla animation sequence, which is on your CYBER PAINT disk as TESLA.SEQ.

Tesla – From .DLT to .SEQ

If you've gone through the CYBER PAINT tutorial, you've already seen the Tesla sequence. However, I'd like you to load it in again, so we can dissect it a frame at a time. And, after it's loaded, you can add your own little touches, then save the new version back to disk.

So, from the Load/Save submenu, load TESLA.SEQ. Once it has loaded, select Forward Play and let the animation run for a few cycles.

Notice that the lightning arcing up the posts seems to be illuminating them – interactive lighting effects, in other words. The effect is most striking as the lightning arc hits the heretofore invisible words "CYBER PAINT" and they flash on and off, making the platform colors vibrate.

Creating an effect like this takes careful planning beforehand. I knew, before I had even booted up CAD-3D 2.0, that I wanted a 22-frame animation (at the time, I was unsure of exactly how much memory it would take up in my 1040 ST, and I wanted to play it safe), and that pulling off the effect would require an understanding of how the special features in both programs – CAD-3D 2.0 and CYBER PAINT – could complement each other.

Here's how I did it. After the idea struck me of doing a "neon sign" created by an electrical arc, I drew a thumbnail sketch of how I envisioned the overall composition. I then sat down and mentally plotted out how I would create the various elements involved: what I would create in CAD-3D 2.0, when to start the animation file, how I would alter the lighting on each of the 22 frames of delta animation, and how to bring up the text. Then I jotted down little notes – a step-by-step storyboard. After that, I booted up CAD-3D 2.0 and got to work.

The first order of business was creating the platform and electrical towers. The platform itself was easy – I simply created a cube from the Primitives menu, lengthened it along its horizontal axis, then compressed it along its vertical axis until it was nearly flat. The

towers were created with the Spin tool. I created one, copied it and placed both at the far corners of the platform. The balls on top of the towers were "off the shelf" – Sphere 3, also from the Primitives menu.

The final CAD-3D 2.0 objects were the letters comprising the text. They were all upper-case letters from the 3D Font Package (PIC# ST0224 from The Catalog). After I had placed them between the towers, I played with CAD-3D 2.0's horizontal slider control (controlling the Camera View window) to determine the best angle, checking the view with the Supermove option. I finally decided on a horizontal axis of +20 degrees, with the Perspective racked up to 999.

Now was the moment of truth – the recording. I selected the Record option in CAD-3D 2.0 and recorded my 22 frames of animation, with the interactive lighting manually altered on *every* frame. With each recorded frame of animation, I would go to the Lighting Control menu and move Light Source A – the top light – around the CAD-3D 2.0 universe perimeter, roughly gauging when it should be back in its original position after 22 frames. The final effect is a stationary object (the lightning platform) with shadows waxing and waning on it, as if there were a spotlight circling around it. Also, since there would be a flashing CYBER PAINT sign appearing in the last third of the animation, I activated the Ambient lighting, through frames 14-22, bringing it up and down one notch every frame, to provide a flashing effect on the platform.

After I'd recorded and saved the required 22 frames of delta animation, I quit CAD-3D 2.0, went into CYBER PAINT, and loaded TESLA.DLT. Because it had been created with CYBER STUDIO, the animation was in delta format and consisted of two files: TESLA.PI1, a DEGAS picture file of the first frame of animation; and TESLA.DLT, a data file containing delta information of the changes from frame to frame.

From CYBER PAINT, I began the process of augmenting the 3D animation – frame by frame. When I had finished, I saved the altered delta animation to disk as a CYBER PAINT .SEQ file, so it would take up less room on the final CYBER PAINT release disk.

Now, if you haven't already, stop the Tesla animation, go to frame #1, and follow along as we examine the sequence, frame by frame. Use the right cursor control key on your ST keyboard to move forward one frame at a time through the sequence.

The Tesla Sequence

Frame #1: Here, there's nothing but the platform, and it's actually rather dim.

The words "CYBER PAINT" won't be visible until the last part of the sequence, although they were actually present on *all* the original CAD-3D 2.0 animation frames. After I loaded the Tesla file into CYBER PAINT, I used the Separate command with black to knock out all occurances of the blue making up the text. I did this *after* I had drawn the lightning on each frame, because I didn't know exactly how many frames it would take before the lightning hit the words CYBER PAINT, and I needed the original geometry of the text present from one frame to the next. That way, I could skip ahead a frame at a time and then see when approximately when the words would appear.

Frame #2: Here you see the first bolt of lightning, arcing up from the floor of the platform between the towers. As you can see, the lighting on the sides of the right side of the towers has suddenly increased (a happy accident when I recorded the original CAD-3D 2.0 animation and began to rotate Light Source A).

I drew the lightning freehand with the Draw option, using the default brush. But below the lightning is another detail that appears on the next four frames – a "reflection" on the floor of the platform – a bright strip of red, multiple shades, created with the Line option. Details such as this, which are taken from observances of real-life events, help tremendously in adding the illusion of life to your animations.

Frames #3-6: The lightning begins to crawl up the base of the towers, and the reflection on the tower base dims as the lighting moves away from it.

Notice how the lightning seems to trace out the contours of the tower bases. This is another detail to keep in mind when you are altering CAD-3D 2.0 delta animation files with CYBER PAINT – you wouldn't be using CAD-3D 2.0 unless you were interested in *three-dimensional* computer graphics. So, when tweaking a CAD-3D 2.0 object, concentrate on following the original geometry of the object as closely as you can. Don't draw straight lines on a curved object, for instance.

Notice also the sparkling array of bright red pixels at the lightning impact point. After drawing the freehand lightning, I went in with the Zoom feature and drew random splotches on every frame containing lightning, to further emphasize that the lightning is actually *doing* something to the CAD-3D 2.0 imagery and is crawling up the towers, touching them.

Frames #7-10: The lightning is crawling higher and the overhead light is moving around and getting brighter, lighting up the platform and the towers.

Frame #11: The lightning has now hit the base of the word "Paint," and begins to trace the bottom of the letters.

This is the first frame in which I didn't use the Separate feature to knock out the blue letters. Instead, I used a large brush and selected black (Color One) from the Color menu to erase the upper part of the word after I had the lightning start to trace out the letters.

Frames #12-13: The lightning continues, tracing out the letters until the entire word "Paint" is visible, with random sparkling pixels running along the letters.

Frame #14: The lightning has now arced to the word "Cyber" and begins to trace it out. Also beginning on this frame, I begin to bring up the blue shades present in the word "Paint," and the ambient lighting effects (originally recorded in the delta file) start here, toggling on and off.

Frames #15-16: The lightning has cleared the word "Paint" (which is getting very bright on frame 15, then has flashed to white on 16) and the word "Cyber" is completely traced out by the lightning. Notice on these frames how the arc is curving around the sphere on the left.

Frames #17-18: The lightning has almost reached its apex, as the word "Paint" flashes on and off. Also, the word "Cyber" is starting to get brighter.

Frame #19: The lightning has disappeared, leaving both words illuminated at the same lighting and color intensity. "Paint" is actually dimming slightly before it will flare back to white. The same will be true for "Cyber."

Frame #20: The word "Paint" flares back to white.

Frames #21-22. Both words now flash on and off like neon signs, as the sequence ends, then returns to frame one to begin anew.

Aftermath

As the Tesla sequence illustrates, careful planning *before* you convert a CAD-3D 2.0 delta to a CYBER PAINT sequence will reward you in the long run. Take the time to storyboard out your animation changes before you boot up your ST. Draw thumbnail sketches, write out a script of events, take down notes, enumerate changes before committing yourself in front of your computer.

Now that you've examined the Tesla sequence, can you think of ways to improve it, or give it your own individual stamp? Here are some suggestions.

Try making the sequence longer. Go to Frame #21, Clip it, then append a frame *after* Frame #22, and paste down your clip. Then, Clip Frame #22, append a frame after 23 (the duplicate of 21) and paste down *that* frame. Keep doing this for several more frames, to make the tail end of the sequence – the flashing words CYBER PAINT – stay on the screen longer.

Another thing you can do is add some additional lightning effects to the sequence. On every frame with lightning, add short, secondary arcs crackling away from the primary one. Make lightning crawl up the sides of the towers and across the spheres.

Here's an odd effect: Select To All, then select Defocus from the Frames menu and defocus every frame. Then, using a large brush and black (Color One), erase everything on each frame *except* the now-defocussed lightning – leaving only the arc and a half-inch on either side of it. You should be looking at a series of black frames, with just a ragged snippet of lightning animation scrawling across. Now, go to frame #1, select Underlay from the Load/Save menu, and load back in the original Tesla sequence *under* the defocussed lightning. When you're finished, play through the new sequence. You'll see the lightning having a strange effect on its surroundings, as if it were radiating heat waves across the platform and towers.

Of course, these are only a few examples of what you can do with the Tesla sequence and CYBER PAINT. But the Tesla sequence is intended only to whet your appetite, suggest new techniques, get

your creative juices flowing. I'm sure, with just a little bit of practice and some artistic savvy, you'll surpass the Tesla sequence in no time. All it takes is patience, time and a willingness to experiment. Show us things to do with CYBER PAINT that we never thought of.

Appendix B

SOME PRACTICAL INFO, HINTS AND TIPS

Compiled by Gary Yost

"Animation can explain whatever the mind of man can conceive."
- Walt Disney

Hopefully, even if you do not currently use the CYBER STUDIO and CYBER CONTROL 3D animation packages, you've heard of them. Now that you've got CYBER PAINT, you have the ability to do 2D and 2-1/2D animations, but you don't have the tools for real 3D animation until you get the complete CYBER suite.

What makes the CYBER suite of animation products so unique is that, used together, they support all dimensional forms of computer animation, especially when combined with the line-interpolating capabilities of Aegis Animator.

But what, exactly, do we mean by "2D," "2-1/2D," "3D," or, for that matter, "stereoscopic" animation? Here is a brief explanation of how the different dimensional terms apply to computer animation.

2D animation has no perspective or depth. Everything is seen flat on, and there are no multiple layers of action. This is the type of animation produced by most computer animation programs and is often seen in games such as Breakout or Pong. CYBER PAINT's basic cel animation functions include all the tools necessary for 2D animation.

2-1/2D animation is usually used to describe 2D animation which is displayed on multiple planes so that some basic depth relationships can be seen. You've seen this kind of animation on most Saturday morning cartoons, such as Road Runner and Bugs Bunny. The

artwork and perspective is still flat, but it's obvious that some of the planes are in front of others. CYBER PAINT supports 2-1/2D animation with its Underlay and Overlay compositing features. When combined with Defocussing, compositing in CYBER PAINT allows you to recreate all the effects you normally see in these types of cartoons.

2-1/2D animation combined with CYBER CONTROL's flexible capabilities can create even more powerful effects. CYBER CONTROL is a member of Cyber family containing features, designed specifically for *blending* true 3D and 2-1/2D animation, that are found in no other (reasonably priced) personal computer animation package. Which brings us to 3D animation...

3D animation is still seen on a 2D screen, but the animated objects convey the perspective and shading you would expect to see in a three-dimensional environment. CAD-3D 2.0 can do 3D animation because the objects are computed in 3D space (we call it 3-space, or Cyberspace), then projected onto a 2D screen for viewing. Most computer animation seen in network TV promotion spots (flying logos, etc.) is 3D animation. In a very real sense, we see 3D animation every time we watch television – a real world 3D scene is projected onto our 2D TV screen (just as the 3D world is projected onto our 2D retinas). CYBER STUDIO contains the modelling and rendering tools necessary to build and display 3D objects, and CYBER CONTROL is the essential choreograpy engine that allows the animator to simulate real-world events. These 3D animations which have been mapped to the 2D screen may then be further manipulated by CYBER PAINT.

Stereoscopic animation, displayed with the liquid crystal shutter Stereotek glasses, is similar to 3D animation, but a different image is displayed to each eye to create the same stereoscopic effect caused by the binocular disparity of our two eyes. Version 1.0 of CYBER PAINT does not support stereoscopic animation because the second eye view makes animation data files twice as large as for monoscopic animation. Because we wanted CYBER PAINT to do as much as possible in a one-megabyte ST, we could not include stereoscopic support. However, if there is a demand for it, CYBER PAINT could fairly easily be rewritten to enable editing of stereoscopic animations created by CYBER STUDIO and CYBER CONTROL – on four-megabyte (and greater) machines. Such is life.

Using the Cyber Family.

Now that you have a complete set of animation tools available to you, you can tackle professional projects that involve visualizing complex concepts for almost every industry. Here are a set of guidelines that you can use to approach a large-scale animation project.

* Design the animation first. Always create a storyboard, be it on the computer itself with the paint tools in CYBER PAINT, or simply with paper and pencil by hand.

* Show your storyboard to friends who may be able to give you fresh ideas. Get to know some animators, buy some books recommended in the bibiliography (espeically the Disney book), and look for classic animations on TV (early Popeye, Looney Tunes, anything from Disney). In fact, you should be familiar with the twelve basic Principles of Animation according to Walt Disney:

1) Squash and Stretch
2) Anticipation
3) Staging
4) Straight Ahead Action and Pose to Pose
5) Follow Through and Overlapping Action
6) Slow In and Slow Out
7) Arcs
8) Secondary Action
9) Timing
10) Exaggeration
11) Solid Drawings
12) Appeal

* Get all the pre-production work out of the way before you start the animation. Write down all the elements that aren't included in the storyboard, such as sound effects and music requirements.

* Find any artwork you may need to scan in with a photo-digitizer for backgrounds. Get photos of objects you'll need to build 3D models of. If you're going to be putting your animation on videotape (with the Sony 8mm tape decks, for example) find the music you'll want and get familiar with it's timing, length, and structure.

- Build the 3D models that you'll be using in the animation using the modelling tools in CAD-3D 2.0, or the Super Extruder on the Fonts Disk (the Super Extruder is great for multicolored objects, objects with holes in them, and logos). Or, if you want more complex objects that more closely simulate the smoothly curved flexible objects that appear in nature, explore the vast object-creation capabilities of CYBER CONTROL. For example, fractals, stochastic models, particle systems, mathematical surfaces, and hierarchically-splined shapes are just some of the possibilities.

- Using your storyboard as a guide, develop sketches of the motion required for the cameras, lights, and objects in the animation. This is all then written in CYBER CONTROL's BASIC-like choreography language, and can either be abstract or based on real physical and mechanical models; natural phenomena; or flight characteristics. Plus, using CYBER CONTROL's random number generator, true explosions and arbitrary events can be simulated.

- Think of how you'd light the scenes in your animation if you were really there "on the set." In the CYBER STUDIO system, CAD-3D 2.0's multiple, directional light sources can have animated positions and intensities. When added to its assignable color palette-to-object features, you can develop dramatic lighting and shading effects. For example, the shadowing technique Darrel Anderson used in the CYBERSCAPE demo was created by flattening out a copy of the diskcraft, and then reshading the (almost 2D) copy to a very dark color. That object was then used as the "shadow" and was manipulated alongside the diskcraft itself by CYBER CONTROL with only a couple of lines of extra script.

- In professional animation, there's almost always multiple layers of 2-1/2D animation, in addition to 3D animation. During the pre-production process, plan your background and foreground elements. If you create them separately, you can use the Defocussing feature of CYBER PAINT on some of them to create depth-of-field effects. Complex relationships can be defined with just a little bit of forethought.

- Do some wireframe tests using the real-time preview functions in CYBER CONTROL (these are equivalent to traditional animation pencil tests). Render some still frames in color and bring them into CYBER PAINT to test color palette relationships for shot-to-shot transitions.

- When rendering the final animation, use Final mode in CAD-3D 2.0 for perfect hidden-line removal. Convert .DLT files to .SEQ files in CYBER PAINT so you can use its compositing and patching features. Always keep back-ups of every stage of your work. Never never never make an irreparable change to the only copy of an animation you care about.

- Record the animation. Right now, to record an entire feature-length animation, with soundtrack, the most practical way to go is to buy Sony's 8mm videotape equipment. Sony is currently working with Antic on a project that will let you use an inexpensive (under $600) 8mm VTR to automatically sequence (up to two-hour) CYBER animations. And if you don't have an expanded-memory 520ST with composite video output, you'll need The Video Key, from Practical Solutions. It provides an (almost) broadcast-quality NTSC composite video signal from the RGB output of any Atari ST. Most 8mm decks also have 3-channel audio, so you can add stereo soundtracks plus a third narrative track. These tools will all be available in the spring of 1988 from The Catalog.

If you don't have the Sony equipment, memory upgrades can make it possible to store up to 15 minutes of video-quality animation at once in a 4 meg machine.

- Use the ADO features of CYBER PAINT to create any kind of post-production effect such as wipes and full-screen axis translation/rotations.

Creating Motion Blur with CYBER PAINT
(Thanks to Darrel Anderson for suggesting this technique.)

When you've loaded a CAD-3D 2.0 animation into CYBER PAINT, you'll notice that the palette is usually two groups of 7 shades or 1 group of 14 shades. You can also create an animation entirely in CYBER PAINT, but it must use similar shading to CAD-3D 2.0's smooth shading palette for the following technique to work. We're going to use an example in which you've got 1 group of 14 shades to illustrate a way to simulate motion blur.

First make sure your shading palette is composed of a range of 14 shades. We'll use the default CAD-3D 2.0 red palette which runs

from 777 (lightest) to 100 darkest, with 000 being the background color and an additional 777 being the non-shaded brightest color.

For this example, the animation itself can be quite simple, but there must be a fair amount of movement within a range of at least 20 frames. A CAD-3D 2.0 animation of a sphere travelling from left to right across the screen would be a perfect example.

Load your 20-frame CAD-3D 2.0 animation of a sphere into CYBER PAINT and press [F10] to go to the last frame. Then press [F7] twice to append two copies of the last frame – making a 22-frame animation. Save this out as a sequence (.SEQ) file and call it SPHERE1.SEQ.

Now, bring up the Palette submenu and select the sixth shade from the left in the Color Bar. Then left-click on Copy, and select the second color from the left (next to white). Now, make sure your Range Bar is set to encompass all fourteen shades (all colors except the leftmost and rightmost ones). Left click on Range and the shading palette will be knocked back and your animation will become darker.

Save this new animation as SPHERE2.SEQ.

Bring up the Palette submenu again and select a new, darker shade for your maximum shading value (probably about the fifth from the left). Left click on Copy, and then select the second color from the left (next to white). Your Range Bar should still be set to encompass your fourteen-color shading palette, and when you left click on Range, your palette will be knocked back once more. You should still be able to see a shadowy image – if it's too dark to see, click on Restore and select a slightly lighter shade for your maximum shading color. Now you've got an even darker version of SPHERE1 than SPHERE2.

Save this new animation as SPHERE3.SEQ.

Now that we've got three different sequence files on disk, we've got to composite them together to create one animation. First, load SPHERE1.SEQ as a Normal animation. Then, press [F6] to move to the second frame of the animation. Now, go to the Load/Save submenu and select Underlay, and load SPHERE2.SEQ. When the outlined underlay box appears during the beginning of the load, just left click and the load will proceed.

You now should have an animation composed of two layers, one at full intensity and the next, offset by one frame, at a lower intensity. We still need to bring in the third animation to create a realistic blur effect. Using the Playback Bar or the [F6] key, position your animation at frame #3. Now, bring back the Load/Save submenu and, with Underlay still active, load SPHERE3.SEQ. Again, left click without moving the mouse when prompted with the outlined Underlay box, and the sequence will begin loading. When finished, hit the [F8] key to play your animation. Voila! You'll probably have to delete the last two frames to make it look just right, and then save the new, composited, animation out as SPHERES.SEQ.

This is just one creative way of using multiple compositing. Experiment!

Animating On 2's
(or... frame doubling can be useful)

Let's say you've just created a 10-frame animation of a cute little doodad. You go over to the ADO and start doing some neat moves that make your animation fly around through Cyberspace. But something seems wrong. Your ADO'd animation is too short to get a smoothly, defined sense of motion. What you need to do is make a duplicate of each frame in your animation to give the ADO some more "meat" to work with. So, let's go back to the main menu screen (by clicking the right mouse button) and double up.

First, position your animation on frame #1 with the Playback Bar. Follow these steps to double your animation.

- Insert a copy of that frame by pressing [F4].
- Press [F10] twice to move to the next frame.
- Go to step #1.

Do this until you have a duplicate of each of your 10 frames – a new 20-frame animation. Now, go back to the ADO and you'll find that your ADO'd animation is much smoother and better-looking.

Animating on 2's can also be applied in other areas besides the ADO. Try experimenting with it. And you're not just limited to making one copy of each frame. Try making two or even three copies. Each time you "double" an animation you're effectively halving its speed. You can use half speed animations composited behind full-speed ones as interesting backgrounds. Try it!

Appendix C

DISK FILE FORMATS

by Jim Kent

CYBER PAINT uses ten different types of files. Some types you'll use often, while others are useful for communicating with other graphics programs – such as DEGAS Elite, or Aegis Animator. There are three types for saving entire animations: .SEQ, .DLT, and .STR; three full-screen picture types: .PI1, .PC1, and NEO; two types that hold a piece (clip) of a single picture: CEL and BL?; one type that holds only the color palette information: .COL; and, finally, the .ADO file type, which holds the settings of the ADO f/x menu.

.SEQ and .DLT files are similar, as their effect within CYBER PAINT. .DLT files load and save faster, and may be used with CYBERMATE, but .SEQ files use less disk space. We recommend using SEQ files when possible for either single screens or animations because they are the most compact, as well as the most flexible with CYBER PAINT. Here is a description of each file type.

SEQ Files

General Background

CYBER PAINT .SEQ files are sequences of compressed raster images. The format is an extension of the .SEQ files that my program Flicker (in the Summer 1987 issue of START, The ST Quarterly) produces. CYBER PAINT can read Flicker .SEQ files, however, Flicker can't read CYBER PAINT files, because I hadn't

figured out how I was going to do the compression scheme at the time I published Flicker.

A .SEQ file is composed of three parts. The first is a 128-byte header. Why 128 bytes? Well, it turns out that 128 bytes is the minimum amount that an ST reads from floppy disk. Though I currently am using only about 16 bytes of the 128 (the rest are set to zero), my experience with binary files suggests it's better to leave some space for future expansion.

The second part of the .SEQ file is a list of offsets (changes) to each individual frame from the beginning of the file. I'm not sure if I like this or not. Generally, it makes it so that you can access the frames in a file individually rather quickly without having to read through the whole file. However, since the compression scheme I use often defines a frame in terms of its changes from the last frame, it seems I've defined a "sequential" (as opposed to random) access format in spite of myself. Anyway, each offset is four bytes long.

The last part of the .SEQ file is the frames themselves. These are composed of, again, a 128-byte header (including information on the color map for each frame, which currently are all the same), followed by the bits that make up the image in one of three formats.

Compression Strategies

In storing a .SEQ file, CYBER PAINT goes through a couple of phases. First, it finds the smallest rectangle in the picture which contains all the non-background (non-zero) pixels (known as the "bounding box"). Then it figures out how big this will be when it's compressed. Second, it performs an EXclusive OR of this frame with the previous frame (except in the case of the first frame, of course!) to get an image which is effectively the *difference* between this frame and the previous frame. Then CYBER PAINT finds the bounding box of the differing image and figures out how large it will be if it's compressed. CYBER PAINT then stores the image, based on whichever type is smaller. If neither one is smaller than the uncompressed image (which can happen easily if you're doing a lot of color-cycle airbrushes), CYBER PAINT stores the image uncompressed.

You should note that while .SEQ files are almost always smaller than .DLT files, and typically nearly half the size of the .PC1/.DLT combination, the .DLT format will uncompress in real-time, while the .SEQ format takes a little longer. In particular, a .SEQ file will require a blit (that is, a bit-shift of a rectangle). While a solitary 68000 blits rather slowly, Atari's blitter chip blits quite quickly indeed. In addition, CYBER PAINT stores the pictures in memory in a format very similar to the .DLT. When a .SEQ is loaded not only must it be uncompressed, it also must be recompressed into .DLT format. This will probably take longer than the uncompress on a blitter-equipped ST.

Compression Details

First, let's explore an uncompressed frame. The format is similar to the ST screen format, i.e., if it's composed of four logical bit-planes which are interleaved a 16-bit word at a time. The first four words will contain the information for the leftmost 16 pixels in the top line. Since the bounding box may not be divisible by 16 in the x dimension, and hence it won't fit into an even number of words, the last word is padded with zero bits as necessary.

If a frame is compressed, it's compressed using a "separate bitplane vertical word run length" compression scheme. What a mouthful! The format is the same whether it's destined to be XORed with the previous frame or just copied on top of a clear background. The run-length compression is done first, and the XOR/copy (if any) is done later.

Now, what exactly is separate bitplane vertical run length compression? First, let's define what run length compression is. If you have an image, or any bits in the ST for that matter that contain areas in the same "color," run length compression is a simple but effective way of storing the same amount of data in considerably less space.

Basically, instead of storing:

0000000111111222222111184321

you'd store:

7 0 6 1 6 2 4 1 5' 84321

The first word tells you *how many* times to repeat, and the second word is *what* to repeat. Numbers with the hi bit set (denoted by ' in 5' above) mean you've got a chunk without repetition.

There are many variations on this theme. The basic unit of compression may be a nybble, a byte, 16 bits, 32 bits or even a whole line. Instead of storing the number to repeat, it's often popular to store one *minus* the number to repeat. It's common, and in fact a little faster, to use the sign of the count rather than the hi bit to tell whether a run is literal or repeating. However, my scheme follows the above example.

So much for my run length compression. Logically, the compression scheme I use is composed of four passes, as follows:

1. Blit the bounding box into a small buffer somewhere.

2. Convert from word-interleaved bitplanes to contiguous bitplanes (i.e., like the Amiga or EGA screen map).

3. Convert from contiguous bitplanes to "columner" bitplanes, i.e. so that the next word contains the pixels underneath this word instead of to the right of it.

4. Run length compress it.

Happily, phases 1, 2, and 3 can all be accomplished at once by proper tweaking of the "next_word," "next_line," and "next_plane" parameters to the ST blit routines. Even more happily – Atari's blitter chip will perform this automatically!

You may wonder at the logic of phases 2 and 3. Let's take a closer look at phase 2. Imagine an ST screen that is a solid color 5 (binary 0101). Since it's a solid color, you would hope it would compress very well. Yet if you look at the ST screen in a hex dump you'd get

$0000 $ffff $0000 $ffff $0000 $ffff $0000 $ffff

. . .and so on about 4000 more times. This doesn't look like promising material for our normal run-length compression. The solution is to separate each bit-plane so it lives all by itself. Then instead of 16000 words, with every other one different, you have 4000 words of zero followed by 4000 words of one followed by 4000 more zeroes, and 4000 more ones. This would compress to 8 words, or 16 bytes, which is fine by me!

Converting from horizontal to vertical orientation is a little more subtle. I must give Steve Dompier at Island Graphics credit for introducing me to the idea. In practice, vertically compressed files average about 60% the size of horizontally compressed files, although it does vary from file to file. Simply put, horizontal stripes compress better horizontally. Now, imagine a very complex picture, but one that has an area roughly 48 x 48 which is solid black. If we compress it *horizontally*, each line will have a run of three 16-bit words which are the same. If we compress it *vertically* each column will have 48 words which are the same. Longer runs means more compression. All in all, vertical compression is better because a 16 x 16 solid area is more common than a 256x1 one.

C Structures for the Headers

First, the structure for the head of a sequence

```
struct seq_header
    {
    WORD magic; /* == 0xfedc Flicker. 0xfedb CYBER PAINT */
    WORD version;
    long cel_count;
    WORD speed;
    char reserved[54]; /* extra space all for me */
    char pad[64]; /* extra space I'm not claiming yet */
    };
```

Second, the header for the individual frames. Indeed, this is the same as the header for a .NEO or .CEL file.

```
struct neo_head
{
    int type; /* 0 for neo, 1 for programmed pictures, -1 for cels */
    int resolution; /*0 lores, 1 medium, 2 hires*/
    int colormap[16];
    char filename[8+1+3];
    int ramp_seg; /*hibit active, bits 0-3 left arrow, 4-7 right arrow*/
    char ramp_active; /*hi bit set if actively cycled*/
    char ramp_speed; /*60hz ticks between cycles*/
    int slide_time; /*60hz ticks until next picture*/
    int xoff, yoff; /*upper left corner of cel*/
    int width, height; /*dimensions of cel*/
```

```
char   op;  /* ==0 for copy , 1 for xor */
char   compress; /* 0 comprssd, 1 vert. run length compressn.*/
long   data_size;  /* size of data (after compression etc) */
char reserved[30];   /* Please leave zero, I may expand later */
char pad[30]; /* You can put some extra info here if you like */
};
```

C Code for Uncompression

Here's some bonafide C code that will do the uncompression. Note
the use of decrementing counters instead of for (i=0; i<count; i++).
This is quite a bit faster.

```
word_uncompress(s, d, length)
WORD *s, *d;
long length;        /* in WORDS! */
{
WORD run_length;
WORD run_data;

for (;;)
    {
  if (length <= 0)    /* check to see if out of data yet */
    break;
  run_length = *s++;
  length -= 1;   /* used up 1 WORD of source */
  if (run_length < 0)    /* see if a compressed run or a literal */
    {
    run_length &= 0x7fff;     /* it's literal , so mask off hi bit*/
    length -= run_length;           /* used up lots more of source */
    while (–run_length >= 0)  /* go thru loop run_length times */
       *d++ = *s++;
    }
  else    /* yea! it's compressed a little */
    {
    run_data = *s++;
    length -= 1;       /* used another WORD of source */
    while (–run_length >= 0)  /* loop run_length times */
      *d++ = run_data;
      }
    }
}
```

Assembler Code for Decompression

The above code still isn't really fast enough, but don't worry; here's some assembler that will really spit it out. Thanks to Jim Eisenstein of Atari Corporation for introducing me to "towers" which speed it up more than two times, at the expense of about 80 bytes of code. (Isn't assembler wonderful?)

```
;fast_word_uncompress(s, d, length)
;       uncompress source s of length into destination d
;       with word-run compression
     public _fast_word_uncompress
firstp    set     12
s     set     firstp
d     set     firstp+4
length    set     firstp+8
_word_uncompress
     movem.l  d2/d3,-(sp)
     move.l    s(sp),a0
     move.l    d(sp),a1
     move.l    length(sp),d2

wuclp     ble     zwuc_lp
     move.w    (a0)+,d0
     bmi     diffucl   ; it's a uniq run (yuck!) have to branch
     move.w    (a0)+,d1 ; yeah! Get to repeat d1 d0 times
     move.w    d0,d3 ; so set up a "tower" to do it.
     asr.w     #4,d3 ; d3 is number of loops through tower
     and.w     #15,d0 ; d0 is where in tower to start
     add.w     d0,d0 ; 2 bytes/tower element
     neg.w     d0
     jmp     32+same_tower(pc,d0.w)
same_tower
     move.w    d1,(a1)+
     move.w    d1,(a1)+
     move.w    d1,(a1)+
     move.w    d1,(a1)+

     move.w    d1,(a1)+
     move.w    d1,(a1)+
     move.w    d1,(a1)+
     move.w    d1,(a1)+
```

```
        move.w    d1,(a1)+
        move.w    d1,(a1)+
        move.w    d1,(a1)+
        move.w    d1,(a1)+

        move.w    d1,(a1)+
        move.w    d1,(a1)+
        move.w    d1,(a1)+
        move.w    d1,(a1)+

        dbra    d3,same_tower
        subq.l    #2,d2
        bra    wuclp
diffucl    and.w    #$7fff,d0    ;mask off hi bit (a neg is 4 cycles
faster...oops)
        sub.l    d0,d2    ; subtract count from size to uncompress
        move.w    d0,d3 ; so set up a "tower" to do it.
        asr.w    #4,d3 ; d3 is number of loops through tower
        and.w    #15,d0 ; d0 is where in tower to start
        add.w    d0,d0 ; 2 bytes/tower element
        neg.w    d0
        jmp    32+uniq_tower(pc,d0.w)
uniq_tower
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+

        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+

        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+

        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
        move.w    (a0)+,(a1)+
```

```
zdiflp    dbra    d3,uniq_tower
   subq.l   #1,d2
   bra     wuclp
zwuc_lp
   movem.l  (sp)+,d2/d3
   rts
```

DLT files

DLT files originated with Mark Kimble while working with Antic on CYBERMATE and CYBER STUDIO. They are a simple but effective way to compress many frames that allow uncompression in real-time. The compression generally isn't as good as in SEQ files, but the speed and simplicity of DLT (delta) format make them attractive. A DLT file is composed of a bunch of frames. Each frame is made up of a count of the number of deltas in the frame followed by the deltas themselves. The count is a 16-bit word, with the value zero being interpreted as end of file. Each delta is a 16-bit offset into the screen followed by a long word (32 bits) to be xored into the screen at that offset. There's no header information at all before the frames.

NOTE: if two adjacent frames are identical you must remember to put in a single delta with 0 as the 32 bit data so that the DLT readers don't interpret it as end of file.

CYBER STUDIO produces DLT files. With STRTODLT.PRG on your CYBER PAINT disk you can also produce DLT files from Aegis Animator "Strip" files. CYBER PAINT doesn't understand stereo DLT files – at least not yet. CYBER PAINT also expects the first frame of every DLT file to be in a PC1 or PI1 file with the same name as the DLT file (e.g., SPACE.DLT and SPACE.PI1). I hope this doesn't inconvenience anyone, but I found it very confusing not to know what PC1 went with which DLT, so I hard wired it....

STR Files

STR files are files that CYBER PAINT can write out but not read. They can be read by the Aegis Animator, where they allow you to mix raster-oriented stuff generated in CYBER PAINT with the metamorphic polygonal and color palette animation found in the

Aegis Animator. When you save in STR mode, CYBER PAINT will create a short text file which is basically just a list of all the CEL files it's about to create. Then it will save out a CEL file for each frame. If there were three frames in your animation and you were saving GUPPY.STR, you would also create GUPPY01.CEL GUPPY02.CEL and GUPPY03.CEL. CEL files aren't compressed at all, so unless it's a short or small animation you're very likely to run out of disk space when you save them – and memory space when you load them into Aegis Animator.

NEO Files

This is a type of file that originated with Dave Staugas of Atari's paint program NEOchrome. It's pretty simple. There's a 128-byte header containing the screen resolution, color cycle and color palette information, and some other stuff. This is followed by a 32000 byte binary image of the screen. The NEO header also appears in CEL and SEQ files. See the SEQ file description for a C language structure (struct neo_head) describing the NEO header.

PI1 Files

This file type originated with Tom Hudson and Batteries Included's paint program DEGAS. It's even simpler than the NEO file. The first word (16 bits) of the file is a zero indicating the resolution. The ST color map follows in the next 16 words. Finally there's 32000 bytes of screen binary image.

PC1 Files

This file type started with DEGAS Elite. It is almost identical to the PI1 file, but the image is compressed. The first word indicates the resolution. Instead of a zero here though there's a hexadecimal $8000 (which is zero with the hi-bit set) to indicate the file is compressed. There are then 16 words (32 bytes) of color map followed by the screen data compressed in the same format compressed IFF pictures use. Technically it's a line-interleaved bitplane byte-run-length encoding. Each line of each bitplane is compressed separately. The algorithm to uncompress a line is:

```
while not through uncompressing line
begin
    n = next byte from compressed source
    if n > 0 then
        copy next (n+1) bytes of compressed source to destination line
    else
        copy next byte of source (1-n) times (n is minus so 1-n is plus)
end
```

CEL Files

CEL files are a simple extension of the NEO file format which first appeared in the Aegis Animator and Flicker. They are functionally equivalent to BL? (or BL1 to be precise) files. That is they save a rectangular piece of a picture, its color palette, and where it came off the screen.

BL? Files

This file type contains information on a rectangular piece of a picture. CYBER PAINT can read in BL3, BL2, or BL1 files created in high, medium, or low-resolution DEGAS Elite. It can also read files made on the Amiga in pretty much any screen configuration except HAM. The fun thing is that hi-res BL3 files can be four times as large as the CYBER PAINT screen. It's interesting to use them to create a scrolling monocolor background. CYBER PAINT only writes low-resolution BL1 files, of course.

Technically these files are Electronics Art/Commodore Amiga IFF FORM ILBM (Interchange File Format Form InterLeaved BitMap). This is a flexible, if somewhat complex format. People interested in more details are refered to their local Amiga guru.

COL Files

This is a raw 16-word image of the ST color registers.

ADO Files

These files were added to CYBER PAINT at the last minute to save
and re-use interesting ADO settings. They consist of two copies of
all the sliders in the ADO menu (one for First and one for
Motion). This is followed by the number of samples in the path
(zero if there's no path), and then the path data. The path data is one
word of x and one word of y absolute screen

Appendix D

RAM UPGRADES

You've probably noticed that if you had more RAM, your animating life would be a lot more fun. We discovered the same thing while developing these programs. So we started asking around – trying to find a good RAM board manufacturer. After doing some informal market research, we discovered that there was definitely one company that made a plug-in (no solder), reliable, expandable memory board – AERCO.

The AERCO board is a compact, plug-in memory expansion that can be configured in three progressively larger stages. Each stage gives you a lot more RAM. The cost of memory-expansion boards is based on the cost of RAM chips. And since the price of RAM fluctuates greatly, we're not going to list prices in here.

The available expansion units include:

1040ST: 2 meg total
          4 meg total

520ST: 2.5 meg total
          4 meg total

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Appendix E

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The holder of the copyright of CYBER PAINT is Jim Kent.

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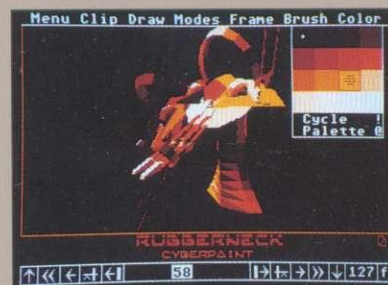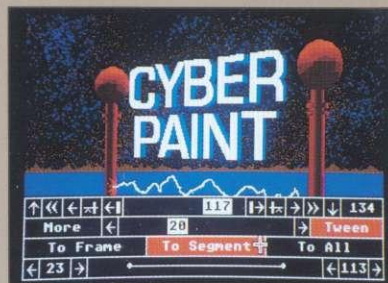PAINT lets you do it fast. And it's fun!

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  areas
- Time menu for global or local
  tweening

- Flood fill and Color Separation
- Real-time Magnify, active at any
  time
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  Aegis Animator, DEGAS/Neo
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