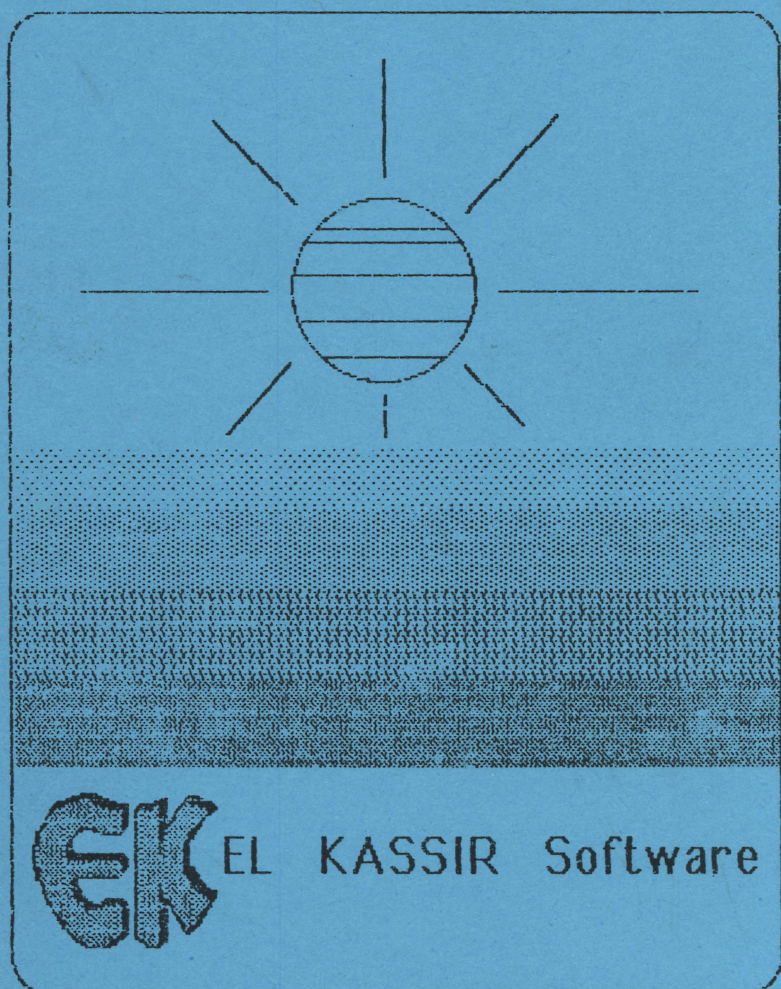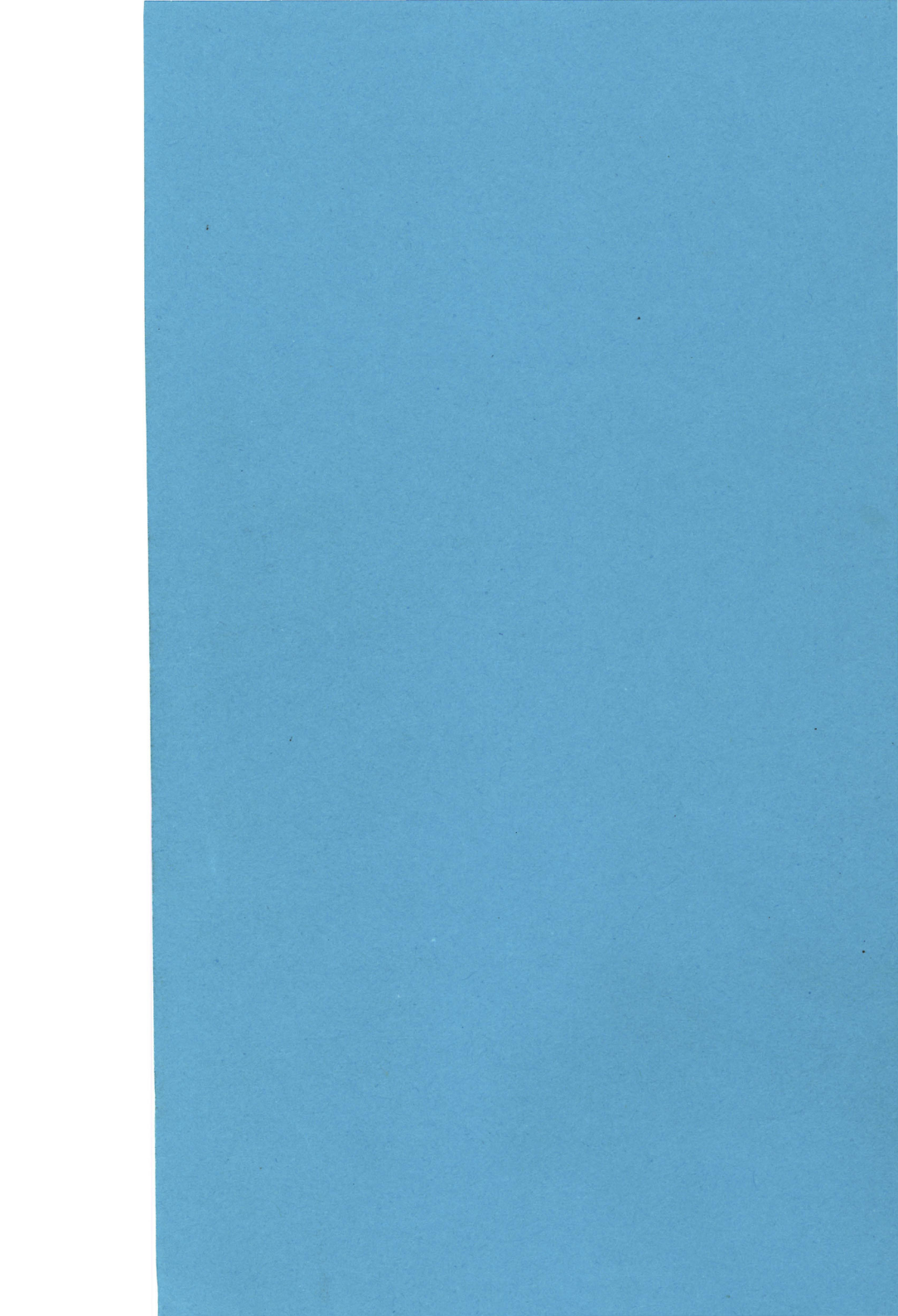# Color+

The Ultimate Paint & Animation Program!

By Bachir Kassir

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Credits

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COLOR+

The Ultimate Paint & Animation Program for the Apple IIGS

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Preface

Welcome to COLOR+, the ultimate graphic art program for the Apple IIGS. Color+ is a complete Paint and Animation program. Unlike other paint programs, Color+ can handle 256 colors within one picture. With it, you can convert pictures from Super Hi-Resolution 320 mode to Super Hi-Resolution 640 mode or visa versa. COLOR+ even allows you to mix 320 mode with 640 mode within the same picture! Whether you plan to use your Apple IIGS for educational purposes, for design work, or just for fun, you will find Color+ perfect for creating both animation and graphics.

EL KASSIR Software is committed to serving our customers, and we are open to your suggestions for updating and improving this product. Please address letters to:

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How To Use This Manual

This manual is divided into chapters that guide you step by step through every feature of COLOR+. Because COLOR+ uses pull-down menus for most of its commands, it is relatively easy to use. Chapter is a quick tutorial and it will help you getting started. After you have completed and carried-out the functions in the manual, you should be able to use COLOR+ without documentation. If you forget an operation or a specific function, the reference section in Chapter 3, has detailed explanations.

Backup Copies

Color+ is not copy protected for your convenience. You can easily install it on a hard drive. However you are allowed to make only ONE copy for backup purposes, either on your hard drive or floppy disks. Please help us serve you better by not pirating this program. **The generation of this piece of software took lots of effort and time** to make it very convenient for you. If you know someone who could benefit from our program, please have them contact us or your local dealer.

System Requirement

Color+ requires at least 768K of memory (RAM) and at least 1 disk drive, although 2 disk drives are recommended. While working with COLOR+ the program disk should always be present in the drive. An Imagewriter II is required for printing in color.

Update Policy

We intend to constantly improve COLOR+. As long as you have returned your Registration Card, you will be notified of any significant updates to the Color+ software. Your suggestions for features for future releases would be appreciated. We also welcome your comments about this software product in general. Please write to tell us what you think; Our address is printed on the front of this manual.

CHAPTER 2

Starting Out

Before you boot Color+ put the Color+ demo disk in drive and boot it. If you are using the Finder⦿ double click on the DEMO.SYSTEM as shown below.
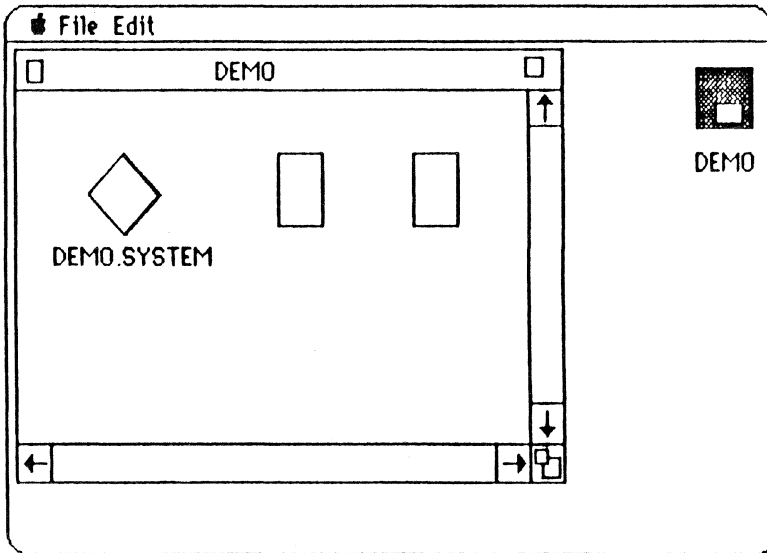
You will see a slide show of many pictures created with Color+. Notice that each picture has more than 16 colors at once. Some have mixed graphics modes. This disk also contains a demo of the ColorMix program. Check it out! The demo disk

loes not contain the animation demo. We will use
he animation demo later on in this section.

After you are done with the Color+ demo, remove
he demo disk. Replace it with the Color+ program
in reboot. You can also reboot by double clicking
in the COLOR.SYSTEM icon if you are using the
Finder as shown below:
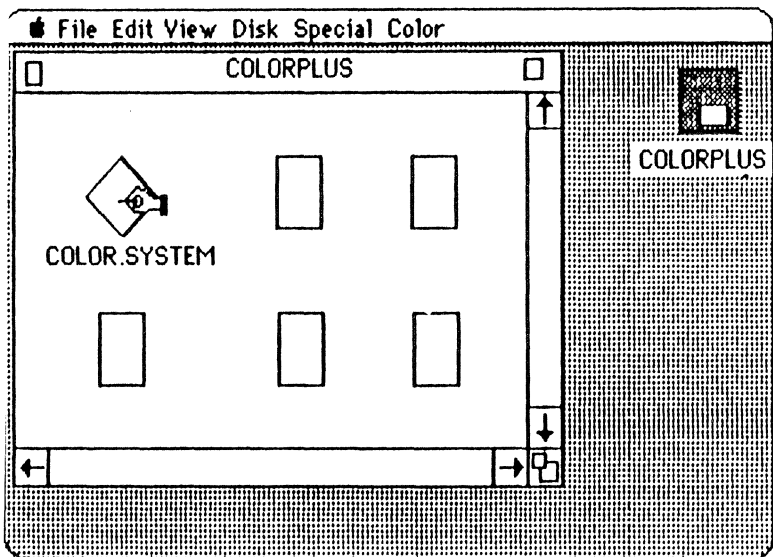
When the Program is executed, the initial
resolution of the screen is 320 mode. The IIGS
screen has two screen resolutions:320 & 640 pixels
on each line. The vertical resolution is always equal
to 200 lines. As shown on the next page:

0   319   0   639

320 Mode   640 Mode
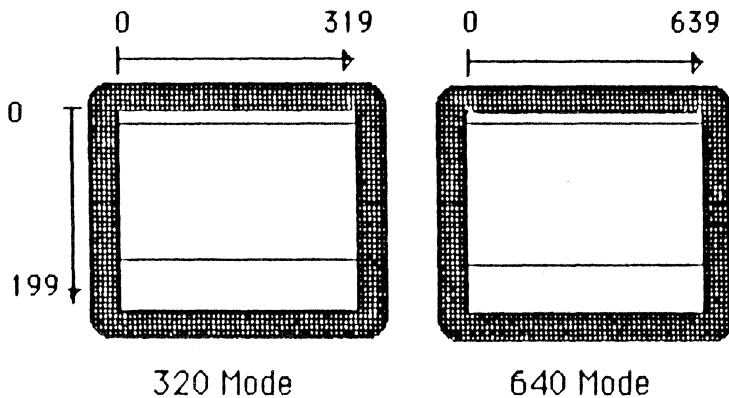
Using Color+ you can individually control the resolution of each line For example, the upper 100 lines can have 320 pixels resolution, and the lower 100 lines can have 640 pixels resolution. The actual line resolution is set using the control panel's SCAN command:

Move the mouse the boxes next to the Scan command and set the following variables as follow: $Y1=0$, $Y2=100$, $P=0$, Mode=320. Now click on the SCAN command and the first 100 lines have 320 mode as the screen resolution, they will be using palette 0. Similarly you can set $Y1=101$, $Y2=199$, $P=1$, and Mode=640 then Click on the Scan command and the lower 100 lines have 640 mode as the screen resolution and they will be using palette 1.

Now to tell Color+ which resolution to use you need to go to the 'Option' Menu and set the drawing resolution accordingly.

The drawing mode and the actual screen resolution are two different things and are controlled separately:

1- The drawing mode 320 or 640 mode can be controlled from the **option** menu 'Set GrMode =320/640' as shown below:
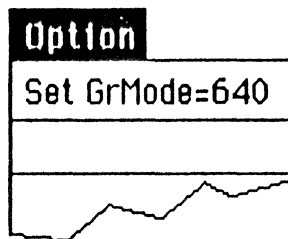
Setting the GrMode allows you to force one drawing mode or the other regardless of the actual screen resolution. With option you can control dithering (dithering is the ability to display 16 colors on the 640 mode by placing different colors next to each other so they will give the appearance of a different color. For example a line of Red and Green dots adjacent to each other appear to have a yellow color) or non dithering effect on the 640 mode resolution. When using 640 drawing mode, if

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the actual screen resolution is 640, mode then only 4 colors are effective for drawing. While if the drawing mode is 320 and the actual screen resolution is 640 then the dithering effect is on and you can have 16 different colors on the 640 mode screen.

2- The actual screen resolution can be controlled using the control panel's SCAN command as show below:
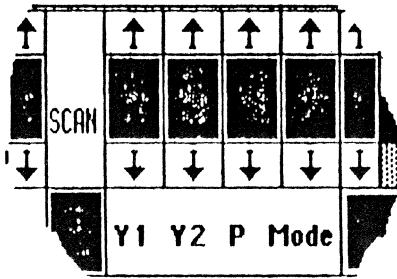
Scan Command on the Control Panel

You may be wondering what happens when the actual resolution of the screen is 640 and the drawing mode is 320. Well try it. This is a valid command with it, you can choose between 4 pure colors on the 640 or 16 dithered colors.

Conversely the actual screen resolution can be set to 320 mode and you change the current drawing mode set to 640. However, even though it is a valid command, the lines won't look good. Color+ will try to use the 640 mode routines on a 320 mode screen.

The Change to 320 or 640 mode affects the following commands: Fill Mode, Lines, points, circles, rectangles, the coordinate system, the zoom routines and the appearance of the control panel. Because the color of the control panel and its resolution are taken from the current palette. The current palette (A palette is like a Paint Box that have 16 colors) is the palette whose number is displayed next to the color selection as shown on the next page:
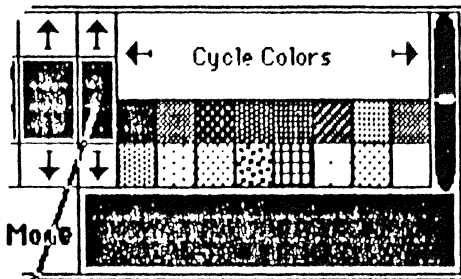
Palette Number is displayed
in this box.
The Colors on the right reflect
the colors for that palette.

Sometimes the control panel colors or text might
not be displayed clearly, this is because the colors
and resolution used for the control panel uses the
current colors and palettes. It should not be a
cause of concern. You can fix it easily by changing
the current drawing mode.

When you first boot, the palette selected might not
be the same one displayed. To display a particular
palette use the 'up' and 'down' arrows of the
palette selection box (Shown on the previous page).
When you select a palette the 'RGB' and 'L' options
on the control panel affect that palette. This way
you can edit the color of any palette to any 4096
possible colors.

The '**Patrn**' menu let you select a pattern to fill any closed area. Choosing Solid Color lets you fill closed area with that color when you are using the fill tool from the tool menu. You can also fill areas with patterns. There are 12 predesigned patterns accessed from the 'ptrn' menu. You can change these patterns using the Pattern Editor program in the '<u>Color</u>' Menu.

To mix colors, and design palettes there is a program called ColorMix. The ColorMix routine can be accessed from the 'Color' Menu, lets you mix colors using their original Red, Green, and Blue. It lets you see the composition of any color. The ColorMix program makes it instructional and Fun to experiment with mixing colors. You will have an idea what the original components of each color are. For example, When you select a maximum Red and a Maximum Green on the resulting color is Yellow. The picture below shows the screen of the ColorMix routine.
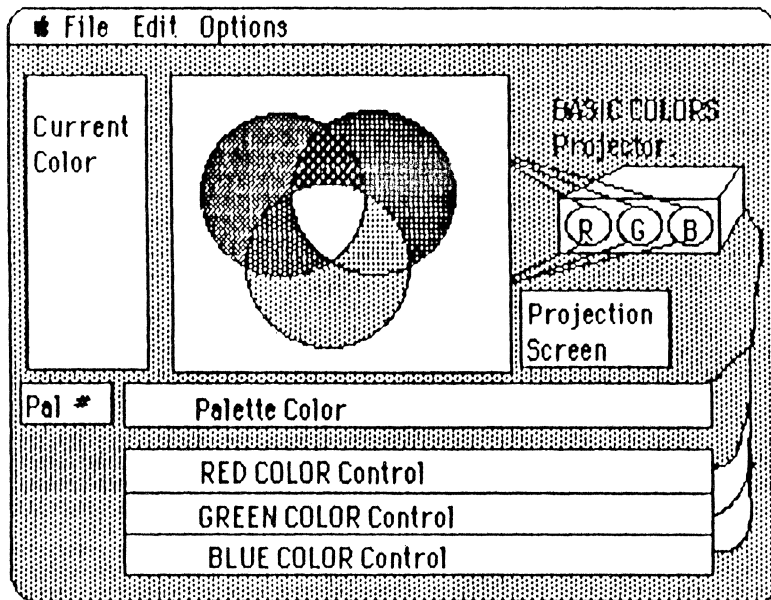
ColorMix Program and Functions

How it is possible to have 256 COLOR?

On the Apple IIGS, each of the 3 color components, red, green, and blue (RGB) can have up to 16 levels of intensity. A color is made of the combination of the 3 components. Since we have 16 levels of red, 16 levels of green and 16 levels of blue there are 16 x 16 x 16 or 4096 different color combination. The Apple IIGS has the capability to display 256 colors at once out of the 4096 colors. Color+ allows you to access the full color capability of the IIGS.

COLOR NUMBER

PALETTES

16 Palettes, each palette 16 colors.
Each Color composed of Red, Green
and Blue. Each Basic color can have
16 level of intensity controlable
from the control panel RGB and L.
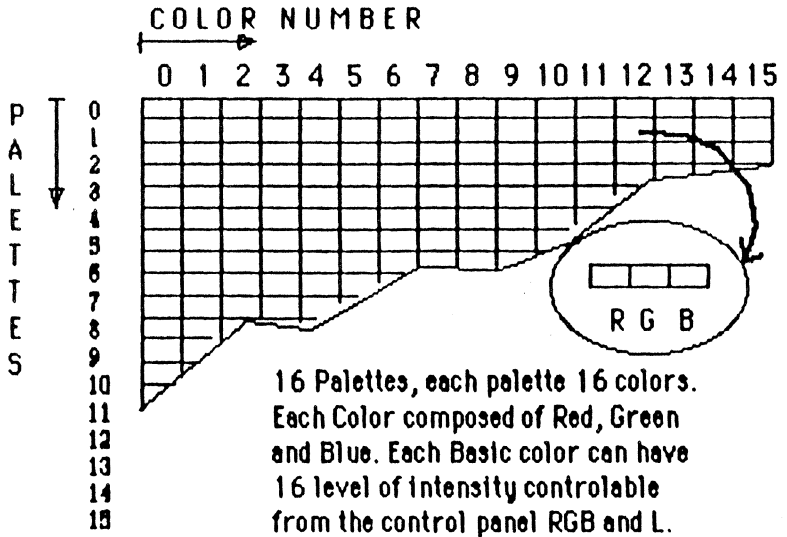
As show in the pictures above, Colors are stored in palettes. A palette is a set of 16 colors. Each picture can have up to 16 palettes, this what makes the 256 color limit.

You might think of a palette as a paint set of 16 colors. Each color can be set independently. The Apple IIGS can handle up 16 independent palettes. It is as if you have a paint box that has 16 different palettes, place to store colors, and each storage area can have 16 colors. Thus, you can paint with 16 colors x 16 palettes or 256 colors at once. One restriction is that each line can have one palette assigned to it, can contain only 16 colors.

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But different lines can be assigned different palettes so you can paint with 256 colors on the whole screen.

Now we will introduce you to the concept of SCB (Scan Control Byte):

Scan Bytes
1 for each line.

X- Coordinate (0-319) or (0-639)

Y

C
o
o
r
d
i
n
a
t
e

0
.
1
9
9

0
1
2
3
4
5
.
.
.

Each Pixel Contain a number from (0-15) on 320 mode and (0-3) on 640 mode.

Every Scan byte correspond to 1 line. Each Scan Byte contain two important information about that line:
1- Indicate the Line Resolution 320 or 640
2- Contain a number from 0 to 15 indicating the palette number. Any time anything is drawn on that line, the colors of that line are taken from the palette number indicated in the SCB (Scan Byte). Use the scan command to control the SCB.

There are 200 vertical lines on the IIGS, Using **Color+** you will have the ability assign each line a different palette (Each line can have a separate

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palette up to 16 palettes). Because each line has one Scan Control Byte. This byte tells the computer both which palette out of the 16 to use and the resolution of that line.

Color+ has made it easy for you to play with all the different combinations. Using the graphics control panel on the bottom of the screen, you can change the palette and the resolution of any line or set of lines.

To change the palette and the mode of any set of lines, just go to the graphics panel on the bottom of the screen. Set y1 and y2 then set the palette and the mode, then press on the 'scan' button. The lines between y1 and y2 now have the palette you set and the mode you set.

For fine tuning your drawings, the Zoom program lets you display any portion of the screen in 3 different zoom levels. The zoom routine can be 320 mode zoom or 640 mode zoom, depending on the 'Set GrMode' command in the option menu.

As stated earlier there are 12 different fill patterns. To edit a pattern go to the Color menu and select pattern editor. Then the current pattern is displayed.

There are some pictures on the disk: SUN5, MAIN, or INCIDER. Try to open them from the file menu. Using Color+ you can open $C1 type and Binary type pictures. These are the standard Super Hi-Res pictures. You cannot load compressed pictures with type $C0 using this version.

Running the Color+ Program.

Boot the color+ program disk, you can boot either from the Finder® or from the disk. If you boot from the Finder just double click on COLOR.SYSTEM after a while the program will be ready.

Check out some of the 256 color pictures on the disk. The graphics control panel will facilitate manipulating complex drawing multipalette (256 Colors) pictures. In fact, using this interface alone you can create variety of special effects.

Animation:

You can Record your moves! Using Color+, you can record your drawing commands by activating the record option. You can turn on/off recording from the animation menu. Using this option, you can create many animation effects. To get an idea of the things that can be done, we've designed some animation file for you to look at.

Loading and running an animation file:

Go to the animation menu and select 'Load Animation'. The load animation window will show. Double click on the animation folder. In this folder there are many predesigned animation files. Load the file called DEMO2.ANM by either double clicking on the file name or by highlighting the file name and clicking on the open button.

You will now have the option of playing the file. Before playing back this file, do the following:

- Go to the 'Patrn' menu and select a solid color for the Fill command. This will init the fill command to be a solid color instead of a pattern.
- Go to the tool selection and select the fill command. Now Fill any area.
- Then go to palette selection arrows next to the colors and select palette 0. This will init the displayed palette to 0.
- Finally go to the animation menu and select play back' option.

The animation file will be played back. This animation file is similar to short cartoon. You can create various animation and color cycling effects.

Things to watch for when working with animation:

The animation file will not reset the screen to its original value when you start the animation. You must reset it before you start animation. Resetting is what we did in the previous paragraph.

Note: If the previous picture on the screen before you run your animation was multi-palette picture You must reset the screen to the original working palette.

If the above animation file shows irregular colors, let it play though, then play it again. The Colors should be normal.

Now play the CYCLE.ANM, INTRO2.ANM and other files. Just load the file and play it. You may find it necessary to clear the screen to color 0, before you play back the file.

Try to create simple animation files on your own. To start a new animation file two simple steps are required:

1- go to the animation menu and turn on recording.
2- go to the option menu and select ·**Start New Animation**·

Now your moves will be recorded as you use Color+. Around 20 different commands can be recorded. To play back your moves only 1 step is required:

Go to the animation menu and select 'Play Back'.

To save your animation file go to the animation menu and select 'Save Anim'

Using Color+ animation you can create very interesting scenes and presentations and short cartoons.

You can make short lessons in mathematics in learning about colors. Color+ animation can be used for a variety of educational purposes.

CHAPTER 3

Reference Section

General Overview.

This chapter and the next one explain all the options available to you for use with Color+.

The Color+ main menu looks like this:

```
 File Edit Select Colors Option Tools Patrn Animat
```
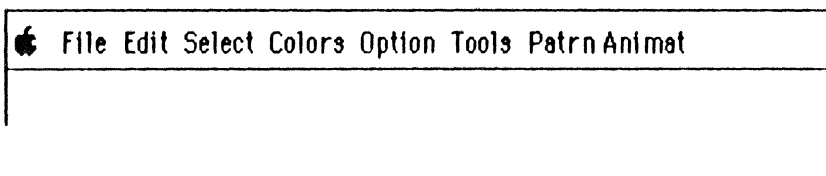
We will go through each menu items and explain its function.

Using the **File** Menu:

The File menu looks like this:

```
┌──────────────┐
│ File         │
├──────────────┤
│ Load Picture │
├──────────────┤
│ Save Picture │
├──────────────┤
│ Load Palette │
├──────────────┤
│ Save Palette │
├──────────────┤
│ Quit To BASIC│
├──────────────┤
│ Quit         │
├──────────────┤
│ Shape Editor │
└──────────────┘
```

Loading Pictures: When you select this option, a window opens to load the picture. The name of your boot volume appears at the top of the window. You have many different options to select from. You can use the arrow to display all the files on this directory. Pictures are displayed in colors different from directories. To open a picture or a directory, either double click on the file name or highlight it and click on Open.

The Disk access window looks like this:

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```
┌─────────────────────────────────────────────┐
│  Select Picture To Load                      │
│                                              │
│  ┌────────────────────────────────────────┐  │
│  │  Current Pathname                      │  │
│  └────────────────────────────────────────┘  │
│  ┌──────────────────────────┐  ┌──────────┐  │
│  │  Picture Names are        │  │  Disk    │  │
│  │  displayed in different   │  └──────────┘  │
│  │  Colors then              │  ┌──────────┐  │
│  │  Directory Names.         │  │  Open    │  │
│  │                           │  └──────────┘  │
│  │                           │  ┌──────────┐  │
│  │                           │  │  Close   │  │
│  │                           │  └──────────┘  │
│  │                           │  ┌──────────┐  │
│  │                           │  │  Cancel  │  │
│  └──────────────────────────┘  └──────────┘  │
└─────────────────────────────────────────────┘
```
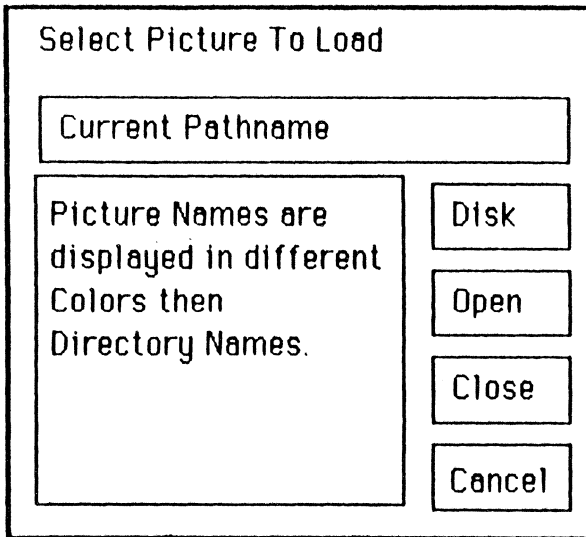
when you open a directory file, the current
pathname is displayed in the upper window.
Using the close command closes the last
subdirectory. Clicking on the pathname will also
close the last directory. If the current pathname is
the main (root) directory, nothing happens, when
you click on th pathname.

When you are in this window, the program won't
detect the insertion of a new disk. The program
can, however, detect when a disk has been
removed. It will no longer display a removed disk.
If you want to change disks you need to click on
'Cancel' to go back to the main program, then
change the disk.

Saving Picture: The process for saving pictures is similar to loading them. The disk save window looks like this:

```
┌─────────────────────────────────────────┐
│  Select Picture To Save                  │
│  ┌────────────────────────────────────┐  │
│  │ Current Pathname                   │  │
│  └────────────────────────────────────┘  │
│  ┌──────────────────────┐  ┌──────────┐  │
│  │ Picture Names are    │  │ Disk     │  │
│  │ displayed in different│  ├──────────┤  │
│  │ Colors then          │  │ Open     │  │
│  │ Directory Names.     │  ├──────────┤  │
│  │                      │  │ Close    │  │
│  │                      │  ├──────────┤  │
│  │                      │  │ Cancel   │  │
│  │                      │  ├──────────┤  │
│  └──────────────────────┘  │ Save     │  │
│  ┌────────────────────────────────────┐  │
│  │ This is the text window            │  │
│  └────────────────────────────────────┘  │
└─────────────────────────────────────────┘
```

Pictures are saved on the subdirectory displayed on the upper window. To enter the file name you need to click on lower text window with the mouse. Then use the keyboard to enter the text. 3 commands keys can be used with the edit text:

1- 'Delete' lets you delete the last character typed.

2- '<--' backspace also let you delete the last character typed.

3- 'Return' lets you go back to mouse control.

When entering text, the mouse is disabled.

Pressing the 'Return' key will let you control your mouse again.

Note: The pictures displayed in the file access window displays only standard super hi-res pictures of type $C1 or BIN.

Loading Palettes: Loading palettes is the same as loading pictures except that only filenames that end with '.PAL' are displayed only. If a palette is saved using the "save palette" option, the program automatically adds the '.PAL' suffix to the filename. If you've designed a palette using Supergraphix II program, to access it from Color+ you need to make sure the file name is in this format: xxxx.PAL.

After the palette is loaded from disk, it is stored in the palette buffer area. At this point you can use the 'UNDO Old Palette' in the 'Option' menu to toggle between the current palettes and the just loaded palettes.

Saving Palettes: the user interface for saving palettes is the same as saving pictures. The save command saves all 16 palettes under the filename you entered.

Quit To BASIC: Sometimes you will find it necessary to quit to basic to do some miscellaneous work such as seeing the catalog. If you are in BASIC, type one of the following commands to go back to COLOR+:

- **RUN TOMAIN.INIT** This command takes you back to color+ leaving all your screens intact. What ever picture was displayed before, will now be displayed again.

- **RUN INIT.2** This command takes back to COLOR+ and it clears the screen. Your previous work will be erased, because you will be starting new picture.

Quit: The Quit command lets you return to the launching program. If you booted from the Finder you go back to the finder. Before the program quits, it will ask if you are sure you want to quit. If you are unsure if you have saved your work, stop the Quit and save your picture. Once you quit any unsaved picture will be lost.

Shape Editor: This option will takes you from Color+ program to the Shape Editor. The shape editor program allows you to draw, design and link shapes for use with color+ as brush or as shapes for your animations. Chapter 4 is devoted to describing the features of the shape editor.

Note that when run the shape editor, your previous work remains intact. When you quit from the Shape Editor, all your pictures and animation files are still there. The only thing you loose is old paste shape. The old shape is replaced with whatever shape you've created in the shape editor. Even though you will not lose your work, it is still advisable to save your work before shifting into the shape editor.

Warning: If you did not use, or load any shape when you executed the shape editor program, **don't** use the paste command directly when you're back into Color+. First use the copy command. Failure to use the copy command before the paste command in this case, will hang the program, causing it to lock.

Using The **Edit Menu**

The Edit menu looks like this:

```
┌─────────────────┐
│ Edit            │
├─────────────────┤
│ Clear Screen    │
│ Undo            │
│ Invert          │
│ Copy            │
│ Paste           │
│ 2-Rotate 90     │
│ Current Mode=0  │
└─────────────────┘
```

Clearing the Screen: This command clears the screen to the current color. Before carrying out this command, the program ask you only once if you are sure. Once the screen is cleared, your picture will be lost. The UNDO command will NOT restore a picture once it has been cleared.

UNDO: This command is very helpful. If you make a mistake, you can use the undo command to repair it. However you still need to take special care. The Undo command will undo only the last move. That means if you've made a mistake and, then draw an extra line or fill with the wrong pattern, you can go and undo the last move, but if you click anywhere on the screen beside the menu

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bar your last move is saved and you cannot undo it.

The last move is considered any action you make. Any time you click on the mouse you have completed an action. The UNDO command will only undo the last action taken.
Although we have built-in many safeguards, it is still a good practice to save your work regularly.

Invert: The command will invert a particular area of the screen. The area inverted is the last area accessed with the Copy command.

Copy: This command is the same as the copy tool in the tool window. You can copy any area of the screen and paste it anywhere you want using 4 different drawing modes explained in the following paragraphs. To Copy an area of the screen click and drag, then release the mouse button.

When using Copy, the area you select will depend on the 'Copy function' currently selected:

1- Copied as is
2- Rotated 90 degree
3- Rotated 180 degree
4- Rotated -90 degree
5- Mirror imaged.

All the above functions will perform differently in 320 and 640 mode. The 'Set GR MODE' in the 'Option' menu determines the current drawing mode regardless of screen mode.

Paste: The last shape copied can be pasted anywhere on the screen. When you choose this option the current cursor show the shape to be pasted. You can move it anywhere using the mouse, whenever you click the shape will be drawn at that location. The mode the shape is drawn depend on the mode selected 0,1,2, or 3.

Set Copy Function: As mentioned before, there are 5 different ways you can copy an area on the screen:

1- Make Shapes
2- Rotate 90
3- Rotate 180
4- Rotate -90
5- Mirror image

The option shown when you pull down the 'Edit' menu is the function selected. any time you select this option the next option mode will be effective. And the next time you pull down the 'Edit' menu that option will show. If the The 'Make Shapes' is shown then when copying the copy copy will use the 'Make Shape' option.

Set Paste Mode: There are 4 different way you can paste a shape:

1-   Mode=0: this mode will paste the shape as is. The background behind the shape is completely replaced by the shape picture elements.

2-   Mode=1: this mode will make color 0 of the shape transparent to the background. That means when you paste a shape in this mode, any color 0 in the shape will show the background.

3-   Mode=2: this mode will XOR the shape pixel elements with the background pixel elements. For example a white in the shape pasted on a white on the background, will turn into a black. The truth table for this function is as follow:

```
Shape BackGD     Result
------------------------
0     0     |     0
0     1     |     1
1     0     |     1
1     1     |     0
```

Color are numbered from 0 to 15

| Color Num	Binary Value
Color 0	0000
Color 1	0001
Color 2	0010
Color 3	0011
Color 4	0100
Color 5	0101
Color 6	0110
Color 7	0111
Color 8	1000
Color 9	1001
Color 10	1010
Color 11	1011
Color 12	1100
Color 13	1101
Color 14	1110
Color 15	1111

Selecting Pen Size

The Select menu looks like this:

```
Select
Size=1
Size=2
Size=3
Size=4
Size=5
Size=6
```

This menu item lets you select the drawing size for all lines (points, lines, circles rectangle...) When you print text the size of the text and shapes drawn will depend on the Size selected.

This command is affected by the 'GR Mode' command in the 'Option' menu. The size of the drawing unit depends on the Gr Mode value either 320 or 640. Here are the following pixel size for each drawing mode.

In 320 mode (when GrMode=320): Size=

1 2 3 4 5 6
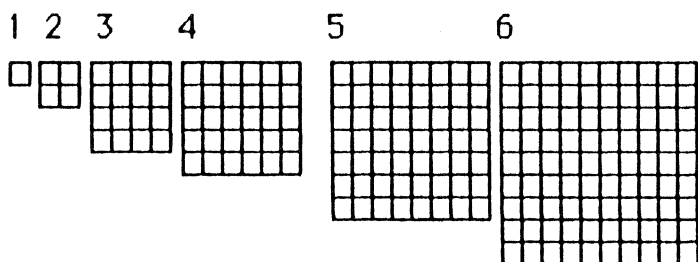
In 640 mode (When GrMode=64): Size=

1 2 3 4 5
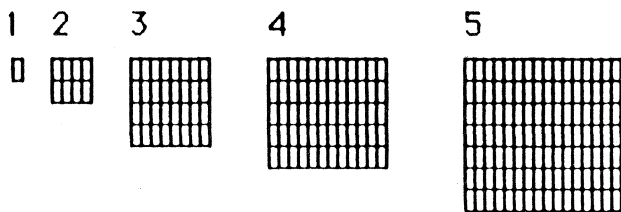
Colors Menu

The Color menu looks like this:

```
 Colors 
 This Color 
 This Palette 
 All Palettes 
 Edit Pattern... 
 Mix Colors... 
 This Pal --> All 
 This Col --> All 
```

This Color: This option is necessary when you are using the RGB and L option on the control panel. When this option is selected, the RGB and L will act only on the color selected and shown. Try to Clear the screen to Color #1, then click on color#1, then use the R,G, and B option to change Red, Green and Blue component of Color#1.

If after changing the RGB value of a particular color, the color doesn't change, use the 'This Color' option to make RGB and L active again.

This Palette: Selecting 'This Palette' makes the RGB and L on the control panel active on all the colors in the current displayed palette. This option

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allows you to easily create a palette with a uniform intensity of one or more colors. That is, you can make a palette with a set amount of red, blue, or green or with a certain light or darkness

All Palettes: This option has the same effect as the 'This Palette' Option except it acts on all palettes.

With this option you can change the RGB and L component of the whole picture.

Edit Pattern: Using this option invokes the edit pattern routine. You can change and edit Fill patterns. After you've created a new pattern this pattern will be effective on your drawing when you quit back to Color+.

When designing a pattern for use with 640 mode, be sure to draw your pattern using only the first 4 colors. Any pattern can be drawn on both mode.

For additional information about patterns look at the 'patterns' section in this chapter, and in chapter 4.

Mix Colors: This option allow the user to change and mix color. The color mix program allows the user to see visually how colors are composed. It is a fun and educational tool. At the same time, it

allows you to choose your colors more effectively. For example if you are designing a Sunset scene, you can plan your colors ahead by mixing the original colors together. A more detailed explanation of the ColorMix program is present in chapter 4.

This Pal --› All: This option gives you more flexibility in designing pictures. For example if you want to start with the original palette. you can set all the 16 palette to the current displayed palette.

Your old palettes are not lost. They are stored in a buffer area in memory. If for any reason you want to restore your old palette back you can use the 'UNDO Old Palettes' in the Option menu.

This Col --› All: This option is useful when you want to start with a color and change it as palettes change. This option let you change the value of this color in all the palettes to the current color.

For example if you have a yellow color in color #2, and you used this option, all color#2 in all palettes will change to yellow.

The Option Menu.

The Option menu looks like this:

```
 Option 
┌─────────────────────┐
│ Set GrMode=640      │
├─────────────────────┤
│ Show Coordinates    │
├─────────────────────┤
│ Hide Control Panel  │
├─────────────────────┤
│ Undo Old Palettes   │
├─────────────────────┤
│ Start New Anim.     │
├─────────────────────┤
│ Buffer Picture      │
└─────────────────────┘
```

Set Graphics mode: This option let you toggle the current drawing mode from 320 to 640 mode or vise versa.

Note that this option won't change the actual screen resolution from 320 to 640 or vise versa. Rather, this option informs the program that it should use the 640 or 320 drawing routines the next time an operation is performed. To change the actual screen resolution you need to use control panel.

For example, supposed your picture consist of screen from 0 to 100 a resolution 320 mode resolution, and from line 101 to 199 a resolution of 640 mode and suppose the current GR MODE is set to 320. When you plot a line, the line will use the

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320 mode routines regardless of where you draw on the screen. If the GR MODE=640, then the line drawn will use the 640 mode routines.

Show Coordinates: This option lets you see the coordinates. These coordinates are displayed only if the control panel is shown. They are displayed on the lower right of the control panel. The coordinates go from 0 to 319 in 320 mode and from 0 to 639 in 640 mode. Y coordinates go from 0 to 199 on both modes.

Hide Control Panel: This option hides or shows the control panel. When hiding the control panel, the picture will be displayed starting from the top.

Note: When you use this option make sure the picture is not scrolled.

UNDO Old Palettes: This option is useful for restoring old palettes in case of error. Also, when loading a palette from disk, the loaded palette is stored in the buffer areas. To transfer those palettes to the main screen area use this option. You can use this option to toggle between old and new palettes.

Start New Anim. This option allows you to start a new animation file. To execute this option, the

Record option should be turned on. Otherwise this selection has no effect.

Be careful. If Record was on and you select this option your previous animation file will be lost. If necessary save your file before using this option.

This option resets the animation pointer to the start of the animation file.

Buffer Picture This option allows you to work with 2 different pictures at the same time. You can use one picture as a buffer picture to store miscellaneous clip art or any other drawings for use with the other picture. Or, if you designed critical drawings, you can use the buffer to save your picture, so you don't lose your work.

Tools:

The Tool Menu looks like this:

Tools
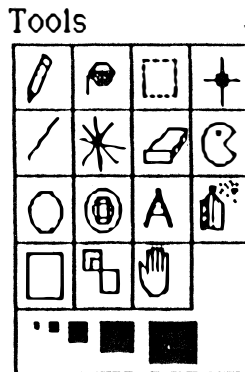
At any time when you click on the tool menu, the tool you are currently using will be highlighted.

The following explain each of the available function in the Tool Menu:

1/	2🡒	3	4	9- Plot Circle
5/	6	7	8	10- Plot Circles
9	10	11	12	11- Enter Text
13	14	15		12- Plot with Br

1- Plot

2- Fill

3- Copy

4- Get Color

5- Plot line

6- Plot lines

7- Erase

8- Plot with Shape

13- Plot rectang
14- Many Rectan
15- Use Hand

Zoom Level 4
Zoom Level 3
Zoom Level 2

1-   Plot: This tool allows you to plot on the screen with the current color. This tool is affected by the size and by GR MODE setting.

2-   This is the Fill tool. Depending on the pattern selected using the Pattern menu, the fill pattern can fill a solid color or a pattern.

The Fill command is affected by the GR MODE command. The appropriate fill routine is invoked depending on GR MODE.

3-   Copy. This is equivalent to the copy option in the Edit Menu. When you choose this option the rectangle you plot will be transformed to a shape depending on the 'Set Copy Function' in the Edit Menu.

The shape copied can be accessed in 2 ways. The first one is by using the paste command. (See 'Set Paste Mode'). The other way a copied shape can be accessed is through the Tool #7 in the Tool Menu, the animation tool. Select tool #7 and Set the ST (Shape Table *) on the control panel to '2'. Now the shape copied can used as a brush (You can paint with this shape). The current drawing mode is set using the 'M' option on the control panel.

4-   Get Color. This tool flashes the color selected. If the color selected is on different palette then the one displayed, you will not be able to see the color. In this case, select "different palette" and click on that color again. Repeat until you find the color value.

Another way to get the color, is to select 'Show Coordinates' in the 'Option' Menu and get the coordinate of what line the color is on. Now use 'Y1' or 'Y2' on the control panel and move to the line where the color is drawn. The palette number of that line will be displayed in the palette window. Now you can go and show that palette, click on your color to find out what number is it.

5-   Line tool. This tool allows you to plot lines. Like the plot tool, this function is affected by the current size setting, and by GR MODE setting.

On a multipalette picture, same color number on different palettes might have different values, so as you plot lines or points, these lines could have many colors.

6-   Same as tool *5. except that the first click determines the center of many lines so long as you move the mouse and keep the bottom pressed.

7-   This is an eraser tool. This tool erases in Color*15. To erase in different colors, you can use a large size with the plot tool, and select the desired color. The plot tool will then act as an eraser also.

8-   The animation tool. This tools allows you to import shapes developed using the Shape Editor Program and use them with your pictures.
The 'SH*' option on the control panel determines the shape number to be plotted. The 'M' option determines the current plotting mode. The 'ST' option determines the current shape table selected. As you cycle between shapes using the 'SH*' option, the current shape will be briefly displayed in the upper left corner of the screen.

Shape Table *1: is the one that you load using the animation menu 'Load Shape'. This shape can be any shape or series of shapes.

Shape Table *2: is the one that you make using the copy option.

Shape Table *3: is Font table *1

Shape Table *4: is Font Table *2

Shape Table *5: is Font Table *3

Shape Table *6: is Font Table *4

Play around with this option and experiment with it. You can Draw pre-designed shapes and patterns, and use them as the unit drawing. The shapes drawn are affected by the mode setting on the control panel 'M'

9- Circle Tool. This tool allows you to plot circle. The current drawing mode is determined by the GR MODE command in the 'Option' Menu.

10- Multi-Circle drawing. The first click determine the center of the successive circle plotting.

11- This the TEXT entry tool. There are 4 pre-designed fonts to use with this tool. The fonts to be used is determined from the control panel on the 'FT' option. You can scroll between the 4 different fonts.

Font#1 (FT=1): is the standard font for use with 320 mode.

Font#2 (FT=2): is the standard font for use with 640 mode.

Font#3 (FT=3): this is a multi-colored large font. Only upper case are valid keys.

Font*4 (FT=4): this is a large font. It includes the entire alphabet set.

Note: All Fonts can be edited. Also you can add or delete characters. This is done using the Shape Editor program accessed from the File menu.

12- The brush Tool. This is an additional brush tool. The Animation Tool (Tool*8) is a more useful and complete brush tool.

13- The rectangle tool. With this tool you can draw rectangle. To draw a filled rectangle, draw it first then use the fill command.

14- Multi-rectangle tool. You can create variety of patterns and effect with this tool.

15- The hand tool. This tool is currently disabled. Use the right most option on the control panel to scroll up and down the whole picture.

Zoom Levels:
The Zoom level determines the enlargement level of the Zoom option. When choosing a zoom level of 2, 3 or 4 the zoom routine is automatically invoked after you release the mouse button.

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The Zoom routine will show you a rectangle which depends on the zoom level selected. You can select what area to zoom on by moving that rectangle to the desired area and clicking once on the mouse button.

More information about the Zoom Routine is available in chapter 4.

The Pattern Menu.

The Pattern menu looks like this:

Patrn
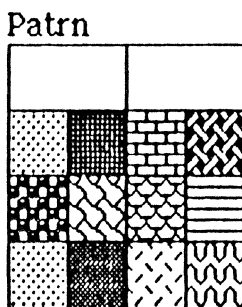
The upper right corner displays the current pattern or color the fill command will use. The upper right corner, if selected, the Fill will be a solid color. This solid color is the current selected color on the control panel. When you click on the 'Patrn' Menu the current pattern will be displayed in the upper left corner. Any pattern can be edited

to any 8x8 pattern using the 'Edit Pattern' option in the 'Color' Menu.

The Animation Menu:

The Animation looks like this:

Animal
Load Shapes
Save Shapes
Record Is Off
Play Back...
Save Anim.
Load Anim.

Saving Shapes: This option saves the area copied using the copy tool as a shape: When use use the copy tool, the

You can load this shape either using the Open shape command or using the shape editor program accessed from the File menu.

Using the shape editor program you can load the shape and add it to another shape to form a larger shape table. Using the Color plus Animation menu,

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you can load the shape and plot it anywhere on the screen with different drawing modes. This option allows you to design custom brush for use when painting.

The shape saved is the one you see when you use the paste command.

Loading shapes: This option will load any shape table into memory. You can access a shape table from the animation tool, Tool #8 in the 'Tool' Menu. You can draw these shapes using drawing modes determined using the 'M' option on the control panel. Look into the M option on the control panel later on this chapter.

The following is an explanation of each of the above function:

This function allows you to load a shape table. To activate the shape table loaded, two steps are required:

1- **Choose the animation tool** from the Tool menu.
2- Make sure that the pointer (the 'ST' variable on the control panel) is set to 1.

Record Is On/Off: When **Record Is On** there are around 20 different function that can be recorded

to create unlimited special effects and animation.
These functions are outlined below:

1-   **The pen and line tools**
     When you use the **pen** and **line** tool, the
     program save your moves with the plot
     command.

2-   **The pattern Fill tool**
     When you use the **Fill pattern** option the
     program saves your moves using the pattern
     Fill tool.

3-   **The color Fill tool**
     Similarly when you **fill** using a specific
     color, the above command is used to save
     your moves.

4-   **The rectangle tool**
     This is the **rectangle tool** in the tool menu.

5-   **The Circle Tool**
     This is the **circle tool** in the tool menu.

6-   **The Color selections**
     Any time you click on the **color** on the
     lower right of the control panel, The color is
     saved and used with the **play back** option.

7-   The Drawing mode selection
Any time you use the 'M' option on the
control panel, the current plotting mode is
selected.

There are 7 different plotting mode:

M=0 Plot the shape as is. This is the block
mode: All the shape's pixels replace
the background pixels.

M=1 Plot the shape with color 0 in the
shape transparent to the background.

M=2 XOR the shape pixels with the
background. This is the Inverse mode.

M=3 Draw the shape in the current selected
color. Color 0 is transparent to the
background.

M=4 This mode is essential in creating
animation. Make sure before you use
this mode to use mode=6. When this
mode is selected, any time you draw
the current shape, the background is
saved into a buffer area, and is
automatically restored when the same
shape is drawn at another location.

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If you forget to use mode=6 before this mode, the replay program might detect the error and open the shape for you. The Play Back routine can remember whether or not a shape has been opened.

M=5 This mode restores the background of the current shape. By doing so, closes the shape.

M=6 This Command opens the current shape. What is meant by 'open' is it saves the background without restoring old background. This is used when displaying the shape for the first time.

8- **Custom Brush and shape tool**
This command draws shape number S in the current mode. Make sure to specify a shape table with ST command.

9- **The Clear command**
Using this command clears the screen command to the last color used.

10- **The shape pointer command**
When you use the ST option on the control panel, the program saves a pointer to the

shape table in use. The pointer uses this command to locate to a specific shape table.

11- The Font pointer command
This command is similar to the shape pointer, but it is used to point to a font table using the 'FT' command on the control panel.

12- The Size command.
Any time you use the size command from the size tool, this command is recorded. Be careful when using this command when record is on. You might have unpredictable results.

13- Setting the graphics mode 320 or 640

14- Cycling left and right commands
Any time you use cycling color on the control panel, your cycling effects are saved. By using these commands, you can create a multitude of special effects.

15 The text Printing command.
Any time you use the Text tool from the tool menu. All your text can be recorded using 5 different fonts. Using this option you can create animated stories with animated text and picture.

16   **The Scan command**
The scan option on the control panel allows you when recording is on to save these moves.

17   **The Palette command and RGB colors**
The R, G, B, and L commands are recorded and can create [a very neat effect] when played back.

Any function not mentioned here is not recorded when recording option is on. You need to be careful when using recording. Suppose recording was off and you plot a circle, then you turn on recording then you use the fill command to fill inside the circle. When you play back your animation file the fill command will fill something other than the circle because the circle was not recorded.
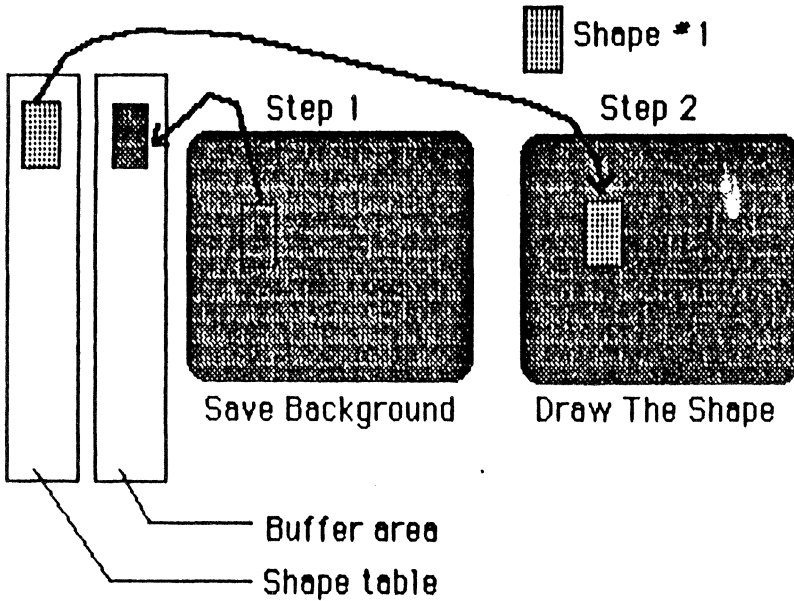
<u>Do not use ST=2 while recording.</u>
The record command will not record copy and paste. To avoid unpredictable effects that ST=2 will call, use ST=1, ST=3, ST=4, ST=5, and ST=6.
The combination of all these function allows you to have hours of fun creating animation, educational lessons, presentation, short stories and so on, all this from within color+.
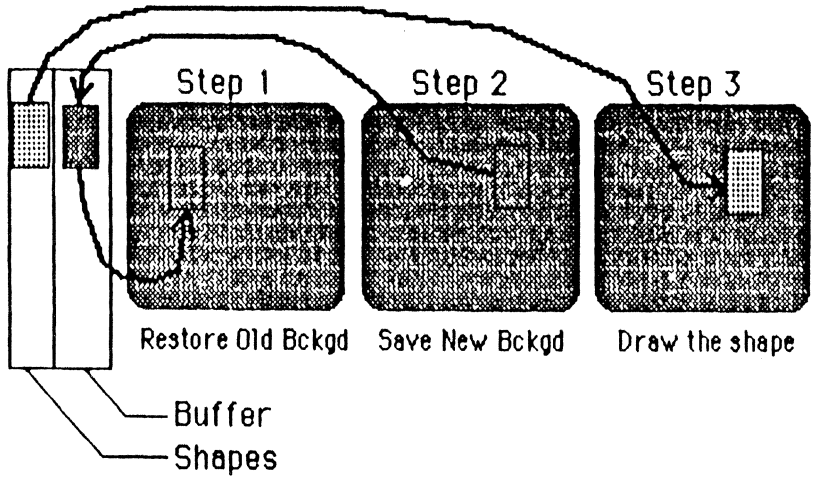
Understanding Shapes and Modes:

The following pictures clarify the use of shapes and modes when using the animation tool from the tool menu. The animation tool, together with function #1, #2, and #3 on the control panel allows you to create various animation effects.
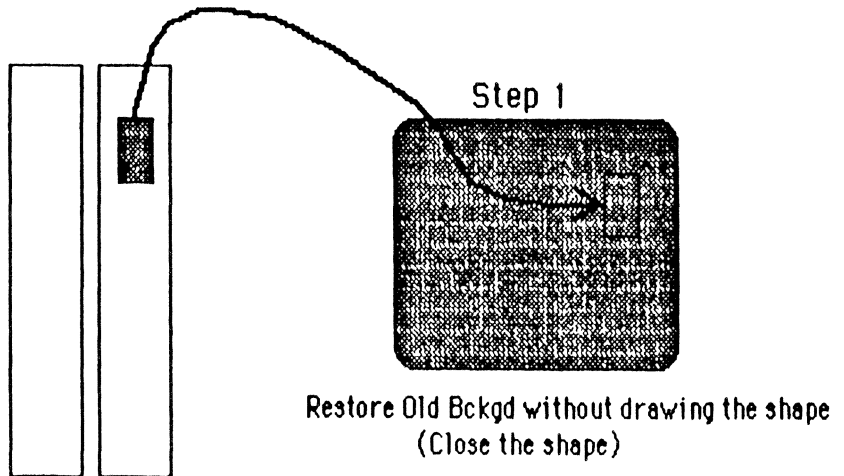

M=6, SH#=1, Drawing using the animation tool.

Restore Old Bckgd   Save New Bckgd   Draw the shape

Buffer

Shapes

$M =$ ₄, SH#$= 1$, drawing using the animation tool.

Restore Old Bckgd without drawing the shape
(Close the shape)

$M=5$, SH#$= 1$, Drawing using the animation tool.

Creating Flickerless animation:

M=0 is a useful mode for creating flickerless animation. To create a walking man, the way to do it is to design 4 scenes, for example, and while you are in record mode, draw one scene above the other by shift it from the previous shape. The result is a walking man, or a moving bicycle and so on.

The DEMO2.ANM file uses an example of flickerless animation using the bicycle.

Play Back: This option allows you to play back your moves.

The length of the play file is limited to 22K. Any file larger than that will give an error. **The length of the animation file is displayed on the lower right corner of the control panel any time you Turn On or Off recording. Although the program won't hang if you exceed 22K, saving the routine will cause a crash. You can do a custom-made save routine to save animation files larger than 22K in size.**

Save Anim, and Load Anim

These two option allow you to save and load your animation work. They work the same way as loading and saving picture. The animation file is

automatically suffixed by '.ANM' When loading animation files, only '.ANM' files are displayed.
When you save an animation file, another file is saved on the disk: The file suffix is '.ANM1'. This file is the current shape table pointed to by ST=1. The reason that the shape table is saved when you play back your animation file is so you don't have to remember what shape table was used when you recorded your file.

When loading an animation file, the shape table is automatically loaded.

Quick tutorial:

To get an idea how is the animation work, we created a sample animation file. to access it do the following:

- Boot Color+
- Go to the 'Anim' menu and choose 'Load Anim' option.
- The open file window will show.
- Double click on the **Animation Folder** to open the animation folder. There you will see a file called INTRO.ANM
- Double click on that file, and the INTRO2.ANM will load. Other Files you might check : DEMO2.ANM and CYCLE.ANM.
- Go choose Color 0

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- Clear the screen. Then go to the Playback option to see this animation file.

Your animation folder may contain more than one animation file. Load them and play them back.

Try to do some small animation file by yourself and experiment with them.

Note that when drawing shapes, and using mode 4,5, or 6, the first time you draw the shape you need to set M=6. Using the animation tool draw the shape at its initial location. Then change the mode to 4 by setting M=4. This way, the successive drawings will be proper. When you play back the animation file, you will get the right effect.

When you use mode 6 to record, click one fast click, then change the mode to 4. If you use a slow click, the same move may be recorded twice on play-back you will see a copy of your shape where it is not supposed to be.

Since, when recording is on, you can only delete the last event recorded, be careful when creating large animation files, and save your work regularly.

Sample Animation:
1- Go to the animation menu and Turn On Recording.
2- Go to the Option menu and select **Start New Anim**.

Start by setting ST=1 on the control panel, then go to Clear Screen on the Edit menu and Clear the screen to black.

Now to create simple shape animation, set the mode M command on the control panel to 4, this mode let you draw without erasing the background. Then go to the tool menu and select the animation tool (the pacman shape) during that time all your moves are being recorded. Now you can click on the mouse and keep the mouse button down while moving the mouse, keep on moving the mouse for a while. Then go select the Line or Pen tool and draw couple of lines, try selecting different colors on the control panel. Also you can try the Fill, Circle and Rectangle tools.

Now Go to the animation menu, and Turn off recording. Then select Play back option. All your move now will be played back.

Later on, if you turn on recording any move you make will be appended to your animation file.

Unless you select Start New Animation, in that case you will start a new animation file.

Try to select other functions, and see the possibilities. Try the Text tool, the color cycling tool, try designing your own shapes using the built in shape editor program. The possibilities are endless.

Hints: If your animation file changes the Scan lines, then it is a very good idea to initialize the Scan lines to an initial value by setting Y1=0, Y2=199 and Mode=320 and Palette=0, then click on the Scan command. This way you will make sure every time your animation file is executed, the screen is reset to its original values.
Also make sure your reset screen color and pen colors and pattern mode (Fill pattern, or Fill solid color). You can do this by selecting and initializing these options while record is on.

Using The Control Panel:

Here is a picture of the control panel with its functions:
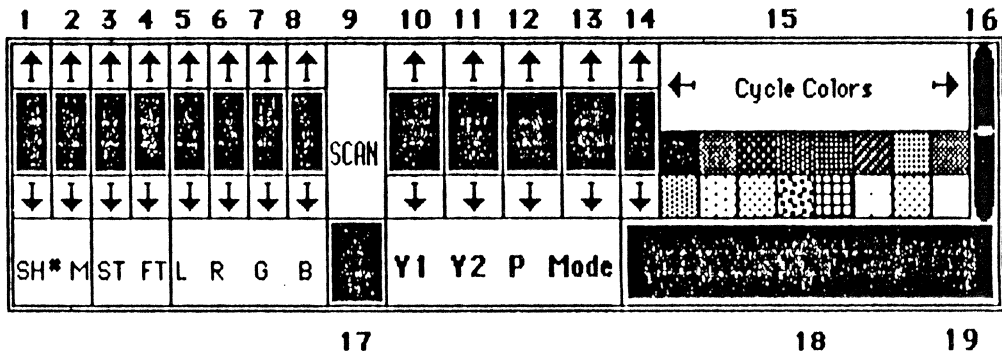
The following is an explanation of each function on the control panel (The function is identified by the number):

1-   This control 'SH*' allows you to view all the shapes or fonts in the current selected shape table. The current selected shape table is indicated by control *3 which is the 'ST' command.

2-   'M' Determines the drawing mode for the selected shape.

3-   'ST' allows you to select a shape or font table to use with the animation tool (tool*8) in the tool menu. This function allows you to paint with any shape on the screen. There are 6 default shape tables:
*1: is the shape loaded using the 'Load Shape' option.

*2: is the last shape used with the copy function. Which is the same one displayed by the Paste option.
*3: is font *1 (standard 320 fonts)
*4: is font *2 (standard 640 fonts)
*5: is font *3 (large colored fonts, only upper case)
*6: is font *4 (large fonts, complete ASCII set)

4   is the font number. There are 4 built in fonts as explained in the earlier function.

5   the 'L' control allows you to change the luminosity of a :
1- current color.
2- current palette.
3- all the palettes (the whole screen)
depending on the setting in the Color option (This Color, This Palette, and All Palettes)

6   R, G, and B are also affected by the setting in the 'Color menu'.
Any time you click on any color, the RGB value of that color is displayed in these windows. If you use the arrows, you can change the color to any of 4096 combinations.

7,8   same as 6

9   Scan Command allows you to change the resolution and the palette assignment of any line (0-199). By selecting a set of lines and manipulating them using 10,11,12, and 13.

10   Y1 indicate the first line the 'scan' will affect.

11   Y2 is the last line the 'Scan' will affect.

12   'P' is the desired palette for the Y1-Y2 lines.

13   'Mode' is the mode desired for (y1-y2) either 320 or 640.

These change won't be effective until you click on the 'Scan' control.

14   **Palette Selection** allows you to change the current displayed palette. With this option you can see all palettes. The L,R,G, and B option work on the current palette.

15   **Color Cycling**: This option allows you to have color cycling effects. The idea is that you need to select two colors between them the color will be cycled. To select what set of colors to cycle, two steps are required:
1- First Click on the last color to cycle for one second or so. (long click)

2- Second Click on the first Color to cycle for one second or so.
Now as you use the arrow, the colors will be cycled between the two points you selected.

16 **Scroll bar**: You can scroll the picture up and down. Before you use 'Hide Control Panel' in the 'Option' Menu make sure the picture is scrolled all the way to the top. Else, the palettes for your picture might not looked right.

17 **Current Color**: In this small window, the current selected color is displayed.

18 **Information Bar**: When 'Show coordinate' is enabled, this window displays the X,Y coordinates of the mouse . The size of the animation file is also displayed on the right anytime you turn on/off recording.

19 **Color Selection**: All 16 colors of the current palette are displayed here. The current resolution of these colors is determined by the 'Set GR Mode' in the 'Option' Menu. When switching between 320 and 640 mode, you will sometimes see some colors that are not good. If you switch to 640 mode and the palette colors are designed for 640 mode, you will not see strange colors.

CHAPTER 4

Using ColorMix program: From the Color menu, select **Mix Colors** and the screen will show three basic light circles and individual color control slides as shown below
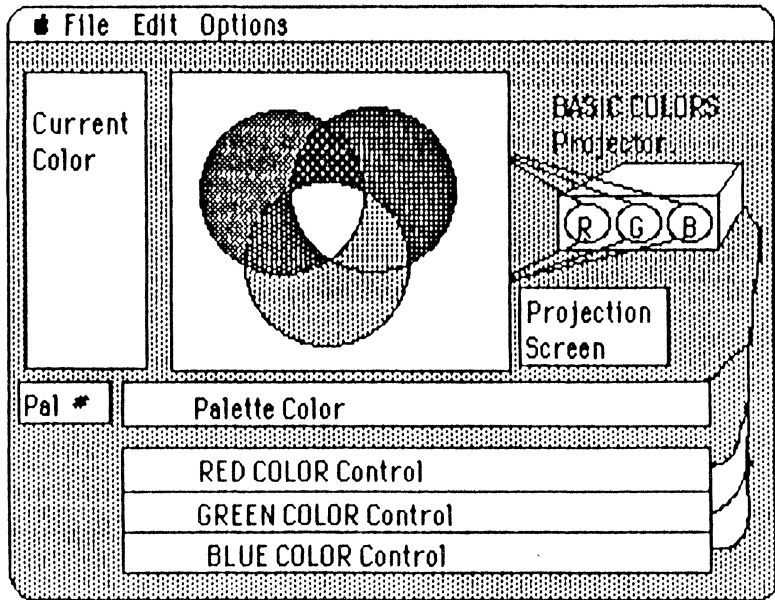
This educational program is easy to use. There are many controls that makes mixing colors and designing custom palettes an easy task:

1- The left arrows next to the color selection allows you to select any of the 16 different palette to work with. This way you can select the palette that need to be changed.

2- See each color its basic composition: click on the color and *voilà* the three basic component of that color are displayed. Using this option, you can get the feeling of the composition of each color. For example, if you select maximum red and maximum green, the resulting combination is yellow. Now you can change slightly the red and/or the green and see what color results. For example maximum red and half green is an orange color. Experiment a little, and you will soon have a sense of any color.

3- Now, after you have selected a particular color, you can fine tune the RGB component of that color using the three color slide on the lower half of the screen. If you are creating a sunset scene, for example, you will need this option to find the best colors for transition from dark blue to light blue to yellow, orange then to red. The ColorMix program gives you even more control of two value of the color than the main menu of color+ does because colorMix gives you a feeling of what each color is composed of.

4- After you are satisfied that the color displayed is the one you like, go to that color. Click the mouse, and drag that color to the desired position in the currently displayed palette.

In designing your own palettes, there are some special options to make this job easy for you. These options can be accessed from the Edit menu:

Edit

1	This Palette ---> Buffer
2	This Palette <--- Buffer
3	Undo This Palette

1- Using the 'Undo This Palette' option: At any time you can undo any palette to its original colors. The original colors of that palette are the ones on that palette when you first enetred the ColorMix routine.

2- Using the 'This Palette ---> Buffer' option: At any time you can save a palette to a buffer palette. This a convenient command when trying to copy one palette onto another palette or when you have a scene of many palettes and you want to slightly change the colors in consecutive palettes. You can copy one palette to buffer then copy the buffer to the palettes that you will be working with. After you have copied to and from the buffer, go to each palette and fine tune its colors.

Toggling between 320 and 640

One more useful function is toggling the displayed
 palette between 320 and 640 mode. This is
useful when working with 640 mode, and
when working with 16 dithered colors on
640 mode. Try it and see how it works.

Quit to Color+

When you quit to Color+, any change you made for
the palettes will show and be effective on the
current picture.

Pattern Editor Program.

The pattern editor program is easy to use. It allows
you to change patterns for the fill command. The
current selected pattern will be displayed for
editing. While you are in the pattern editor you can
select any other pattern for editing purpose. Also
an additional control is provided to see your
palette in 640 mode.

You can enter the pattern editor program from the
Color menu of the main program.

Zooming

The zoom option can be accessed from the tool menu. The resolution assumed when the zoom is executed is the resolution set by the **SET GR MODE** command in the option menu. Regardless of the actual screen resolution, the zoom routine will either be 320 or 640 mode. If you zoomed into 640 screen resolution with current GrMode set to 320 then you will not be able to control every pixel. To do so, you have to quit then change the GRMODE to 640. Now, when you zoom again into that area, you will have complete control.

Shape Editor program:

There is a built in shape editor program inside Color+: Any time you copy a portion of the screen using the copy tool, it is saved as a shape table of 2 shapes. One shape is the area copied. The second shape is empty. In many instances, you would like to make a series of shapes to be used with your animation file. For instancy, the bicycle parts, and the space craft and the bees. These shapes are drawn using the Shape Editor Program.

You probably noticed that there are many shapes that are used with the animation tools. The shape editor program allows you to create shape tables

with up 255 shapes on each table. You can even create and edit fonts for use with color+ using the shape editor.

To Execute the Shape Editor program, go to the File Menu and Select 'Shape Editor' The first thing the program asked you is how many shapes you want in your shape table. This number of shapes you will be able to fit is the * you select minus one. If you want a shape table of up to 10 shapes in size, enter 11.

In the shape editor program you can do the following:

• Edit shapes & Fonts
• Load any shape or Font Table, Edit it and save it.
• Select any of the 16 different palettes to work with.
• At any time see all the shapes present in the shape table.
• Rotate and manipulate any shape you want.
• Combine shapes from different shape tables. This is a useful option if you are going to combine shapes created with color+ and put them all into one shape picture.

The File menu allows you LOAD and SAVE different shape or font tables. Note that a font table is technically the same as a shape table except that

fonts are pre-arranged in the order of the character set (i.e. they are alphabetized). To load a Shape table set Load Shape, and the shape load screen will allows you to see shapes in different folders and load them. Try to open the shapes folder and load any shape table FLY3.SHP. Once you have loaded a shape table, you can see all the shapes within the table by using the arrow on the left of the screen. Later on, try to open the font folder and open the font table called: ALPHA3. This is the font table for the large colored font. Feel free to edit, modify or add fonts as you like.

The SAVE option acts the same as the load option. You can save your work when you're done composing your shape or font table. Similarly you can save your shape table in any directory. You don't need to add the SHP suffix. The save routine will do that for you.

To mix shapes from different shape tables, make sure the shape that you want to add to the other shape table is displayed in the large window.

In the edit menu, you will have more control over your shapes: Clear Screen, Rotate 90º, Mirror Image, Upside Down, Toggle Grid, See Shape.

Note: If you have a shape table that can fit 40 shapes and this shape table contains 25 shapes, the

next shape you edit will always be the last shape in this case, the next shape you make is shape number 26. Except when you select edit shape from the Shape menu, the next shape you make is the shape number that you have selected, when you are done the next time you make a shape the program will automatically remember the total number of shapes present in this shape table. For example, if you want to modify shape number 10, to do that, go to the shape menu and select edit shape, then enter 10. Now, the next time you use MAKE EVEN SHAPE, shape number 10 will be made. After you have used that command the shape pointer will again jump to the last shape in this example shape number 26.

You can also Zoom in and out of a shape. To see the effect you zoom, select show grid or select see shape, and you will see that your shape is bigger or smaller.
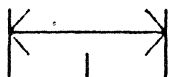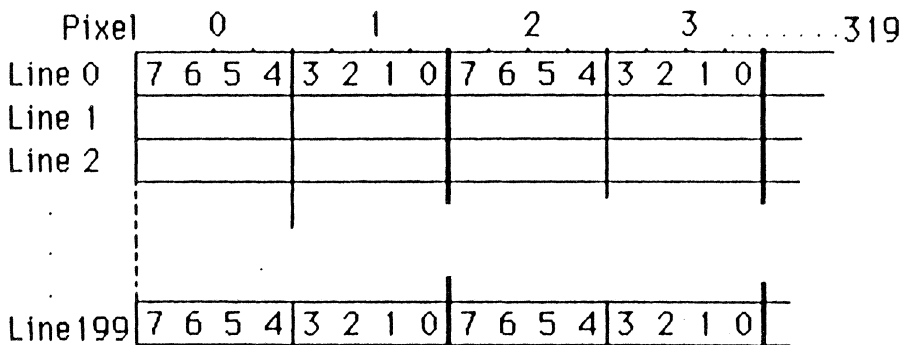
CHAPTER 5

Graphics on the Apple IIGS:

The video screen area is locate in Bank $E1 starting from address $2000 and of length 32K.

Each line on the screen can be assigned any of the 16 available palettes, and either graphics modes: 320 or 640.

The following pictures clarify how pixels are arranged on either mode.

In 320 mode:

Pixel 0   1   2   3 319

Line 0 | 7 6 5 4 | 3 2 1 0 | 7 6 5 4 | 3 2 1 0 |
Line 1
Line 2

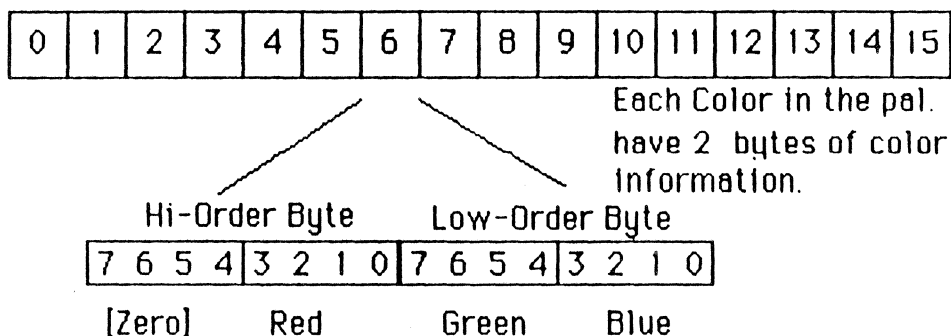Line 199 | 7 6 5 4 | 3 2 1 0 | 7 6 5 4 | 3 2 1 0 |

Each Pixel can have 16 possible
Values (from 0 to 15)
This number determines the color
number in the palette.

In 640 mode:
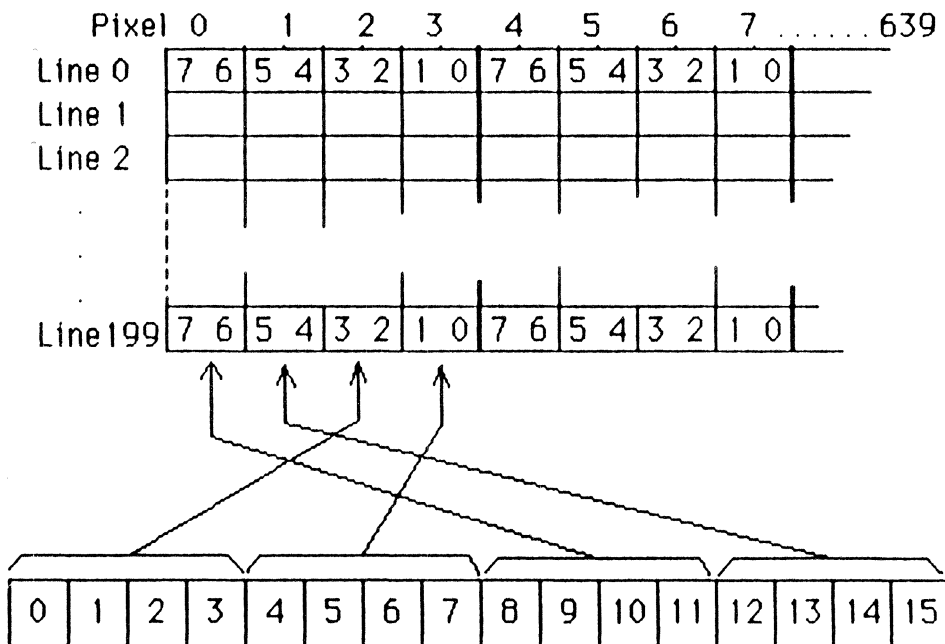
Each palette contain 32 bytes of information for a total of 16 colors. Each color can have any of 4096 value depending on the RGB components. Each of the Red, Green, and Blue component have 4 bits of information (4 x 4 x 4 = 4096).

The format of a palette is show in this picture:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

Each Color in the pal.
have 2 bytes of color
information.

Hi-Order Byte   Low-Order Byte

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

[Zero]   Red   Green   Blue
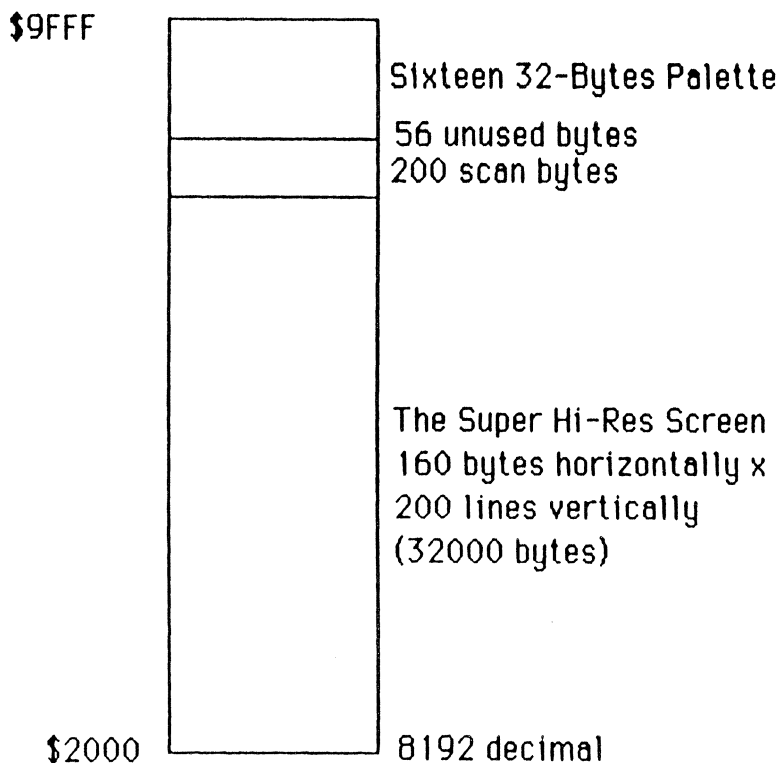
Using Color+ Pictures from Other Programs.

1- You can load Color+ pictures from any paint program. But you will probably only be able to display 16 colors. Unlike color+, which supports 256 colors, most programs support only 16.

2- If you are writing your own program from any language, it is fairly easy to include 256 color pictures within you program. Here is one way you can do it:

a-   Since Color+ picture is saved in the standard way the Apple IIGS display graphics, all you need to do is load the picture in a particular memory location (you need to reserve in advance 32K of

80

memory). After you load a binary picture file, all you need to do to display it is move it to the Video screen location: $E1/2000 ($01/2000 if shadowing is enabled, shadowing allows the picture data to be written on bank $01 of memory and shadowed to bank $E1 which is the video ram):

$9FFF

Sixteen 32-Bytes Palette

56 unused bytes
200 scan bytes

The Super Hi-Res Screen
160 bytes horizontally x
200 lines vertically
(32000 bytes)

$2000   8192 decimal

Bank $E1 or Bank $01 if shaddowing
is enabled.

$0E/2000

or $01/2000 if shadowing is enabled.

The picture format is as following:

Each picture has 200 lines. Each line has 160 bytes of pixel data. Therefore, each picture has total of 160 x 200= 32000 bytes.

In addition each line has 1 SCB byte associated with it.

Also, each line can be assigned 1 of the 16 available palettes.

The total length of a standard picture is

32000+256+512= 32768 bytes.

Appendix A

Trouble Shooting:

1-   **If you hear a beep,** then your program has crashed. All you need to do to make it work again is:

Press:
CTRL-C, then followed by 'RETURN' Twice.
then, TYPE:

RUN TOMAIN.INIT

In most cases this works. Your program will be on track again. At this point it is recommended that you save your work. However if it did not work type this command:

RUN INIT.2

If Mouse is not reaching all the screen or If you feel that **the mouse cursor is behaving strangely** here is how to recover:

Keep pressing CTRL-C (hold down the control key while pressing on 'C') until you hear a beep. After that press 'RETURN' key a couple of times. Then

type: TOMAIN.INIT this file will display your latest picture and put you inside Color+ program. At this point, save your work.

To start with new picture type: INIT.2.

If this still did not work, you need to reboot your disk.

In any case please report all bugs to us, so we can try to fix them.

APPENDIX B

Going Beyond 256 Colors

If 256 colors at once is not enough for you, there are some techniques to increase this number to more than 256 colors at once. One way to do it is to use interrupts (a signal that force the microprocessor to jump to a subroutine) the interrupt subroutine can change the colors in a particular palette. With this techniques the maximum number of colors that can be displayed at once is 3200 colors by assigning to each line different palette. On the IIGS there are 200 lines each line can be assigned one palette (16 colors) a total of 200 x 16 = 3200 colors. One drawback of these kind of pictures is that you cannot do much with them because the microprocessor is overloaded by servicing the interrupt routines (because interrupt routines should occur fast enough to get the illusion of more than 256 colors). These kind of pictures are only good for display mode. In a later release Color+ might have the ability to do so. The other technique of displaying more than 256 colors at once is when using animation. As an object is being animated, the user can change the working palette and this will give

the illusion of more than 256 colors. This kind is better when using animation.