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Dear Draw ON /// Customer:

As you know, we are a bit late with the delivery of Draw ON ///. This is due to some delays in the production and printing of the Draw ON manual. We are working as quickly as possible to finish the printing of the manual and get the entire package in your hands. We estimate that the complete package will be shipped within the next three weeks.

Once again, we are very sorry for the delays and are working as fast as possible to correct this. On the lighter side, we have had time to make Draw ON even more powerful. The version of Draw ON that you will receive in the next few weeks will work with the mouse. With the mouse compatibility the price of Draw ON /// will go to \$179. Due to our delays you will receive this program update free of charge.

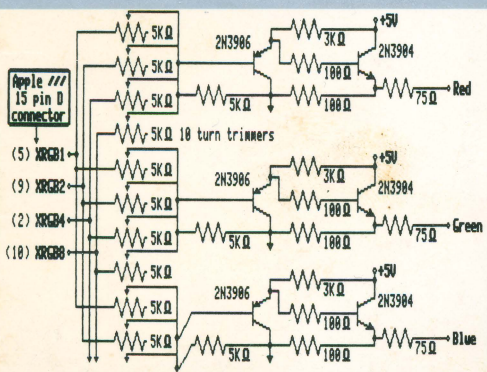
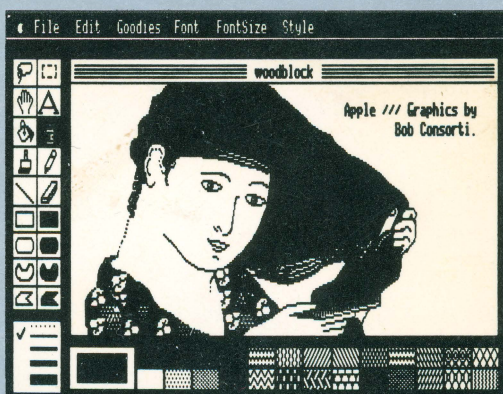
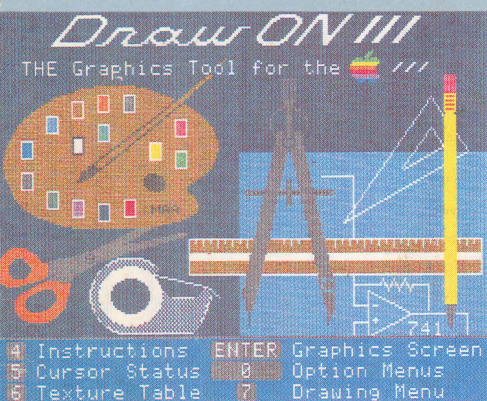
Please note that at this time there is no Apple /// mouse, but if you purchase an Apple // mouse with interface card, simply plug it into the Apple /// and you will be able to use it with Draw ON. The addition of the mouse makes Draw ON even easier to use and we hope that you will consider purchasing one.

Sincerely yours,

Bob Consorti
Editor - Publisher

ON THREE

Draw ON /// Graphics Tool User's Guide



ON THREE

Draw ON /// Graphics Tool

User's Guide

Program written by
Melvin Astrahan, Ph.d.

Manual written by
Bob Consorti and Suzanne Salazar.

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Preface

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This manual is the **User's Guide** for **Draw ON /// - THE Graphics Tool for the Apple /// and Apple /// plus Personal Computers**. It will show you how to use Draw ON in all of your drawing applications.

Throughout this manual we will use the term Apple /// to describe both the Apple /// and Apple /// plus.

Before reading this manual, you should familiarize yourself with general use of the Apple /// by looking over the *Apple /// Owner's Guide*.

Once you are familiar with the Apple /// computer you can use this manual to learn how to use **Draw ON ///**. The *Draw ON /// User's Guide* is divided into eight chapters and nine appendices. Below is a brief description of the manual's contents:

- Chapter 1 is an introduction into the basics of Draw ON, and will tell you what you will need to start using this powerful graphics package.
- Chapter 2 will teach you how to start-up the program and how to use the Help Menu. It will also step you through some of the common functions of Draw ON so that you can start creating diagrams, flowcharts, artwork, etc.
- Chapter 3 will show you how to put lines of text on your drawing screen. Thus, labeling your drawings or adding directions to a diagram will become very easy after looking over this chapter.
- Chapter 4 will show you how to pick up and make copies of objects on your drawing screen. This is the heart of Draw ON and with it you can create libraries of useful shapes and objects such as tables, chairs and circuit components. You can then place these objects anywhere on your drawing screen.
- Chapter 5 will show you how to use the more advanced graphics features of Draw ON. Circles, arcs, polygons, texturing, the grids and more are all explained.
- Chapter 6 will show you how to use the shape record feature of Draw ON. With shapes you can very quickly draw an object to any size or rotation.
- Chapter 7 teaches you how to change the various options of Draw ON to suit your taste.

- Chapter 8 will show you how other people are using Draw ON ///. Various applications such as Computer Aided Design, Font Creation, and Business Graphics, are presented.
- Appendix A will show you how to connect your mouse or joystick to your Apple ///. If you have an Apple // mouse, this section will also tell you how to connect and use it with your Apple /// and Draw ON.
- Appendix B will show you how to install and use Draw ON under Selector /// or Catalyst. These programs allow you to place all of your programs on your hard disk drive and switch between them without restarting your Apple ///.
- Appendix C will show you how to set up Draw ON for the printer that you are using. If you have a PKASO Interface card or the newer PKASO U, read over this section for information on using it with Draw ON and the Apple ///.
- Appendix D explains the strange Graphics Display Mode 1. This high resolution display mode can produce extraordinary color graphics and this section will show you how to use it effectively.
- Appendix E explains the Graphics Memory Organization of the Apple ///. If you have a use for this technical information, read over this section.
- Appendix F will show you all of the Text Editing Options that Draw ON has to offer. As you type in a line of text or a pathname, there are editing options available that will speed up correcting errors. This section will explain the various options.
- Appendix G explains the Storage Format Of Shape Tables. This technical information can be used by programmers to create other applications that use the shapes of Draw ON.
- Appendix H lists all of the errors that are possible under Draw ON and their corrective actions. If you have a problem with Draw ON, look over this section for information on fixing it.
- Appendix I gives you information on the various types of color monitors that you can attach to your Apple ///. It also shows you how to connect both NTSC and RGB monitors to your Apple ///.

How To Use This Manual

Depending on how much you know about your Apple /// or /// plus, you may choose to read only selected parts of this manual. Before trying to use Draw ON ///, everyone should read Chapter 1, which gives an overview of Draw ON.

After looking over Chapter 1, the best way to learn how to use the Draw ON /// program is to try it. Experiment! Practicing will enhance your experience and confidence with Draw ON. Don't worry about "harming" your computer, nothing you can do using the Draw ON /// program can damage your computer in any way.

Physical care, however, must be paid to both the Apple /// and Draw ON /// diskettes. Always handle diskettes gently, keeping them away from magnetic fields, dirt, and liquids.

The other chapters present reference information and examples for Draw ON ///. Use the information in these chapters as a tutorial, follow along with what is presented in the book and in a very short while you will have mastered all of this powerful program's features.

Symbols Used In This Manual

Three special symbols are used in this manual to emphasize information about helpful or unusual features of Draw ON ///.



A hand precedes a paragraph that contains information of an especially useful nature, which may not be obvious at first sight.



An eye points out some characteristic of the software or hardware operation that you should be careful about.



Stop! This symbol draws your attention to something that may have serious consequences if not used properly, such as erasing the drawing you are working on, or destroying some information.

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1

Introduction

This chapter is an introduction into the basics of **Draw ON ///**. It will tell you what you need to know to start using this powerful graphics package. To learn the actual use of Draw ON, you will have to go over the other chapters in this *User's Guide*.

1.1 What Is Draw ON ///?

Draw ON /// is a powerful and versatile graphics tool designed exclusively for the Apple /// and Apple /// plus computers.

Draw ON /// provides you with the typical tools of a drafting table:

- pens
- erasers
- templates (e.g. circles, arcs, triangles, rulers etc.)
- scissors
- tapes

Powerful cut and paste facilities give the user the ability to create unlimited libraries of your own special figures and objects. These objects may then be selected from these libraries and moved onto, between, and around on any of the available drawing screens.

Objects may be enlarged or shrunken, rotated, textured, inverted, moved *on top* of items already on the screen, *behind* previously drawn objects, or *overlayed* along with other objects on the drawing screen. You may also enlarge and pan on a portion of your drawing for detailed design work.

Character text is readily mixed with you drawings. Numerous fonts are included in a variety of sizes for inclusion in your drawings. In addition, Draw ON /// has the ability to load, design, and save your own character fonts. These new fonts can be used to label your drawings. They can also be used in other programs such as your word processing system.

The screen that is displayed is just a window into the actual drawing screen. You can scroll up and down, left and right. When these *windows* are printed out, they can produce banners, mechanical drawings, flowcharts, free-hand artwork and other drawings.

Draw ON /// is also a painter's easel, color palette and brush set. You can paint with any of the Apple ///'s 16 colors, or over 1,000 color-texture combinations. There are also an unlimited number of brush styles as you can use any object that you create as a brush.

Draw ON /// is operated from either a mouse, joystick or keyboard. The commands are simple with numerous menus and help screens to aid you in use of the program. A reference card and keypad overlay are included to make many of Draw ON ///'s options even easier to remember and use.

1.2 What You Need

To use the Draw ON /// program you will need the following equipment:

- An Apple /// computer with a minimum of 256K of memory or an Apple /// Plus.
- Your Video Monitor.
- The Draw ON /// diskettes.
- The Draw ON /// User's Guide.
- Command Summary Keypad Overlay.



Optional equipment:

- A Mouse /// or a Cursor /// Joystick (or equivalent Apple /// Joystick).
- An NTSC or RGB Color Video Monitor (see Appendix I).
- A Dot Matrix Printer and
- A **PKASO Printer Interface Card** for print-outs of your drawings.

1.3 Getting Started

Before actually using Draw ON /// you will have to learn a few things about the Apple /// and Apple /// plus in general. In addition, you should know about some of the optional equipment and their use within Draw ON ///. The rest of this introduction will present you with that information.

1.4 Backing Up Draw ON ///

Before starting up Draw ON ///, you must make a back-up copy of each of the three different Draw ON /// diskettes. To do this you must follow the instructions in the *Apple /// Owner's Manual* on copying diskettes.

Make copies of your **Draw ON /// Start-up Disk**, **Draw ON /// Program Disk**, and your **Draw ON /// Sample Pictures, Fonts, and Textures Disk**. When copying the *Sample Picture* disk remember that both sides have sample files on them. Since you cannot normally copy onto both sides of a diskette, use the following procedure:

Make a copy of the front side of the *Sample Picture* disk and label it **Sample Pictures, Fonts, and Textures - Front**. Next, make a copy of the back side of the *Sample Picture* disk onto the front side of another of your diskettes and label it **Sample Pictures, Fonts, and Textures - Back**.

Once you have finished copying these diskettes, place the originals in a safe place away from the ones you will be using day to day.

In the event that the diskettes that you are using every day fail (coffee spill, fire, etc.), you can use your master Draw ON /// diskettes to make some more copies. If you lose or damage all copies of your Draw ON /// diskettes, **ON THREE** can send you replacements. Please see the registration card for information on obtaining replacement disks.

1.5 Using The Mouse Or Joystick



Figure 1.1 . Mouse ///

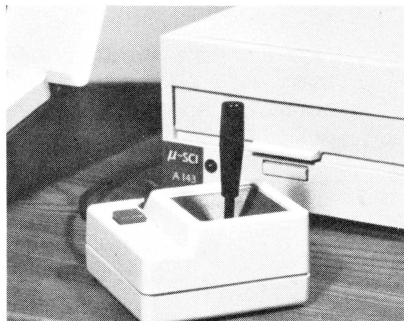


Figure 1.2 . Cursor ///

To control the operation of Draw ON ///, it is highly recommended that you have either a *Mouse ///* or a *Cursor ///* Joystick. Draw ON /// will work faster and easier with a mouse or joystick than by using the keyboard commands. Please see **Appendix A** for details of connecting your mouse or joystick to your Apple ///. After connecting your mouse or joystick (if you have one), please read the rest of this introduction.

In this manual you will often see references to the **Button**. If you are using Draw ON /// with the *Mouse ///*, the **Button** refers to the large button on the mouse. When using a *Cursor ///* joystick, this refers to the orange push button. If you are using another joystick connected to your Apple ///, it corresponds to whichever button or switch on the joystick is connected to the *Button 0* input of joystick port A or B.

References to the **Switch** refer to the grey colored switch on an original *Cursor ///* joystick (or *Button 1* of port A or B). If you are using a *Mouse ///* you will have to use the keyboard commands outlined in **Figure 1.3**.



Newer *Cursor ///* joysticks have a second orange button in place of the switch. The **Switch** is the button on the side of the *Cursor ///* that the wire comes out of. On an older *Cursor ///*, this switch is a momentary contact in one direction, and locks closed in the other direction.

If you are using a joystick, it is highly recommended that the joystick you use be self centering. After connecting the joystick as outlined in **Appendix A** and before starting up the program, be sure that it is in its centered position.

As the program starts up, Draw ON looks at the joystick with the assumption that it is centered. If the joystick is not centered, you might not be able to properly control the program later on. If you cannot correctly center your joystick, see **Appendix A** for further information.



Unless noted, instructions and descriptions in this manual will assume that you are using a *Mouse ///* or joystick with your Draw ON. If you do not have a mouse or joystick, you must use the keyboard commands outlined below.






Button	=	TAB or RETURN
Switch	=	 C - Once to open, once again to lock.
Mouse/Joystick		
Movements	=	   

Figure 1.3 . Keyboard Commands

1.6 Apple /// Graphics Displays

The Apple /// Personal Computer supports four different types of graphics displays. They are usually referred to as graphics modes 0, 1, 2 and 3. Each mode of displaying graphics produces a different type of image on your video monitor.

The Apple /// Graphic Display modes are listed below:

- **Mode 0:** Black and White, low resolution
(280 horizontal dots, 192 vertical dots)
- **Mode 1:** Limited Color, high resolution
(280 horizontal dots, 192 vertical dots)
- **Mode 2:** Black and White, high resolution
(560 horizontal dots, 192 vertical dots)
- **Mode 3:** Full Color, low resolution
(140 horizontal dots, 192 vertical dots)

The dots on the graphics display are sometimes called **pixels** - short for *picture elements*. Thus, Graphic Display Mode 2 is made up of 560 pixels across and 192 pixels up and down. Each of these pixels may be black or white. Graphics Display Mode 3 consists of 140 pixels across and 192 pixels up and down. Each of these pixels may be any one of the 16 available colors.

If you are familiar with graph paper you should quickly understand the meaning of dots or pixels. The pixels on the Graphics Displays are arranged in a certain manner. In Graphics Display Mode 2, they are numbered from 0 to 559 across the screen and 0 to 191 up and down the screen.

The bottom left hand corner of this Display Mode is pixel number 0 across and 0 up and down. This is commonly referred to as location 0, 0. The pixel in the upper right hand corner is 559 across and 191 up and down, or location 559, 191.



Graphics Display Mode 1 is the limited color mode, and will not be explained here. For more information please read over **Appendices D** and **E** in addition to the material on the Graphics driver in the *Standard Device Drivers Manual*.

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Using Draw ON

This chapter will teach you how to start-up the Draw ON program and how to use the **Help Menu**. It will also step you through some of the common functions of Draw ON so that you can start creating diagrams, flowcharts, artwork, etc.

2.1 Starting The Program

If you are going to use Draw ON /// with a program switching utility such as *Selector ///* or *Catalyst*, follow the instructions in **Appendix B** for installing and starting the program. Additionally, to set up Draw ON for the type of printer you are using, read over **Appendix C**.

For conventional users, make sure that your video monitor is connected and that your Apple /// is plugged in. Now locate the three Draw ON /// diskettes and follow these instructions:

- Place the keypad overlay over the keys on the numeric keypad.
- Turn your video monitor ON if it is off.
- Open the door of the built-in disk drive by lifting up on it and gently insert your **Draw ON /// - Apple /// Start-up Disk**. Close the drive door by pushing down on it until it is shut.
- If your Apple /// is OFF, turn ON the power switch at the back left corner of your Apple ///.
- If some other program has been running on your Apple ///, you can start-up the Draw ON /// program by pressing **CONTROL** and **RESET** at the same time. A few programs (for example, *VisiCalc* and *Apple Writer ///*) will not allow you to restart by pressing **CONTROL** and **RESET**, so you must first exit these programs and then press the **CONTROL** and **RESET** keys.

The disk will *whir* for about 15 seconds. The first thing that you will see on your monitor is the standard SOS message telling what version of SOS you are using and the time and date. Soon afterward the screen will clear and you will be instructed to:

Insert the Draw ON /// Program disk and press RETURN.

Remove the *Start-up Disk* from the internal drive and put it back in the protective envelope as you won't need it again until you restart the Draw ON program.

Next find the Draw ON /// diskette labeled **Apple /// Program Disk** and insert it into the internal disk drive. Press **RETURN** when you have done this and the program will continue starting-up from the diskette.

In about thirty more seconds, the Draw ON /// Title Screen will be displayed as shown in **Figure 2.1**. Now Draw ON /// will check to see if you have a mouse and/or joystick installed.

```

      Draw ON ///  V2.0      Ser.#    0
      THE graphics tool for the Apple ///

Joystick test:   centered

⌘ M toggles between mouse & joystick

Program Author: Melvin Astrahan, Ph.D.
                (c) 1984 by ON THREE
  
```

Figure 2.1

If you do not have a mouse, the line concerning the mouse test will be absent. If your joystick is not centered, a line similar to this will be shown:

Joystick test: Not centered X=196 Y=139

If you receive the message saying that your joystick is not centered, please read over **Appendix A** for instructions on how to center it.

In a short while, the *Draw ON /// Logo Screen* will be displayed. The program will now finish loading the various fonts and textures from the diskette. In a few more moments the **Help Menu** will come up as shown in **Figure 2.2**. Draw ON /// is now ready to go.

2.2 Using The Help Menu

This menu is designed to help you remember some of the more common keyboard command functions available from within the program. In other words, it will tell you what keys to press to have the program do what you want it to do.

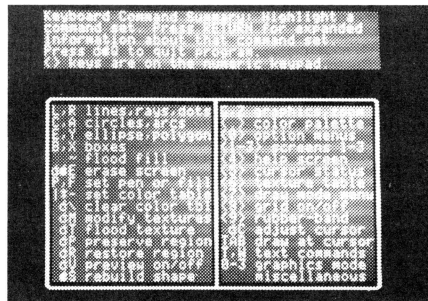


Figure 2.2

It is not intended to be a complete description of everything Draw ON /// can do, but rather a summary of many of the available features. This menu holds information on 30 different items. These are divided into 15 on the right side of the screen and 15 on the left side of the screen.

Just after starting-up Draw ON, the item on the top of the right side of the screen will be highlighted. To choose help information on a particular item, use the mouse, joystick or arrow keys to move the highlight over the item and press the button.

A short instruction summary will appear at the top of the screen. Practice in moving the highlight over other items on this menu and press the button to see the help information on that item. Do this a few times until you become comfortable in moving the highlight and selecting help information.



The help screen information is located in a file on the program disk. If you have removed the program disk from the built-in disk drive, Draw ON will not be able to show you the help information. In this event, Draw ON will tell you it can't find the help file and will ask you to please insert the program disk into the built-in drive and try again.

You can return to the help menu at any time by pressing the question mark key ? or the number <4> on the numeric keypad.



The Draw ON /// program and the Draw ON /// User's Guide both distinguish between the keys on the numeric keypad and the keys on the main keyboard by putting a bracket < > around the keys that are on the numeric keypad. Thus, when the program or manual says to press the <4> key, it means to press the 4 key on the numeric keypad.

2.3 The End Of The Beginning

Before getting down to business and actually using Draw ON, you must learn two more things about the program. As you use Draw ON, you will be working on an image on your computer monitor. You will manipulate this image with a pointing object on the monitor screen. The image is usually referred to as a *Drawing Screen* and the pointing object is called a *Cursor*. The next two parts of this chapter will focus on these two ideas.

2.4 Draw ON /// Drawing Screens

Draw ON /// maintains three Drawing Screens which may be shown in any of the four Graphic Display Modes. For instance, Drawing Screen #1 may have a picture created in Graphics Display mode 2, while Drawing Screen #2 could contain a picture done in mode 3. Likewise, Drawing Screen #3 may hold a picture done in any of the Apple /// Graphics Display Modes.

While an image on any of the three drawing screens can be displayed in any of the Apple /// Graphics Display Modes, it will usually only make sense if displayed in the mode in which it was originally drawn.

You can choose which Drawing Screen you want to work on by pressing the keys <1>, <2>, or <3>. After pressing one of these keys, the screen you were working on will immediately be changed to the screen which you have chosen. To check which screen you are currently using, press <5>. This will display the **Cursor Status** screen. If you look in the *Program Status box* on the top right portion of the screen, you will see the item **Bfr#**. This is the current drawing screen that you are using.

Draw ON /// provides facilities to move images from one display mode to another. Entire drawing screens may be swapped and scrolled. Thus, the portion of the picture image that you are creating may fill more than one drawing screen. If you have filled the display screen that you are currently using, simply scroll the screen up, down, left or right to get more room to work in.

Information on scrolling between the various screens can be found in **Chapter 5** under the heading **Scrolling Between Drawing Screens**. This is an advanced feature and you should only try it when you are familiar with the basics of Draw ON.

The portion of your picture that was scrolled out of the display screen will not be lost. It's just waiting for you to scroll it back into the display screen. The part that you see on the display screen is just a *window* into a much larger drawing screen.

For users who are more familiar with the Apple /// or who are technically oriented, the internal memory organization of these Graphics Display Modes is described in **Appendix E**.

2.5 Draw ON /// Cursors

To control the various operations of Draw ON /// you will use either the mouse, joystick or cursor keys to move a small pointer on the graphics screen. This pointer is called a cursor.



Do not confuse the *Cursor* /// Joystick with the cursor on the graphics screen. The *Cursor* /// is the trade name for one of the joysticks that work with Draw ON ///.

As you move the cursor across the drawing screen, the cursor color will automatically change to the reverse color of whatever is on the screen. For example, a black background will give a white cursor and a white background will give a black cursor. Thus, you will never need to worry about not being able to see the cursor.

When creating an image on a drawing screen, the cursor defines where on the drawing screen you are working. Lines, circles, arcs, etc. are all drawn by moving the cursor to a new location on the drawing screen and pressing the mouse or joystick button.

The cursor may also be *opened* to outline a rectangular portion of the drawing screen. With the open cursor you will be working on a particular area of the drawing screen. The open cursor has many special functions within Draw ON ///, these will be described as you come to them throughout the manual.

Draw ON /// has a special cursor for each of the graphics display modes. The standard cursor type is the cross-hair. These cursors and how they look in the various Graphics Display Modes are displayed in **Figure 2.3**.

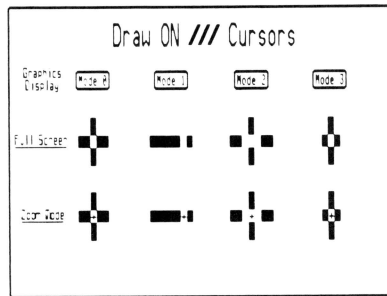


Figure 2.3

For detailed work, you can use a single pixel cursor in Graphics Display Modes 0, 2 and 3. Instead of a cross-hair, this cursor is a single dot on the screen. This cursor will show you exactly where on the Display Screen you are working.

To change from a cross-hair to a point cursor, simply press the . key. Likewise, to change from a point to a cross-hair cursor, press the + key. When choosing the cross-hair cursor, note that you don't have to type **SHIFT** = to get the +, = will do just fine.

There are times when it is hard to see the cursor. When drawing over a complex background, you may lose sight of the cursor. Because of this, Draw ON /// allows you to have either a solid cursor or a flashing cursor. The flashing cursor is easy to see at all times and is available in all Graphics Display Modes.

Changing from a solid cursor to a flashing one is quite easy. If you want a flashing cross-hair cursor, simply press the + key twice. If you desire a flashing point cursor, just press the . key twice. In any case, after doing this, your cursor will be flashing on and off.

To change back to a solid cursor, press the appropriate key (+ or .) once again. These keys act as a *toggle*, that is to say, they toggle back and forth from a solid cursor to a flashing one and back again.

As shown in **Figure 2.3** you can see that the cursor in Mode 1 looks different from the rest. If you remember, Mode 1 is the Limited Color, High Resolution Graphics Display Mode. If you intend to use the High Resolution Color Graphics Display Mode, you should become familiar with the peculiarities of drawing in this mode.



A flashing cursor is available with Graphics Display Mode 1 just as in all the other modes. However, because of this limited Graphics Display Mode, there is only one type of cursor available. There is no point or cross-hair cursor available in this mode.

If you are just learning Draw ON ///, you should only use Modes 0, 2 and 3 until you are familiar with this program. For those of you who like a challenge, read over the next paragraph. It will explain the strange looking cursor in Mode 1. If you are not familiar with the behavior of the Mode 1 Graphics Display, skip it for now. For an explanation of that strange mode, read **Appendices D** and **E** of this manual and review the chapter about the **Graphics Driver** in the *Standard Device Drivers Manual*.

The cursor in Graphics Display Mode 1 highlights the seven pixel horizontal segment which contains the pixel in question, and inverts the pixel against that highlight. The highlight is black with a white pixel marker, except when the background color in that segment is black, in which case the highlight is white with a black pixel marker. This permits you to easily align your drawings to fall on the seven pixel boundaries associated with this mode.

2.6 Learning To Fly

Now that you are familiar with the basic ideas regarding Draw ON /// and the Apple /// in general, you are ready to start using Draw ON. The rest of this guide will teach you all of the various options and commands that Draw ON has to offer. If you have been following along, your computer monitor should now be displaying the help screen. If this isn't the case, follow the instructions in this chapter under *Starting The Program*.

Press **ENTER** or type **G** to go to the Graphics Display Screen. You will now see a blank screen with a cross-hair cursor at the center of that screen. You are looking at Drawing Screen #2 in Graphics Display Mode #3. This is the full color, low resolution mode.

If the Draw ON /// logo fotofile was available when the program started-up, Draw ON will have loaded it into drawing screen #1. If you press <1>, the screen will change to drawing screen #1. This logo was drawn in the special high resolution (limited color) mode 1. Note the peculiar looking cursor associated with drawing in mode 1. For further information regarding this mode, please read over **Appendices D** and **E**.

Use the mouse or joystick now to move the cursor about on the screen. Spend a few moments learning how to fly the cursor around. You will find that the cursor responds to the mouse or joystick in three ways:

Movement	Result
1. A slight movement	Cursor moves 1 pixel in the direction selected.
2. A large movement	Cursor moves a proportional amount in the direction selected.
3. Very small movement	No movement of the cursor. This is to minimize problems associated with electrical noise and mechanical vibration.

Draw ON allows you to adjust the responsiveness of the mouse and joystick to suit your own taste. For information on adjusting these devices, please read **Section 7.3** on setting the mouse or joystick response. That section will show you how to change the effective speed of your mouse or joystick. If the cursor is not responding the way it should (it moves left when you move right, etc.), read over **Section 7.4** on reversing the joystick sense.

If you don't have a mouse or joystick, you can control the movements of the cursor with just the arrow keys. They will move the cursor one pixel at a time in relation to the arrow key pressed. If you hold the arrow keys down, the cursor will continue to move in the specified direction. If you press harder, the cursor will move faster. If you hold the **SHIFT** key down while you press one of the arrow keys, the cursor will move seven pixels at a time.

2.7 Drawing Lines

Lines are one of the many tools that Draw ON has to offer as you create your drawing. Dots, circles, ellipses, polygons are some of the others. These next few paragraphs will tell you how to use Draw ON to draw lines.

Drawing lines with Draw ON is very simple. For the examples below we will be working on drawing screen #2, in mode 3 (full color). Drawing lines is the same (with reservations below) on all of the drawing screens and with every display mode.

If you are not already looking at screen #2, go to it now by pressing <2>. Make sure that you are in display mode 3 by pressing **3** on the main keyboard. To draw a line:

- Move the cursor to the place on the screen you would like the line to begin.
- Press **L** to tell Draw ON you want to draw a line.
- Move the cursor to the place on the screen you would like the line to end.
- Press the button.

When you press the button, a line will be drawn from the position at which the cursor was when you pressed **L** to the current cursor position. Next, move the cursor once again and press the button. The line will continue from the end of the first line to the new position of the cursor.

To start a new line, move the cursor to where the new line is to begin and press **L** again. This will tell Draw ON that you want to start a new line and not continue an old one. If you move the cursor to a new position and press the button, your new line will be drawn.



Lines will continuously be drawn with each new press of the button until a new line (**L**) or other drawing mode is selected. As you choose a new drawing mode (as described throughout this manual), that drawing mode will remain in effect until you choose another.

2.8 Rubber Banding

After you picked a starting position for drawing a line and then moved the cursor to another place on the drawing screen, the line followed the cursor around the screen. Note that the line did not change anything already on the screen, but *Rubber Banded* from one point to another as you dragged the line across the screen.



Rubber Banding is available when drawing lines in all of the Graphics Display Modes except the special high resolution, limited color mode (2).

You can toggle (turn on or off) Rubber Banding by pressing <9>. Since drawing lines with Rubber Banding on takes a bit more time than with it off, you may want to turn it off when you need to draw very fast and smooth lines. To draw free-hand lines on the screen, turn off Rubber Banding and press **L** to start a new line. Now, hold down the button as you move the cursor across the screen. This will result in lines being draw as fast as you can move the cursor.

2.9 Selecting Colors

In the above examples, you were drawing white lines on a black background. The black color of the background is called the **Fill** color and the white color of the lines is called the **Pen** color. When using the color drawing modes you can choose the pen and fill color from a palette of the 16 available colors. When working in the black and white drawing modes you can choose from black and white as your pen or fill colors.



The **Fill** color is the color used when you erase a screen. It is also used as the background color when printing text on the screen.

To change the pen and fill colors, you must do the following:

- Press either <. > or the **SPACE BAR**. Draw ON will present the **Color Table** and **Palette Menu**.
- Use the mouse, joystick or arrow keys to move the cursor over the color you want as your new **Pen** color.
- Press either the button or **P** to select your new **Pen** color.

- Now move the cursor over the color you want as your new **Fill** color.
- Press **F** to select your new **Fill** color.

On the bottom right of the color table you will see three lines labeled **Pen**, **Fill** and **New**. As you move the cursor over the various colors on the color table, the line labeled **New** will change to whatever color the cursor is over. As you select a new pen and fill color, the lines labeled **Pen** and **Fill** will change to correspond to the pen and fill color that are currently selected.

When the pen is set to the color that you desire, press **ENTER** or **G** to go back to the drawing screen. You may now continue drawing with the new color. Notice that your original drawing screen is intact and that by selecting a new pen and/or fill color, nothing already existing on the screen has changed.

As an example, draw some lines with the above examples and then go to the color table by pressing **<.>** or the **SPACE BAR**. Now move the cursor over color number 3 (violet) and press the button to select violet as your new pen color. Go back to the drawing screen by pressing **ENTER** or **G**. As you draw new lines (or use any other drawing tool) they will now be in the color violet.

2.10 Drawing Dots

Dots are another one of the tools that Draw ON has to offer. This tool will change the image on your drawing screen one pixel (dot) at a time. Just as when you were drawing with lines, you can choose any of the 16 available colors for the color of the dots you are drawing with.

To tell Draw ON that you would like to draw with dots, do the following:

- Press **D** (for dot).
- Move the cursor to the place on the screen where you would like to draw dots.
- Press the button to draw a dot.

Each time the button is pressed, a dot with the pen color will be drawn on the screen at the current cursor location. If you try holding down the button and moving the joystick, you will see a series of dots on the screen following the cursor.

If you were following the examples above, your screen should be filled with a collection of white and violet lines and violet dots. If you wanted to now draw with pink dots, go to the color palette and pick up a pen color of pink (color number 11). Return to the drawing screen by pressing **ENTER** and simply draw some more dots. These dots will all be in the color pink.

You can also draw dots with the fill color by pressing K. Each time you now press the button, a dot with the fill color will be drawn on the screen at the current cursor location. This feature is useful when switching between two colors since you don't have to go to the color palette to change the colors.





The Dot drawing mode will remain in effect until another drawing mode (line, circle, ellipse, etc.) is selected.

2.11 Erasing The Screen

Even though Draw ON can help you create beautiful artwork and complicated drawings and diagrams, there will be times when you want to start over with a blank screen and try again. To erase the entire drawing screen:



Press   **E**. This means to hold both the Apple keys down and press the **E** key. When you do this your screen will be erased.

The image that was on your screen will be gone forever unless, of course, you had previously saved it on disk or had a copy elsewhere. Saving drawing screens to disk is presented later in this chapter in the section entitled **Saving A Drawing To Disk**.



When you erase a drawing screen, you are erasing it to the current fill color. Thus, if your fill color is set to black, you will get a completely black screen. If your fill color was white, when you erased the screen Draw ON would have erased the screen with the color white. If you are using one of the color graphics display modes, the erased screen can be any of the available colors.

2.12 Draw ON /// Menus

Draw ON displays several menu and information screens in addition to the three drawing screens and the **Help Menu** and **Color Palette**. They will be illustrated in this next section and described in the rest of the manual.

Figure 2.4 shows the **Cursor Status Screen**. Draw ON will display it whenever you press <5>. This screen is very similar to the **Help Menu** except that the highlights are in the *cursor status box* at the top of the screen rather than in the instruction box. When this screen is displayed, the mouse or joystick remains in control of the graphic cursor. The current cursor coordinates and open cursor width (explained later in this chapter) are continuously updated as you move the cursor. **Figure 2.5** illustrates the locations of various informative markers in the *cursor status box*. As these markers are discussed throughout the manual, refer to **Figure 2.5**.

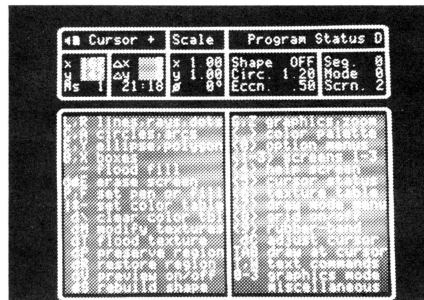


Figure 2.4

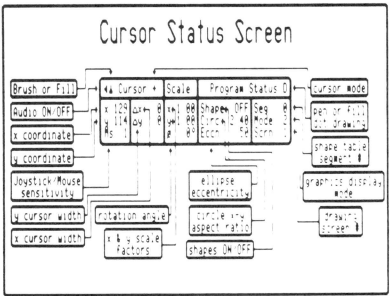


Figure 2.5

Figure 2.6 is the **color palette** and **color operator table (COT)** screen. To see this menu press <. > or the **SPACE BAR**. The right half is the **color palette** and the left side is the **color operator table**. This menu allows you to choose drawing colors and color precedences. These precedences allow you to protect objects already drawn on the screen from being drawn over. Thus, you can draw objects in front of, behind, or overlaid onto other objects. It also allows you to change the way colors are put on the drawing screen. For example, you can set up the **color operator table (COT)** so that whenever you draw blue lines over an orange background you will get pink lines over that background. This can get quite complex and is explained in detail in **Chapter 4** under the heading **Using The Color Operator Table**.

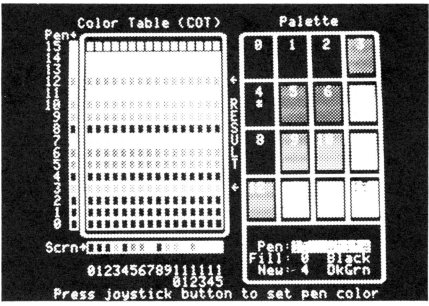


Figure 2.6

Figure 2.7 shows the **Color/Texture Table**. To see this menu, press <6>. With this menu you can select textures and patterns to be used in filling objects. Draw ON /// supports 24 different textures at any one time with a variety of colors. You can change the color/texture patterns at any time and save your new patterns to disk. This table is explained in detail in **Chapter 5** under the sections entitled **Flood Texturing** and **Changing The Textures**.

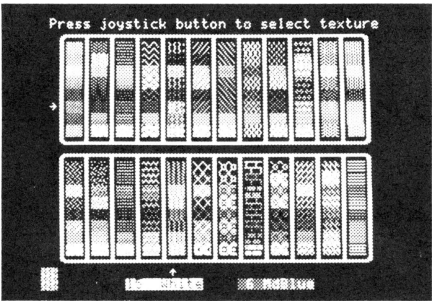


Figure 2.7

Figure 2.8 illustrates the **Utilities Menu** screen. To see this menu, press <0> or **M**. Divided into four menu parts, each part has six functions associated with it. You select a menu by using the mouse or joystick to move the highlight to the menu item that you want.

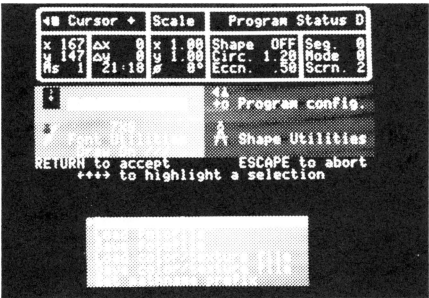


Figure 2.8

The **File Options Menu** is used to load and save your drawings as fotofiles, display a listing of the files on a disk, load and save color/texture patterns and set the pathname prefix. The **Program Configuration Menu** is used to print out hardcopies of your drawings. It is also used to set the various program options, such as the responsiveness of the mouse and joystick, the aspect ratios of circles (so that they appear as circles on your monitor or printer), ellipse eccentricity, audio feedback, and to save the prefix and other program parameters.

The **Font Utilities Menu** provides facilities to load and save character fonts in three sizes, and choose between them. The various facilities for doing this are explained in Chapter 3. The **Shape Utilities Menu** is used to load and save shape tables, to set the horizontal and vertical scaling factors, etc. These are all fully described in **Chapter 6**.

Figure 2.9 illustrates the drawing mode and polygon selection menu. You can display the drawing mode menu by pressing <7>. This menu permits the selection of several standard polygon types and drawing modes such as lines, circles, dots, etc. Intended for the beginner, this menu will help you over those rough spots in quickly choosing a new drawing mode. Direct keyboard commands are also available to select drawing modes and other drawing options. These direct commands are explained throughout this manual.

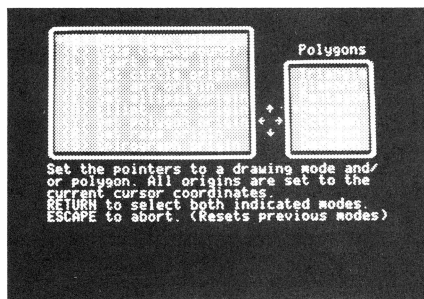


Figure 2.9



If you don't want to learn the keyboard commands, just press <7> and move the highlight over the item you want to select. Do this to choose lines, circles, and any of the other drawing modes. After you have highlighted the option you want, simply press the button. You will now be returned to your drawing screen. Each time you now press the button, Draw ON will draw the object you selected.







2.13 Changing The Cursor Style

As you may recall from earlier in this chapter, there are two different types of cursors available in graphics display modes 0, 2, and 3. In mode 1 there is only one type of cursor (the seven pixel slot) available. In graphics display modes 0, 2, and 3 you may select either a cross-hair cursor for coarse work or a single pixel for fine work. The single pixel cursor will be referred to in this manual as the point cursor.

To change from a cross-hair to a point cursor, press **..**. You may now use the point cursor in all of your drawing applications. To change from a point to a cross-hair cursor, press **+**. You may change to either of the cursors at any time and from any drawing or menu screen.

You also have the option of having the cursor flash. This is particularly useful when drawing over a complex background with a solid cursor. There are times when the cursor (point or cross-hair) will be very hard to see. By making the cursor flash, you will be able to see it anywhere on the screen.



The flashing cursor is toggled on and off by pressing **.** or **+**. If you have a solid cross-hair cursor, pressing **+** again will turn the flashing cross-hair on. With the cross-hair cursor flashing, pressing **+** once again will return it to a solid cross-hair. The same procedure is used to make the point cursor flash and turn back to a solid point cursor.

Every so often you will want to take a photograph of your monitor screen and use it to make slides etc. Thus, it is sometimes desirable to turn the cursor off so that it doesn't show up on the screen. You can toggle the cursor on and off by pressing   **C** - Double Apple **C**. If the cursor is on and you want to remove it from the screen, press   **C**. When you are finished taking pictures, press   **C** again to turn the cursor back on.

2.14 Opening And Closing The Cursor



The cursor on your drawing screen is not limited to controlling a single point or line at a time. The cursor may be opened to define a rectangular area of the drawing screen. This open cursor is used to define objects in many of the advanced graphics features, such as moving objects, rotating, inverting and texturing objects.


One simple feature of the open cursor is the ability to erase any rectangular portion of the screen. This is discussed in the next section of this chapter. You can open the cursor by following the next few steps.

- Place the cursor at the position on your drawing screen that will be the upper left hand corner of the rectangle.
- Press  **C**. Do this by holding the Open Apple key down while pressing **C**.
- Now use the mouse to drag the other three corners of the rectangle down and right. As you move the mouse to the right and down, the other three cursors will appear on the screen while the cursor in the upper left hand corner will remain fixed in place.
- To lock the cursor open, press the button once or press  **C** again.

If you move the mouse or joystick now, the four cursors will move as one. They are delimiting the four corners of a rectangle, and what you are moving is the borders defining the rectangle.


You can close the cursor to a single point (or cross-hair) by following the same general procedure. With the cursor open:

- Press  **C**. Do this by pressing the Open Apple key down while pressing **C**.
- Now use the mouse to drag the other three corners of the rectangle up and left. As you move the mouse up and to the left, the other three corners will come closer to the one fixed corner.
- When all four corners come together as one, press the button once or press  **C** again.

This is useful for not only closing the open cursor but in making the open cursor (rectangle) smaller. If you want to quickly close the cursor down to a single point, press  **C**. This will immediately close the cursor down to a single point.

2.15 Erasing A Section Of The Screen

Instead of erasing the entire drawing screen, you can erase selected portions of it by using the open cursor to erase rectangular portions of the screen. When you erase a portion of the screen it will be erased with the current fill color. See the section on **Selecting Colors** described earlier in this chapter for checking what the current fill color is.

To erase a portion of the screen, press  **F** to set up the filling mode. Now open the cursor as described above to a small rectangle. Use the mouse to move the rectangle over the portion of the screen that you would like erased. When you have the rectangle where you want it, press the button once and the portion of the screen under the rectangle will be erased.



If you are working with a white picture over a black background, the fill color should have been set to black to erase selected portions of the screen with black. When working with a white background and using a black pen color, you must have set the fill color to white to erase properly. If you are working over a colored background, you must set the fill color to be the background color of the drawing screen you are working on. You may also erase selected colors from a drawing screen by properly setting the **Color Operator Table (COT)** as described in **Chapters 3 and 4**.

2.16 Magnifying The Screen (Zoom And Pan)

Draw ON lets you magnify the portion of the screen that surrounds the cursor. You will find this a very useful feature when drawing in detail. All of the features of Draw ON are available when using the zoom mode. Thus, you will be able to draw with lines, points, circles, etc. when you have zoomed in on a particular part of the screen.

The cross-hair cursor will be hard to see at times so you should use the point cursor when zooming in. This cursor will be easier to see as you move over a cluttered background. On a color monitor, the single point cursor will appear orange (medium grey on a black & white monitor). This will help distinguish the cursor from the drawing that you are working on.

As an example, let's return to the *Draw ON /// Logo* to show off the zoom feature. If you are not already looking at the Logo, press **ENTER** and then <1> to go to drawing screen #1. The *Draw ON /// Logo* should now be displayed. Note where the cursor is located on the drawing screen. Press <-> or **Z** (for Zoom). The screen should now display the 40 X 24 pixel region that surrounded the cursor.

Use the mouse to move the cursor around the zoom screen. The cursor will remain at the center of the zoom screen except when you approach the edge of the screen, whereupon the cursor will approach that screen edge. To return to the entire drawing screen, press **ENTER** or press **G**.



Depending on the graphics display mode you are working in, the horizontal and vertical scaling may be distorted in the zoom mode. Thus, circles may look like ellipses, objects may appear elongated. This is perfectly normal and is no cause for concern.

When using the zoom feature, the upper left hand corner of the screen will contain the coordinates of the cursor. This is particularly useful when you get 'Lost' and are not sure where on the drawing screen you are. They can be toggled on and off by pressing the @ key (**SHIFT 2**). With the coordinates off, scrolling and moving around on the zoom screen will be slightly faster.

2.17 Saving A Drawing To Disk

Once you have used Draw ON to create a drawing, you have the option of saving the drawing to disk as a FotoFile. This is very useful when you have to leave Draw ON and work on something else. At a later time you could start-up Draw ON once again and load in the FotoFile that you had previously saved.

To save a drawing press <0>. You will now be within the **Options Menu**. Use the mouse to move the highlight bar over the **File Options Menu** and then move the highlight bar over the **Save FotoFile** option. Press the button (or **RETURN**) to select this option and you will see the prompt (in orange on a color monitor). Draw ON is now asking for a filename or pathname to save the drawing with. Type in the filename or pathname now and then press **RETURN**. The drawing that was last displayed will now be saved onto disk.



If the drawing has been successfully saved on disk, Draw ON will respond with a beep and return to the **File Options Menu**. If there is a problem such as not enough room on the disk, Draw ON will return an error message. These error messages and corrective actions are shown in **Appendix H**.



If there is already a file on the disk with the same name that you are saving your file with, Draw ON will tell you this and ask you if you really want to delete the old file from the disk. If you type in **Y** for Yes and press **RETURN**, Draw ON will delete the old drawing from disk and replace it with the one you are trying to save. If you type in **N** for No, Draw ON will return to the **File Options Menu** and not change the file already on the disk.

If you change your mind about saving the drawing that you are working on, you can press **ESCAPE** before pressing **RETURN**. The **Save FotoFile** option will be aborted and the drawing will not be saved to disk. As you enter the filename or pathname, you have a variety of editing options available for the line of text that you are entering. Please read over **Appendix F** for information on editing a line of text.

As an example, if you have created a drawing and would like to save it to disk, follow along with the next paragraph and your creation will be saved for eternity (or until you delete it).

- Press **ENTER** to go to a drawing screen and draw your picture.
- Press <0> to go to the **Options Menu**.
- Use the mouse to highlight the **File Options Menu**.
- Use the mouse to move the highlight bar over the **Save Fotofile** option and press the button once.
- Now insert a blank disk (or one that has some room on it) into the internal disk drive.
- If you type in **.D1/MYPICTURE** and press **RETURN**, the picture will be saved with the name **MYPICTURE** on the disk in the internal disk drive.

2.18 Loading A Drawing From Disk

To load in a drawing that you had previously saved to disk, you will follow a procedure similar to that listed above under **Saving A Drawing To Disk**. After saving a drawing, you will want to load back that drawing and work on it at a later time. The **Load Fotofile** option will do this for you.

To load a drawing from disk, press <0> to go to the **Options Menu**. Use the mouse to move the highlight bar over the **File Options Menu** and then move the highlight bar over the **Load FotoFile** option. Press the button (or **RETURN**) to select this option and you will see the prompt (in orange on a color monitor). Draw ON is now asking for the filename or pathname of the drawing that you would like to load in and work on. Enter the filename now, and then press **RETURN**. The drawing that was saved on disk will now be brought in so that you can work on it. To return to the drawing screen, press **ENTER** and the drawing will be displayed.



If there is a problem loading the file, Draw ON will respond with an error message. This message will indicate what the problem was, such as the file was not found on the disk, or there was no disk in the disk drive specified. These error messages and corrective actions are shown in **Appendix H**.

If you change your mind about loading in a particular file, you can press **ESCAPE** anytime before pressing **RETURN**. The **Load FotoFile** option will be aborted and no drawing will be loaded from disk. Just as with the **Save A FotoFile** option, you have a variety of editing options available for the line of text you are entering. Please read over **Appendix F** for information on editing a line of text.

As an example, let's go over the procedure for loading in one of the drawings that is included with Draw ON ///. On the back side of the **Sample Pictures, Fonts, and Textures Disk** there is a FotoFile with the name **WOODBLOCK**. To load that drawing in so that you can work with it, use the following instructions:

- Insert the back side of the **Draw ON /// Sample Pictures, Fonts, and Textures Disk** into the internal drive.
- Press <0> to go to the **Options Menu**.
- Use the mouse to highlight the **File Options Menu**.
- Use the mouse to move the highlight bar over the **Load FotoFile** option and press the button once.
- Now type in **.D1/WOODBLOCK** and press **RETURN**. Draw ON will take about 10 seconds to load in that drawing.
- Press **ENTER** to return to the drawing screen and the **WOODBLOCK** picture will be shown on your drawing screen.



2.19 Cataloging A Diskette

To find which FotoFiles are saved on a disk, you don't need to rely on your memory. Draw ON /// has the option of listing the files on a particular diskette or subdirectory. This is called **Cataloging A Diskette**, or reading the **Disk Directory**. The Disk Directory is a part of the diskette that holds the names of the files on that diskette.

Cataloging A Diskette is very simple. If you are not already on the **Options Menu**, press <0> to go there. Use the mouse to move the highlight over the **File Options Menu** and then move to the **Disk Directory** option. Press the button (or **RETURN**) to select this option and you will see the prompt (in orange on a color monitor). Draw ON is now asking for the name of the disk or subdirectory which holds the files that you would like to list. Enter the name now and then press **RETURN**. The files that are on that disk will be displayed.



If there is a problem locating the disk or subdirectory that holds the files you want to list, Draw ON will respond with an error message. This message will indicate what the problem was, such as the subdirectory was not found, or there was no disk in the disk drive specified. These error messages and corrective actions are shown in **Appendix H**.


If you change your mind about listing the files on a particular disk or subdirectory, you can press **ESCAPE** anytime before pressing **RETURN**. The **Disk Directory** option will be aborted and no files will be listed. Just as with all other options which ask for a pathname, you have a variety of editing options available for the line of text that you are entering. Please read over **Appendix F** for information on editing a line of text.

As an example, let's go over the procedure for Cataloging A Diskette. To list the files that are contained on the back side of the **Sample Pictures, Fonts, and Textures Disk** use the following instructions:


- Insert the back side of the Draw ON /// Sample Pictures, Fonts, and Textures Disk into the internal drive.
- Press <0> to go to the **Options Menu**.
- Use the mouse to move the highlight to the **File Options Menu**.

- Use the mouse to move the highlight bar over the **Disk Directory** option and press the button once.
- Type in **.D1** and press **RETURN**. The files on that diskette will now be displayed on your monitor screen.

2.20 Deleting a Disk File

There will be times when you run out of disk space and need to delete some files from your disks. Draw ON /// allows you to do this from the Options Menu. To delete a file, go to the **Options Menu** by pressing <0>. Now press  **D** and you will see the prompt. Enter the filename that you would like to delete and press **RETURN**. That file will then be deleted. As with all other file options, any errors will be reported by Draw ON and may be corrected as outlined in **Appendix H**.

If you ever run out of room on your disks and need to delete that first test picture that you saved onto disk, follow the next few steps to delete that file.

- Press <0> to go to the **Options Menu**.
- Press  **D** to tell Draw ON you want to delete a file.
- Insert the diskette with the test picture (remember **MYPICTURE?**) into the internal disk drive.
- Type in **.D1/MYPICTURE** and press **RETURN**. The file will now be deleted from the diskette.

2.21 Setting The Prefix

There are times when you will have to use a very long filename. This will usually occur when you are using Draw ON with a hard disk or other drive where you are using subdirectories. Draw ON allows you to set the prefix so that instead of typing in a complete file pathname, you can just specify the partial pathname. This section will show you how to do this.



Just after you start up Draw ON, the prefix will be set to **.D2/**. If you would like to change the prefix to any other disk or subdirectory, follow the procedure presented below to do this:

- Press <0> to go to the **Options Menu**.
- Use the mouse to move the highlight to the **File Options Menu**.
- Now, move the highlight bar over the **Set Pathname Prefix** option and press the button once.
- Type in the prefix and press **RETURN**.

After you have entered a new prefix, each time you specify a file, you will not have to type in the entire pathname - just the filename. As an example, say that you are using Draw ON with a hard disk system and you have all of your Draw ON pictures on a subdirectory with the name **PICTURES**. If you set the prefix to **.PROFILE/PICTURES/**, each time you try to load, save, or catalog a file on that subdirectory, you will only have to specify the name of the file itself - not the entire pathname. Thus, if you had a drawing with the name **WOODBLOCK** on that subdirectory, you could load it in by just typing in **WOODBLOCK** when asked for the drawing to load. Otherwise you would have to type in **.PROFILE/PICTURES/WOODBLOCK**.

2.22 Printing Your Drawing

Draw ON allows you to print out your drawings on a variety of dot matrix printers that are connected to your Apple /// via the *PKASO Parallel Interface Card*. Additionally the *PKASO* card can be used from within all of your other programs. Instructions for installing and configuring your *PKASO* interface card can be found in your *PKASO Users Manual*. Draw ON comes configured with the *PKASO* driver in the following way:

- Driver name: **.PKASO**
- Interface card in slot 1.
- Printer Type: **C.Itoh 8510 (Apple Dot Matrix Printer)**.

If your *PKASO* card is not in that slot, or if you have a different type of printer, please read over **Appendices D and E** of the *PKASO Users Manual* for changing this information. Similar information is found in **Appendix C** of the Draw ON manual. Once your printer is correctly configured and installed, you can print out your drawing with the following procedure:

- Press <0> to go to the **Options Menu**.
- Use the mouse to move the highlight to the **Program Config. Menu**.
- Now, move the highlight bar over the **Hardcopy via PKASO card** option and press the button once.
- Select the appropriate options and press **RETURN** to start the printing of your drawing screen.

After you press **RETURN** to start the printout, Draw ON will take the image on your drawing screen and send it to your printer taking into account the options that you have selected. The first of these options asks you if you want your drawing rotated or not. The rotation factor is the orientation that your drawing is printed on your printer. The drawing will normally be printed from top to bottom, but this can be changed to sideways. The standard way of printing is top side up, thus **NO** rotation. If you want your drawing printed sideways, change this to **Yes**.

The second of these options is the size of the printout. Some printers can print out your drawing in more than one size. The *PKASO* card allows up to three different sizes for your printouts. Appropriately, they are labeled, Small, Medium and Large. Your printer may not be able to print out in all of the three sizes. You will have to test your printer out to see the various sizes it can produce. Combined with the ability to rotate your drawing, Draw ON allows many different sizes and rotations for your printouts. The standard printout size is Medium, but you can change it to meet your requirements.

The third of these options is the ability to print an exact copy of your screen, inverted or regularly. Since you will normally be working on a black background, the standard here is Inverted. Again, you can change this to suit your needs.

The last of these options is the Grey texture type. The grey texturing option is explained in the *PKASO Users Manual* under GRAY COMMAND. When printing out a color drawing screen to your black and white printer, this option is used in printing out the various colors in black and white. When the option is set to Fixed, Draw ON will produce colors from a fixed pattern. If set to Statistical, Draw ON will produce colors from a statistical pattern. Each of these options will look better than the other in different color drawings, so it is up to you to test out this feature and see what works in your drawings.

If you are using the version of Draw ON for the *IDS Color Prism* (see **Appendices B and C**), you will not be able to change the last option as you are working on a color printer. Since the normal Grey texture option is for the printing of color drawings on black and white printers, Draw ON doesn't need it for working with the *IDS Color Prism*.



If your *PKASO* printer driver is not named .PKASO, Draw ON will ask you for the name of the printer driver. After typing it in, Draw ON will check to see if it is an actual *PKASO* printer driver. If not, Draw ON will not allow you to print out your drawing. After you give a correct name for the *PKASO* printer driver (possibly **.PRINTER**), Draw ON will allow you to print out your drawing.

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3

Putting Text On The Screen

This chapter will show you how to put lines of text on your drawing screen. Thus, labeling your drawings or adding directions to a diagram will soon become very simple.

3.1 Entering Text Strings

Draw ON /// is capable of putting text (words, phrases, etc.) directly on your drawing screen. This is useful for labeling your drawings, adding directions to a diagram, or whenever text is necessary for your graphic design. A variety of character types and sizes are included to make this option even more versatile.

To put a line of text on your drawing screen, there are two steps that you must follow. The first is to enter the line of text on a separate screen. You can then write out that line of text on your drawing screen. The rest of this section will show you how to do this.

To enter a line of text so that it can be placed on your drawing screen, press **T**. The text entry screen and the prompt will be displayed. Your screen will look like **Figure 3.1**. You will enter the line of text that you would like to put on your drawing screen here. Notice the editing options available. These options are the same ones that are available during pathname entry (see **Appendix F**). If you make a mistake in entering, follow the instructions for editing the line of text.

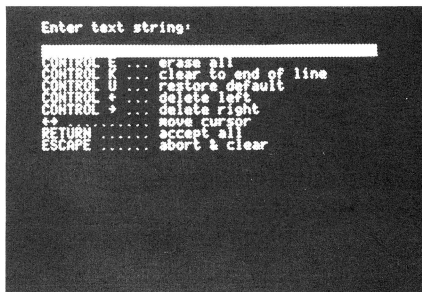


Figure 3.1

When you are finished entering the line of text, press **RETURN**. This will accept the line of text you have entered and return you back to the drawing screen.





Typing in a line of text does not write that line of text to the drawing screen. To write that line of text to the drawing screen you must follow the information presented in the next few paragraphs on how to write that line of text to the drawing screen.

Now that you have entered a line of text you can place it on your drawing screen. To do this, use the mouse to place the cursor where you would like the line of text to start and press **W**. The position of the cursor will be the upper left corner of the first character written to your drawing screen. The text will be written on the drawing screen in the current pen color, against a background of the current fill color. For example, if your pen color was white and your fill color was black, the characters that will be placed on your drawing screen will be white over a black background.

The **W** command writes out the line of text in a normal way. Draw **ON** also allows you to change the way text is written to the drawing screen. If you press **I** instead of **W**, the text will be written out in the invert mode. This simply inverts whatever is on the screen wherever the line of text changes it. If you write the string out by pressing **I**, and then realize that it wasn't in the place you wanted it, you could press **I** again and the drawing screen would be restored to whatever was originally there. This *undo* command can be very useful when you want to check how something will look on the screen.

The **W** and **I** commands for writing out text to the drawing screen are two of the options available when writing out a line of text. The other is the **O** command which stands for overlay. This option allows you to write out the line of text with just the pen color. For example, if you want to write a line of text over a complex background without destroying what is already on the screen with the black background color of your text string, use the **O** command to overlay what is on the screen with the line of text. Experiment with the different options so that you will know when it is best to use each of them.

3.2 Direct Text Entry

You may write a line of text directly to the drawing screen with the direct text command as outlined below. It is not as versatile as the normal entering and writing of text strings, but has other uses. If you would simply like to start writing text on the screen wherever the cursor position is, press  **T** to turn on direct text entry. When you are finished typing in the line of text, press  **G** to turn off direct text entry.

When using the direct text entry, keyboard commands such as **L** to start a new line are disabled. When pressed while using direct text, these keys act as normal text characters. Thus, you will not be able to change drawing modes (L - lines, D - dots, etc.) from the keyboard since they are regular text characters. To use these drawing mode options of Draw ON when using direct text entry, use the drawing mode menu <7>. Here you will be able to choose the various drawing options while in direct text entry.



In direct text mode, the **SPACE BAR** will produce a blank character (if the fill is set to black) instead of showing the **color table**. **RETURN** will perform a true carriage return-linefeed on the drawing screen, with increments determined by the size of the current text font used. As you press the **SPACE BAR** or **RETURN**, the graphic cursor will move to indicate the top left corner of the next character. The cursor will also move in response to the arrow keys or mouse by moving in character sized increments. This allows you to backspace the cursor for making corrections.

3.3 Introduction To The Color Operator Table

The *Color Operator Table* (C.O.T.) allows you to protect colors on the drawing screen from being overwritten. It also allows you to eliminate colors from objects that you are drawing with. These objects may be lines of text or other graphics images. Using the C.O.T. you can also change the way colors are put on your drawing screen. For example, you could set up the C.O.T. so that wherever you draw a yellow line across a red background, a blue line will appear across the yellow background. Since it can get very complicated, we will just briefly go over it in this section. For further information on the C.O.T. read over the section **Using The Color Operator Table** in **Chapter 4**.

One of the easiest C.O.T. functions is to eliminate the background color of a text string. For example, if your pen color is set to white and your fill color is set to black, whenever you put a line of text on the drawing screen, you will place the black background color on the drawing screen along with the lettering. If the object on the drawing screen that you are writing text over has the colors yellow and red, your line of text will have knocked out part of the yellow and red and replaced it with the black background color.

Using the C.O.T., you will be able to place only the characters themselves onto your drawings. To begin, use Draw ON to create a yellow and red background for the test. Make some lines and dots in those two colors. Now press **SPACE BAR** or **<.>** and the **color palette** should be displayed. Next, set the pen color to the color that you would like your line of text to be drawn with. After this, set your fill color to the background color (in this case black).

Press **ENTER** to go back to the drawing screen and then press **T** to enter some text. Type in the line **This is a test** and press **RETURN**. Now move the cursor so that it is over some of the yellow and red colors on the screen. Press **W** to write the text string out and notice how the black background color of the line of text erased parts of your drawing. This is a perfect example of the need for the *Color Operator Table*.

To change Draw ON so that it doesn't erase any of your drawing as you put your line of text on the drawing screen, go back to the **color palette** by pressing **SPACE BAR** or **<.>**. Move the cursor to the left of the **color palette** until it jumps off the palette and onto the **color operator table**.




Cursor movement from the palette to the C.O.T. and vice-versa is only permitted where color-cells are found in the direction of cursor movement. This means that if the cursor is on the bottom row of the C.O.T., you must go up one row, then right to get back to the **color palette**.

Once the cursor is on the C.O.T., move the cursor as far down on the screen as it can go. You will see that this row of the C.O.T. is labeled 0 with a black cell next to it at the extreme left edge of the screen. This scale is labeled **Pen**, and it refers to any color (pen or fill) which is to be drawn on the screen (in our case - black). Below the C.O.T. is a similar scale which is labeled **Scrn** for screen. This refers to the color already on the screen at the location where you are drawing.

Note that each cell in the *black pen* row is filled with the color black. This means that when the color black is drawn, it will take precedence over any other color already on the drawing screen and be drawn over it. You can prevent black from being drawn (and erasing part of your drawing) by pressing the underscore key `_` (or minus) when the cursor is on the *black pen* row. You will hear 16 ticks, and notice that the color cells along the row have changed to the same color as the cells of the **Scrn** scale just below it. When you now draw with the color black over the color orange, you will get orange. If you draw with black over the color green, you will get green and so on.

This means that all other colors now take precedence over black, thus eliminating the color black from whatever you now draw with (such as a line of text). If you now return to your drawing screen and write out your line of text (press **W**), you will see the characters in your line of text written in the pen color on top of whatever was on the screen. If your pen was set to green, you would see your text being written with green characters on top of whatever was on the screen.

To reset the C.O.T. so that Draw ON operates in the normal way, press  \ when the **color palette** is displayed. The cursor position within the **color palette** is not important. As soon as you do this you will hear a number of ticks and the C.O.T. will return to its original state. Press **ENTER** or **G** to return to your drawing screen.



If you want to protect an object that is already on the screen so that your line of text appears to be written behind it, read over the section in **Chapter 4** titled **Using The Color Operator Table**. There you will find complete information on all of the amazing things that you can do with the *Color Operator Table*.

3.4 Changing Character Fonts

Draw ON allows you to use a number of different sized characters in a variety of typestyles. Draw ON has three different sizes and styles available at any given time. You can change from one to the other very quickly and use the new style or size to write text on your drawing screen. The next few paragraphs will show you how to do this.

You can change the character font in which you text is written by using the **Font Utilities Menu**. Press <0> or **M** to switch to the **Options Menu** and then use the mouse to move to the **Font Utilities Menu**. The font that you are currently using is shown just below the *Font Utilities title*. The size of this font is shown just above the *Font Utilities title*. The bottom most selection on this menu allows you to change to the other font styles and types.

To switch to the 14 X 24 large font, move the highlight bar to **Select Font** and keep pressing the button (or **RETURN**) until the font size and style that you want is displayed. If you press the button twice you will see **14 X 24** displayed just above the *Font Utilities title*. Press the button again and you will return to the **standard Draw ON /// 7 X 8 font**. Press the button once again and you will be using the **alternate 7 X 8 font**. The alternate font is whatever font you were using at the time the program was started. When you start Draw ON this will be the **Boot-up font**.

The next section of this manual shows you how to use the menu selection **Load alt. font file** to change from one standard (7 X 8) font to another. It also shows you how to load a 10 X 18 or a 14 X 24 sized font. Note that you may only use one 10 X 18 or 14 X 24 font at a time. Thus, at all times you can have two regular fonts and one of either a 10 X 18 or 14 X 24 sized font within the program.

After changing to the 14 X 24 size font, go back to your Drawing Screen and try using the new font size. Write out a couple of lines of text and see how the large font looks on the screen. Remember that you can change back to a different font at any time by simply going back to the **Font Utilities Menu** and selecting a new font.



When you change the character font (size, style or both), anything already on your Drawing Screen does not change. When you write out new lines to the screen they will appear in the new style or size.



3.5 Loading A New Character Font

Draw ON is supplied with a variety of font styles and sizes. These can be found on the **Sample Pictures, Fonts, and Textures Disk**. Your Apple /// also has a variety of fonts available. Some can be found on your Apple Writer /// diskette with the names **GOTHIC.CHR** and **STOP.CHR**. The diskette labeled **SYSTEM UTILITIES DATA** also has a few fonts. They can be found under the subdirectory **FONTS** with the names **STANDARD**, **APPLE**, **ROMAN** and **BYTE**. Draw ON allows you to load in any of these fonts and use them in writing text to your Drawing Screen.

To load an alternate (7 X 8) font, go to the **Font Utilities Menu** and use the mouse to move the highlight over the selection **Load alt. 7X8 font file** and press the button (or **RETURN**). You will be prompted to enter the pathname of the new font file. Enter the pathname and press **RETURN**. The new font will be loaded into the alternate font area. You can now return to your Drawing Screen and use the new font.

Simply loading an alternate font does not overwrite the 7 X 8 Std. (standard) program font. Draw ON has three different font areas - one for the standard font which you can't change, one for the alternate font which you can change, and one for the large font (10 X 14 or 18 X 24). If you load a new 14 X 24 or 10 X 18 font, you will lose the original 14 X 24 font as it will be replaced by the new font.

To load in a large (10 X 18 or 14 X 24) font, go to the **Font Utilities Menu** and use the mouse to move the highlight bar over the **Load large font file** selection and press the button (or **RETURN**). Enter the pathname of the large font file and press **RETURN**. Your new font will be loaded in and you can now begin to use it.

3.6 Designing A New Character Font

You may design your own special character font (in either the 7 X 8, 10 X 18, or 14 X 24 size) for use with Draw ON, or any other program. This permits you to create special characters for use in labeling your drawings. You can design a *Greek alphabet* or even those special **mathematical symbols** you have been hoping for. The rest of this section will show you how to create and save new font styles.

To start creating or changing a standard 7 X 8 font, first load the fotofile **TEMPLATE.7X8** from the **Sample Pictures, Fonts and Textures Disk**. Now go back to the drawing screen by pressing **RETURN** and you will see the blank *Character Font Template*. Illustrated in **Figure 3.2**, this template will help you design a new font for use within Draw ON /// or elsewhere. Before loading a font into the template so that you can change it, you must make sure that the currently selected font is the one you want to modify. Do this by going to the **File Utilities Menu** and making sure that the selected font is the one you want to change.

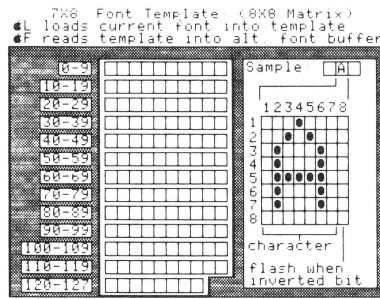




Figure 3.2






Once you have selected the correct font, press  **L**. This will load the currently activated font into the template. You should note that the standard template is actually designed for an 8 X 8 character cell. The rightmost pixel of each character is never printed with a standard font, but is used to create flashing characters on the text screen. If the rightmost (the 8th) dot of a row is blank, that row will not flash. If it is filled, it will flash. Read over **Appendix G** of your *Standard Device Drivers Manual* for more details on character font design.

To modify the current font, use the zoom feature to blow up the region around the character you want to change, set the point (dot) drawing mode by pressing **D** or **K**, and change the character to whatever you want. Be careful not to overwrite the template. It won't hurt if you do, but you could get confused as to where the characters need to be drawn, and your characters may not be correctly stored when you are finished.

When you are finished designing your new font, press  **F** to build the new font. Draw ON will take a second or so to load in the new characters and you will then be able to use these new characters in your drawing applications. If you have changed (overwritten) the template and placed the characters in the wrong places, they will be jumbled after you load them in. Draw ON requires that the characters be in certain places on the screen and if they aren't, the program will not be able to correctly load them in for future use.

You can design a new large sized font (10 X 18 or 14 X 24) in a very similar manner. Just load in the appropriate font design template for whatever character size you want to change. You must also make sure to select the correct size font on the **File Utilities Menu** before loading it into the template. The *large font templates* are also found on the **Sample Pictures, Fonts, and Textures Disk**. They have the names **TEMPLATE.10X18** and **TEMPLATE.14X24** respectively.

To make changes in either of the large sizes, after loading in the font template (and selecting the correct font), press  **L** to load the font into the template. Zoom in on a particular character and make the changes you would like. When finished, press  **M** for a 10 X 18 font, or press  **V** for a 14 X 24 sized font. This will cause Draw ON to build that font and replace the old font.

3.7 Saving A New Character Font

You may save any font that you have created by using the **Save font file's** selection of the **Font Utilities Menu**, in the same way that you loaded a new font from disk. To save a standard (7 X 8) font, go to the **Font Utilities Menu**, use the mouse to move the highlight bar over the selection **Save alt. 7X8 font file** and then press the button (or **RETURN**). You will be prompted to enter the pathname for the new font file. Enter the pathname and then press **RETURN**. Your new font will be saved with that name. Saving a large font is also very easy. On the **Font Utilities Menu** there are two selections labeled **Save 10 X 18 font file** and **Save 14 X 24 font file**. Use these to save the large font that you have created.

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4

Moving Objects On The Screen

This chapter will show you how to pick up and make copies of objects on your drawing screen. This is the heart of Draw ON and with it you can create libraries of useful shapes and objects such as tables, chairs and circuit components. You can then place these objects anywhere on your drawing screen.

4.1 Preserving (Picking Up) An Object



Preserving and *Restoring* of objects is the heart of Draw ON ///. Using this capability, you can create fotofile libraries of useful shapes and objects. If you draw objects such as tables, chairs, circuit components and put them onto one drawing screen, you can save that drawing screen to disk as a fotofile. When you later need one of the objects, you can load back that fotofile library onto an unused drawing screen. Using the **Preserve/Preview/Restore** options presented later in this chapter, you will be able to make copies of those objects on your current drawing screen.

To preserve an object on the screen, open the cursor so that it completely encloses the object and press  **P** (to preserve or pick up). Everything within the open cursor will be preserved. You can pick up any sized object - up to the size of the entire drawing screen.






When preserving an object, the cursor will disappear for a few moments, depending on the size of the object. When it reappears, the object will have been preserved.

As an example, use Draw ON to draw a small triangle on your drawing screen. Make sure that you are working in the full color display mode by pressing **3** on the main keyboard and use the line drawing command (**L**) to create the triangle. Now use the dot (**D**) command to draw some dots within the triangle. Change colors a few times so that the triangle is filled with dots of varying colors.



Now open the cursor so that it encloses the triangle and press  **P** to pick up the triangle. As soon as you press  **P**, the triangle will be preserved so that you can restore it later. The next section of the chapter will show you how to make copies of the triangle and any other object you have picked up.

4.2 Restoring (Copying) An Object



You may make a copy of whatever has been preserved by moving the open cursor to where you would like the copy to be redrawn and press  **R**. This will restore the last object that you preserved. You can make as many copies of the object as you like by simply moving the open cursor to a new area on the drawing screen and pressing  **R**.

To make a copy of the triangle that was preserved in the last section of this chapter, simply move the open cursor to some new area on the screen and press  **R**. The triangle will be redrawn at the new open cursor position. To eliminate portions of the object that was preserved, such as the black background color, from being redrawn, set the *Color Operator Table* to eliminate the color black. This was partially described in **Section 3.3** under **Introduction To The Color Operator Table**, and will be explained further in **Section 4.5 - Using The Color Operator Table**.

4.3 Copying From One Mode To Another

You can preserve an object in one of the graphics display modes and restore it in a different mode by pressing  **I** instead of  **R**. This will restore the object as a bit image in two colors (pen and fill). When transferring objects from one display mode to another you must remember that there will be some horizontal distortions when transferring objects from different size graphics display modes.







If you try to transfer an object from one display mode to another by pressing  **R** instead of  **I**, most of the time the object will appear jumbled and will not be recognizable.

4.4 Previewing An Object (Dragging)


Draw ON /// allows you to pick up and make copies of any object that you can draw on the drawing screen. At times during the copying process, it is desirable to place the object in an exact spot on the drawing screen before making the copy. You can use the preview options to do this.

Simply put, it will allow you to pick up your object and drag it to a new location. As you drag the object across the screen it doesn't change anything under the object. Thus, you can have a preview of exactly what the object will look like in a certain position on the screen. When you are satisfied with the position of the object you can make a copy of it in the new position.

To preview an object that you have preserved, press  **V** (for preview). As you move the open cursor around the screen, the object will move with it. The larger the object, the slower the dragging. Use the mouse to move the object around on the screen until it is in the position you want. Press  **V** again to exit previewing and then press  **R** to restore or make a copy of the object. Remember, previewing is toggled on and off by pressing  **V**.




While you can pick up any sized object (up to the size of the drawing screen), you can preview any moderately sized object. This object may not be more than approximately one fourth of the size of the drawing screen. If the entire object is too large to be previewed, first make note of the exact size of the open cursor by looking on the *Cursor Status Screen* (press <5>). Next, close the cursor down so that it only shows the upper left hand corner of the object. Drag the corner of the object into position, exit the preview mode and then open the cursor back to its original dimensions and restore the entire object.

Most drawing functions (lines, circles, etc.) are disabled during preview. You may not change the cursor size when in preview but you can restore an object when previewing. You can do this by pressing  **R** to restore or make a copy. You can also make a copy by pressing the button on the mouse or joystick. Copying with a press of the button is only available when you are using the brushing drawing mode. This is described later in this chapter under the **Section 4.7 - Brushing And Multi-Copying**.

4.5 Using The Color Operator Table

The *Color Operator Table* (C.O.T.), is one of the most powerful features of Draw ON ///. With it you can set color precedences and allow objects to be drawn *in front of*, *behind* or *overlayed* along with existing objects on the drawing screen. This section will show you how easy it is to use the C.O.T. in all of your drawing applications.

If you haven't read over the **Introduction To The C.O.T.** in **Section 3.3**, do so now to learn how to eliminate a color from something being drawn. You can use this same procedure to eliminate the background color of an object that you want to restore, or the object that you are dragging around the screen. To show what we're talking about, follow the instructions in the next few paragraphs.


The triangle that we have been dragging around and restoring on our drawing screen is a perfect example of the need for the C.O.T. If you were following along with the example, you picked up the small triangle and made copies of it on your drawing screen. As a test, drag a copy of the triangle so that the background of the object (the color black) goes over one of the triangles already on the screen. If you press  **R** to make a copy, you will notice that in addition to the triangle, Draw ON restored the black background color over the triangle that was on the screen.

This shows that when you preserved (picked up) the object, you picked up everything within the open cursor, including the black background color. When making copies you may not want to redraw the background, but only the triangle itself. We can set the C.O.T. so that the color black is eliminated from the object that you are redrawing. The next few paragraphs will show how to do this. After doing this, when you redraw the object, you will be drawing with only the object and not the background color.

To do this, press <.> or **SPACE BAR** to go to the **color palette**. Use the mouse to move the cursor to the left of the **color palette** until it jumps off the palette and onto the **color operator table**. Once the cursor is on the C.O.T., move it as far down on the screen as it can go. You will see that this row of the C.O.T. is labeled 0 with a black cell next to it at the extreme left edge of the screen. This scale is labeled **Pen**, and it refers to


the color (pen or fill) which is to be drawn on the screen (in our case - black!). Below the C.O.T. is a similar scale which is labeled **Scrn** for screen. This refers to the color already on the screen at the location where you are drawing.

Note that each cell in the *black pen row* is filled with the color black. This means that when the color black is drawn, it will take precedence over any other color already on the drawing screen and will be drawn over it. Since we want to prevent the color black from being drawn, simply press the underscore key `_` (or minus) when the cursor is on the *black pen row*. You will hear 16 ticks, and notice that the color cells along the row have changed to the same color as the cells of the **Scrn** scale just below it. This means that all other colors will now take precedence over black, thus eliminating black from whatever you now draw with (such as our multi-colored triangle).

If you now return to your drawing screen and drag your triangle around the screen, you will see that you are only dragging the triangle. The black background color has been eliminated. When you start redrawing the triangle and make copies all over your drawing screen, you will be redrawing only the triangle. After you have finished drawing your new triangles, reset the C.O.T. by going to the **color palette** and pressing  \. The next few paragraphs describe some more advanced features of Draw ON and they require that we start with a fresh C.O.T.


Protecting Objects On The Drawing Screen

One of the other features of the C.O.T. is the ability to protect objects already on the drawing screen from being drawn over. To protect an object (or color) already on your drawing screen, read over the next few paragraphs and follow along with the examples. This will allow you to place new objects on your drawing screen that appear to be behind objects that are already on your screen.

For this example we will need a blank drawing screen in graphics display mode 3, the full color mode. Go to your drawing screen by pressing **ENTER** and then make sure that you are in the right mode by pressing **3** on the main keyboard. Since we want to start fresh, let's erase the drawing screen by pressing  **E**. This will erase the drawing screen with the current fill color. If the fill color was not black, your screen will be erased to the current fill color. If your drawing screen is not black, go back to the **color palette**, change the fill color to black and erase the screen again.

Make sure that your pen color is set to white and start drawing a group of white lines in the center of your drawing screen so that a solid portion of your drawing screen is set to white. Now set your pen color to pink (color number 11) and draw another triangle. Next, change the pen color a few times and draw a variety of colored dots (press **D** to set dot drawing mode) within the triangle.

If we wanted to make a copy of the triangle so that it was partially behind the blotch of white on your drawing screen, we need to protect the color white from being drawn over. To do this, go to the **color palette** and move the cursor onto the C.O.T.. Now use the mouse to move the cursor to the column (up and down) number 15 (white) and press the vertical bar key **|**. This will change the entire column to the **Scrn** color, and thus prevent any color from changing the color white on the drawing screen.

If you tried drawing a blue line over the white blotch on the screen, the blue line would only appear on the edges of the white blotch, appearing as though it were drawn behind the white blotch. Likewise, we can pick up the triangle and drag it over the white blotch. If you made a copy now by pressing  **R**, the color white would not be drawn over and the triangle would look as if part of it was hidden behind the white blotch.

You can protect multi-colored objects on the drawing screen from being drawn over in a similar manner. If the object that you wanted to protect was white and orange, you would go to the C.O.T. and protect both white and orange. If you then tried to draw something over the white and orange object it will not change, thus you have protected that object. Anything that you tried to draw over that object would be drawn behind it instead.

Likewise, if you are drawing with a multi-colored object, you could prevent more than one color of that object from being drawn on the screen. Just as you eliminated the color black from the object that you were drawing in the examples above, you could eliminate any number of colors from being drawn. Just go to the C.O.T. and follow the instructions for eliminating the background color. By simply pressing the underscore `_` (or minus) while the cursor is on the row of the color that you want to eliminate, you will no longer be able to draw with those colors.


The *Color Operator Table* is just that, a table. Whenever Draw ON tries to draw something on your drawing screen, it looks at the color that it is drawing with and checks the color that already is on the drawing screen. It then looks up this point in the C.O.T. and puts that color on the drawing screen. If you look at the C.O.T. you will see that the columns on the left hand portion of the screen are labeled **Pen** and the rows are labeled **Scrn**. When you draw with an orange pen color over the color yellow already on the drawing screen, the color orange will be drawn over the color yellow on the screen. If you look on the C.O.T. and trace the orange row to the intersection of the yellow column, you will see an orange cell. Thus, when you draw with orange over yellow, Draw ON looks up the intersection of those two colors in the C.O.T. and puts whatever it finds in the table onto the screen. This will normally be orange, but as described below, you can change it to any other color for a variety of interesting color effects.

Changing The Way Of The Colors

We have already changed entire rows and columns to eliminate and protect colors. Now we are going to change a single cell in the C.O.T. so that when drawing with one color over another color on the drawing screen, it will produce a third color. To change a single cell on the C.O.T., set the pen color to the desired result and then move the cursor over the cell that you would like to change. Press `*` to change the cell, and the color in that cell will change to the current pen color.

As an example, say we would like the color red to appear whenever orange is drawn over yellow. Go to the **color palette** and select red as the pen color. Now, move the cursor onto the C.O.T. and place the cursor over the intersection of the orange row and the yellow column. Press * and that cell will change to red. Next, go back to the **color palette** and select yellow as the pen color. Return to your drawing screen and draw a group of yellow lines so that a patch of yellow appears on your screen. Now go back to the **color palette** and select orange as your pen color. Return to your drawing screen and draw a line across the yellow patch. The line will be in the color orange except where it crosses the yellow patch, there the line will turn to red.

Another use for the C.O.T. is in changing a color of an object. Say that you have drawn a red truck with a number of other multi-colored objects on your drawing screen. For some reason you didn't like the color of the truck and wanted to change the color to green. Instead of erasing the truck and trying to redraw it, you can use the C.O.T. to change the color for you.

To change the red color in the truck to green, select an arbitrary fill color, let's say black. Use the command to eliminate the color black from the C.O.T. by moving the cursor to the black row on the C.O.T. and pressing . Now select the color green from the **color palette** to be your new pen color and move the cursor back onto the C.O.T. and position it over the intersection of the black row and the red column. Press * to set this cell to green and return to your drawing screen. Press  F to set the filling mode and then open the cursor to surround the red truck. If you now press the button, Draw ON will change the color red within the open cursor to the color green and your red truck will turn to green.

This works because when you open the cursor and press the button, Draw ON tries to erase everything within the open cursor to the color black (if the fill color is black). However, since black has been eliminated (when you used the command), nothing will happen except for the changing of red to green. This is the reason for setting that single cell of the *color operator table* to green.



As you change the C.O.T. from the standard values, drawing operations will slow down. The more you change the C.O.T., the speed of drawing, erasing, filling, etc. will be much slower than normal. For optimum program speed, change the C.O.T. only as much as needed and reset it when finished to speed things up.



The *Color Operator Table* is one of the most powerful features of Draw ON. Because of this it is also the hardest feature to learn. To get used to it you really should have followed through with the examples in this section. After going through this section, if you are still unsure of how to use the C.O.T., go over it again and pay careful attention to the examples. The best practice that you can get, however, is by working with it. Try new things and test out just what the C.O.T. can do for you.





If you are not sure of the results of how you set the *Color Operator Table*, you can use the preview feature to pick up an object and then drag it around the screen to see exactly how it will look when you restore or make a copy of it. Thus, you can experiment with the C.O.T. without permanently changing what is on your drawing screen.

4.6 Transfer Options (*Xfrop*tion)

In addition to the C.O.T., Draw ON allows you to control the **xfrop**tion (*transfer option*) feature of the graphics driver. The **xfrop**tion feature allows you to control overlay, invert and other drawing operations. These features are normally intended for the black and white graphics display modes, but may be used in color modes as well. They are not intended to be used by beginners as it is a difficult subject to learn.

These features are described in detail in the *Standard Device Drivers Manual* under the **Graphics Driver** chapter, in the *Business Basic Manual Vol. 2* under **The Graphics Invokable**, and in the *Apple /// Pascal Programmer's Manual Vol. 2* under The PGRAF Unit. They change the way that information is placed onto your drawing screen. These options are numbered from 0 to 7 and may be activated from within Draw ON by pressing   **0..7**. When you first start-up Draw ON, this option is set to transfer mode 0. This is the standard transfer setting and will put information on the drawing screen in the normal way, it will replace whatever is on the screen with whatever is being drawn.



Option 2, activated by pressing   **2** is one of the other useful transfer options. If you draw in any color, over any background, the result will probably be clearly visible. If you then repeat the drawing with the same color, the effect is to erase the drawing and restore the




background to what it was originally. Thus, you can try drawing objects such as circles, polygons etc. without worrying about changing your drawing. If it isn't what you want, just draw it again and it will restore your drawing screen to its original state.



In color graphics display modes, it is usually easier to modify colors with the C.O.T., rather than using a transfer option. While the transfer options are quite powerful, they are complex, so study which method you prefer and try to use the way that is easiest for you.

4.7 Brushing And Multi-Copying

When you pick up and drag an object around your drawing screen you can make a copy of it by pressing  **R**. Since taking your hand off the mouse, going to the keyboard and pressing those keys can be time consuming, Draw ON allows you to use the object that you pick up as a *Brush*. You can tell Draw ON to make a copy of the object (the same as pressing  **R**) every time you press the button on the mouse.




To enter the brush drawing mode, press  **B**. In brush mode, the contents of the preserve buffer (the object you picked up) will be used to fill the open cursor whenever the button is pressed. In filling mode, the open cursor is filled (erased) with the fill color. Press  **F** to go to filling mode or  **B** to change to brush mode. You can check which drawing mode you are in by pressing <5> to go to the cursor status screen. The fill/brush mode indicator is the paint brush symbol at the top left of the *cursor status box*. If the little brush is present, you are in the brush drawing mode.

The brush mode allows you to paint with multiple colors and brushes of your own choosing. Instead of drawing with lines or dots, you can pick up any object, such as the triangle that we were using in previous examples and use it as a brush. You can simply draw the brush you want using dots, lines, circles, or any of the other drawing tools. Color it in with any color that you want, and then open the cursor around the object and preserve it. Set the C.O.T. to eliminate any colors you don't want to brush, such as the original background color. Then set the brush drawing mode and as you drag the object around the screen, press the button wherever you want a copy made.

When brushing with an object, you must have the cursor open to the size of the object you picked up. If the cursor is closed down to a single point, or smaller than the object you picked up, your brush will be a single point (similar to dot drawing) or just a portion of your object. Since this is probably not the effect you wanted, after picking up your object, don't change the size of the open cursor.



You don't have to be dragging the object to use it as a brush. If you turn off dragging (if it was on) and simply move the open cursor around on the screen, you can brush with the object that you picked up by pressing the button. This will speed up brushing considerably since Draw ON doesn't have to keep on redrawing the object. If you hold the button down continuously and move the open cursor around the screen, you will be drawing on the screen with the object as your brush.



As an example, pick up (preserve) the triangle that you drew a few sections back by opening the cursor so it surrounds the triangle and press  **P**. Next press  **B** to select brush drawing mode. Now go to the C.O.T. and eliminate the black background color from the triangle. This will let us draw with only the triangle and not the black background. Return to your drawing screen by pressing **ENTER** and start brushing with the triangle. As you move the open cursor and press the button, copies of the triangle will appear on your drawing screen. If you turn on dragging ( **V**) you will be able to move the triangle exactly where you want it so you could then press the button once to make a copy.

Brushes may be used to place multiple copies of an object on Computer Aided Design (CAD) drawings or other engineering applications. For example, draw a transistor, preserve it, move it to the proper place in a circuit and brush it in by pressing the button. You may then simply move on to a new location for the transistor and brush it there. You can create libraries of brushes such as logicgates, resistors, funny faces etc. and store them as fotofiles. If you then load in your object library (a simple fotofile) onto one of the unused drawing screens, you can pick up the object on your work screen and switch to your actual drawing screen and make copies of it there.

4.8 Rotating, Scaling And Inverting (RSI)


Any object that you have preserved (picked up) may be restored to your drawing screen, rotated to a specific angle, and/or scaled up or down in size. This process is called an **RSI** restore, because when restoring an object this way you can rotate, scale or invert it. The angle to rotate an object and the size on the X and Y axis to scale the object can both be set on the **Shape Utilities Menu**. The next few paragraphs will show you how to rotate, make mirror images and shrink or expand any object that you have picked up.

To rotate an object that you have picked up, go to the **Options Menu** by pressing <0> and use the mouse to move the highlight to the **Shape Utilities Menu**. Now select **Set rotation & arc angles** by using the mouse to move the highlight bar over that menu item and pressing the button. On the top of the screen, inside the *Scale status box*, the angle indicator will now be highlighted. Use the mouse, joystick or arrow keys to select the angle of rotation. When you have selected the correct angle, press the button. The highlight will disappear, indicating that Draw ON has accepted the new rotation angle.


If you now return to your drawing screen you can make a rotated copy of the object you picked up by pressing  **R**. Note that this instructs Draw ON to do an **RSI** restore, while pressing  **R** simply makes a copy of the object you picked up. Redrawing a rotated object will take a few seconds depending on the size of the object. If you want to stop an **RSI** restore, simply press any key and the restoration will stop.



The **RSI** restore is somewhat slow, but can be speeded up if you set the fill color to the background color of the object. The way Draw ON smooths out the object as it is rotated and redrawn will sometimes yield a strange looking object. Because of this it is best to practice restoring an object on a spare drawing screen. When it is redrawn exactly as you want it, pick up this rotated object and make a copy of it just where you want it. Rotation may also leave holes in the rotated object which must be filled in manually.




To test out this rotation feature, go to a drawing screen and draw a small box and fill it with some colored dots. Set the rotation angle to 45 degrees by going to the **Shape Utilities Menu**, selecting the **Set rotation & arc angles** menu item and changing the rotation angle. Return to the drawing screen and preserve the colored box. Now move the open cursor to a new part of the drawing screen and press  **R** to do a **RSI** restore. Draw ON will redraw your box rotated to a 45 degree angle.

You can have Draw ON redraw your object scaled to different sizes in a similar manner. Go back to the **Shape Utilities Menu** and set the rotation angle back to 0 degrees. Next, look at the *Scale status box* and note that the X and Y scale factors both have a 1.0 next to them. This indicates that the object will be restored at the same size as the original. If the X factor is set greater than 1.0, the object will be lengthened proportionally along the X axis. If the Y factor is set greater than 1.0, the object will be increased in size along the Y axis as it is restored. If they are greater than 0 but less than 1, the object will shrink accordingly. When the scale factors are negative, the object will be redrawn reversed from left to right or top to bottom.


Now move the highlight bar over the **Set X and Y scale factors** menu item and press the button once. Now use the mouse, joystick or arrow keys to change the scale factors. Change the X and Y scale factors to 2 and press the button once again. Return to your drawing screen, move the open cursor to a blank area on the screen and press  **R**. Your box will be redrawn at twice the normal size.




Note that when redrawing at a larger size there are some holes in the object that will have to be filled manually. Generally speaking, scaling an object to a greater than normal size will leave holes while scaling an object to a less than normal size will tend to lose detail in the object.



After you have redrawn your rotated/scaled object, don't use  **R** to make more copies of this object. To make copies of the new object use the normal preserve an object and restore an object features of Draw ON. Just pick up this new object and place copies of it on your drawing screen by pressing  **R** or by pressing the button while you are in brush mode. The normal way of restoring objects ( **R**) is much faster than the **RSI** restore. For larger objects, try using the *shape record techniques* described in **Chapter 6**.

Now that you have learned to rotate an object and scale the object in size, let's learn a very practical application of the scaling feature. Using the X and Y scaling factors we can make a mirror image of an object very easily. We can invert an object from left to right, from top to bottom or both. The rest of this section will show you just how to do this.

To invert an object from left to right, go to the **Shape Utilities Menu** and move the highlight bar over the **Set X and Y scale factors** menu item. After pressing the button to select this item, set the X scale factor to -1.0 by moving the mouse, joystick or arrow keys to the left. Make sure that the Y scale factor is set to 1 and that the rotation angle is 0 degrees. Return to your drawing screen and move the open cursor to an empty area on the screen. Press  **R** to do an **RSI** restore and your object (the colored box) will be restored as a mirror image (from left to right) of the original.

To invert your object from top to bottom we will follow a very similar procedure. Go to the **Shape Utility Menu** and move the highlight bar over the **Set X and Y scale** menu item. After pressing the button, set the Y scale factor to -1.0, and reset the X scale factor back to 1.0. Once you return to your drawing screen, press  **R** to do the **RSI** restore. If you look at the object as it is being redrawn on your drawing screen, it will be inverted from top to bottom.

Since we've gone through it twice now, I'll bet that you can figure out how to invert an object from left to right and from top to bottom. Try it by yourself and then read over the rest of this paragraph to check if you did it right. It's all very simple, just set the X and Y scale factors to -1.0 and do the **RSI** restore. Your object will then look reversed from left to right and from top to bottom.

When resetting the scaling factors back to 1, you don't have to manually move the numbers back to 1. If you press  **X**, the X scale factor will return to 1.0. Likewise, you can reset the Y scale factor back to 1.0 by pressing  **Y**.



Advanced Graphics Features

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5

Advanced Graphics Features

This chapter will show you how to use the more advanced graphics features of Draw ON. Circles, arcs, polygons, texturing, the grids and more will all be explained.

5.1 Drawing Circles

To draw a **circle**, return to the drawing screen (if you aren't already there) by pressing **ENTER** or **G**. Move the cursor to the center of where you would like the circle to be drawn and press **C**. When **C** is pressed, Draw ON will remember this point as the center of the circle. Now, move the cursor a short distance away from the center and press the button. The circle will be drawn in the current pen color.



You may also enter circle drawing mode by pressing **<7>** and making the appropriate selection. You can do this (after pressing **<7>**) by moving the highlight over the menu item **Set circle origin** and pressing the button. If you have rubber banding turned on (**<9>**), a second cursor will indicate the circle center. It will remain on the drawing screen until you turn off rubber banding or choose another drawing mode.

The distance that you moved the cursor away from the center of the origin is called the radius of the circle. If you would like, you can move the cursor to some new radius, press the joystick button, and a second circle will be drawn with the same center. You can change and draw a new circle by simply moving the cursor to some new location on the drawing screen and pressing **C**. This will become the center of your new circle. Circle drawing mode remains in effect until you set a new drawing mode.

Circles are drawn with respect to two factors that you can change. The first factor is the aspect ratio of the circle. This changes the way the circle looks on your monitor. If a circle does not appear perfectly circular on your video monitor or printer (due to differences in screen and printer hardware), change the aspect ratio to adjust for the best circle.

You can change the aspect ratio of a circle from the **Program Config. Menu**. Press <0> to go to the **Options Menu** and use the mouse to move the highlight over the **Program Config. Menu**. Now select the **Set circle aspect ratio** menu item. At the top of the screen, inside the *Program Status box*, the item **Circ.** will now be highlighted. You can adjust the ratio with either the mouse, joystick, or right and left arrow. Try adjusting the value slightly higher and/or lower, draw a circle and see the effect. Write down the value which produces the correct aspect ratio on your monitor or printer and use this from now on.

The second of these factors is the accuracy of the circle. When Draw ON draws a circle it uses a certain resolution factor. This number is an increment (in degrees) of the 360 degrees in a circle. The lower this increment, the more accurate the circle drawn. These more accurate circles will, of course, require more time to draw. To draw a more accurate circle, read **Section 5.5** on drawing polygons.



Draw ON allows you to *Rubber-band* a circle. To do this, set the transfer option (see **Section 4.6**) to 2 by pressing **2**. Now draw your circle and if it's not how or where you wanted it, simply draw it again (press the button) and the circle will disappear without changing your drawing. When you have placed your circle correctly, reset the transfer option to 0 by pressing **0** and draw your circle once again. Your circle will now be correctly positioned.

5.2 Drawing Arcs

An **arc**, for those of us who have forgotten our geometry, is a portion of a circle. Draw ON allows you to draw arcs of any size. This size is called the arc angle and can be changed at any time. Since a circle consists of 360 degrees, an arc of 90 degrees will be one fourth of the circle. Likewise, a smaller arc angle will produce a smaller portion of the circle.

To draw an arc you must first set the arc angle and direction. The direction of the arc is simply the direction that the arc is drawn, clockwise or counterclockwise. To set the arc angle and direction, press <0> to go to the **Options Menu** and use the mouse to highlight the **Shape Utilities Menu**. Now move the highlight bar over the menu item **Set rotation & arc angles** and press the button once. On the top portion

of the screen, in the *Scale box*, the **angle indicator** will now be highlighted. Use the mouse, joystick or left and right arrow keys to change the arc angle in degrees. If the arc angle is a positive, the arc will be drawn clockwise. If you set the arc angle to a negative degree, the arc will be drawn counterclockwise. Once you have the correct angle, press the button once to select this new arc. After doing so, the **angle indicator** in the *Scale box* will no longer be highlighted.

Once you have set the angle, go back to the drawing screen by pressing **ENTER** or **G**. Now, place the cursor at the center of the circle, of which the arc that you want to draw is a part of. Press **A** to enter the arc drawing mode (or press <7> and make appropriate selection). Next, place the cursor at the beginning of where you would like the arc to begin, press the button and the arc will be drawn.



If you have rubber banding turned on (<9>), a second cursor will appear on the drawing screen. This is to indicate the center of the circle of which the arc that you want to draw is a part of. It will remain on the drawing screen until you turn off rubber banding or choose another drawing mode.

If the arc that was drawn terminates on the drawing screen, the cursor will be placed at the terminal end of the arc to facilitate pie wedge drawing. Otherwise it will be placed at the beginning coordinate. Arcs will be drawn in the current pen color, and the arc drawing mode will remain in effect until you set a new drawing mode.

5.3 Drawing Ellipses

Some of your drawing applications will require objects other than the normal circles, lines, dots, etc. Draw ON will also automatically draw **ellipses**, which are sort of squashed circles. Since they are similar to circles, drawing an ellipse is very much like drawing a circle.

To draw an ellipse, return to the drawing screen by pressing **ENTER** or **G**. Move the cursor to the center of where you would like the ellipse to be drawn and press **E** to enter the ellipse drawing mode (or press <7> and make the appropriate selection). When **E** is pressed, Draw ON will remember this point as the center of the ellipse. Now, move the cursor a short distance away from the center and press the button. The ellipse will be drawn in the current pen color.



If you have rubber banding turned on (<9>), a second cursor will appear on the drawing screen. This is to indicate the center of the ellipse that you are drawing. It will remain on the drawing screen until you turn off rubber banding or choose another drawing mode. The ellipse drawing mode will remain in effect until you set a new drawing mode.

When you move the cursor away from the center of the ellipse and press the button, the ellipse will be drawn such that the new cursor position will mark where the long axis of the ellipse intersects the ellipse circumference. Simply put, it tells Draw ON in what orientation to draw the ellipse.

The ellipse is drawn with respect to the *eccentricity factor*. This controls how elongated or stubby the ellipse will be drawn. An eccentricity factor of 1 will draw a circle, while a factor of 0 will draw the line corresponding to the long axis of the ellipse. Factors between 0 and 1 will draw ellipses of various elongations. When Draw ON is first started, the eccentricity factor is set to **.50**. When an ellipse is drawn with this factor, it will be about twice as long on one axis than on the other.

To change the eccentricity factor, press <0> to go to the **Options Menu** and move the highlight over the **Program Config Menu**. Next, use the mouse to move the highlight bar over the **Set ellipse eccentricity** option and press the button to select it. Set the eccentricity factor using the mouse, joystick or right and left arrow keys. When you have the number you want, press the button once again to set the new factor. If you now return to your drawing screen and draw some new ellipses, they will be drawn with the new eccentricity factor.

5.4 Drawing Elliptical Arcs

Just as a normal arc is a portion of a circle, Draw ON allows you to draw **elliptical arcs**, which are portions of an ellipse. The procedure for drawing elliptical arcs is very similar to drawing normal arcs. You will first have to specify just how much of the ellipse (in degrees) that you would like. Just as with normal arcs, you can have Draw ON draw the arc clockwise or counterclockwise by how you set the degree of arc (positive or negative).

To draw an elliptical arc, first set the arc angle and direction as shown in **Section 5.2** which tells how to draw arcs. Once you have set the arc angle, go back to the drawing screen by pressing **ENTER** or **G**. Now, place the cursor at the center of the ellipse of which the arc that you want to draw is part of. Press **H** to select the elliptical arc drawing mode (or press <7> and make the appropriate selection). Next, place the cursor at the point where the long axis of the ellipse intersects the circumference of the ellipse. Press the button and the arc will be drawn in the current pen color.



If you have rubber banding turned on (<9>), a second cursor will appear on the drawing screen. This is to indicate the center of the ellipse of which the arc that you want to draw is a part of. It will remain on the drawing screen until you turn off rubber banding or choose another drawing mode. The elliptical arc drawing mode will remain in effect until you set a new drawing mode.

5.5 Drawing Polygons (Triangles, Hexagons, Etc.)

One of the objects that Draw ON can draw with is a **polygon**. If you check your old geometry books again, a polygon is an object with three or more straight sides. Draw ON allows you to draw polygons with any number of sides. Thus, triangles, hexagons, pentagons and other multi-sided objects are some more of the tools that Draw ON has to offer.

You can select one of the standard polygons from the **Draw Mode Menu** (press <7>). Use the mouse to move the highlight to the right side of the screen, the polygon selection menu. Now move the highlight bar over the polygon you would like to draw with. Once you have the highlight over your selection, notice the arrow pointing to it. If you now push the mouse (or joystick, or left arrow key) to the left, the highlight will jump back to the drawing mode menu. Next, move the highlight over the **Set polygon origin** menu item and press the button.

Draw ON will now return you to your drawing screen and will have set the center of the polygon to the current cursor position. If you now move the cursor to the outside edge of the polygon you want to draw and press the button, the polygon will be drawn in the current pen color. To select a new center for drawing polygons, you don't have to return to the **Draw Mode Menu**, just move the cursor to the new center position and press Y.



If you have rubber banding turned on (<9>), a second cursor will appear on the drawing screen. This is to indicate the center of the polygon you are drawing. It will remain on the drawing screen until you turn off rubber banding or choose another drawing mode. The polygon drawing mode will remain in effect until you set a new drawing mode.

Polygons are drawn with respect to the ellipse eccentricity factor. You can adjust the elongation of your polygons by changing the ellipse eccentricity factor. If you would like your polygons to be symmetrical, that is to say, one side is as long as the other, set the eccentricity factor to 1.0. If your polygons looks strange, check this factor and make sure it is set to 1.0.

The selection of polygons that you can draw is not limited to those on the **Draw Mode Menu**. You may manually set the type of polygon that you want to draw with. The next paragraph will explain just how the polygons are drawn. It is not the easiest reading, but it will show you how they are drawn and how you can make Draw ON create any polygon.

Polygons are drawn by rotating a point by arc increments as many times as will fit in 360 degrees. To draw a **triangle**, Draw ON sets the polygon arc increment to *120 degrees*. Since 120 goes into 360 three times, the object that is drawn will have three sides. A **hexagon** sets the arc increment to *60 degrees*, thus six sides. A **diamond** sets the factor to *90 degrees*. The smaller the arc increment, the greater the number of sides in your polygon. Values which do not divide evenly into 360 degrees will produce incomplete figures.

To draw a new polygon, you have to set the polygon arc increment. You can do this by pressing <0> to go to the **Options Menu** and then moving the highlight to the **Shape Utilities Menu**. Next, use the mouse to move the highlight bar over the **Set polygon arc increment** menu item and press the button to select it. Now you can change the arc increment to whatever you like. The current **arc increment** value will be shown highlighted in the *Scale box* at the top of the screen. Once you have the correct value, press the button to set it, and the highlight will disappear. If you now return to your drawing screen, you will be able to draw polygons with your new arc increment value.

In **Section 5.1**, while showing how to draw circles, we mentioned that there was a way to get more accurate circles. These very accurate circles can be created with the polygon feature of Draw ON. This procedure is explained below.

If you remember just a paragraph or so ago, we mentioned that the smaller the arc increment, the greater the number of sides in the polygon. A normal circle is just a simple polygon drawn with an arc increment set to **4**. If you reduce the arc increment further, a more accurate circle will be drawn. By setting the arc increment to **1** and drawing a polygon, Draw ON will create the most accurate circle it can draw.

5.6 Spirograph

One of the interesting side effects of polygons is the **spirograph** drawing mode. Describing spirographs is just about impossible, but they can be very beautiful. They resemble *String Art* which looks quite a bit like the drawings that can be created with the spirograph toy. The best way to learn about this drawing tool is by playing with it.

To draw spirograph figures, place the cursor in the center of the spirograph which you want to draw and press **S** (or press <7> and make the appropriate selection). Next, move the cursor out a short way from the center and press the button. Your spirograph will be drawn in the current pen color.



If you have rubber banding turned on (<9>), a second cursor will appear on the drawing screen. This is to indicate the center of the spirograph you are drawing. It will remain on the drawing screen until you turn off rubber banding or choose another drawing mode. The spirograph drawing mode will remain in effect until you set a new drawing mode.

The factors which will change the spirograph you are drawing are: *eccentricity*, *polygon arc increment*, *degrees of arc*, and the *X and Y scale factors*. To draw any spirograph you must set the degrees of arc. Start off with 360 degrees and decrease from there. Set the polygon arc increment to a low number (try 3 to begin). Experiment, see what happens when you set the X and Y scale factors greater and less than 1.0. The number of different spirographs is infinite, so you have to try out various numbers and see the results.

5.7 Drawing Rays

To draw **rays** emanating from a central point, move the cursor to the point on your drawing screen where you would like the rays to come from. Press **R** to select the ray drawing mode (or press <7> and make the appropriate selection). Now, you may draw rays to any other point by moving the cursor there and pressing the button. Rays are just lines drawn from one fixed point to wherever the cursor is when the button is pressed.



If you have rubber banding turned on (<9>), a second cursor will appear on the drawing screen. This is to indicate the source of the rays. It will remain on the drawing screen until you turn off rubber banding or choose another drawing mode. The ray drawing mode will remain in effect until you set a new drawing mode.

The rays will be drawn in the current pen color, so try changing the color and see the effects. Try holding your finger down on the button and move the mouse in circles. Watch the various color effects you can achieve with this drawing mode.

5.8 Drawing Boxes

In addition to circles, lines, dots, etc. Draw ON can draw **boxes**. Two types of boxes are available. You can draw regular boxes, or ones with rounded corners. To draw either type of box, open the cursor so that the four corners of the open cursor correspond to the corners of the box that you would like to draw. Move the open cursor around on the screen to the place you would like the box to be drawn. Press **B** to draw a regular box, or press **X** to draw the clipped corner box (rounded corners).

The box drawing mode remains in effect until you close the cursor. The boxes are drawn in the pen color. If you change the pen color, you can change the color of the boxes you draw.

5.9 Flood Filling




To fill in an object or part of a drawing, Draw ON has something called **flood filling**. This allows you to fill any object on your drawing screen with the current fill color. To do this, place the cursor anywhere inside the object to be filled. When the cursor is inside the object press **SHIFT TILDE**. On an Apple ///, this key is located just above the **RETURN** key. On an Apple /// plus, this key is just to the right of the **ALPHA LOCK** key. Your object will now begin to fill with the pen color.

If you are filling an outlined region, make sure the borders are solid, or else the flood fill will *leak* out into the rest of your drawing. You may stop the flood fill at any time (such as when a leak occurs), by pressing any key *except* **SHIFT TILDE**. At times, flood filling will occasionally miss a few areas of a very complicated object. When this occurs, simply place the cursor at a point within the areas that weren't filled and continue filling.

If you attempt to flood fill a region which is already the flood fill color, there will be no effect except in black and white modes 0 and 2. In the black and white modes (0 and 2), the fill color is automatically selected by the program. If the point on the screen where you place the cursor is black, the object is filled with white. If the point is white, the object is filled with black.



When flood filling in the limited color mode 1, Draw ON will miss certain areas of the fill. This is due to the fact that changing a single pixel may also change up to six other pixels in the seven pixel screen segments of that graphics display mode. The pixels in some regions can be masked off from being filled by the fact that more than one pixel color changes. If this occurs, simply place the cursor at a new point within the area that wasn't filled and continue filling.

Since this is a very powerful and useful feature, let's go through the filling of an object to test it out. Go to your drawing screen and make sure that you are in color display mode 3 by pressing **3** on the main keyboard. So that you have a clean drawing screen to work with, press   **E** to erase the screen. You will now set the pen color to white and return to the drawing screen. Open the cursor by pressing  **C** and moving the mouse down and to the right. Press the button once to lock the cursor open. Now press **B** to draw a box.

Next, move the open cursor to a new point on the drawing screen and draw another box by pressing **B** again. Do this a few more times so that you have a number of boxes on the drawing screen. For a little variety, move the cursor to an empty area on the drawing screen and draw a few circles. Draw a few circles within circles by just moving the cursor out from the center and pressing the button.

We now have a number of objects on the drawing screen that are perfect for filling. If you return to the **color palette** and select a new pen color, you will now be able to fill in these objects with that color. After returning to your drawing screen, move the cursor inside one of the boxes and press **SHIFT TILDE**. Almost immediately your box will be filled with the color you selected. Go back to the **color palette** and select a new color. Go back to your drawing screen and fill in another box with the new color.



You should now see that flood filling floods an enclosed area with a particular color. If you have already filled an object with one color but decide that it might look better filled with a different color, just re-fill it. Choose your new pen color, move the cursor inside the object you want to re-fill and press **SHIFT TILDE**. The object will be filled again, this time with the new color. Thus, it doesn't matter what color the object is already filled with, Draw ON can fill it again.



If you try filling the circles inside the circles with different colors, you will notice two things. First, when you flood fill an object it can have any number of twists and turns. Draw ON just starts at one end and works around until it is finished. Secondly, the original white circles that you drew are not changed when the object is filled. This is because the lines are the edges of the object and stop Draw ON from filling everything. If you want those white circles to blend into the colors on the screen, redraw the circles with the appropriate colors. Another way to do this is by first flood filling with the color white, and then filling with the color you want to change it to.

5.10 Flood Texturing

Texturing is very similar to flood filling in that an object will be filled. However, instead of filling the object with just a color, Draw ON can fill the object with a texture. There are 24 standard texture patterns that you can choose from and Draw ON allows you to change these patterns as you like. Information on changing the patterns to suit your taste can be found in the next section of this chapter (**5.11 - Changing The Textures**). The rest of this section will show just how to flood texture an object.

If you press <6>, Draw ON will display the **Texture/Pattern Table**. Note all of the different patterns and colors on this screen. Practice moving the cursor around the **Texture/Pattern Table**. To select a texture, simply move the cursor over the texture you want and press the button. In the lower left corner of this screen, an example of what that pattern looks like will be displayed. If you return to your drawing screen and flood texture an object, this is the pattern that will fill that object.

If you return to your drawing screen, we will create some objects to fill, just as in the last section. Make sure that you are on the full color drawing screen by pressing **3** on the main keyboard. Let's start off with an empty screen, so press   **E** to erase the drawing screen you are looking at. If you will now draw some boxes and circles as you did in the last section, we can begin.

Go back to the **Texture/Pattern Table** by pressing <6> and select a texture pattern that you would like to fill your objects with. Once you have selected the pattern, press **ENTER** or **G** to return to your drawing screen. If you now move the cursor inside one of the boxes and press  **T** (for texture), Draw ON will fill the box with the pattern you have selected. If you change the pattern by returning to the **Texture/Pattern Table**, the next object you texture ( **T**) will be textured with the latest pattern that you have selected.

Once you have flood textured an object, you will not be able to change to a different texture as you could change to a different fill color (described in the last section). When you texture the object, that's it. If you want to test out how different flood texture patterns look, pick up the object you want to flood texture and move it to an unused part of the drawing screen (or another drawing screen). Test out the different textures on that copy of your object. When you have a texture that you like, simply return to your original object and flood texture it.





Flood texturing uses the preserve buffer as a *scratch-pad* when it fills the object with the texture. Thus, whatever was in the preserve buffer (the last thing you picked up) will be lost following a flood texture. If you have picked up an object and want to texture some area of the screen, make a copy of the object on an unused portion of your drawing screen before texturing. When you are finished, pick the object up again.


When you flood texture an object, the border of the object will not be changed. If you want the entire object textured, first do a flood fill of the object with the color of the border and then texture the object. This will include the border in the next texture fill.

5.11 Changing The Textures

Draw ON allows you to change the texture patterns that you can fill objects with. This section will tell you how to do this. For the example below you will need your **Draw ON /// Sample Pictures, Fonts, and Textures Disk**. Follow along and you will see just how easy it is to change your textures.

To change the texture patterns, you will load in a texture template from disk. This template is a standard fotofile and contains the instructions for changing your texture patterns. It is on the *Sample Pictures disk* with the name **TEMPLATE.TXTR**. After loading it in, return to your drawing screen and observe the template. If you press  **P**, Draw on will put the texture patterns onto the template. Note the sample texture displayed on the drawing screen. Inside each of the 24 boxes is one of the textures that you can change. The sample shows you how to do it.

You change a texture pattern by going into the zoom mode (press <-> or **Z**) and change the pattern within the cell on a dot by dot basis. When you texture fill an object with a certain pattern, the pattern (an 8 dot by 8 dot pattern) is repeated throughout the filling. After you change the pattern, you must tell Draw ON that you would like to use this new pattern. You do this by pressing  **I** to install the new patterns. After doing this, press <6> and observe how the patterns look.

In addition to changing the patterns of the texture table, Draw ON allows you to modify the colors of the patterns. If the color combination of the texture is not what you want, you can change it to any of the 16 colors. Simply go to the **color palette** and choose the two colors that you would like the pattern to be by selecting a new pen and fill color. Go back to the texture table by pressing <6> and move the cursor over the pattern whose colors you would like to change. Press  **M** to modify the pattern color.

The new patterns can now be used in all of your flood texturing operations. They will remain until you either change them or turn your computer off. If you would like to save the new patterns so you could use them again, you can save them on a disk and later load them back into the program. Once you have created a new texture pattern, follow the instructions below to save it on disk and load it back into Draw ON.


To save a texture pattern as a disk file, press <0> to go to the **Options Menu** and move the highlight to the **File Options Menu**. Next use the mouse to move the highlight bar over the **Save color/texture file** menu item and press the button. Draw ON will then ask you for a filename to save the texture with. Give it a name and press **RETURN**. Draw ON will save the textures onto disk. If you would like to later load them back in, use the option **Load color/texture file**.



The standard texture patterns are located in the subdirectory **DRW3.DIR** with the name **DRW3TXRTS**. When the program first starts up, these textures are loaded in. If you create a set of textures that you would like to use immediately after starting Draw ON, save the new textures with the standard texture file name. Draw ON will then load in your new textures each time it starts up.

5.12 Image Texturing


In addition to flood texturing of objects, Draw ON allows you to texture an entire region (or image) on the drawing screen. Combined with flood texturing, **Image Texturing** allows you to mix textures and texture several objects at the same time. This section will show you how to accomplish this.

To Image Texture a region on the drawing screen, go to the texture table and select the texture pattern you would like to texture your region with. Now return to your drawing screen and open the cursor to surround the region you want to texture. Press  T and the region will be textured with the selected pattern.

In image texturing, anything within the open cursor that is the same color as the pen color will be replaced by the texture. Thus, if you want to texture an entire black region on the drawing screen you must first set the pen color to black. If the region or objects that you want to texture are white, the pen color must be set to white.



Some irregular shapes, when intermixed with other shapes of the same color will be difficult to image texture. This is because some of the objects may overlap the object that you want to image texture within the open cursor. For these situations, use flood texturing.

Texturing of objects and regions on the color display mode 3, is very similar to black and white texturing. First, select the texture from the texture table and then set the pen color to the color of the region which you want to texture. When you press  T to texture the region, everything of the pen color will be textured with the selected pattern.






When you press  T to image texture a region on the drawing screen, the preserve buffer is used as a *scratch-pad* when it fills the region. Thus, whatever was in the preserve buffer (the last thing you picked up) will be lost following an image texture. If you have picked up an object and want to image texture a region on your drawing screen, make a copy of the object on an unused portion of your drawing screen before image texturing. When you are finished, pick up the object again.

Image texturing does not work in the limited color, high resolution graphics display mode 1. For these drawings you must use flood texturing. To protect objects on your drawing screen from being textured, use the C.O.T. to protect the color of the object. You can then image texture the region surrounding the object without changing that object.

5.13 Inverting The Screen


When you open the cursor you are telling Draw ON that you want to operate on a region of the drawing screen at a time. One of the things that you can do when the cursor is opened is invert the image within the open cursor. Inverting is primarily useful in the black and white display modes although it may be used in the color modes as well.

To invert an image on your drawing screen, first open the cursor to surround the image. Next press  **N** and watch as the image is inverted. If you press  **N** again, the image will be restored.



Inverting in the color graphics display modes performs a logical *XOR* between the pixel on the drawing screen and the fill color (in color modes). It can yield interesting but probably not very useful results. Try inverting a multi-colored drawing in display mode 3 with various fill colors.








5.14 Swapping Screens

Draw ON allows you to work on up to three different drawing screens. As you know, you can change from one drawing screen to another by pressing <1>, <2>, or <3>. Simply put, the swapping screens feature of Draw ON enables you to quickly swap the contents of two of the drawing screens. If you press  **S**, the contents of two drawing screens will be swapped.

The usefulness of screen swapping requires that you are familiar with graphics display mode 0 and the memory structure of Draw ON ///. When the drawing screens are swapped, the contents of the two 16K graphics buffers are exchanged. If drawing screen 1 is in buffer 1, then drawing screen 1 will be swapped with drawing screen 2. If drawing screen 3 is in buffer 1, then screen 3 will be swapped with screen 2. This is useful since the bit images of modes 0 and 1 only overlap in the memory associated with buffer 1. Swapping in mode 0 provides access to the memory of buffer 2 in mode 0. This allows up to six mode 0 drawing screens on line at one time. This can be very useful for large drawings that are to be concatenated.









5.15 Using The Grid





One of the tools that Draw ON provides to speed you in your drawings is the **Grid**. The grid is a pattern of dots on the drawing screen that can help you align your drawings along certain boundaries. You can use the grid just as you use graph paper to help you draw straight lines and similarly sized objects. The grid can be turned on or off at any time. Using the grid will not change anything on your drawing screen as it is non-destructive and non-printing.





To turn the grid on press <8>. Pressing <8> acts as a toggle in turning the grid on and off. Once it appears on your drawing screen, you can turn it off by pressing <8>. You can also adjust the horizontal and vertical spacing of the grid. If the size of the grid is not to your liking, hold down the **SHIFT** and  keys while pressing the arrow keys to move the grid. If you press **SHIFT**  , the grid will come closer together horizontally. If you press **SHIFT**   the grid will close down vertically. Likewise, the  and  will expand the size of the grid.





5.16 Scrolling Between Drawing Screens

The drawing screen that Draw ON uses is just a window into a much larger drawing area. Draw ON allows you to scroll to different parts of the drawing area at will. For large drawings, you can concatenate two different drawing screens either one above the other (vertically), or side-by-side (horizontally). Scrolling is intended to help you align your drawings that must be broken up into more than one drawing screen. They can then be concatenated during or after printing.

To scroll the drawing screen left press  . Pressing   will scroll the drawing screen to the right. Scrolling left or right will move the drawing that you are working on seven pixels (in the appropriate direction) in graphics display mode 0, 1, and 3, while it will move you 14 pixels in mode 2. To scroll up, press  . If you press   your drawing will be moved down. Scrolling up or down will move your drawing 16 pixels at a time.

You can also change the rate at which Draw ON scrolls the drawing screen. Pressing **OA** and the arrow key combination will always scroll the screen in the above mentioned units. To choose a different rate of scrolling, press **CONTROL**  or **CONTROL** . The screen will now scroll up or down at a user defined rate. The initial rate is 1, thus, the screen will scroll one line at a time. You can change this rate to either 1, 2, 4, 8, 16, and 32 lines at a time. If you want to change the rate, press **<5>** to go to the **Cursor Status screen**. Now press   **S** and notice the box on the top of the screen that was labeled **Scale** will change to **Scroll**. Use the mouse, joystick, or up and down arrow keys to vary the Y indicator. This is the up and down scrolling rate.

There is one more scrolling factor that you can change. You can control which part of the drawing screen is to be scrolled horizontally. This is useful in split screen cut and paste applications, animation simulation, etc. You can adjust the number of lines which scroll horizontally from 192 (the entire screen) to 1 (just the bottom line). It is normally 192 for a full screen scroll but you can change it. To do so, go back to the cursor status screen by pressing **<5>**. Now press   **S** and the *Scale box* will again change to the scroll box. You can now use the mouse, joystick or right and left arrow keys to vary the X indicator. This is the number of horizontal lines which will scroll horizontally when the **CONTROL** , or **CONTROL**  keys are pressed.

As an example, load in the *Draw ON /// Logo* screen and go to that drawing screen. If you just started Draw ON you can press **<1>** to go there, otherwise you will have to load that fotofile in. If you now press **<5>** and then   **S** to adjust the scrolling, use the left arrow key to adjust the X indicator from 192 down to 32. Press **ENTER** twice to set the new scrolling value and return to the drawing screen. Now, hold down the **CONTROL** key and press either  or . Watch as just the instruction box is scrolled off the screen. This happens because the instruction box takes up lines 0 to 31 on the drawing screen, thus, 32 lines were scrolled.

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6

Using Shape Records

This chapter will show you how to use the shape record feature of DRAW ON. With shapes you can very quickly draw an object to any size or rotation.

6.1 Why Use Shape Records?

Shape Records enable you to draw a moderately complicated object from *lines, circles, arcs, ellipses, elliptical arcs, rays, flood fills*, and *direct text* in any color. It is a bit more trouble to draw an object as a shape record, but there is a big tradeoff. After drawing an object as a shape, you may then scale the size of the shape or rotate the object with much greater ease, speed and precision.


You can use shape records to initially describe an object, such as an electrical component. Rotate it into all of the orientations you are likely to need, and then create and save a library screen of that and other electrical components. From then on, use the **preserve/preview/restore** techniques described in **Chapter 4** to put the object on your drawing screen.


In addition, when you draw an object from a shape record, it can exceed the screen boundaries (solid object restorations can not). Thus, objects drawn with shape records can be clipped as they reach the edge of a drawing screen. Shape records also require only four blocks of disk space, so objects may be stored more efficiently as shape records than as fotofiles.



Shape records do not support any open cursor functions such as *texturing, brushing*, or *boxes* (boxes may be produced using individual lines). Shape records also do not record the settings of the *color operator table* (C.O.T.). You must reset these manually if necessary.


6.2 Building The Shape

You can build a new shape record by pressing  **O**. This sets the shape coordinate origin (the center of the object) to the current position of the cursor. It will also reset the shape segment counter for the first shape segment. Each time you draw a line, circle or use another tool of Draw ON to create your object, one shape segment will be used.

After pressing  **O** to set the center of the object (used as the center for rotations and scalings), move the cursor to wherever the first part of the shape is to start. When you have the cursor in position, press the applicable key (or use the drawing mode menu) to select what you want to draw. Draw your shape using *lines*, *dots*, *circles*, *polygons*, *arcs*, *ellipses*, *elliptical arcs*, *rays*, *flood fills*, or *direct text* of any color.

Each time you press a drawing mode key, a text character, or the button (same as **TAB** or **RETURN**), Draw ON fills one segment of the shape record buffer. For information on the storage format of shape records, please see **Appendix G**. This buffer can hold up to approximately 150 different segments, thus, you can create fairly complex objects using the shape recording feature of Draw ON.


As you are drawing your shape, you can check on the number of segments that the shape is using by pressing <0> to go to the **Options Menu**. Once there, look at the top right portion of the screen. Look for the item labeled **Seg.** and the number just to the right. This is the number of segments in the shape record. When you start Draw ON this is set to zero, indicating that there is no shape record. As you add segments to your shape record, this number will increment.

When you have finished drawing your shape, press  **N** to turn shape recording off. Your shape record will now be stored and you can redraw your shape or even save it to disk so that you can use it later. These features will be shown in the remaining sections of this chapter.



Since there are times when it may be difficult to draw only a single point or line (using the button, **TAB** or **RETURN**), when shape recording is on the button (and **TAB** or **RETURN**) is set so that it can only be pressed once in a specific area on the drawing screen. This is to prevent the normal auto repeat feature from adding unwanted segments to your shape. When you turn off shape recording, the auto repeat feature returns to normal.

6.3 Using The Shape

You may redraw your shape on any drawing screen by pressing  **S**. The shape will be redrawn with respect to the current settings of the X and Y scales, the rotation angle, and the circle aspect ratio. Other factors such as the ellipse eccentricity are also taken into account when redrawing your shape.

The shape will be rebuilt around the current cursor position, in the same relationship as when you created the shape. The position of text characters put on the drawing screen will be rotated correctly, but the characters themselves will be printed in normal format. The shape will be rebuilt in accordance with the current **color operator table** (C.O.T.) settings, so you may want to reset the C.O.T. before redrawing your shape.






You may stop a shape record from being redrawn at any time by pressing any key. This is particularly useful when redrawing a large shape record and you quickly see that the shape is not in the correct position. Just press any key and the shape will stop redrawing itself.

6.4 Loading And Saving A Shape

Once you have created a shape, you can save it on disk for later use. By doing this you can create libraries of useful shapes, and store them on disk as shape records. When you later need them, you can load them back from disk and use them on your current drawing. This section will explain how to load and save shape records to and from disks.

To save a shape that you have created, go to the **Options Menu** by pressing <0>. When there, move the highlight to the **Shape Utilities Menu**. Now, use the mouse to move the highlight bar over the **Save shape record file** menu item and press the button. Draw ON will now ask you for the name of the file to store the shape in. For an example, type in **MYSHAPE**, press **RETURN** and the shape will be stored on disk with the name **MYSHAPE**.

To load in a shape that has been previously stored on disk, go to the **Options Menu** by pressing <0>. Next, move the highlight back to the **Shape Utilities Menu**. If you now move the highlight bar over the **Load shape record file** menu item, Draw ON will ask you for the filename of a shape already on disk. If you type in **MYSHAPE** and press **RETURN**, Draw ON will load the shape that you saved on disk back in so that you can use it. Now type **ENTER** or **G** to return to the drawing screen and press  **S** to redraw your shape.



There is a sample shape record that comes with Draw ON. It is on your **Draw ON /// Sample Pictures, Fonts, and Textures Disk** (*front side*). Load in the shape record with the name **SHAPEDEMO**. Return to your drawing screen (**ENTER** or **G**) and erase it by pressing  **E**. Now switch to graphics display mode 3 by pressing **3**. If you now move the cursor to the center of the drawing screen and press  **S** to redraw the shape, Draw ON will go through a short demonstration of some of the many things shape records can do.

6.5 Modifying Shapes


Draw ON allows you to remove a segment (or several segments) from a shape record. This gives you a rudimentary editing capability of your shapes. You may also add segments to an existing shape record using the techniques presented in the rest of this section.


To remove a segment of a shape record, first create a shape as illustrated in **Section 6.2**. Now press <0> to go to the **Options Menu** and move the highlight to the **Shape Utilities Menu**. Now select the **Set next shape segment** menu item by moving the highlight bar over it and pressing the button. You can now use the mouse, joystick or arrow keys to remove the last segment from your shape. As you remove a segment the shape, the **Seg.** counter in the upper right hand part of the drawing screen will be reduced by one.


To test out removing segments from a shape record, create your shape and then practice clipping off the end of a shape using the method presented above. Now, redraw your shape and notice how the last segment of the shape is no longer drawn. Thus, each time you reduce the segment counter by one, the last segment of the shape will be erased.


To add one shape to another, you can turn shape recording back on at any time by pressing  **Y**. Once it is turned back on, you can concatenate shapes to your existing shape record or simply continue adding segments to your shape. When finished adding segments to your shape, press  **N** to turn off shape recording.

6.6 Rotating And Scaling A Shape

Draw ON allows you to very quickly scale a shape in size and/or rotate that shape. This occurs much faster than the solid object scalings or rotations. To scale the size of an object up or down, set the **X and Y scale factors** on the **Shape Utilities Menu**. When you press  **S**, the shape will be redrawn with respect to the new scaling factors. Likewise, if you set the rotation angle on that same menu, your shape will be redrawn at the chosen angle.

To test out these powerful features, we are going to step through creating a shape and then rotating and scaling it. To start, return to your drawing screen (if you're not already there) by pressing **ENTER**. Now choose graphics display mode 3 by pressing **3**, erase your drawing screen and move the cursor to the center of the screen. Turn shape recording on by pressing  **O**. Now, go to the **color palette** by pressing **SPACE BAR** or **<.>**. Select a white pen color by moving the cursor over the color white and pressing the button. Return to your drawing screen by pressing **ENTER** and you are ready to draw your shape.

Move the cursor a bit to the left and up of the center point. Press **L** to start drawing lines and draw a box around the center. Move the cursor inside the box and press **<.>** to go back to the **color palette**. Move the cursor to the color brown (number 8) and press the button. Return to your drawing screen and press **SHIFT TILDE** to flood fill the box. Now move the cursor to the center of the box and press **C** to set the center for drawing circles. Move the cursor outside the box and press **<.>** to change the color again. Choose the color violet (number 3) and return to your drawing screen. Press the button to draw a circle, return to the **color palette** and select light blue (number 7) and flood fill the circle. Once finished, press  **N** to turn off shape recording.

Your shape is now stored and you can redraw it by moving the cursor to the center of where the shape is to be redrawn and pressing  **S**. Erase your drawing screen and do this now. In a few moments your shape will be redrawn. Now that you have seen that your shape will appear just as you created it, let's practice scaling and rotating the shape.

Press <0> to go to the **Options Menu** and change both the **X and Y scale factors** on the **Shape Utilities Menu** to **2.0**. If you redraw your object it will be twice the normal size. Go back to the **Shape Utilities Menu** and set the **rotation and arc angle** to **45 degrees**. When you redraw the object it will be tilted at a 45 degree angle.

In addition to setting the X and Y scale factors and the rotation angle to change the way your shape is redrawn, there are other factors which will change the shape. If your shape record draws a circle or ellipse, the factors that control the drawing of those objects can change the way the shape is redrawn. If you set the *circle aspect ratio* or the *ellipse eccentricity*, those objects will be appropriately changed as they are redrawn.

Since shapes can be redrawn in a variety of sizes and rotations, practice redrawing shapes with different factors. See how a shape is redrawn with the various factors and you will begin to see the real power behind using shape records.

The following table lists the various drawing tools available in the Draw ON software. Each tool is described in detail, including its function and how to use it. The tools are organized into categories: Basic Drawing Tools, Advanced Drawing Tools, and Editing Tools.

Basic Drawing Tools

- Line Tool:** Used to draw straight lines. Click and drag to create a line. Hold the Shift key for a horizontal or vertical line.
- Rectangle Tool:** Used to draw rectangles. Click and drag to create a rectangle. Hold the Shift key for a square.
- Circle Tool:** Used to draw circles. Click and drag to create a circle. Hold the Shift key for a perfect circle.
- Text Tool:** Used to add text to the drawing. Click to place the text cursor, then type the text.
- Eraser Tool:** Used to remove parts of the drawing. Click and drag over the area to be erased.
- Fill Tool:** Used to fill a shape with a color. Click on the shape to apply the fill color.
- Stroke Tool:** Used to draw lines with different stroke widths and colors. Click and drag to create a stroke.
- Image Tool:** Used to insert images into the drawing. Click to place the image cursor, then select the image to insert.

Advanced Drawing Tools

- Bezier Tool:** Used to draw smooth, curved lines. Click to place the start point, then click and drag to create the curve.
- Freehand Tool:** Used to draw freehand shapes. Click and drag to create a freehand shape.
- Grouping Tool:** Used to group multiple objects together. Select the objects, then click the Grouping Tool.
- Align Tool:** Used to align objects to the left, center, right, top, middle, or bottom.
- Distribute Tool:** Used to distribute objects evenly across the page.
- Zoom Tool:** Used to zoom in and out of the drawing. Click and drag to zoom in, or click and drag to zoom out.
- Undo Tool:** Used to undo the last action performed.
- Redo Tool:** Used to redo the last action performed.

Editing Tools

- Move Tool:** Used to move objects around the drawing. Click and drag the object to the new location.
- Resize Tool:** Used to resize objects. Click and drag the handles to resize the object.
- Rotate Tool:** Used to rotate objects. Click and drag the rotation handle to rotate the object.
- Copy Tool:** Used to copy objects. Select the objects, then click the Copy Tool.
- Paste Tool:** Used to paste copied objects. Click the Paste Tool.
- Delete Tool:** Used to delete objects. Select the objects, then click the Delete Tool.

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7

Changing Draw ON Options



Draw ON has a number of options which you can change. This chapter tells you about these options and how to set them to suit your taste.

7.1 Turn Clicking ON Or OFF

Each time you press the button, move the highlight bar when on a menu, or choose a drawing mode, Draw ON will make a small click to indicate that the cursor has moved or the button has been pressed. After a while this can be annoying so there is an option to turn the clicking *off*. This section will tell you how to do this and how to turn clicking back *on*.

If you would like Draw ON to stop clicking after every move, press <0> to go to the **Options Menu**. Move the highlight to the **Program Config. Menu** and then use the mouse to highlight the **Click mode on/off** menu item. Once you have the highlight bar over this item, pressing the button will toggle on and off the clicking. If you look in the upper left hand corner of the screen, the **speaker symbol** will appear and disappear each time you press the button. When the *speaker icon* is displayed, Draw ON will make the clicking noise, when it is not there, there will be no noise.

7.2 Switching Between Mouse And Joystick

Draw ON allows you to operate the program from either a mouse, joystick or the arrow keys. At any time you can use either the mouse and arrow keys, or the joystick and the arrow keys. To switch between the mouse and joystick, simply press   **M**. If you were using the mouse, Draw ON would switch to the joystick. If you were using the joystick, Draw ON would switch to the mouse.



If you do not have a mouse installed in your Apple /// and configured into your **SOS.DRIVER** file on the **Draw ON /// Start-up Disk**, you will only be able to use the joystick. If you do not have a joystick or mouse installed, Draw ON will only allow you to use the arrow keys to control the program.

7.3 Setting The Mouse Or Joystick Response

As you use the mouse or joystick to move the cursor around the drawing screen, you will have to move the mouse or joystick a certain distance to move the cursor a certain distance on the drawing screen. Draw ON allows you to adjust the responsiveness of the mouse and joystick to suit your taste. This section will show you how to adjust the mouse or joystick.

If you are using a mouse with Draw ON /// use the following procedure for adjusting the mouse responsiveness. Press <0> to go to the **Options Menu** and move the highlight over the **Program Config. Menu**. Now, use the mouse to highlight the **Set joystick response** menu item. Press the button to select it and look at the left part of the *Cursor box* at the top part of the screen. The item labeled **Ms** will now be highlighted and it will normally contain a **3**. Use the mouse or the left and right arrow keys to adjust this value. The higher the number, the slower the cursor will move in response to the mouse. The lower the number, the faster the cursor will move across the drawing screen in response to the mouse.





If you are using a joystick with Draw ON /// use the following procedure for adjusting the joystick responsiveness. Press <0> to go to the **Options Menu** and move the highlight over the **Program Config. Menu**. Now, use the joystick to highlight the **Set joystick response** menu item. Press the button to select it and look at the left part of the *Cursor box* at the top part of the screen. The item labeled **Js** will now be highlighted and it will normally contain a **10**. Use the joystick or the left and right arrow keys to adjust this value. The higher the number, the slower the cursor will move in response to the joystick. The lower the number, the faster the cursor will move across the drawing screen in response to the joystick.

7.4 Reversing The Joystick Sense

For some strange reason, the various manufacturers of joysticks for the Apple /// seem to be backwards. By backwards I mean that when you move the joystick to the right, the Draw ON cursor will move to the left.

Likewise, there are some that when you move the joystick up, the Draw ON cursor will move down. There is no apparent pattern to this problem as some joysticks by the same manufacturer act in different directions. It looks as if they are simply hooking up the wiring the wrong way on some of their joysticks.

To get over this small problem, Draw ON allows you to reverse the sense of the joystick. Again, some of the joysticks we have tested are backwards only on one axis (direction) in relation to the other axis. Because of this, Draw ON allows you to change the sense of each axis independently of the other. This should solve all joystick compatibility problems.

If the joystick is moving wrong as you move it from right to left you will need to change the sense of the joystick along the X axis. To do this, press   **X**. If the joystick is moving wrong as you move it up and down you will need to change the sense of the joystick along the Y axis. To do this, press   **Y**.

7.5 Saving The Parameters

Draw ON maintains the various program parameters such as the prefix, clicking mode, mouse and joystick responsiveness, the joystick sense and others in a program parameter file on disk. This file is used by Draw ON each time it starts up to set up the initial values for these options. Once you have set these options as you want them, you can save them back to the program parameter file. The next time you start up Draw ON, these new values for the various options will be loaded automatically.

After setting the various options, use the following procedure for saving the program parameters:

- Press <0> to go to the **Options Menu**.
- Move the highlight to the **Program Config. Menu**.
- Now, move the highlight bar over the **Save prefix & parameter** menu item.
- Press the button once to save the various options.

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8

Draw ON Applications

This chapter will show you how other people are using Draw ON ///. Various applications such as Computer Aided Design, Font Creation, Business Graphics, and more will be presented.

8.1 Business Graphics

Draw ON /// provides the small business with an inexpensive graphic arts studio. You can use Draw ON and its multiple fonts and texturing capabilities to design your own business cards, forms, title pages, and company logos. You might create special symbols, letterheads, calendars and so on for your small business. Print the prototype drawings and bring them to your local printing company as examples of what you want. You can also use a copier to make your own stationary, forms or advertising flyers.

Use Draw ON /// to draw your charts and graphs for presentations in either black and white or color. After creating your presentation quality charts, you can either photograph the RGB color monitor screen with slide film, or print the screen on a black and white or color dot matrix printer. When photographing the drawing screen, remember to toggle off the cursor by pressing   C. When you are finished photographing the drawing screen, press   C again to turn the cursor back on.

Most of the popular charting programs allow you to save the chart that you have created to a disk file. After creating the basic chart and saving it on disk, use Draw ON to load in that drawing and change it to suit your tastes. Move objects around, texture bar or pie charts, add and move titles around the drawing screen. Since Draw ON has a variety of fonts styles and sizes available, it is the ideal tool for making those boring charts more readable and exciting.

Draw ON is also an excellent tool for the graphic artist. They can use the program to speed the initial design and evaluation of advertising materials, labels, color combinations, product wrappings or box design.

8.2 Computer Aided Design

Draw ON has several features useful in two dimensional Computer Aided Design applications. The ability to create libraries of objects and to copy them onto a drawing screen can greatly accelerate the generation of complex circuit or design diagrams. Engineering plans, floorplans, charts and other drawings are all possible with a little imagination and Draw ON ///.

One very useful possibility for Draw ON is in circuit layout and design. If you create one or more libraries of the various circuit components that you will be using (such as resistors, logic gates, IC's, transistors, etc.), you can save them to disk as fotofiles. As you need them you can load the libraries onto an unused drawing screen, pick up the appropriate object and place it on your circuit layout. If the circuit is too large to fit on one drawing screen, simply scroll around the drawing surface and concatenate them during or after printing them out.

You can also use Draw ON to design floorplans for room additions, or other relatively simple two dimensional drafting applications. The ability to move objects around the drawing screen can even reduce the risk of strained backs. Simply use Draw ON to move those heavy chairs and tables around with a push of the mouse. When they are in position of the drawing screen, move the furniture around - once. Redesigning a store's floorplan for improved customer access is now so easy. You could create a library of floor plans for your apartment chain, and another library of the various types of furniture. Use Draw ON to determine what furniture will fit in what rooms and how you can move them in (through windows, doors, etc.).

For manager and programming types, use Draw ON to produce stunningly colorful system diagrams and flowcharts of your business operations, corporate hierarchy, program layouts and more. The box, circle, line, and textual features of Draw ON are perfectly suited to these applications. Using the preserve and restore features, you can quickly reproduce common sections of your chart. When printing you can concatenate as many drawing screens as necessary to produce large flowcharts or other drawings.

8.3 Font Creation

You can use Draw ON to create standard sized character fonts (7 by 8) for use with your word processor, spreadsheet, or business graphics application. You can also use these fonts on any custom program that you write. Draw ON also allows you to create special fonts drawn in large sizes (10 by 18, and 14 by 24) that can be used from within Draw ON or from within any program that you write.

8.4 Painting And Drawing

Draw ON is also one of the most powerful painting or drawing systems on the market today. Using the various brushed, geometric shapes, colors, textures and other tools that Draw ON has to offer, you can create some stunning original artwork. If you print your drawings to a black and white or color printer, you can have a permanent copy of your creation. Additionally, you can photograph the drawing screen and blow up the resulting slide to a size that you can frame.

8.5 Video Tape Titles & Graphics

One of the most interesting uses of Draw ON is the ability to create title frames and other graphics for your home video tape recorder. You can directly record the image on your drawing screen by connecting the NTSC output of your Apple /// to the video input of your VCR, or use a camera to record your drawing screen on your monitor.

8.6 Animation And Game Simulation

Draw ON can also be used as an aid in producing animated films and games. If your video camera has single frame advance you will be able to draw the film directly with Draw ON ///. To do this, create a library of fotofiles that contain the objects or characters to be animated in the various positions that will be needed. Additionally, draw the backdrops of the scenes of the films and store them on disk as fotofiles.

For example, create a library of small creatures in various walking positions. Set the color operator table to eliminate the background color that the creatures were drawn against. Load in the first backdrop (possibly a jungle scene) and pick up one of the characters that is going to be animated. Now use the preview (dragging) feature to non-destructively place the creature on the backdrop (remember to turn off the cursor). Expose one frame on the film, get the next walking position and expose that. Continue this way to animate the film. You can also use the scrolling techniques presented in **Chapter 5 (Section 16)**, to horizontally scroll a portion of your drawing screen. You could scroll part of the jungle scene while not moving a cloud formation.

Your creativity is the only limit with the great number of things that Draw ON can do. You can even design games for the Apple /// with the techniques outlined above. Simulating the action of pinball games, space adventures and other fun programs is simple as you can very easily arrange and rearrange your screen for different locations of objects such as balls, spinners or spaceships.



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A

Connecting Your Mouse Or Joystick

To control the operation of Draw ON ///, a mouse or joystick can be used. Since these are not normally supplied with the Apple ///, you will have to purchase them separately. This appendix will show you how to connect your mouse or joystick so that Draw ON can use them.

A.1 Connecting Your Mouse

Draw On allows you to use the *Apple Mouse ///* as the controlling device. If you can not get an *Apple Mouse ///*, you can use the *Apple Mouse //e*. The mice are essentially the same, the only difference is in the packaging. The **Draw ON /// Start-up Disk** has the driver that allows Draw ON to communicate with either mouse. If you activate this driver as described below, Draw ON can be used with the mouse.

As stated, Draw ON can use the *Apple Mouse //e*. To install the *Apple Mouse //e*, follow the instructions in your *Apple /// Owner's Guide* in **Chapter 6** on installing a peripheral card. The examples below assume that the mouse interface card is installed in slot **2**. If that slot already has an interface card in it, put the mouse interface card in another slot and change the examples below to indicate what slot you put the mouse interface card in.

If you are using the *Apple Mouse ///* with Draw On, follow the instructions for installing the mouse in the manual that came with that product. After you have inserted the interface card and plugged the mouse in (either *Apple Mouse ///*, or *//e*), the only thing left to do is to activate the mouse driver and you will be able to use the mouse with Draw ON. Once you have installed the mouse, use the following steps to enable Draw ON /// to use the mouse:

If you are using *System Utilities Version 1.2*, read the section titled *For System Utilities Version 1.2*.

For System Utilities Version 1.1 . . .

- Start-up the *System Utilities Diskette*.
- Press **S** at the main menu to go to the **System Configuration Program**.
- Press **R** to **Read A Driver File**.
- Take the *System Utilities Diskette* out of the built-in drive.
- Insert the **Draw ON /// Start-up Disk** into the built-in drive and press **RETURN**.
- Once the driver configuration is loaded, put the *System Utilities Diskette* back into the built-in drive, press **ESCAPE** and then press **E** to edit a driver.
- Use the arrow keys to move the highlight bar over the item named **.MOUSE** and press **RETURN**.
- Use the arrow keys to move the highlight bar over **item 4**, the **Driver Status** menu item, and press **RETURN**.
- Now press **A** to activate the mouse driver and then press **ESCAPE** three times.
- You should now be at the **System Configuration Program Main Menu**. Press **C** to **Change System Parameters**.
- Move the highlight bar to **item 2 - Change Peripheral Slot Assignment** and press **RETURN**.
- Move the highlight bar to the item that says **.MOUSE** and press **RETURN**.
- Type in the slot number and press **RETURN**. This should be **2** (or **1**, **3**, or **4** corresponding to the slot your mouse interface card is in).
- Press **ESCAPE** three times to return to the main menu.
- Press **G** to **Generate A New System**.
- When the prompt appears at the bottom of the screen, take the *System Utilities Disk* out of the built-in disk drive and put the **Draw ON Start-up Disk** in the built-in disk drive.

- Type in **.D1/SOS.DRIVER** and press **RETURN**.
- Draw ON will now attempt to save the new configuration to your **Draw ON Start-up Disk**. Since a **SOS.DRIVER** file already exists, Draw ON will ask if you want to delete the one already on the disk. Press **Y** for yes to replace the old driver file with the new one.

You have now successfully configured Draw ON to work with the mouse. To continue, skip this next section and finish the rest of the appendix.

For System Utilities Version 1.2 . . .

- Start-up the *System Utilities Diskette*.
- Press **S** at the main menu to go to the **System Configuration Program**.
- Press **R** to **Read A Driver File**.
- Take the *System Utilities Diskette* out of the built-in drive.
- Insert the **Draw ON /// Start-up Disk** into the built-in drive and press **RETURN**.
- Once the driver configuration is loaded, put the *System Utilities Diskette* back into the built-in drive, press **ESCAPE** and then press **E** to edit a driver.
- Use the arrow keys to move the highlight bar over the item named **.MOUSE** and press **RETURN**.
- Use the arrow keys to move the highlight bar over **item 2**, the **Driver Status** menu item, and press **RETURN**.
- Now press **A** to activate the mouse driver and then press **ESCAPE** once.
- Move the highlight bar down one item and press **RETURN**. Here you will change the slot number of the mouse driver.
- Press **2** (or **1**, **3**, or **4** corresponding to the slot your mouse interface card is in) and press **RETURN**.
- Now that you have set the slot number, press **ESCAPE** three times to return to the main menu.

- Press **G** to **Generate A New System**.
- When the prompt appears at the bottom of the screen, take the *System Utilities Disk* out of the built-in disk drive and put the **Draw ON Start-up Disk** in the built-in disk drive.
- Type in **.D1/SOS.DRIVER** and press **RETURN**.
- Draw ON will now attempt to save the new configuration to your **Draw ON Start-up Disk**. Since a **SOS.DRIVER** file already exists, Draw ON will ask if you want to delete the one already on the disk. Press **Y** for yes to replace the old driver file with the new one.



If you do not have an *Apple Mouse III* or *Apple Mouse IIe* installed in your Apple *III* and you activate the mouse driver on the **Draw ON III Start-up Disk**, the Draw ON program will not work. Draw ON will display the title screen and stop. You will have to turn the computer off before turning it on again and use the *System Utilities Program* to inactivate the mouse driver. Additionally, Draw ON will not work if you have the mouse installed in the wrong slot. If so, you must again turn your Apple *III* off before starting the *System Utilities Program* to change the slot that the mouse driver thinks the mouse is in.

You have now successfully configured Draw ON to work with the mouse, and you can start using the program. Return to **Chapter 1** and finish the introduction to Draw ON. As soon as you finish **Chapter 1**, **Chapter 2** will show you how to get started using Draw ON.



To switch between mouse and joystick, follow the instructions given in **Section 7.2**. You will of course, only be able to switch from one to another if you have both devices installed and correctly configured.

A.2 Connecting Your Joystick

In addition to using the mouse, Draw ON allows you to use a joystick as the controlling device. The joystick connects to either of the Apple *III* joystick ports on the back panel of the machine. These **ports** are labeled **A** and **B**. If you have a *Silentype* printer attached to port A, the joystick will have to be plugged into port B. Since at a later time you may add a *Silentype*, attach the joystick to port B. Draw ON doesn't care which port the joystick is plugged into as the program will find it. If you want to, you can attach the joystick to port A.

The *Cursor ///* and the *T.G. Joystick* for the Apple /// both have instructions for connecting their joysticks to port A or B. In both cases you will simply have to attach a cable from the joystick to the appropriate joystick port. It is a very easy operation and both joysticks have the procedure documented with instruction booklets.

You have now successfully installed a joystick to your Apple ///, and you can now start using the program. Return to **Chapter 1** and finish the introduction. As soon as you finish **Chapter 1**, **Chapter 2** will show you how to get started using Draw ON ///.



To switch between mouse and joystick, follow the instructions given in **Section 7.2**. You will of course, only be able to switch from one to another if you have both devices installed and correctly configured.

A.3 Centering Your Joystick

If your *Cursor ///* or other Apple /// joystick is way out of adjustment, you may have to reset the internal setscrews or centering tabs in order to take full advantage of Draw ON ///. Since the *Cursor ///* has no centering tabs you will have to take it apart to adjust the joystick. This is presented below. If your joystick has centering tabs or other centering controls, make sure that they are centered prior to starting up Draw ON.

When the joystick is in its natural resting position and the centering tabs are centered, the joystick will return a value of around 127 (+ or - 10) for both the X and Y axis. This is the middle of the range returned by the joystick (0..255). Draw ON checks the joystick as the program starts up and uses the value that is returned as the positioning reference. If the value is below 100 or greater than 160, you may have trouble controlling Draw ON. To determine what values the joystick is producing, use the following *Business Basic* program:


```

100 REM Business Basic program to test the joystick in port B
105 REM Push Button 0 to stop this program
110 HOME
115 PRINT "X = ";PDL(0)
120 PRINT "Y = ";PDL(1)
125 PRINT "BUTTON 0 = "; BUTTON(0)
130 PRINT "SWITCH 1 = "; BUTTON(1)
135 IF BUTTON (0) = 255 THEN 200
140 GOTO 110
200 STOP

```

When you run this program, the **X** and **Y** values will be shown on the screen. Note the values when the joystick is in its normal centered position. If you have centering tabs, use them so that the values on the screen will be in the range 117 to 137. If possible, set the tabs so that a steady stream of **X** = 127 , and **Y** = 127 appear on the screen. If you can't get the values in this range, bring the joystick back to your dealer for an exchange or repair.

If you have a joystick such as the *Cursor ///* that doesn't have centering tabs and the values that are returned by the above program are not in the acceptable range, you have a problem. You should either return the joystick to your dealer for repair, or attempt to fix it yourself. If you are not confident that you can take apart the joystick and reassemble it, take it to your dealer.

Adjusting a *Cursor ///* (or other joystick without centering tabs) is a bit of a chore. To open a *Cursor ///* , remove the rubber feet from the bottom of the case and use a small screwdriver to unscrew the screws holding the case together. Once open, gently loosen the setscrew that holds the joystick positioners to the potentiometer shaft. Twist the shaft slightly and remember which direction you twisted it in. Run the joystick test program again and see how the movement changed the values returned. Keep on doing this until you get acceptable values. Close up the case in the reverse manner that you took it apart and your *Cursor ///* should now work correctly with Draw ON.



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B**Installing And Using Draw ON Under Selector /// Or Catalyst**

Draw ON is normally used from the supplied diskettes. It may also be used from a hard disk system (or other drive) by one of the program switching utilities such as the popular *Selector ///* or *Catalyst*. This appendix will show you how to use Draw ON with these utilities.

B.1 Installing Draw ON Under Selector ///

Selector /// is a utility for the Apple /// which allows you to store all of your programs on any floppy or hard disk. It allows you to switch from one applications program to another without having to restart (reboot) the Apple ///. Thus, you can switch between programs such as *VisiCalc* and *Applewriter* without using any floppy diskettes. Each of these programs (Draw ON included) can be transferred to your hard disk (or other drive) and executed from there. For the most part, users will be able to put away floppy disks and run programs from their hard disks. The rest of this section will tell you how to install and use Draw ON with *Selector ///*.

The examples below will assume you are using a *ProFile* hard disk with the device name **.PROFILE**. If this is not the case, simply switch the device name of the drive you are using (**.D3**, **.XCOMP**, **.ICE**, etc.) with **.PROFILE** in the examples below. Before starting, make sure that your ProFile has at least 225 free blocks on it. If you don't have this much room, you will not be able to fit Draw ON on the ProFile.

There are three steps to installing Draw ON on your ProFile. First, make a unique subdirectory for your program in the **/PROGRAMS** subdirectory on your ProFile disk. Second, copy the files from your Draw ON Program Diskette into that subdirectory. Third, add the new program to the Selector menu and fill in the Menu Item Specification Form.

1 — Use the *System Utilities Program* to make a subdirectory named **.PROFILE/PROGRAMS/DRAW.ON.3/**.

2 — Insert the **Draw ON /// Program Disk** into the built-in drive and copy the following files from **.D1/**

SYSTEM.STARTUP SYSTEM.MISCINFO DRW3.DIR

to the files **.PROFILE/PROGRAMS/DRAW.ON.3/=**

If you are using an **IDS Color Prism**, first delete the file **.PROFILE/PROGRAMS/DRAW.ON.3/SYSTEM.STARTUP**. Next, insert the **Draw ON /// Start-up Disk** into the built-in drive and copy the file **.D1/DRAW.ON.3.CLR** to the file **.PROFILE/PROGRAMS/DRAW.ON.3/SYSTEM.STARTUP**.

3 — You will now have to add the program to your *Selector Menu*. Choose the **Menu Editor** from the *Selector Main Menu*. After about 20 seconds, you'll see the **Editing Tasks** screen. Press **E** to **Edit the menu**. If you need help as you add the program to your *Selector Menu*, remember the help screens.

Press This: To Do This:




? Describes the screen and its options.



? Describes the highlight item.

CONTROL ? Lists the keys you can press and tells what each will do.

Move the highlight to an empty place on the menu screen and press  **I** to insert a new menu item. When the window pops up on the upper right portion of the screen, press **P** to insert a program or use the arrow keys to highlight the program menu item and press **RETURN**. Type in the name **Draw ON ///** and press **RETURN**.

After pressing **RETURN** the **Menu Item Specification Form** will appear on your screen. This form will have five fields (sections). Use the information below to fill in the fields.


DATA directory: **.PROFILE/PROGRAMS/DRAW.ON.3/**
PROGRAM file:

.PROFILE/PROGRAMS/DRAW.ON.3/SYSTEM.STARTUP



LANGUAGE file: **.PROFILE/LANGUAGES/PASCAL.RTINTERP**

CHARACTER SET file: (STANDARD CHARACTER SET)

KEYBOARDLAYOUT file: (STANDARD KEYBOARD ARRANGEMENT)

When you have filled in the form with the above information, press  **A** to accept it. The **Menu Editor** will then show the *Selector Main Menu* with **Draw ON** as one of the menu items. Since you are now finished adding the program to your menu, you will need to save your revised menu to your ProFile. You'll find the **S - Save the menu file** option on the **Editing Tasks** screen. Press **ESCAPE** once to see this screen. Press **S** or move the highlight over this option and press **RETURN**. The **Menu Editor** will now save the new menu on your ProFile.

You are all done with the **Menu Editor**, so press **Q** to exit the **Menu Editor** and return to the *Selector Main Menu*. You can now select and use **Draw ON ///** from under *Selector ///*. To do this, simply move the highlight over the **Draw ON ///** menu item on the *Selector Main Menu* (or any submenu where you have placed Draw ON) and press **RETURN**. *Selector* will load in Draw ON just as if you had used diskettes to load the program. At this point you can return to **Chapter 2.1** as the *Draw ON ///* *Title Screen* should now be displayed.

To quit Draw ON and return to *Selector ///*, press   **Q**. When the prompt asks you to confirm that you want to leave, type **Y** for yes and then press **RETURN**. In a few seconds you will be back at the *Selector ///* *Menu* and you will be able to choose another program.

B.2 Installing Draw ON Under Catalyst

Catalyst is a utility for the Apple /// which allows you to store all of your programs on a ProFile hard disk. It allows you to switch from one application program to another without having to restart (reboot) the Apple ///. Thus, you can switch between programs such as *VisiCalc* and *Applewriter* without using floppy diskettes. Each of these programs (Draw ON included) can be transferred to your ProFile and executed from there. For the most part, users will be able to put away floppy disks and run programs from their ProFile. The rest of this section will tell you how to install and use Draw ON with *Catalyst*.

The examples below will assume your *ProFile* has the device name **.PROFILE**. If this is not the case, simply switch the device name of your *ProFile* (**.PRO**, **.BACKUP**, etc.) with **.PROFILE** in the examples below. Before starting, make sure that your ProFile has at least 225 free blocks on it. If you don't have this much room, you will not be able to fit Draw ON on the ProFile.

There are three steps to installing Draw ON on your ProFile. First, make a unique subdirectory for your program in the **/CATALYST** subdirectory on your ProFile disk. Second, copy the files from your Draw ON Program Diskette into the subdirectory. Third, add the new program to the Catalyst menu and fill in the item information.


1 — Use the *System Utilities Program* to make a subdirectory named **.PROFILE/CATALYST/DRAW.ON.3/**.

2 — Insert the **Draw ON /// Program Disk** into the built-in drive and copy the following files from **.D1/**

SYSTEM.STARTUP
DRW3.DIR

to the files **.PROFILE/CATALYST/DRAW.ON.3/=**

If you are using an **IDS Color Prism**, first delete the file **.PROFILE/CATALYST/DRAW.ON.3/SYSTEM.STARTUP**. Next, insert the **Draw ON /// Start-up Disk** into the built-in drive and copy the file **.D1/DRAW.ON.3.CLR** to the file **.PROFILE/DRAW.ON.3/SYSTEM.STARTUP**.

3 — You will now have to add the program to your *Catalyst Menu*. Choose the **Catalyst Editor** Option from the *Catalyst Main Menu*. After a few seconds, you'll see the **Catalyst Editor** screen. Press **1** and then **RETURN** to edit your menu. If you need help as you add the program to your *Catalyst Menu*, press  ?. This will display some help information.

Move the highlight to where you would like to insert your Draw ON menu item and press **A** to add an entry. Type in **Draw ON ///** and press **RETURN**. You will now have to fill in the program parameters for Draw ON ///. Use the information below to fill in the fields.

Interpreter path: **.PROFILE/CATALYST/PASCAL**

Extra Drivers: None

Character set path: Standard

Screen: Normal





Keyboard path: Standard

Initial prefix: **.PROFILE/CATALYST/DRAW.ON.3/**

Max files allowed open: 3



Program path: **.PROFILE/CATALYST/DRAW.ON.3/SYSTEM.STARTUP**

When you have finished adding Draw ON to the *Catalyst Menu*, press **ESCAPE** to return to the **Editor Menu**. Now press **5** and **RETURN**. Press **Y** and then **RETURN** when the question appears and then press the **SPACE BAR**. You are all done with the Editor, so press **7** and then **RETURN** to exit the **Menu Editor** and return to the *Catalyst Main Menu*. You can now select and use **Draw ON ///** from under *Catalyst*. To do this, simply move the highlight bar over the **Draw ON ///** menu item on the *Catalyst Main Menu*. *Catalyst* will load in Draw ON just as if you had used diskettes to load the program. At this point you can return to **Chapter 2.1** as the *Draw ON /// Title Screen* should now be displayed.

To quit Draw ON and return to *Catalyst*, press   **Q**. When the prompt asks you to confirm that you want to leave, type **Y** for yes and then press **RETURN**. In a few seconds you will be at the *Pascal Command Line*. Press   **ESCAPE** to return to *Catalyst*. In a second or so you will be back at the *Catalyst Menu* and you will be able to choose another program.

B.3 Problems Working With Catalyst

There are a number of things that you will have to watch for when working with Draw ON /// under *Catalyst*. Specifically, since Draw ON is a large program that uses quite a bit of memory, there are times when it will not work with *Catalyst*. This is primarily due to the large amount of memory that *Catalyst* uses. The rest of this section will tell you of the problems and how to correct them.

After choosing Draw ON /// from the *Catalyst Menu*, there are a number of problems which may occur. The first of these errors will usually tell you that not enough graphics space has been allocated. This is a simple fix, but it can create other problems. Draw ON requires that 32K of graphics space be allocated. To do this, after pressing the **SPACE BAR** as the program asks, you will first be presented with the *Pascal Command Line*. Press **O** and then **A** to change the *Graphics Space Allocation*. Press **D** to set 32K of graphics space and then press **Q** to exit. In a few moments you will be returned to the *Pascal Command Line*. Press   **ESCAPE** to return to the *Catalyst Menu* and then choose Draw ON /// again.

Once you have set 32K of graphics space for Draw ON, all of your other **Pascal** programs will have 32K less of memory to use. This can create some problems. If you are using a program such as **Lazarus** on your *Catalyst*, **Lazarus** will then not work since it requires 0K of graphics space allocated. Each time you want to use **Lazarus** you will have to manually set 0K of graphics space. This problem is due to the way *Catalyst* works with Pascal programs. *Selector ///* corrects this problem with something called the *Pascal Run-Time Interpreter*. Contact **Quark** for the availability of the *Pascal Run-Time Interpreter* for *Catalyst*.

One of the other errors will say that no **.GRAFIX** driver is present. To fix this, you will have to do one of two things. You can either add the **.GRAFIX** driver to your **Catalyst Start-up Diskette** or dynamically load in the **.GRAFIX** driver into Draw ON from the *Catalyst Menu Editor*. For information on doing this, read over the *Catalyst User's Manual*.

The last of the problems is that after the *Draw ON Title Screen* is displayed you will get a **Stack Overflow** error message. If this occurs you will have to inactivate some of the drivers on your **Catalyst Start-up Diskette**. You will not be able to use *Discourse*, or any other driver that consumes a large amount of memory. Try dynamically loading the format drivers (**.FMTD1**, **.FMTD2**, etc.) only into the *System Utilities Program* and delete them from your **Catalyst Start-up Diskette**.

B.4 Installing The Mouse Driver On Selector /// Or Catalyst

If you are using Draw ON with *Selector ///* or *Catalyst* and have a mouse attached to your Apple ///, you will have to add the Mouse Driver to your *Selector ///* or *Catalyst Start-up Diskettes*. The material in this section will step you through how to add the mouse driver to those diskettes. For the example below you will need a blank disk to temporarily store the mouse driver.

Boot up the *System Utilities Program* (or choose it from the *Selector* or *Catalyst* menu) and follow the instructions below for adding the mouse driver. If you have selected the Utilities program from the *Selector* or *Catalyst* menu, delete the references to inserting and removing the *System Utilities Diskette* from the built-in drive in the following instructions. If you are using *System Utilities Version 1.2*, skip down and look over the section titled *For System Utilities Version 1.2*.



For System Utilities Version 1.1 . . .

- Start-up the *System Utilities Diskette*.
- Press **S** at the main menu to go to the **System Configuration Program**.
- Press **R** to **Read A Driver File**.
- Take the *System Utilities Diskette* out of the built-in drive.
- Insert the **Draw ON /// Start-up Disk** into the built-in drive and press **RETURN**.
- Once the driver configuration is loaded, put the *System Utilities Diskette* back into the built-in drive, press **ESCAPE** and then press **E** to edit a driver.
- Use the arrow keys to move the highlight bar over the item named **.MOUSE** and press **RETURN**.
- Use the arrow keys to move the highlight bar over **item 4**, the **Driver Status** menu item, and press **RETURN**.
- Now press **A** to activate the mouse driver and then press **ESCAPE** three times.
- You should now be at the **System Configuration Program Main Menu**. Press **C** to **Change System Parameters**.
- Move the highlight bar to **item 2 - Change Peripheral Slot Assignment** and press **RETURN**.
- Move the highlight bar to the item that says **.MOUSE** and press **RETURN**.
- Type in the slot number and press **RETURN**.
- Press **ESCAPE** three times to return to the main menu.
- Press **D** to delete a driver. You will be deleting every driver except the **.MOUSE** driver.
- Move the highlight bar over every driver (except the **.MOUSE**) and delete it.
- Press **ESCAPE** to return to the main menu.
- Press **G** to **Generate A New System**.

- When the prompt appears at the bottom of the screen, take the *System Utilities Diskette* out of the built-in disk drive and put a blank disk into the built-in drive.
- Type in **.D1/MOUSE.DRIVER** and press **RETURN**.
- Draw ON will now save the mouse driver on your blank disk.
- Press **ESCAPE** once to return to the main menu. Put the *System Utilities Disk* back into the built-in drive.
- Press **Q** to leave the **System Configuration Program** and then press **S** to return to it.
- Press **R** to **Read A Driver File**.
- Take the *System Utilities Diskette* out of the built-in drive.
- Insert the *Selector /// or Catalyst Start-up Diskette* into the built-in drive and press **RETURN**.
- Insert the blank disk that you saved the mouse driver on into the built-in drive.
- Type in **.D1/MOUSE.DRIVER** and press **RETURN**.
- Put the *System Utilities Diskette* back into the built-in drive and press **ESCAPE**.
- Press **G** to **Generate A New System** and put the *Selector /// or Catalyst Start-up Diskette* back into the built-in disk drive.
- Type in **.D1/SOS.DRIVER** and press **RETURN**.
- Press **Y** when it asks if you want to delete the old **SOS.DRIVER**. You will be replacing the old **SOS.DRIVER** with the new one with the mouse driver on it.

You have now successfully configured *Selector /// or Catalyst* to work with the mouse when using Draw ON. Restart your *Selector /// or Catalyst* by pressing **CONTROL RESET**, and you will be able to use Draw ON with your mouse.

For System Utilities Version 1.2 . . .

- Start-up the *System Utilities Diskette*.
- Press **S** at the main menu to go to the **System Configuration Program**.

- Press **R** to **Read A Driver File**.
- Take the *System Utilities Diskette* out of the built-in drive.
- Insert the **Draw ON /// Start-up Disk** into the built-in drive and press **RETURN**.
- Once the driver configuration is loaded, put the *System Utilities Diskette* back into the built-in drive, press **ESCAPE** and then press **E** to edit a driver.
- Use the arrow keys to move the highlight bar over the item named **.MOUSE** and press **RETURN**.
- Use the arrow keys to move the highlight bar over **item 2**, the **Driver Status** menu item, and press **RETURN**.
- Now press **A** to activate the mouse driver and then press **ESCAPE** once.
- Move the highlight bar down one item and press **RETURN**. Here you will change the slot number of the mouse driver.
- Press **2** (or **1**, **3**, or **4** corresponding to the slot your mouse interface card is in) and press **RETURN**.
- Now that you have set the slot number, press **ESCAPE** three times to return to the main menu.
- Press **D** to delete a driver. You will be deleting every driver except the **.MOUSE** driver.
- Move the highlight bar over every driver (except the **.MOUSE**) and delete it.
- Press **ESCAPE** to return to the main menu.
- Press **G** to **Generate A New System**.
- When the prompt appears at the bottom of the screen, take the *System Utilities Disk* out of the built-in drive and put a blank disk in the built-in drive.
- Type in **.D1/MOUSE.DRIVER** and press **RETURN**.
- Draw ON will now save the mouse driver on your blank disk.
- Press **ESCAPE** once to return to the main menu. Put the *System Utilities Disk* back into the built-in drive.

- Press **Q** to leave the **System Configuration Program** and then press **S** to return to it.
- Press **R** to **Read A Driver File**.
- Take the *System Utilities Diskette* out of the built-in drive.
- Insert the *Sector ///* or *Catalyst Start-up Diskette* into the Built-in drive and press **RETURN**.
- Insert the blank disk that you saved the mouse driver on into the built-in drive.
- Type in **.D1/MOUSE.DRIVER** and press **RETURN**.
- Put the *System Utilities Diskette* back into the built-in drive and press **ESCAPE**.
- Press **G** to **Generate A New System** and put the *Selector ///* or *Catalyst Start-up Diskette* back into the built-in disk drive.
- Type in **.D1/SOS.DRIVER** and press **RETURN**.
- Press **Y** when it asks if you want to delete the old **SOS.DRIVER**. You will be replacing the old **SOS.DRIVER** with the new one with the mouse driver on it.

You have now successfully configured *Selector ///* or *Catalyst* to work with the mouse when using Draw ON. Restart your *Selector ///* or *Catalyst* by pressing **CONTROL RESET**, and you will be able to use Draw ON with your mouse.



Setting Up Draw ON For Your Printer

Draw ON will print out graphics images on a variety of *Dot Matrix Printers*. If your Apple /// and printer are connected with the *PKASO Parallel Interface Card*, Draw ON will directly print out your charts and graphs. The **Draw ON Start-up Disk** comes configured for a *PKASO* interface card in slot 1. The **PKASO** driver is set up for an *Apple Dot Matrix Printer*. To change the driver so that it recognizes your printer, follow the directions below.

The **PKASO** driver sends the graphics image to the printer in a different way for each different type of printer it can be connected to. To change the type of printer that you are using, follow the instructions in **Appendix D** and **E** of the *PKASO /// User's Manual*. You will simply be changing the first byte (#00) in the configuration block of the **PKASO** driver. The value of this byte determines which printer that you are using with the **PKASO** card. The values for some popular printers are below.

Byte #00	Type Of Printer
00	Epson MX-80, Type-II, Old MX-100
01	Epson Type III, Grafrax, Grafrax-Plus
02	Epson, MX-70
03	Centronics 739
04	Okidata, text models
05	IDS Prism
06	Okidata with Okigraph
07	NEC PC8023, C.Itoh 8510, Apple DMP

Additionally, you will have to change the last byte (#0A) in the configuration block. The value of this byte determines what size and type of printer (**B/W** or **Color**) that you are using. The values that you should use are below.

Byte #0A	Printer Sub-type
00	80 column B/W
01	132 column B/W
02	80 column Color
03	132 column Column

Change these two bytes as described in your *PKASO User's Manual* and Draw ON will directly print out your graphs from within Draw ON. If you don't have one of the printers listed above, Draw ON will not be able to print out your graphic images from within the program.

If you have the newer **PKASO U** interface card, simply follow the instructions that came with that package for first setting up the interface card. Then set up the **PKASO** driver (as described above) for the type of printer that you are using. When finished, Draw ON will directly print out your graphs from within Draw ON.

If you are using the **IDS Color Prism**, you will have to do one more thing before being able to print out graphics on your printer. Follow the instructions below and you will be able to use your *Prism* from directly within Draw ON ///. You will need the *System Utilities Diskette* and copies of your **Draw ON /// Disks**.



The following operation will modify your Draw ON /// Disks. Because of this, remember to use a backup copy instead of the original disks. In the event of a problem (deleting the wrong file, etc.) you can make another copy from your originals.

- Start up the *System Utilities Diskette*.
- Press **F** at the main menu to go to the **File Handling Commands**.
- Insert the **Draw ON /// Program Disk** into the built-in drive.
- Delete the file **.D1/SYSTEM.STARTUP**.
- Insert the **Draw ON /// Start-up Disk** into the 1st external drive (**.D2**).
- Copy the file **.D2/DRAW.ON.3.CLR** to the file **.D1/SYSTEM.STARTUP**.

You have now successfully configured Draw ON to work with your printer, and you can start using the program. Return to **Chapter 2** and finish the section on **Starting The Program**.



ON THREE is constantly working to change Draw ON so that it supports even more printers. If your printer is not listed above, contact **ON THREE** for availability of a version of Draw ON that will work with your printer.

Graphics Display Mode 1

This graphics display mode is called the limited color, high resolution mode for one major reason. While you can have 16 different colors on the drawing screen at any one time, there are limitations to the places on the screen where you can place the colors. This section will try to explain these limitations. Since it is a complex idea, don't be worried if it takes a couple of readings to pick it up.

Think of the drawing screen in this display mode as a regular (280 by 192) black and white screen with a 40 by 192 color overlay. The black and white screen is just like the 280 by 192 display mode 0 screen. The color overlay gives colors to the image on the black and white display. Each 280 dot line on the screen is divided into 40 segments of seven dots each. Within each seven dot segment, only two colors can appear. The dots that are *on* will appear in the foreground (*pen*) color and the dots that are *off* will appear in the background (*fill*) color.

The foreground color may be any of the 16 colors, but changing the color of any *on* dot within a seven dot segment will also change the color of every other *on* dot in that segment. The background color may also be any of the 16 colors, but changing the color of any *off* dot within a seven dot segment will also change the color of every other *off* dot in that segment.



Display mode 1 can be used quite effectively for any graphic display that uses only two colors. If you are careful in aligning different colors along the seven pixel boundaries, separate areas of the screen can have different colors. A multi-colored stacked bar chart will look very good in this display mode, but be careful when drawing objects that are hard to separate into the seven pixel boundaries.

Drawing in this color mode is more time consuming than in the other modes because of the seven pixel boundary problems. Some detailed work must be done on a pixel by pixel basis for multi colored drawings. The results will generally be worth the added effort as the increased resolution looks very good.

Graphics Memory Organization

This section is for those of you who are concerned with the internal memory organization of graphics on the Apple ///. As it is technical in nature, please don't attempt reading it until you have a thorough working knowledge of both Draw ON and the Apple ///. In addition, please look over the *SOS Reference Manual Vol. 1*. That book will show you even more about the internal structure of the Apple ///. In the following discussion, memory addresses in *hexadecimal* will be preceded by a \$ and (in most cases) followed by the decimal equivalents in parenthesis.

The graphics memory of the Apple /// occupies bank 0, and is switched in when the **XBYTE** is set to \$8F (143). When bank 0 is addressed using enhanced indirect addressing, the graphics data occupies address \$2000 (8192) through \$9FFF (40959). The organization of the various data buffers is illustrated in **Figure E.1**.

A total of 32K of RAM can be allocated for graphics on the Apple ///. This is enough for two complete 16K drawing screens in any of the graphics display modes. Draw ON provides a third drawing screen by swapping the 16K associated with graphics buffer #1 (\$2000 - \$5FFF) with an extra buffer located elsewhere in memory. This permits you to use 6 mode 0 drawing screens at one time, all of which are accessible via special swapping and scrolling commands.

You should take a moment and study the ways in which the memory segments overlay one another in the various display modes. Note, that when in mode 0, screen #2 displays the same region of memory which contains the color data of buffer #1 when displayed in mode 1. Also note that in mode 0, buffer #1 overlays the bit-image data of color mode 1.

This is very useful when drawing in mode 1 when trying to overcome the peculiar memory organization. You can easily manipulate the bit-image portion of mode 1 drawing. Thus, you can fill regions with, say, blue dots by changing to mode 0, filling with white, changing back to mode 1 and setting one dot in each seven pixel boundary. In some cases you could also do this by flood filling with blue.

There are no overlaying capabilities with the memory associated with buffer #2 (in modes 1, 2 and 3). However, Draw ON provides buffer swapping and scrolling, so the contents of buffer #2 may be exchanged with whatever is in buffer #1. The internal byte memory organization for each of the graphics display modes is illustrated in **Figures E.2** through **E.5** .

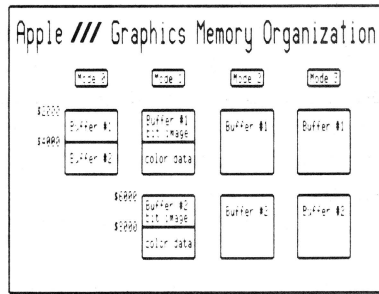


Figure E.1

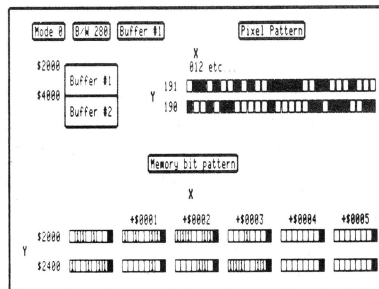


Figure E.2

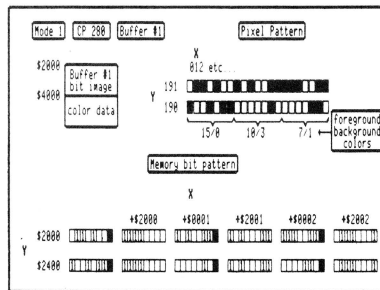


Figure E.3

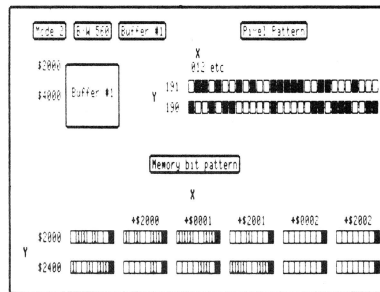


Figure E.4

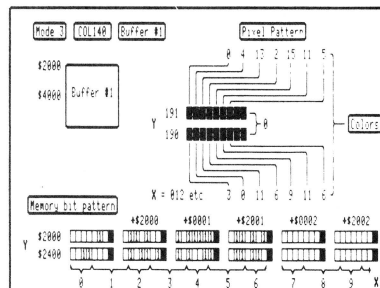






Figure E.5



Text Editing Options


As you enter a line of text to be printed on the drawing screen, or type in a file name, Draw ON has a variety of editing options available. The table below will show you the various options.

Keypress	Function
	Move the cursor left within the line of text.
	Move the cursor right within the line of text.
CONTROL 	Delete the character to the left of the cursor.
CONTROL 	Delete the character to the right of the cursor.
CONTROL E	Erase the entire line of text.
CONTROL K	Erases everything to the right of the cursor.
CONTROL U	This is the Undo keypress. It will restore the line of text to what it was before you changed it.
RETURN	Accepts the entire response. It doesn't matter where the cursor is on the line of text, it will accept the entire line of text.
ESCAPE	Erase the line of text and leave text entry.



Storage Format Of Shape Tables

This appendix shows the storage format of the shape records used by Draw ON ///. It is intended only for advanced users, as the information is not something you will normally be able to use. Using the information presented here, an advanced Draw ON user who is familiar with programming can use a separate program to modify or use the shape records used within Draw ON ///.

After you have turned on shape recording (with  **O**), each time you press a drawing mode key, a text character, or the button (same as **TAB** or **RETURN**), Draw ON fills one segment of the shape record buffer. The shape record buffer is 152 segments long, and each segment takes up five words (10 bytes). The first segment contains the coordinates of the origin and the number of segments in the shape. Each segment after that records the current program parameters as illustrated below.

16 BIT WORD	Low Byte		High Byte	Alternate
1	pen	fill	opcode	
2	X coordinate			(or X origin)
3	Y coordinate			(or Y origin)
4	resolution	eccentricity		(or text character)
5	arc angle			(or # of segments)

Errors

When Draw ON detects an error, it will respond in one of three ways:

- For common errors such as pressing an invalid key, Draw ON will simply *beep*. This is to indicate that the key you pressed is not a valid drawing or selection key.
- If you have installed Draw ON under *Selector ///* or *Catalyst*, there are a number of errors that you can receive. Most of these are described in **Appendix B**. When you start-up Draw ON you can also get an error message indicating that it can not find the files on the **DRW3.DIR** subdirectory. This will happen if you did not install your Draw ON Program correctly. If you get this type of error message review the procedures in **Appendix B** for copying the files.
- When loading or saving files, Draw ON may show you some error messages. There are two parts to these errors, the number and the text of the error message. The number is the **SOS Error Number** as described in the *SOS Reference Manual*. The ones which you are likely to get using Draw ON are listed below.

Error # Error Message

- 16 Device Not Found.** Draw ON could not find the drive that you tried to save a file onto. Make sure that you have correctly configured that drive onto the **Draw ON Start-up Disk**.
- 39 I/O Error.** Draw ON received an error when it tried to load or save a file. It usually means that the information on that disk is bad and not recoverable. That disk drive may also have a problem that needs to be fixed.

- 43 Disk Write Protected.** The disk that you were trying to save a file onto has the write protect notch covered. Uncover it and you will be able to save the file.
- 64 Invalid Path Syntax.** The name that you used in loading or saving a file is incorrect. Check for the slashes being in the right place, etc.
- 68 Path Not Found.** Draw ON could not find the file path that you specified. Make sure that you have the subdirectory named correctly.
- 69 Volume Not Found.** Draw ON could not locate the volume name that you specified. Make sure that the disk that you want to use is in a drive attached to your Apple ///.
- 70 File Not Found.** Draw ON could not find the file name that you specified. Make sure that you spelled the name correctly.
- 72 Overrun On Volume.** There is no more room left on the disk so Draw ON could not save the file. Switch to another disk and try to save the file again.
- 73 Directory Full.** The main directory already contains 51 files and can hold no more. Switch to another disk and try to save the file again.
- 78 Access Not Allowed.** Draw ON can not save information over a file that has been locked. If you really want to do this, use the *System Utilities Program* to unlock the file.
- 88 Not A Block Device.** Draw ON can not read or write information to a device that is not a disk drive. You will get this error if you try to list the files on **.CONSOLE**, etc.

Color Monitors And The Apple ///

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I

Color Monitors And The Apple ///

This appendix will give you information on the various types of color monitors that you can attach to your Apple ///. It will also show you how to connect both NTSC and RGB monitors to your Apple ///.

I.1 Should You Buy An NTSC Or An RGB Monitor?

If you plan to use the color capabilities of Draw ON ///, you should purchase a color video monitor for your Apple ///. There are two types of color monitors for the Apple ///, the *NTSC* composite and the *RGB* monitor. The RGB monitor will give a much better display than the NTSC, but will cost a bit more.

Some inexpensive NTSC monitors use a picture tube similar to those found in conventional television sets. The manufacturers remove the tuner section, and in some cases the audio section as well. After doing this, they sell what remains for about the *same price* or more!

The NTSC signal that comes out of the Apple /// is the same type used by video cassette recorders (VCR). In fact, you can directly record the video output of the Apple /// to a VCR. If you are short on cash, but have a VCR, you may connect the Apple /// to the video-input jack on the VCR, and use your standard TV set. If you go this route, the picture quality will be somewhat poorer than using a high-quality monitor directly.

One of the most impressive capabilities of the Apple /// is its 16 color text and graphics capabilities. Highly readable color text is a powerful tool for directing your attention to some location on a crowded screen. In order to take advantage of this capability, an RGB color monitor is absolutely essential. An RGB monitor gives a character sharpness and color quality approaching that of your black and white or green screen. Even the poorest quality RGB monitor is significantly better than an NTSC composite monitor.

You should get the highest resolution monitor that you can afford. Look for one with a rated resolution minimum of 560 pixels horizontally by 192 pixels vertically. The greater the resolution rating, the more distinct a color will appear on the screen. RGB color monitors for the Apple /// are available priced between \$400 and \$1400.

A good monitor for the Apple /// (based on price and performance) is the 13 inch *Electrohome ECM 1302-2*. It has a resolution of 580 by 235 and is manufactured by Electrohome Limited, 250 Wales Ave., Tonawanda, New York 14150. It is completely compatible with the Apple /// and is priced at around \$450. An NTSC video and sound adapter is available for about \$100 which allows the monitor to be used in both native and emulation mode. Another good Apple /// RGB monitor is available through Heathkit/Zenith Data Systems. The *ZVM 135* also provides NTSC capability as well as a green screen mode. Priced about the same, it is manufactured by Panasonic.

1.2 Connecting An NTSC Monitor

Connecting an NTSC monitor to your Apple /// is a rather simple procedure. Buried in **Appendix C**, pages 132-135, of the *Apple /// Owner's Guide* is most of the information you need. The rest of this section will show you how to do this.

To connect an NTSC monitor, the general idea is to add a socket similar to the one which you use to hook up your B/W monitor to the ///. On the back of your Apple /// is a 15 pin D-type connector (socket) which is the video port. You will need to find a 15 pin D connector (plug). At your local electronics supply store you should also be able to find a 1 foot long coax audio extension cable. This is the same type of plug found on the back of stereo receivers, cassette decks, etc. Find one with a female socket on one end and a male socket on the other end.

Use a wire stripper to cut off the male (pronged) plug of the cable and throw the plug away. Now, carefully strip about one inch off the outermost insulation from the plugless end. Unbraid (a tack or pin is helpful in separating the wires) the braided shielding wires from the inner insulation as far as possible. Now, gently twist them into a rope like bundle. Strip the insulation from the inner wire for about 1/8 of an inch and solder the center wire to pin 12 of the 15 pin D plug.

Soldering will be easier if you gently clamp the plug in a vice, prong side down, and melt a tiny bit of solder into the hole of each pin that you are going to connect a wire to. Then take the wire in one hand, reheat the pin with the other, and insert the wire, holding it steady until the solder cools. Solder the tip of the twisted shielding wires to pin 13, being careful to not let the inner wire and shielding short out anywhere. A bit of heat shrinkable insulation on the braided wires prior to installation is a good idea.

You can get heat shrink insulation at most electronic supply stores. Use the side of your soldering iron, a match, hair dryer, etc. to shrink the insulation tubing over the exposed wire. You should use a low temperature soldering iron with a fine tip. Never use a soldering gun or you will melt or damage everything in sight when working with electronic components. Put the plastic shields onto the plug (if you purchased them), and gently lock down the strain relief (if there is one) onto the coax cable where it exits from the shield. Test the resistance between pins 12 and 13, and all the other pins with a multitester (if you have one) to verify that there are no electrical shorts. Plug the 15 pin D connector into the color video port on the back of the Apple ///.

You may now hook up most any NTSC monitor, VCR or TV using the same kind of male-male coax cable that you are using to connect your Monitor /// to the B/W video socket. Simply plug it into the female plug coming out of the 15 pin D connector which you have just built.

Glossary

arc - a tool that Draw ON can draw with. This is a portion of a circle.

aspect ratio - the way an object looks as it appears on your drawing screen.

audio feedback - the clicking noise which occurs each time you draw an object or move the cursor. This can be turned on or off.

boxes - a tool that Draw ON can draw with. This four sided figure can be any size.

brushing - the technique of using an object that you have picked up on your drawing screen as a brush. You can do this by making copies of the object as you move the cursor around the drawing screen.

centered position - the normal *at rest* position of a joystick attached to your Apple ///.

centering tabs - the portions of a joystick that allow you to quickly put the joystick in a centered position.

character - a symbol used by the Apple /// to display letters, numbers etc. Draw ON allows you to use and change 128 standard sized characters and 96 large characters.

clicking - the noise which can occur each time you draw an object or move the cursor.

closed cursor - when the cursor is controlling a single point or line at a time.

color operator table - specifies the color that results when drawing with a particular color over any existing color on the drawing screen. You can use the C.O.T. to set color precedences and allow objects to be drawn in front of, behind, or overlayed along with existing objects on your drawing screen.

color palette - the menu which allows you to select colors to draw and fill objects with.

computer aided design - the process of using a computer to aid you in the design of floorplans, circuit diagrams or other complex objects.

cross hair cursor - the way the small controlling pointer on the drawing screen can look. This cursor type looks like the cross hair in a telescope or other sighting device.

cursor - the small pointer on the drawing screen which defines where on the drawing screen you will be working.

Cursor Status Box - this portion of the screen gives information on the cursor. The cursor coordinates, open cursor width, and the mouse or joystick responsiveness are shown here.

device driver - a portion of the Apple ///'s *Sophisticated Operating System* that allows you to communicate to a particular device attached to your Apple ///. An example is the *PKASO* driver. This allows Draw ON to use the printer attached to your Apple /// with the *PKASO Interface Card*.

disk directory - the portion of a disk which holds the information concerning the files on that disk. This information includes the files names, type, length and more.

dot matrix printer - a printer which prints characters formed by a pattern of dots. These dots are located at the intersections on a fixed grid inside the printer.

dragging - this process is the moving around of an object on your drawing screen. By doing this, you can get an idea of what the object will look like in a particular place before actually putting it there.

drawing screen - the place where you can use the tools of Draw ON to draw floorplans, engineering diagrams and other artwork.

driver status - a device driver can either be on or off. Use the *System Configuration Program* to set the status. Certain device drivers can not be turned on if there is no device connected to your Apple ///. An example is the *Mouse* driver. If it is on and you don't have a mouse installed in your system, Draw ON will not work.

eccentricity factor - this controls how elongated or stubby an ellipse will be drawn.

ellipse - a tool that Draw ON can draw with. This object looks like a flattened circle.

error messages - when an error occurs, such as not finding a file on a disk, Draw ON responds with a message indicating the problem.

filename - see **pathname**.

File Options Menu - the menu which allows you to perform file operations. This can be anything from loading or saving your drawings to listing the files on a disk and more.

fill color - the color used when you erase the drawing screen. It is also used as the background color when printing text on the screen.

flood fill - this procedure quickly fills an object with a solid color.

flood texture - this procedure quickly fills an object with a texture pattern.

floppy disk - this is a disk made of a piece of plastic coated with a thin layer of metal. It holds information such as pictures, fonts, etc. from your Apple ///.

Font Utilities Menu - this menu allows you to perform font operations. Using this menu you can load and save fonts, or choose different sizes of fonts for printing information on your drawing screen.

font - a complete set of characters that can be printed on your drawing screen, or saved to disk for later use.

foto file - this file contains the information of one drawing screen and can be used by other Apple /// programs.

graphics display - the image of the drawing screen which appears on your monitor.

grid - a pattern of dots that allows you to align your drawings on certain boundaries of the screen.

hard disk - this is a disk made of hard metal that is sealed into a drive. Just as a floppy disk, it holds information from your Apple ///. Hard disks offer considerable speed improvements over floppy disks.

highlight - when working on a menu with a number of choices, the item you are currently over is called the highlighted item.

input - how information is put into the computer. It can be as simple as entering a line of text, or as complex as drawing an architectural floorplan.

interface - this term describes the connection of pieces of equipment to the Apple ///.

internal set screws - the portions of a joystick that must be set to allow you to put the joystick in a centered position.

joystick - a stick or lever like device that allows you to control the operation of Draw ON.

joystick sense - the way the cursor moves on the drawing screen in response to mouse or joystick movements.

memory - the portion of the computer which stores information. Draw ON uses the memory of the Apple /// to store the drawing screens and parts of the Draw ON program.

menu - a list of choices that you can select. Draw ON displays a number of menus to aid you in use of the program.

menu item - one of the choices on a menu. In Draw ON you can select a menu item by moving the highlight over the item and pressing the button or **RETURN**.

modes - the various ways that Draw ON can display graphics information.

Mode 0 - Black and White, low resolution.

1 - Limited color, high resolution.

2 - Black and White, high resolution.

3 - Full color, low resolution.

mouse - similar to a joystick in function, a box like device that allows you to control the operation of Draw ON.

mouse driver - a portion of the Apple ///'s *Sophisticated Operating System* that allows you to communicate with the mouse. If you have a mouse attached to your Apple ///, Draw ON uses the mouse driver to communicate with the mouse.

multi-copying - see **brushing**.

numeric keypad - the thirteen keys on the right hand portion of the Apple ///'s keyboard. Draw ON uses the numeric keypad to select the various menus and options of Draw ON.

object - any collection of drawing tools (lines, dots, circles, etc.) that represent something on your drawing screen. This can be as simple as a stick figure of a person or as complex as an engineering drawing.

open cursor - usually represented by four cross-hair or dot cursors, it allows control of an entire region of the drawing screen.

Options Menu - the menu which allows you to select from some of the other menus that Draw ON has to offer.

pan - returning to the entire drawing screen after you have zoomed in on a particular portion of it.

pathname - the entire name of a file. If the file's name is **WOODBLOCK** and it is located on the diskette in drive 2, the pathname is **.D2/WOODBLOCK**.

pen color - the color used when you draw anything on the drawing screen. All of the tools that you draw with are drawn using the current pen color.

peripheral slot assignment - the *System Configuration Program* is used to set up the **Draw ON /// Start-up Disk** for the various interface cards. You have to tell this program what slots you have inserted your interface cards into. Some examples of interface cards that you must set the peripheral slot assignment for are: *PKASO Printer Interface Card*, *Mouse Interface Card* and the *ProFile Interface Card*.

pick up - see **preserve**.

pixel - a single element of the drawing screen. Each drawing screen is made up of a number of pixels arranged like graph paper.

pixel region - the group of pixels which surround a particular pixel on the drawing screen.

PKASO Printer Interface Card - a popular printer interface card for the Apple /// which allows you to connect your Apple /// to almost every parallel printer. Draw ON prints out your drawing through this device.

point cursor - the way the small controlling pointer on the drawing screen can look. This cursor type is a single dot.

polygons - a tool that Draw ON can draw with. This is an object with three or more straight sides. Examples are triangles, hexagons, etc.

Polygon Selection Menu - the menu which allows you to quickly select different polygons types to draw with. You can select a polygon, such as a pentagon, and then draw this object on your drawing screen.

port - this term refers to the two joystick ports on the back of the Apple ///. You can connect a joystick to either of these ports and use it as the controlling device for Draw ON.

prefix - the path of the name of the file. If the file's pathname is **.D2/WOODBLOCK**, you can set the prefix to **.D2/** and then refer to the file with just the name **WOODBLOCK**.

preserve - this procedure is used in making copies of objects on your drawing screen. Once you have preserved (picked up) an object, you can preview and restore it to a different area of the drawing screen.

preview - see **dragging**.

ProFile - a common hard disk drive.

Program Configuration Menu - the menu which allows you to perform operations which will affect the programs use. This is everything from printing out copies of your drawing, to setting the various program options, such as the responsiveness of the mouse and joystick.

program diskette - the **Draw ON diskette** that contains the **Draw ON Program**. This disk is used after the **Draw ON Start-up Disk**.

program parameters - these are things that the user can change such as the prefix, the aspect ratio of circles, audio feedback on/off and more. They are saved in a file on disk so that each time you start-up Draw ON you do not have to reset them.

Program Status Box - this portion of the screen gives information of the programs status. It tells the values of the circle aspect ratio and eccentricity factor, and whether shape recording is on or off. It also shows which drawing screen you are working on and what graphics display mode you are drawing in.

prompt - the flashing cursor which appears when Draw ON requests that you type something. This can be either a line of text to place on the drawing screen or a pathname.

radius - the line from the center of a circle to the edge of the circle (the circumference).

rays - a tool that Draw ON can draw with. These are lines drawn from a central point on the drawing screen.

restore (RSI) - this is the process of making a copy of an object that you have picked up on your drawing screen. This object may be rotated, scaled up or down in size, or inverted as it is redrawn on your drawing screen.

restoring - this is the process of making a copy of an object that you have picked up on your drawing screen.

rubber banding - the process of picking up one end of a line and dragging the line around the screen without changing anything already on your drawing screen.

Scale Status Box - this portion of the screen gives information on the scaling factors. The X and Y scale factors along with the rotation angle are shown here.

scaling factor - the factors by which an object will be redrawn. If the X and Y scale factors are set to 2.0, after picking up an object, you can redraw it twice the normal size.

scratch pad - either an empty drawing screen or an empty portion of a drawing screen that you can draw objects on. Once you are satisfied with how the objects look on your scratch pad, simply pick them up and make a copy of them on your main drawing screen.

screen swapping - the process of exchanging the contents of one drawing screen for another.

scrolling - the process of moving to a different portion of your drawing area.

shape - a special feature of Draw ON that allows you to record the drawing of complex objects so that they can later be redrawn very quickly.

Shape Utilities Menu - the menu which allows you to perform shape operations. This can be anything from loading, saving or editing your shapes to setting the scaling factors for restoring the shapes.

SOS - (pronounced *sauce*) the Apple ///'s *Sophisticated Operating System*. It acts as a controller between the Apple /// computer and the software which uses the special features of the Apple ///.

SOS.DRIVER - the portion of the Apple ///'s *Sophisticated Operating System* that allows you to communicate with the various devices attached to your Apple ///.

spirograph - a tool that Draw ON can draw with. They are a series of polygons in a circular pattern.

start-up diskette - the Draw ON diskette that you first use to start Draw ON. It contains the Apple ///'s *Sophisticated Operating System*.

subdirectory - a file that is just like a disk directory. It holds the information concerning the files on that disk that are not in the main disk directory. Each subdirectory file is listed elsewhere on the disk, in the main disk directory or in another subdirectory.

text string - a line of text that is either to be printed on the drawing screen or used as a pathname in looking for a file on disk.

texture patterns - the patterns that Draw ON can use when filling an object or area on the drawing screen with a texture.

texture template - the template that helps you to change the way the texture patterns look.

transfer option - a feature of Draw ON that allows you to change the way graphics images are put on the drawing screen.

window - the portion of your drawing that is currently on your drawing screen. This can be scrolled or swapped with another portion of your drawing area.

zoom mode - a feature of Draw ON that allows you to zoom in on a small portion of your drawing to do detailed work.

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