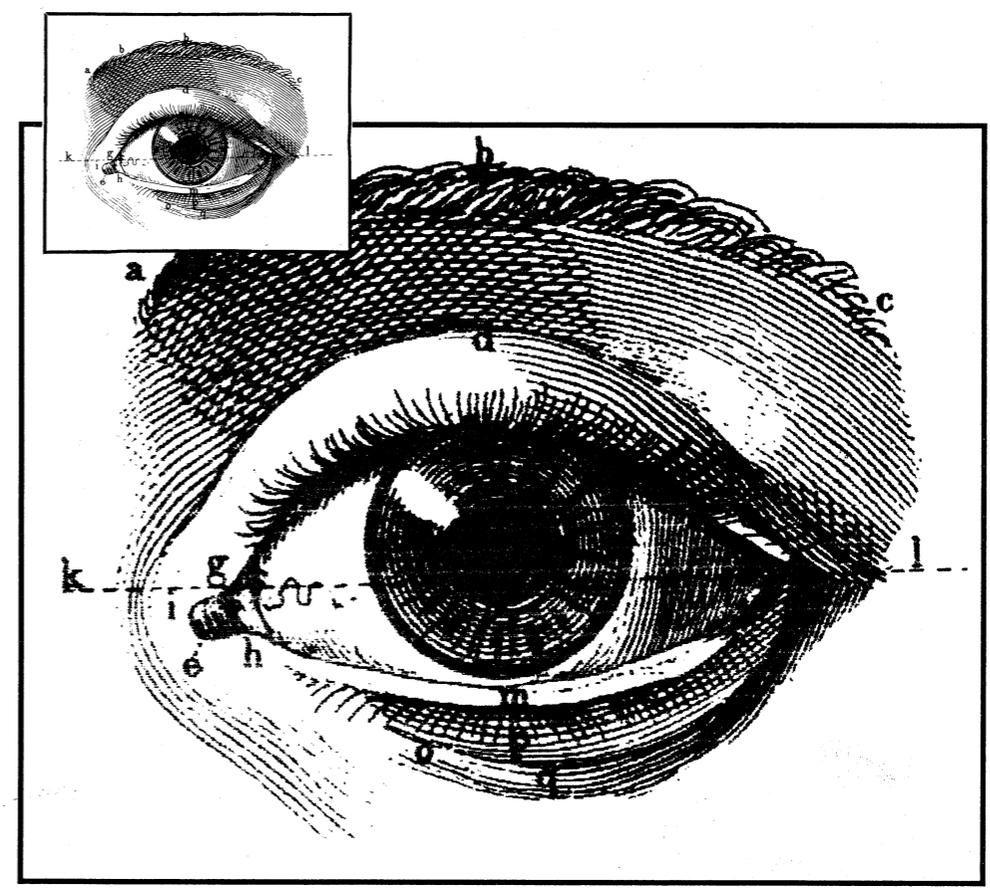




Thunderware®

ThunderScan®



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User's Guide

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Introduction

What Is ThunderScan?

ThunderScan from Thunderware turns your ImageWriter into a high-resolution scanner. It works with anything you can roll through the printer:

- Drawings.
- Illustrations.
- Logos.
- Photographs.
- Maps.
- Diagrams and sketches.
- Handwriting and printed documents.

To put the image into the computer, you scan it with ThunderScan.

ThunderScan takes an image and records all its shades of gray. Then you can make it lighter or darker, change the contrast, and even turn it into a negative. You can print it with an ImageWriter. You can save the image to change it with a painting program (like Dazzle Draw, Mouse Paint, Paintworks Plus, or DeluxePaint II), or put it into an AppleWorks document by using a desk accessory program (like Pinpoint GraphMerge).

We won't even try to tell you everything you can do with ThunderScan, but here are some ideas:

- Create collections of clip art.
- Insert illustrations into a letter.
- Turn maps, charts, and other teaching aids into computer files for transparencies or handouts.
- Send an image to another computer, using a communications program.

How To Use This Manual

This manual is designed to make ThunderScan easy to learn and use. If you know how to start up a program, load and save files, copy a disk, and use your ImageWriter, you'll be ready to start using ThunderScan.

- For instructions on installing ThunderScan, turn to Chapter One, *Installation*.
- If you want a short lesson on using ThunderScan, you'll find a good teacher in Chapter Two, *Learning ThunderScan*.
- If you want to jump straight into ThunderScan, you'll find a friendly consultant in Chapter Three, *Using ThunderScan*. This chapter explains nearly everything you can do with ThunderScan.

Some Important Things to Know about ThunderScan

- After learning ThunderScan and using it for a while, turn to Chapter Four, *Reference*, if you'd like technical information.

ThunderScan runs using Apple's ProDOS operating system. If you want to use images created with ThunderScan with DOS 3.3, refer to the section "Using Files with DOS 3.3" in Chapter Four, *Reference*.

When you're done using ThunderScan, be sure to:

- Disconnect the scanner from your Apple when you've finished scanning. Other programs may not work properly with the scanner connected. ThunderScan connects to your Apple II via the Game I/O connector and uses Pushbutton O Input (PB0) to send its digitized data. Other programs may not work properly with the scanner connected.
- Avoid pressing CONTROL-RESET with ThunderScan connected. Doing so may cause your Apple to reboot.
- If you're using an Apple IIgs, you must disable the print buffering option in the control panel before starting to scan.

One More Thing...

The manufacturers of ThunderScan hope that you will enjoy the scanner and take advantage of its full graphics potential. Please remember, however, that many images you may wish to scan are protected under copyright laws and should not be used without prior permission from the artists or photographers who created them.

Chapter One: Installing ThunderScan

You don't have to be a technician to install ThunderScan. You only need some basics:

- An Apple IIe (with a super serial card), Apple IIc or IIc Plus, or Apple IIgs computer (or a Laser 128 or 128EX).
- An ImageWriter I, ImageWriter II, or Wide-carriage ImageWriter printer.

And you'll need these parts from the ThunderScan package:

- The ThunderScan digitizing cartridge, or scanner. The scanner is the device that actually transfers your images from paper into a form your computer can work with.
- The plastic scan key, for the ImageWriter I or Wide-carriage ImageWriter.
- Velcro™ strips, to hold your scanner cable in place.

There's really not much work to installing ThunderScan. The following steps show you how to:

- Make a working copy of your disk.
- Connect the scanner.
- Install the scanner.
- Prepare for scanning.
- Configure ThunderScan.

Once you've finished these steps, you'll be ready to scan.

Making a Working Copy of Your Disk

Before scanning, use a utility program to make a working copy of your ThunderScan disk (if you're running with a single 5-1/4" drive, you'll need to make a disk for every scan you make, since only a small scan will fit on the ThunderScan disk). Use the working copy for day-to-day use, and put your master disk away in a safe place. To do this, use any utility program like Apple's *System Utilities* or *Filer*.

Connecting the Scanner to Your Apple II

ThunderScan and your printer are connected to different ports on your computer. The ImageWriter plugs into your printer port (for the Apple IIc, IIc Plus, and Apple IIgs) or your printer card (for the Apple IIe). The scanner plugs into the game port (the port you would use to connect joysticks for computer games, or a mouse on a IIc or IIc Plus). You should disconnect the scanner after every use.

To connect the scanner to an Apple II:

- Make sure your computer is turned *off*.
- If you have a mouse, joystick, or other device connected to the game port, disconnect it.
- Plug the cable from the scanner into the mouse port (if you have an Apple IIc or IIc Plus) or the game port (if you have an Apple IIe or Apple IIgs). Tighten the thumbscrews on the connectors so they don't come loose.

Installing the Scanner in the Printer

When you want to scan a document, you simply insert the scanner in your ImageWriter instead of a ribbon cartridge. These instructions show you how to install the scanner. After you've done it a few times, you'll find that it only takes a few seconds to get your printer ready to scan.

The scanner itself resembles a printer ribbon cartridge with a cable attached. (See **Figure 1.1**.) The "eye" of the scanner is in the nose of the cartridge. It may look off-center, but it's designed that way. Don't worry about it.

Velcro (to attach cable to scanner on an ImageWriter I or Wide-carriage ImageWriter).

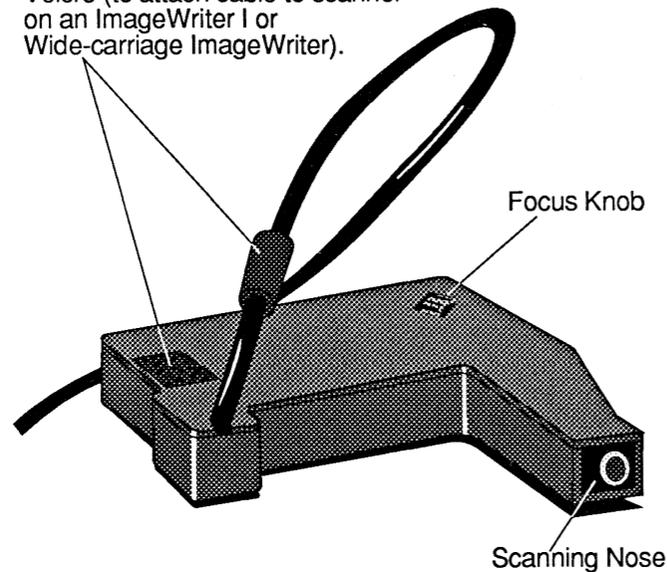


Figure 1.1
Important components
of the scanner

To install the scanner in the printer, follow these steps:

- Make sure both your printer and your computer are turned off.
- Remove the printer cover and set it aside.
- Gently move the print head assembly to the middle of the carriage. Take out the ribbon cartridge and set it aside.
- If you have an ImageWriter I or Wide-carriage ImageWriter, make sure the roller shaft on the printer is against the platen. (The roller shaft — sometimes called the paper bale — holds the paper against the platen.)
- Take the ThunderScan cartridge in both hands, and with the nose of the cartridge pointed toward the platen and angled slightly down (so it doesn't bump into the roller shaft), guide it onto the ribbon deck. (See **Figure 1.2**.)

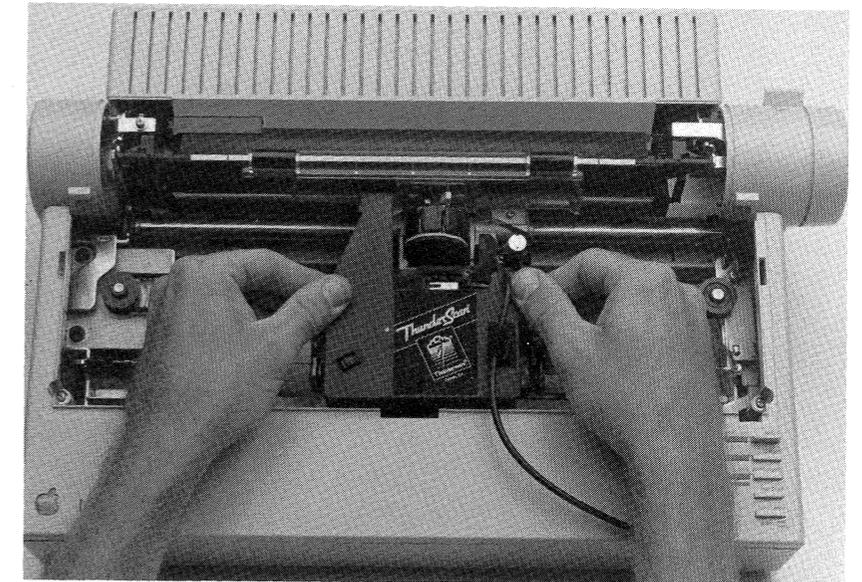


Figure 1.2
Installing the scanner

- Snap the scanner firmly into place. The two ribbon cartridge retainers should snap into the notches on the sides of the ThunderScan cartridge. If your scanner won't click into place completely, make sure it isn't caught on something.

Important Note

You may cause serious damage to the ThunderScan cartridge if you attempt to scan anything when the cartridge is not firmly in place.

- Double-check to make sure your printer is *off*. Grasp the print head assembly (not the scanner or ribbon cartridge deck) and gently move it as far to the right as it will go, then move it as far to the left as it will go. Make sure that nothing interferes with its movement and that the cable doesn't catch on anything.
- Make sure your hands are away from the printing mechanism. Turn on the ImageWriter. The print head and scanner will move to the left margin. On an ImageWriter I or Wide-carriage ImageWriter, the motion then stops. On an ImageWriter II, the print head and scanner return to the center, and the ribbon cartridge deck pivots down and back up. This startup routine will ensure that the scanning cartridge is properly seated. On an ImageWriter II, it will position the scanner so that the "eye" is in front of a hole in the plastic paper guide and the scanner light can shine on the image to be scanned. Don't worry if your ImageWriter registers a paper error.
- Turn off the ImageWriter.

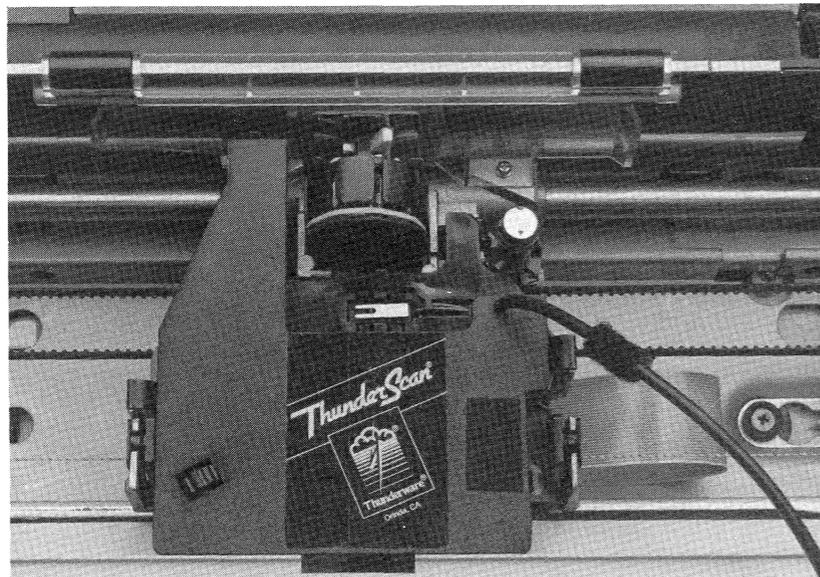


Figure 1.3
The scanner in place

Preparing the Printer for Scanning

Before you can scan an image, you need to prepare the ImageWriter for scanning. The procedure is the same for the ImageWriter I and Wide-carriage ImageWriter, but slightly different for the ImageWriter II.

Preparing the ImageWriter I and Wide-carriage ImageWriter

The scanner is designed to operate in these printers without the printer cover (the printer cover gets in its way). Normally the printer shuts down when the cover is removed, but the scan key makes it possible for the printer to operate without it.

To prepare an ImageWriter I or Wide-carriage ImageWriter for scanning:

- Find the small, square piece of Velcro that comes in the ThunderScan package. Remove the backing to expose the adhesive and stick it to the middle of the front panel of your ImageWriter. (See **Figure 1.4**.)
- Make sure that the scanner cable is attached to the scanner with the Velcro on the scanner cable.
- There's a piece of fuzzy Velcro about 14 inches down the scanner cable. Press it against the piece of Velcro you attached to your printer. This will keep the cable in place while you're scanning.
- Find the scan key. The round magnet of the scan key fits into the semi-circular recess normally occupied by the magnet on the printer cover. (See **Figure 1.4**.) The scan key allows the printer to operate without the printer cover.

An optional printer cover specially designed for use with ThunderScan is available from Thunderware. It can be used for both printing and scanning. For more information, contact Thunderware at the address or phone number on the back of this manual.

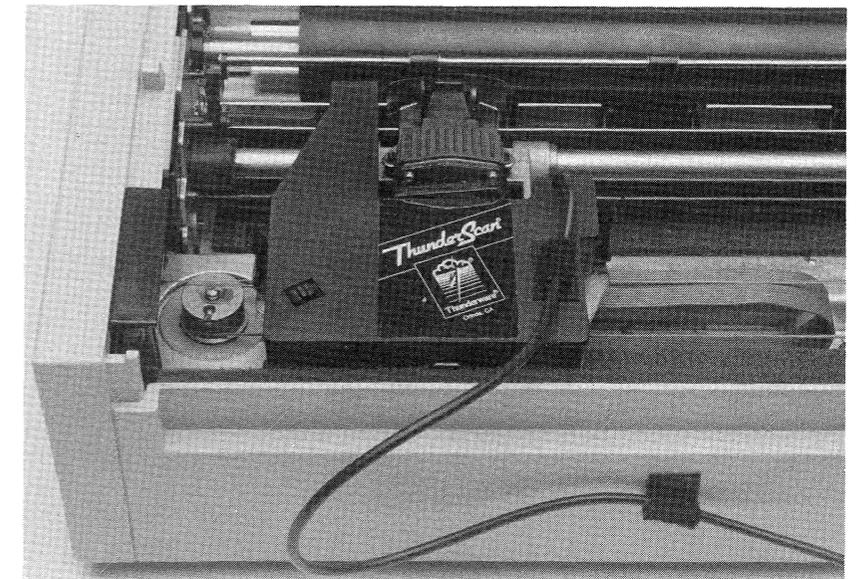


Figure 1.4
The scanner and scan key installed in an ImageWriter I or Wide-carriage ImageWriter

Important Note

Be careful when using the scan key. Keep hands, hair, pets, children and all objects away from the printer during operation. Never put the standard ImageWriter I or Wide-carriage ImageWriter cover on while you have the scanning cartridge installed. It may damage your scanner.

Preparing the ImageWriter II

To prepare the ImageWriter II for scanning:

- Before scanning, remove the clear plexiglass window from the printer cover. To do this, locate the two plastic catches on the front cover window that fit through the front cover. Gently press the tabs inward and carefully separate the two pieces. (See **Figure 1.5**.)

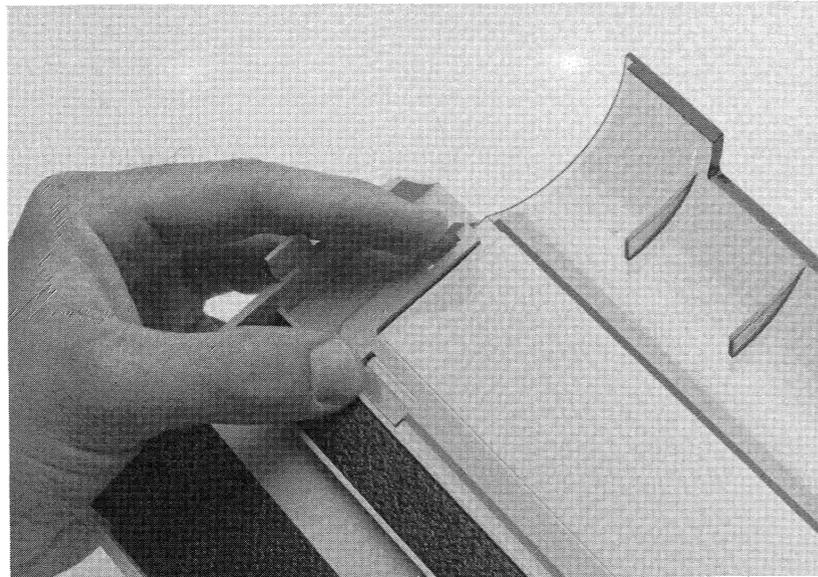


Figure 1.5

Detaching the window from the printer cover

- Adjust the paper thickness lever on your ImageWriter II to allow for maximum paper thickness. If you cannot locate the lever, refer to your printer manual.
- Put the cover (with the window detached) back onto the printer. The scanning cartridge cable should be routed over the top of the printer cover. Make sure that the Velcro on the cable isn't stuck to the scanner. (The piece of Velcro on the scanner is for use with other ImageWriter printer models.)
- Find the square piece of Velcro that comes in the ThunderScan package. Remove the backing to expose the adhesive. Stick it on the center of your ImageWriter II, about half way between the Apple logo and the control panel. (See **Figure 1.6**.)

- Find the piece of fuzzy Velcro about 14 inches down the cable that comes from the scanner. Press it against the piece of Velcro you just attached to your printer. This will keep the cable in place during scanning.

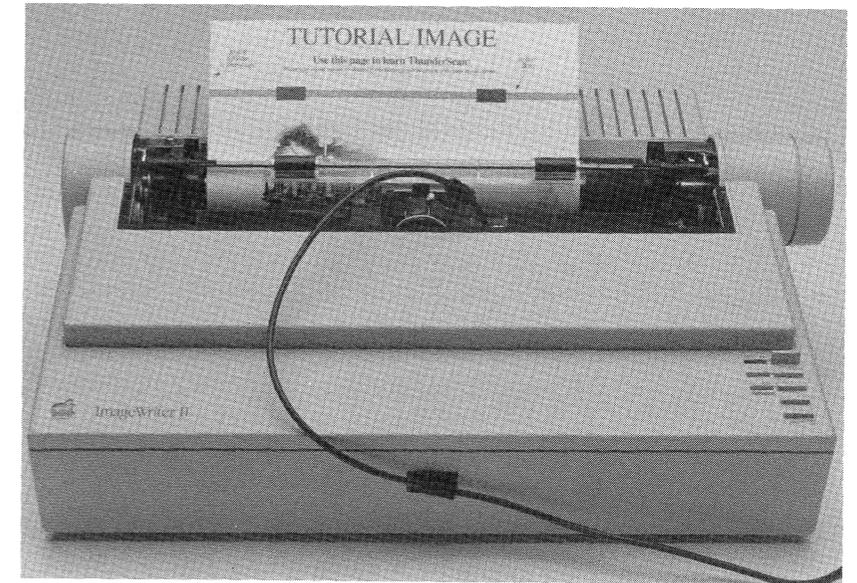


Figure 1.6

The scanner and printer cover installed in an ImageWriter II

Configuring ThunderScan for Your Printer

ThunderScan works with the ImageWriter I, ImageWriter II, and Wide-carriage ImageWriter. You have to tell ThunderScan which one you're using. This is done with the **Configure** command listed on the Main Menu. Unless you change to another printer, you have to do this only once, the first time you use the program. To choose your printer:

- Insert the ThunderScan disk in Drive 1 (ThunderScan comes in both disk formats, so you're ready to go whether you have 5-1/4" or 3-1/2" drives). Turn on your computer and monitor.
- When the Main Menu appears, type **C** (for Configure) and press **Return**.

The Configuration Menu appears:

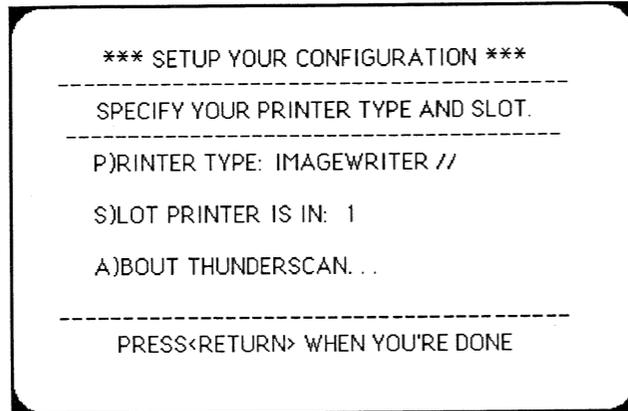


Figure 1.7
The Configure screen

The first two options let you specify your printer type and the slot that contains your printer card. The third option gives you some general information about the ThunderScan program. The printer option settings change each time you press the appropriate letter.

- To change the printer type, press **P** until you see the name of your printer.
- To change the number of the slot containing the printer card, press **S** until you see the slot number you need. (For the Apple IIc, IIc Plus, and IIgs, you're probably using Slot 1. For other models, peek inside the case to see which slot contains the printer card.) If the message **NOT RECOGNIZED** appears next to the slot number you've selected, it means ThunderScan doesn't recognize the card in this slot as a serial card. See "Hardware Compatibility" in Chapter Four, *Reference*.
- When you're finished, press **Return** to return to the Main Menu. Choose the **Quit** command if you want to leave ThunderScan.

Where to Go Next

For a quick lesson, read the next chapter, *Learning ThunderScan*. For more advanced information, read *Using ThunderScan*.

Chapter Two: Learning ThunderScan

If you feel ready to scan every loose piece of paper or photograph in sight, you may want to skip this chapter and refer instead to the next chapter, *Using ThunderScan*.

If you want some guidance as you scan your first image, you've come to the right place. In this chapter, you'll find out how to scan an image, play with it, print it, and save it.

By the time you finish this tutorial, you'll have worked with nearly all the major features of ThunderScan. It's easy. Just follow the directions!

Important Note

If you have a 3-1/2" drive, both ThunderScan and large scanned images can fit on the same disk. You're all set. If you have a single 5-1/4" disk drive, you will have enough disk space to scan only a small image. You should seriously consider the purchase of another disk drive (preferably, a 3-1/2" drive). If you have two 5-1/4" drives, format a blank disk to store your scanned image. (If you don't know how to format, the owner's manual for your computer tells you how.)

How to Begin

Make sure you have followed these steps before starting out. They are explained in Chapter One:

- Make a working copy of the ThunderScan disk.
- Install your scanner.
- If you have an ImageWriter I or Wide-carriage ImageWriter, put the scan key into the notch on the left side of the printer.
- If you have an ImageWriter II, remove the printer cover, separate the clear plexiglass window, and put the printer cover back on.
- Adjust the paper thickness lever on the ImageWriter II for maximum thickness.
- Configure your software for your system.
- If you're using an Apple IIgs, you must disable the print buffering option in the control panel before starting to scan.

Scanning an Image

To begin scanning, insert the ThunderScan disk into Drive 1 and reboot your computer. In a few seconds, ThunderScan's **Main Menu** will appear:

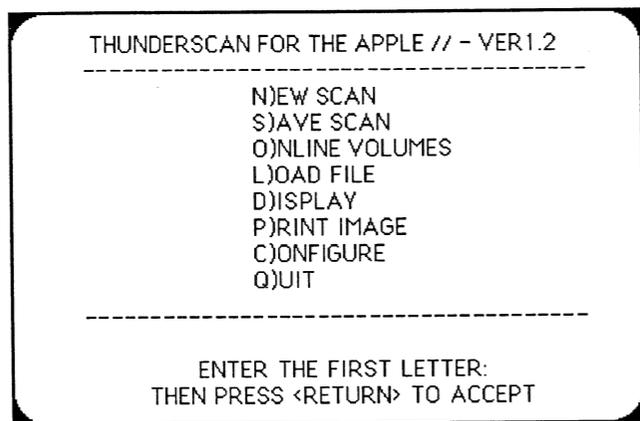


Figure 2.1
The Main Menu

The ThunderScan Main Menu lists commands that you can choose to perform different tasks. To select from the available choices, enter the first letter of the option. As you select from the menu, your choice is highlighted. To activate the choice, press **Return**.

Inserting Something to Scan

ThunderScan will scan documents correctly as long as they have an even white left margin of at least 1/4-inch along the entire left side of the page. If a document you want to scan does not have a sufficient white edge:

- Offset a piece of white paper behind your original so that a 1/4-inch white margin is created, or
- Photocopy your original so that it has a clean white left edge of 1/4-inch, or
- Select the Rough edge setting on the New Scan screen.

For this lesson, use the tutorial image (the picture of a train supplied in the ThunderScan package).

- Make sure that the printer is off and that all paper is removed from your ImageWriter.
- Set the release lever to the pin feed position to slide in the tutorial image easily (your ImageWriter manual shows you how).

- If you have an ImageWriter I or Wide-carriage ImageWriter, move the paper bail (sometimes called the roller shaft) toward you, away from the platen. (The platen is the big roller that the paper goes around.)
- If you have an ImageWriter II, pull the paper thickness lever all the way down toward you (allowing for maximum paper thickness).
- Insert the train original so that it is facing toward you after you roll it through the printer. The alignment guides printed on the picture will help you put the image in the proper position. Adjust the document so that the printed roller shaft bar is slightly below the actual roller shaft bar.
- If you have an ImageWriter I or Wide-carriage ImageWriter, push the paper bail back against the platen.
- Set the release lever back to the friction feed position and roll the document into place manually (refer to the guidelines on the tutorial image).

Now that your original is in the printer, you're ready to scan. When scanning on an original ImageWriter or ImageWriter II, originals should be inserted along the left edge of the platen. If you're scanning on a Wide-carriage ImageWriter, your original should be offset 3/8" from the left edge of the platen.

Preparing to Scan

Select the **New Scan** command on the Main Menu to begin the scanning process:

- Type N (for New Scan) and press **Return**.

The **Scan Select** screen appears:

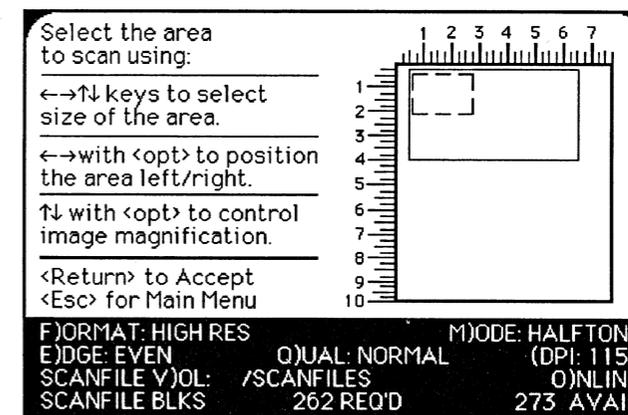


Figure 2.2
The Scan Select screen

The Scan Select screen is the control panel for scanning. With it, you can tell ThunderScan an area of your original to scan, how to show the image on the screen, where to save it, and much more.

Choosing Settings

The bottom of the screen lists options for you to choose from as you prepare to scan. The **Format** and **Mode** options let you specify how ThunderScan should save the image and show it on the screen. When you want to change one of these options, you press the first letter until you see the setting you want.

Try it! To change the format setting:

- Press **F**. Press **F** again until you see the original setting again.

Notice that the dotted outline on the page map changes whenever you change the format setting. You'll learn what this means in a moment.

To change the mode setting:

- Press **M**. And keep pressing **M** until you see the original setting again.

After playing with these settings a little, you're ready to choose the actual settings for your first scan. Not all settings can be used with every computer. For this tutorial, choose the settings for your computer from the chart below:

Computer	Memory	Format Setting	Mode Setting
Apple IIe	64K	High Res	Halftone
Apple IIe	128K	Double Res	Halftone
Apple IIc	Any Size	Double Res	Halftone
Apple IIc Plus	Any Size	Double Res	Halftone
Apple IIgs	Any Size	Super Res	Color

Figure 2.3
Available format and mode settings

The Apple IIe, Apple IIc and IIc Plus monitors can't show actual gray-shades recorded from an image on the screen. ThunderScan uses the **Halftone** mode to simulate gray-shades in an image on the screen by placing dots closer together or farther apart. The standard Apple IIgs monitor, however, can display true gray-shades as varying intensities of light.

Notice that the **Special** format is not included in the chart. It's explained in the next chapter.

Important Note

If you have an Apple IIgs and are scanning the the Super Res format, the Color mode will default to display gray-shades. (See "Filters" in Chapter Three, Using ThunderScan, to learn how to assign colors.)

Selecting a Disk to Store the Scanned Image

ThunderScan saves the scanned image on disk during scanning. This means that you can scan images that take up much more space than will fit in your computer's memory. Images take a lot of disk space to store. If you have a single 5-1/4" disk drive, you'll only be able to scan small images.

The **Scanfile Volume** is the disk that ThunderScan will use to save images. If you have a second disk drive, you may wish to use it to save your images. To select the disk to store the scanned image:

- Insert a formatted disk into Drive 2.
- Press **O** (for Online), so ThunderScan checks to see which disks are in which drives.
- Press **V** (for Volume) until you see the name of the disk you want to use. (If you only have a single disk drive, pressing **V** won't change anything.)

After you have the volume selected, you're ready to choose an area to scan.

Selecting an Area to Scan

Now look at the upper part of the Scan Select screen. The **page map** lets you select an area of your original to be scanned. The solid outline, called the **selection rectangle**, represents the area on the page that the scanner will record. The dotted line shows the effects of magnification. Using the arrow keys, you can adjust the size and position of the selection rectangle.

The standard selection rectangle on the screen is the size that you need for this lesson. As you can see on your screen, the selection rectangle starts one-half inch from the left edge of the page map and extends to the 6-1/2 inch point. It extends down 3-1/2 inches. This approximates the dimensions of the train picture. To reduce or enlarge the selection rectangle:

- Press the Arrow keys. The rulers show the exact position and size in inches of the selected area. Try it!

Notice that as the selection rectangle gets larger or smaller, the bottom line of the screen tells you how large an area you're selecting in blocks. (A block is 512 bytes, or half a kilobyte.)

To move the selection rectangle to the left and right:

- Hold down the **Option** or **⌘** key and press the Right and Left Arrow keys.

To continue this lesson, put the selection rectangle in its original position (so it starts one-half inch from the left edge of the page map, extends to the right to the 6-1/2 inch point, and extends down 3-1/2 inches).

Selecting a DPI for Scanning

You can also adjust the size of the image by specifying how large to represent it on the screen. Notice the number in the lower right corner of the screen for **DPI**. This is the number of dots per inch that ThunderScan records. When you increase DPI, you increase magnification. Higher magnification means that the image is larger, so that less of an image can be seen on the screen at any one time.

The dotted line rectangle shows you how big the computer screen is in relation to the image that's being recorded during the scan. This rectangle becomes smaller as you increase DPI: ThunderScan needs more area of the screen to show greater DPI. When the dotted rectangle is smaller than the selection rectangle, the entire image will not fit on the screen at one time.

To change the DPI:

- Hold down the **Option** or **⌘** key and press the Up and Down Arrow keys. Watch the size of the dotted line rectangle change as the DPI number changes.

For this lesson, choose a DPI that makes the dotted line rectangle about the same size (or a little smaller) as the selected area, so that the train image will fill your screen. If you see the message **CAN'T SAVE SCAN**, reduce the DPI until the message disappears. The chart below shows you the approximate DPI you should choose, depending on the format you selected.

Format	DPI
High Res	60
Double Res	125
Super Res	72

Figure 2.4
Approximate DPI
settings for scanning

Focusing the Scanner

The next step for scanning is focusing. The scanner must be focused on your image before every scan. To focus:

- Press **Return**.

The **Focus** screen appears with instructions you should follow.

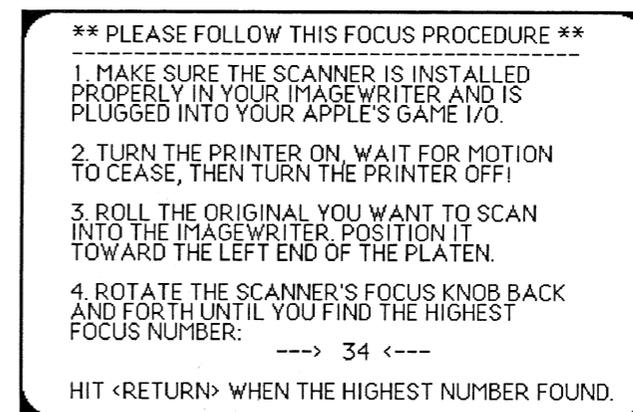


Figure 2.5
The focus screen

The focus number on the screen tells you when the scanner is in focus. Look at the image you're scanning, where the scanner's nose almost touches it: you can see a red light shining onto your original. That's the light that the scanner uses to record your image during scanning. If you are repeating a scan and the scanner is already focused, press **ESC** to continue.

- Make sure the printer and scanner are both hooked up to your computer. If the printer is on, turn it off.
- If you're working with an ImageWriter II, make sure the printer cover has been removed.
- Using the print head of the ribbon deck (don't use the scanner itself!), move the scanner until the scanner's nose is pointing at the whitest area on the train picture.
- Find the focus knob on the top side of the scanner. Roll it back and forth until the focus number on your screen is as high as it will go. The exact number varies from scanner to scanner, from original to original, and over time. Don't worry if the focus number flickers.
- If the number is greater than 60, move the focus knob until the number is 60. You want the highest focus number possible, but no higher than 60.
- When you've found the highest focus number that's not greater than 60, press **Return**. Follow the instructions on the screen to prepare the printer for scanning.

Starting the Scan

You've chosen your format and mode, selected an area to scan, selected the DPI, and focused the scanner on your original. Now you're ready to start scanning!

To start the scan:

- If you have an ImageWriter II, put the cover back on the printer. If you have an ImageWriter I or Wide-carriage ImageWriter, make sure the scan key is in its little slot on the left side.
- Turn on the printer and make sure the select light is on.
- Press **Return** and follow the instructions on the screen.

After a few seconds, ThunderScan's software prepares the printer for scanning. There will be a pause before scanning to give you a chance to roll the image back into position. Adjust the image without moving the scanner or turning off the ImageWriter. Then the scanner begins to move back and forth and the image starts to appear, line by line, on the screen.

Here's what you should see when the scanner stops scanning:

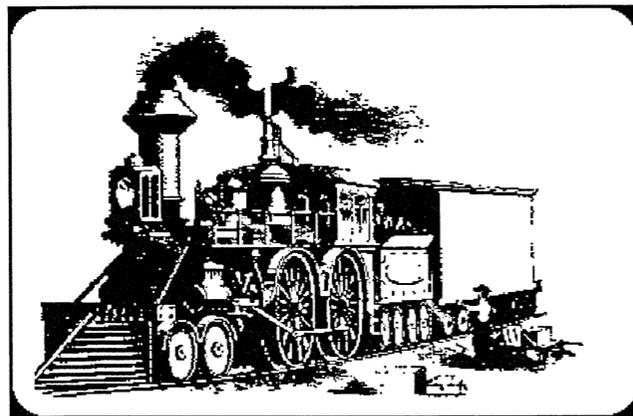


Figure 2.6
Scanned image of train

Your computer will beep three times to let you know when it's finished scanning. The image of the train might be too light or dark for your liking. Don't worry: you'll be able to change it later using the brightness and contrast controls.

Playing with ThunderScan

Scanning is just the beginning of what you can do with ThunderScan. You can change the brightness or contrast of an image and produce unusual effects.

Changing Brightness and Contrast

You can adjust the **brightness** and **contrast** to change the way your image appears on the screen. ThunderScan's brightness and contrast controls are similar to the controls on a television set.

To increase the brightness of your image:

- Press **B** (for Brightness).

The contrast and brightness controls appear at the bottom of the screen. The letters serve as sliders for the controls. You operate the sliders with the Left and Right Arrow keys.

- Press the Right Arrow key four times to slide the **B** (brightness) control a little to the right.

Notice that each time you press the Right Arrow key, you increase the brightness by one point. To see the effect of the change on your image:

- Press **Return**. (If you have an Apple IIGs, you don't have to press **Return**. The effects are instantaneous.)

ThunderScan redraws the image line-by-line, according to the new brightness control setting. Your image should look lighter.

The contrast control affects the range of grays in an image. In a low-contrast image you can't tell much difference between the darks and lights; in a high-contrast image, everything is black or white.

You adjust the contrast control like the brightness control, with the Right and Left Arrow keys.

- Press **C** to activate the contrast control.
- Use the arrow keys to change the setting.
- Press **Return** to see the changes to the image. (If you have an Apple IIGs, you don't have to press **Return**. The effects are instantaneous.)

Go ahead and experiment with the brightness and contrast controls. Move them up and down and see what happens. When you're finished experimenting:

- Press **B** to see the controls again.
- Press **N** (for Normal) to reset brightness to zero and contrast to 100%.

- Press **Return** to see the effects.
- Press **ESC** to go to the Main Menu.

Great! You've adjusted both brightness and contrast and seen the results of your changes. Now you're ready to change the way the image is displayed.

Changing the Way the Image Is Displayed

You can display an image in different modes. For example, you've been looking at the image in **Halftone** mode, which shows different shades of gray. Another mode, **Line Art**, gives you a stark black-and-white image, leaving out most of the gray.

Here's how to change display modes:

- Press **D** (for Display).

The **Change Display** screen appears:

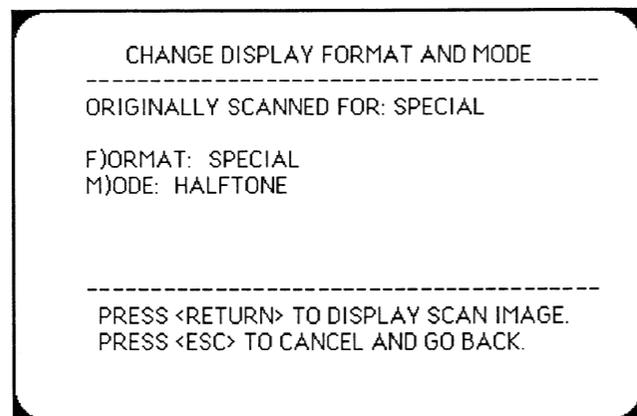


Figure 2.7
The Change Display screen

This screen tells you the current format and mode. The **Format** helps make the picture look right on the screen for different types of computer systems. The **Mode** determines how the gray-shades appear (or simulated colors, if you have a color monitor).

To change the display mode to line art:

- Press **M** (for Mode) until **LINE ART** appears. (If you have an Apple IIGs, you must change to the Ultra Res, Double Res or High Res format before you can choose the Line Art mode).
- Press **Return** to see the result.

Printing

Notice that the grays have disappeared, and you have a line art version of the train.

Congratulations! You've finished scanning an image and changing its appearance. Now you can print your image.

Begin by getting the printer ready for printing (instead of scanning).

- Turn off the ImageWriter. (Always turn off the printer when you change between the ribbon and scanner cartridges, or when you focus the scanner.)
- Disconnect your scanner. (Always disconnect it after you're finished scanning.)
- Take the train image out of the printer and load some paper.
- Replace the scanner with a ribbon cartridge.
- If you have an ImageWriter I or Wide-carriage ImageWriter, remove the scan key and replace the printer cover. If you have an ImageWriter II, put the paper thickness lever in the proper position and replace the printer cover.
- Press **ESC** to return to the Main Menu.
- From the main menu, type **P** (for Print). Turn your printer back on.

The **Prepare to Print** screen appears.

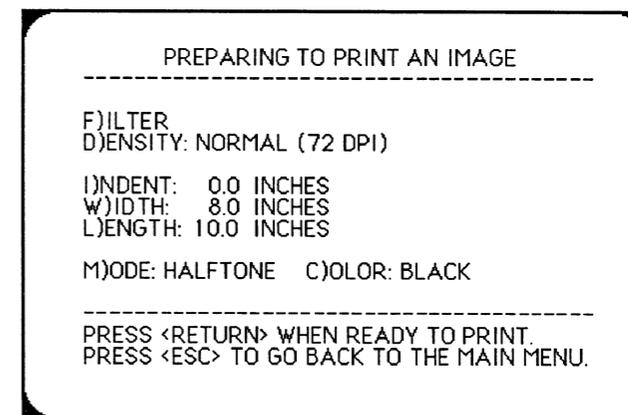


Figure 2.8
The Prepare to Print screen

Saving and Quitting

The following chapter, *Using ThunderScan*, explains how to change the options on this screen. For now, you'll print using the standard options.

- Press **Return**, and follow the instructions on the screen.

Your printer starts printing, and soon you have your own scanned image of a train.

After printing is complete, you should save the image. The **Save** command permanently stores the temporary file that was created for the image during scanning. To save:

- Press **ESC** to return to the Main Menu.
- Type **S** (for Save). Type **TRAIN** for the image name.
- Press **Return** to save the image.

After saving the image, ThunderScan returns to the Main Menu.

That's it! You've finished the tutorial.

Where to Go Next

You're ready to begin scanning in earnest. The next chapter, *Using ThunderScan*, and the following one, *Reference*, explain all of ThunderScan's features in detail.

Chapter Three: Using ThunderScan

ThunderScan lets you take images off paper and put them into the computer. Once you have an image in the computer, you can use the ThunderScan tools to adjust the image quality.

The process that puts an image into the computer is called **scanning**. You scan an image with a device (the **scanner**) that plugs into your printer. The scanner moves back and forth across the page, translating each point it sees into a dot corresponding to one of 16 shades of gray. This conversion is called **digitizing**. The whole computerized image consists of thousands of dots. ThunderScan remembers where each dot is and its corresponding shade of gray. Scan Image files are like maps of the gray-shades in an image.

With an Apple IIGs, you can see gray-shades on the screen. With other versions of the Apple II, the screen can only show black or white dots. ThunderScan figures out which dots to include on the screen to represent the image faithfully (this is called **dithering**). Although the changes you make to the image are reflected on the screen, altering an image on the screen never changes the gray map. ThunderScan still remembers the gray map, allowing you to make changes to the screen image, start over, and even produce many different images from the original Scan Image.

This chapter explains how to use ThunderScan. Make sure you have the scanner installed before you go any further. If you'd like to start with a little guided practice, you'll find a short lesson in Chapter Two, *Learning ThunderScan*.

Getting Ready for Scanning

If you have a second disk drive, have some blank formatted disks ready to store scanned image files. (Your owner's manual for your computer shows you how to format disks.) ThunderScan files can be quite large and you'll want to be sure to have enough room to store them.

Make sure you've installed your scanner. If you have an ImageWriter II, make sure you've removed the clear plexiglass window from your printer cover. If you have an ImageWriter I or Wide-carriage ImageWriter, make sure you've installed the scan key. (See Chapter One, *Installation*.) If you have an Apple IIGs, make sure you've disabled the print buffering option in the control panel before starting to scan.

Starting ThunderScan

You start ThunderScan as you would any other Apple II application:

- Insert the ThunderScan disk into Drive 1 and turn on your computer and monitor.

In a few seconds, ThunderScan's **Main Menu** appears:

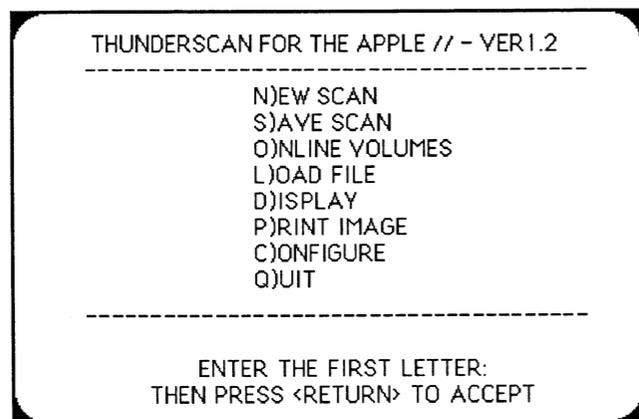


Figure 3.1
The Main Menu

Putting an Image into the Printer

Your original image can be anything that fits into the printer — within reason. If you'd like to work with an image that won't fit into a printer, make a photocopy of it. Use the photocopy as your original image.

To insert an original image into your printer:

- Remove any printer paper from the printer.
- Set the release lever to the pin feed position. This will allow you to slide in your original easily.
- If you have an ImageWriter I or Wide-carriage ImageWriter, move the paper bail (sometimes called the roller shaft) toward you, away from the platen. (The roller shaft is the little bar. The platen is the big roller).
- If you have an ImageWriter II, pull the paper thickness lever all the way toward you.
- If you have an ImageWriter I or an ImageWriter II, insert your original so that the left edge is flush with the left edge of the platen. If you have a Wide-carriage ImageWriter, your original should be offset 3/8" from the left edge of the platen. The photographs below illustrate the proper position for your original.

- If you have an ImageWriter I or a Wide-carriage ImageWriter, push the roller shaft back against the platen.
- Set the release lever to the friction feed position.

Figure 3.2
Proper position of original for scanning with an ImageWriter I or ImageWriter II. Note that the left edge of the original is lying even with the left edge of the platen.

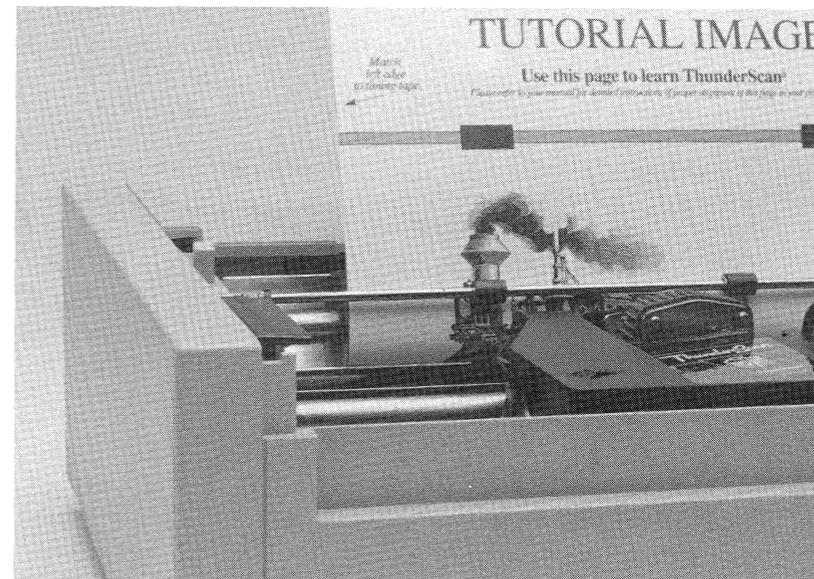
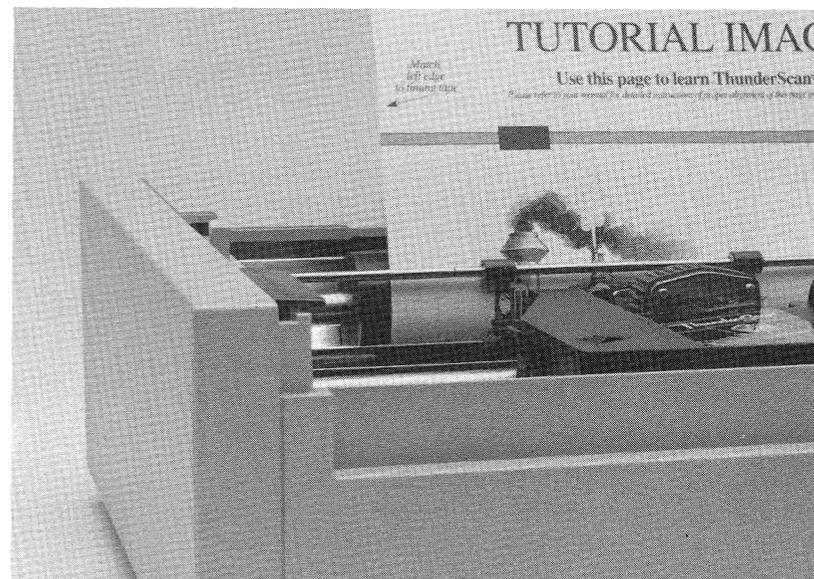


Figure 3.3
Proper position of original for scanning with a Wide-carriage ImageWriter. Note that the left edge of the original is positioned approximately 3/8" from the left edge of the platen.



Preparing to Scan

This section shows you how to take an image from paper and turn it into a computer file. Later sections show how to work with a scanned image.

Choosing New Scan

The **New Scan** command on the Main Menu begins the scanning process. To choose New Scan:

- Type N (for New Scan) and press **Return**.

The **Scan Select** screen appears.

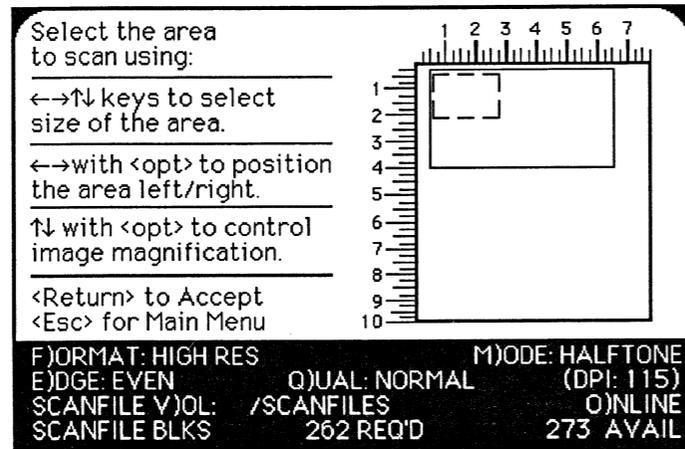


Figure 3.4
The Scan Select screen

Disk Space Required for a Scan Image

The amount of disk space required to store a Scan Image depends on three factors:

- The size of the area you've selected for scanning.
- The format used to display the image during scanning.
- The DPI selected for the scan.

The bottom two lines of the Scan Select screen tell you which disk or volume will be used to store the image, how much space is required, and how much space is available on the current disk.

Disk space is measured in blocks. A block contains 512 bytes (half a kilobyte). A file that requires 200 blocks will take up 100K of a disk. A standard 5-1/4" floppy disk stores 280 blocks. An 3-1/2" disk stores 1600 blocks. A hard disk stores even more.

When there's not enough room on a disk, the message **CAN'T SAVE SCAN** is highlighted at the bottom of the screen. You may be able to eliminate this message in several ways:

- Reduce the size of the selection rectangle.
- Change the format or reduce the DPI.
- Switch to another disk with more space available on it.
- Delete the file **BASIC.SYSTEM** from the ThunderScan disk (if you're saving to the ThunderScan disk).

If you have a RAM disk volume, use it as the Scanfile volume. Because ThunderScan writes the image file to disk while scanning, a RAM disk will speed up the process.

The next few sections explain how to do each of these tasks.

Selecting an Area to Scan

Use the page map to select an exact area of your original for scanning. You may want to measure the original image with a ruler before putting it in the printer. That will help you determine an area for scanning more accurately.

To select an area to scan:

- Use the arrow keys to expand or contract the selection rectangle over the area you want to scan.

The selection rectangle expands as you press the Right and Down Arrow keys. It contracts when you press the Left and Up Arrow keys. The rulers show the area selected in inches.

- To move the entire selection rectangle left or right, hold down the **Option** or **⌘** key as you press the Left or Right Arrow keys.

Choosing the Format

The **Format** determines how an image appears on your screen. Different formats represent an image with different numbers of dots (called **pixels**, for "picture elements") on the screen. For the Apple IIc and IIc Plus and most Apple IIe computers, High Res and Double Res formats are available. The Apple IIgs has Ultra Res and Super Res as well. Each format shows a different number of grayshades, from 2 (black and white) up to 16. Some monitors will display color, too.

The format you choose depends on whether you wish to display and print your scan directly from ThunderScan or save it for use with other applications, as well on the model and memory of your computer. The chart below shows the formats available for each Apple II model.

Format	Apple Model	Resolution	Display Shades
Special	All models	280 X 192	B&W
High Res	All models	280 X 192	B&W
Double Res	All models	560 X 192 140 X 192	B&W 16 colors
Super Res	Iks only	320 X 200	16 grays or colors
Ultra Res	Iks only	640 X 200	4 grays or colors

Figure 3.5
Formats for each
Apple II model

Important Note

ThunderScan's color is simulated rather than true color. When you scan a colored original with ThunderScan, it is translated into 16 gray-shades, and a shade of green and a shade of blue may appear as the same shade of gray to the scanner. However, it can represent each of the 16 gray-shades as a different color on a color monitor and print them using 7 colors with an ImageWriter II using a color ribbon. You'll be able to create interesting and unusual effects with this capability. Many painting programs give you more options with color.

Changing the Format

The current format appears at the top left of the scanning options section of the Scan Select screen. Option settings switch each time you press the first letter of the option name.

To change the format setting:

- Press **F** (for Format) until you see the setting you want.

Notice that as you change the format setting, the number of blocks required to save the image may also change.

Choosing a Mode

The **Mode** determines how an image will appear on the screen. Depending on the format setting, you can choose from three modes:

- **Halftone.** A halftone uses black and white dots to represent shades of gray. Lighter areas have more white dots, darker areas have more black dots.

- **Line Art.** A line art image appears in high contrast, with only white areas and black areas. Lighter shades of gray become white and darker shades of gray become black.
- **Color.** When used with a color monitor, all formats except High Res and Special can represent shades of gray as colors instead. (You can choose which colors will represent which shades — see "Filters," later in this chapter.) To display color, you must have a color monitor.

This chart shows you which resolutions can use which modes:

Format Setting	Mode Settings
High Res	Halftone, Line art
Double Res Color	Halftone, Line art
Super Res	Color
Ultra Res	Line art, Color
Special	Halftone, Line art

Figure 3.6
Available modes

The current mode appears at the upper right of the scanning options section of the Scan Select screen. Option settings switch each time you press the first letter of the option name.

To change the mode setting:

- Press **M** (for Mode) until you see the setting you want.

ThunderScan only shows you the modes available for the current format setting. If the mode you want doesn't appear, that means it isn't available with the current format setting. You'll have to switch to another resolution that permits the format you want.

Using and Setting DPI

Magnification is measured in **dots per inch (DPI)**, as shown in the DPI setting on the Scan Select screen. The DPI setting refers to the number of dots in each horizontal line of the screen used to represent a horizontal inch of the original. A DPI of 100 means that 100 dots on the screen represent one inch of the original. A DPI of 43 means that 43 dots represent an inch of the original (hence, more of the total image will appear on screen at one time if you choose a lower DPI).

You select the amount of magnification by adjusting the DPI setting which changes the size of the **dotted rectangle** on the page map. The dotted rectangle represents the size of the screen compared to the size of the scanned image. The size of the image is represented by the **solid rectangle**. At larger magnifications, only a little of the image will fit on screen, so the dotted rectangle is smaller than the image size. At lower magnifications, more of the image will fit on the screen, so the dotted rectangle may be larger than the image size.

The DPI control lets you specify how many dots on the screen to devote to each inch of your original. You can make a scanned image the same size, larger, or smaller than the original image you're scanning, depending on what you wish to do with it, and on the amount of free space on the disk that will store the image.

The standard DPI setting is 125 (which will result in a printout slightly larger than the original when printed with the ImageWriter at 72 DPI, and about half the size when printed at 144 DPI).

Determining DPI Settings in the Special Mode

If you wish to scan an image so it will print enlarged or reduced to a particular size, use the **Special** mode. A DPI setting of 72 DPI in the Special mode will yield a printout the same size as the original when printed at 72 DPI (the ImageWriter's standard setting). A DPI setting of 144 DPI in the Special mode will yield a printout the same size as the original when printed at 144 DPI (the ImageWriter's highest quality setting). If you wish to determine DPI settings for other sizes of printouts, use the formulas below.

<p>For 72 DPI printing:</p> $\text{DPI setting} = 72 \times \frac{\text{desired printing size (length or width in inches)}}{\text{selected scan size (length or width in inches)}}$
<p>For 144 DPI printing:</p> $\text{DPI setting} = 144 \times \frac{\text{desired printing size (length or width in inches)}}{\text{selected scan size (length or width in inches)}}$

Figure 3.7
Formulas to calculate printing size

Because ThunderScan DPI settings are limited, you must use the setting that is closest to the one determined by the formula.

To set the DPI:

- Hold down the **Option** or **⌘** key and press the Down Arrow to decrease magnification, or the Up Arrow to increase magnification.

Important Note

Changing formats will change the size of the dotted rectangle, but the DPI setting will remain the same. The size of the dotted rectangle changes to reflect the characteristics of the format settings chosen.

Setting the Edge Quality

To improve the quality of scanned images, original images should have a clean, straight, white left margin of at least 1/4-inch. If your image doesn't, you should make sure that the Edge option is set to **Rough**. However, scanning is faster and more accurate when you have a clean white margin of at least 1/4-inch that will allow you to set the Edge option to **Even**.

To change the Edge quality setting:

- Press **E** (for Edge).

Each time you press **E**, the setting switches between Rough and Even.

Setting the Scan Quality

ThunderScan can work at two speeds. The normal speed gives standard quality. The slower speed gives slightly higher quality, but is considerably slower. The **Quality** option lets you switch between normal and higher quality scanning.

To change the Quality setting:

- Press **Q** (for Quality).

Each time you press **Q**, the setting switches between normal and high.

Selecting a Disk to Store the Scanned Image

ThunderScan saves the scanned image on disk during scanning. This means that you can scan images that take up much more space than will fit in your computer's memory. The **Scanfile Volume** is the disk that ThunderScan uses to save images while scanning. You can change the **Volume** option in the same way as you change the other options.

To change the Scanfile Volume:

- Press **V** (for Volume) until you see the name of the disk or volume you want to use.

The Scanfile Volume command switches between disks that ThunderScan knows are on line. The space available figure at the lower-right corner of the screen shows how much space (in blocks) is available on each disk. If the space available on a disk is less than the space required to hold the image (shown in the

middle of the bottom line), the message CAN'T SAVE SCAN appears in the bottom line of the screen. You'll have to change to another disk that has more space, reduce the size of your selection, or change the resolution setting.

If you have an extra memory card in your computer that is configured as a RAM disk, ThunderScan considers the additional memory to be a volume just like any disk. The volume name will appear with the other scanfile volumes when you use the Scanfile Volume command. The scan will go faster if you have a RAM disk because it's faster to store the image in memory than on a disk drive.

For 3-1/2" disk drives: Your images should fit easily on the same disk as ThunderScan. If you have two drives, you still may want to save your images on a separate disk. Use the Volume command to specify on which disk you want to store your images.

For 5-1/4" disk drives: You'll be able to save larger images by putting them on a disk other than the ThunderScan disk. Keep ThunderScan in Drive 1 and a blank formatted disk in Drive 2. Use the Volume command to specify the disk to contain your images.

Identifying Newly Inserted Disks

If you want to put another disk in a disk drive to hold your image, you can take out the old image disk and insert a new disk. The **Online** command tells ThunderScan to identify the disks in the disk drives. If you switch disks, always use the Online command before using the Volume command.

To use the Online command:

- Insert the new disk into a disk drive.
- Press **O** (for Online).

ThunderScan checks to see which disks you have on line. Now when you use the Volume command, it will reflect the new disk names.

Important Note

Never remove the disk that the ThunderScan application is on. The program will not operate correctly if it is taken off line.

Scanning an Image

After you set the resolution, mode, edge quality, scan quality, and disk to hold the scanned image, you're ready to scan. The first step in the process is to focus your scanner on the original image you're going to scan.

Focusing

Different images have different ranges of grays. Focusing the scanner ensures the best response to each image. You should refocus the scanner each time you scan a new item. To begin:

- Press **Return**.

The **Focus** screen appears.

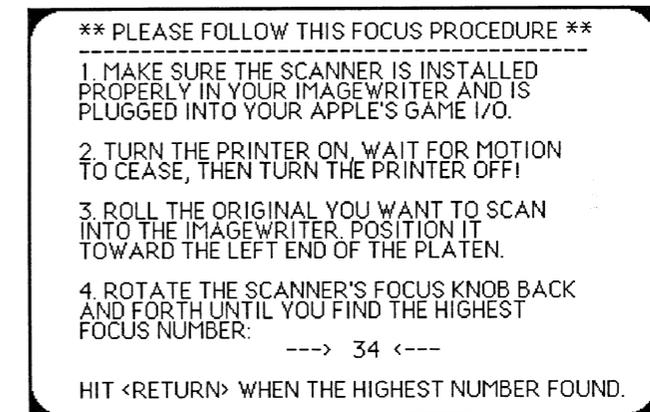


Figure 3.8
The Focus screen

To focus the scanner:

- Make sure your ImageWriter is off. Remove the cover if necessary and insert your original. Look at your original where the scanner nose almost touches it: you should see a red light shining onto your original. That's the light beam that the scanner uses to record your image.
- Use the print head (not the scanner itself!) to move the scanner until the scanner light is hitting the whitest portion of the area of the original which you wish to scan. If the area for scanning doesn't have areas that are absolutely white, focus on the lightest area to be scanned. (Grasp the print head assembly of the printer, rather than the scanner itself, whenever you need to move the scanner.)
- Find the focus knob on the top side of the scanner. Roll it back and forth until the focus number is as high as it will go. If you get a three-digit number, a number below 30, or if your computer makes a clicking sound, consult the troubleshooting section in Chapter Four, *Reference*. Don't worry

if the focus number flickers. If the number is greater than 60, move the focus knob until the number is 60. The exact number varies with the quality and the color of the paper used in the original. The important thing is to use the highest number that appears (but not over 60).

When the highest number is showing on the screen, press **Return** to continue to the **Prepare to Scan** screen. This screen provides last-minute instructions to follow before scanning.

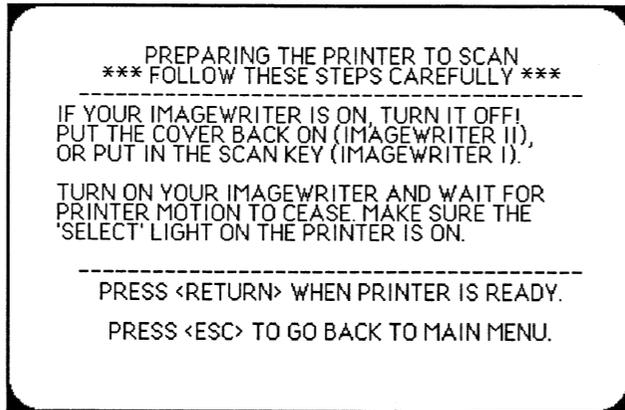


Figure 3.9
The Prepare to Scan screen

Starting the Scan

Before you can scan, the printer must be ready for scanning.

- For the ImageWriter II, replace the printer cover. For the ImageWriter and Wide-carriage ImageWriter, make sure the scan key is in place.
- Turn on your ImageWriter and make sure the select light is on.
- Press **Return**.

A final screen reminds you to adjust your document to the top of the area to be scanned. If you decide not to scan, you can return to the Main Menu by pressing **ESC**. When everything's ready to go:

- Press **Return**.

The scanner will zip back and forth in the ImageWriter, translating each point scanned to one of 16 possible gray-shades. As the image is scanned, the screen begins to fill with your image. Later in this chapter, "Working with a Scanned Document" explains how you can make changes to your scanned image.

Pausing During a Scan

If you need to stop a scan temporarily, you can use the **Pause** command. The Pause command tells ThunderScan to stop scanning until you're ready to continue.

To pause during a scan:

- Press **P** (for Pause).

To resume scanning:

- Press any other key.

ThunderScan resumes scanning where it left off.

Stopping a Scan in Progress

You may decide to stop a scan before it's finished. For example, the selected area might be different than you expected, or the magnification might be too large. You can stop a scan in progress by pressing **ESC**. ThunderScan stops the scan and warns you that you haven't finished scanning yet.

- Press **N** to continue the scan.
- Press **Y** to return to the Main Menu.

Saving

Perhaps you're planning to print your image directly from ThunderScan. Or, you might want to use your images with other programs or even with another kind of computer. In order to provide this flexibility, your image can be stored in two ways:

A **Scan Image** saves the entire ThunderScan image you've created, along with any gray-shade information that ThunderScan recorded (the gray map). Saving as a Scan Image allows you to return later to make more filter, brightness, and contrast decisions. Scan Image files are the only kind that ThunderScan can load, so keep a Scan Image copy of your file if you'll ever want to change contrast, brightness or filter controls, or if your image is larger than the other formats allow.

A **screen file** saves only the image showing on the screen. Screens may be saved in High Res, Double Res, Super Res or Ultra Res formats for importing into other programs (for example, an image displayed in Super Res and saved as a Super Res screen may be imported into Paintworks, DeluxePaint, or 8/16 Paint; an image displayed in Double Res and saved as a Double Res screen may be imported into DazzleDraw). Before saving as a screen file, be sure your image is displayed in the format accepted by the program you wish to use it in.

Important Note

It's a good idea to save all scans as Scan Images first. Scan Image files can be used as reference files. An infinite number of screen saves may be generated from a single Scan Image.

If you are working with ThunderScan on an Apple IIGs, there are three additional screen file formats that are available in Super or Ultra Res:

- A **Paintworks Screen file** can be used with painting programs like Paintworks. This file is a single screen in size.
- A **Paintworks Paint file** saves the screen showing and a full screen below it. It can be used with painting programs like Paintworks.
- A **DeluxePaint II file** saves the screen showing in Apple's Preferred File Format. It can be used with painting programs like DeluxePaint II.

The following section explains how to save a ThunderScan image in both the Scan Image and Screen File formats. Although you can save an image as a screen save, please remember that ThunderScan can open only Scan Image files.

Saving as a Scan Image

Scan Image files are saved through the **Save Scan** option on the Main Menu.

To save as a Scan Image:

- Press **ESC** to return to the Main Menu.
- Type **S** (for Save) and press **Return** .
- Type in the file name and press **Return** .

ThunderScan saves the file on the volume you specified in the Scan Select screen. (Since the image was actually saved on disk while scanning, the file is renamed and not saved, so this process is very quick.)

Saving a Screen File

- Load or create a Scan Image.
- Press **D** (for Display) in the Main Menu and press **Return** .
- Choose the proper format and mode (refer to the chart on the enclosed *Quick Reference Card* for more information).
- Press **Return** and allow the screen to fill with the image.

- Use the arrow keys to position the image.
- Use the contrast, brightness, and filter controls to fine-tune your image.
- Press **S** (for Save). The **Screen Save** screen appears:

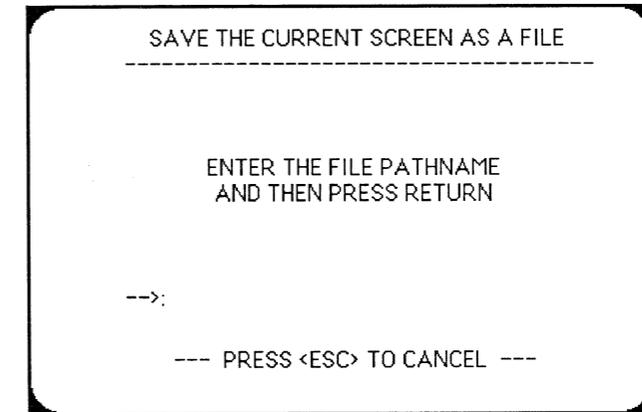


Figure 3.10
The Screen Save screen

- Type a slash (/) followed by a *full* pathname. The name of the screen file must be different than the name of the scan file to avoid errors.
- Press **Return** .

If you are working with an Apple IIgs and your image is displayed in Super Res or Ultra Res, an additional screen will appear:

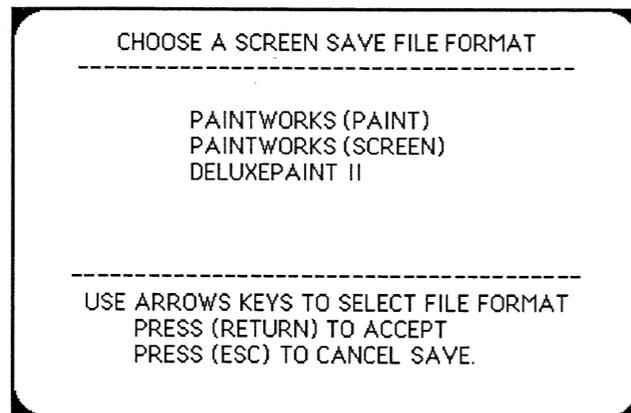


Figure 3.11
The Screen Save File
Format screen

Important Note

To import screen files into Paintworks, Deluxe Paint II, or other Apple IIgs-specific programs, remember to scan or display images in the Super Res or Ultra Res formats.

Loading an Image from Disk

Unless you've just scanned an image, you have to load an image from a disk in order to have something to work with.

To load an image, start from the Main Menu:

- Type **L** (for Load) and press **Return**.

The Load Screen appears.

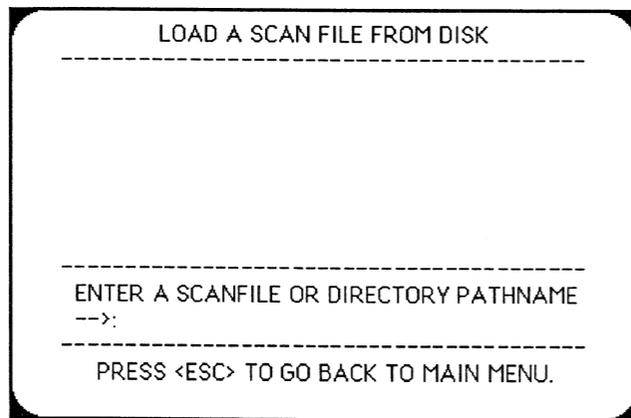


Figure 3.12
The Load screen

- If you know the complete pathname, type it in and press **Return**.
- If you don't remember the name of the volume with the image, do an Online from the Main Menu. If you know the volume name, type it in and press **Return**. The files and/or directories on the volume are listed. Use the Up and Down Arrow keys to move the highlighting to a Scan Image file (or directory) from the list.
- Press **Return** to accept your choice. The file name (or directory) you've chosen appears after the name of the current disk. (If you selected a directory, repeat this process until the complete pathname appears.)
- Press **Return** to confirm your choice.

Voilà! The image fills the screen.

Working with a Scanned Document

After you've finished scanning an image or opened it from a disk, you can move the image around to see more of it, adjust the contrast or brightness, or alter the way ThunderScan sees shades of gray using the filter command.

Seeing More of an Image

Since images you scan can be quite large, you might not see all of your image on the screen at once. So ThunderScan lets you **scroll** the image (move it around on the screen). The screen is just a "window" over the larger image.

To scroll the image:

- Use the appropriate arrow key (Up, Down, Right, or Left) to move the image in the direction you want.

To scroll inches at a time:

- Hold down the **Option** or **Apple** key while scrolling. When you've reached the edge of your image, your Apple will beep.

The image is moved on your screen and repainted in the new position. (If you're displaying an image in a format that's different from the format in which it was originally scanned, horizontal scrolling won't occur smoothly.)

Adjusting the Brightness and Contrast

ThunderScan uses the brightness and contrast settings to determine how to represent an image on the screen. ThunderScan's brightness and contrast controls are similar to the controls on a television set. After you choose the Brightness or Contrast command, the controls appear at the bottom of the screen.

Brightness. Changing the brightness makes the overall image lighter or darker. If an image appears too dark, you might want to increase its brightness using the Right Arrow. If it appears washed out, you might want to decrease its brightness using the Left Arrow.

To adjust the brightness of your image:

- Press **B** (for Brightness).

The brightness control is highlighted at the bottom of the screen. You operate the slider on these controls with the Left and Right Arrow keys.

- Press the Right or Left Arrow key to move the **B** in the brightness control to the right or left.

Each time you press an arrow key, you change the brightness by one point. If you're scanning with an Apple IIgs in Super Res or Ultra Res, the effects are instantaneous.

- If you're using an Apple IIe, IIc, or IIc Plus, press **Return** to see the effect of the change on your image.

ThunderScan redraws the image line-by-line, according to the new brightness control setting. Your image should look lighter or darker, depending on whether you increased or decreased the brightness.

Contrast. Changing the contrast alters the range of light and dark in an image. Increasing contrast (by using the Right Arrow) makes light areas lighter and dark areas darker. Dark grays become black, and light grays become white. Decreasing the contrast (using the Left Arrow) reduces the difference between light and dark.

The contrast control affects the range of grays in an image. In a low-contrast image you can't tell much difference between the darks and lights; in a high-contrast image, everything is black or white.

You adjust the contrast control highlighted at the bottom of the screen as you do the brightness control, with the Right and Left Arrow keys. To adjust the contrast of your image:

- Press **C** (for Contrast).
- Press the Right or Left Arrow key to move the **C** in the contrast control to the right or left.

Each time you press an arrow key, the contrast changes. If you're scanning with an Apple IIgs in Super Res or Ultra Res, the effects are instantaneous.

- If you're using an Apple IIe, IIc, or IIc Plus, press **Return** to see the effect of the change on your image.
- To reset Contrast and Brightness settings to their normal modes, simply press **C** or **B**, and then press **N** (for Normal).

Filters

When you scan an image, ThunderScan records each dot it sees as one of 16 gray-shades. Depending on the format and mode you have selected, ThunderScan uses a particular **filter** to determine how to show the image on screen. Normally the filters are set to show each gray-shade as close to the natural shade as possible. You can change the filters to change the way the image appears. For example, if certain gray-shades appear a little dark, you can assign a lighter shade of gray to them. Or you can invert the gray-shades, making darks light and vice-versa, to produce a negative image. For resolutions that show color, you can specify which gray-shades you want to appear as which color.

You access the filter for the format and mode you've selected by pressing **F** (for Filter) while an image is on screen. The **actual** gray-shades in the left column are the shades that ThunderScan records for the image. There are 16 gray-shades ranging from white to black. The **palette**, on the right, is a collection of gray-shades (or colors) that you can use to represent the actual shades on the screen or in printing. The **assigned** shades, in the middle, are the shades chosen from the palette for each actual shade. Normally, the assigned shades are the same as the actual shades.

The **Halftone/Line Art Gray Filter** lets you choose from the standard palette of 16 gray-shades for High Res or Double Res formats (except in the color mode). Although the High Res and Double Res formats don't actually display gray-shades on the screen, this filter determines the distribution of white and black dots used to represent grays.

You can use this filter to make a negative image. Simply reverse the order of the assigned gray-shades, so that white is represented by black, black by white, and so on.

Figure 3.13
Halftone/Line Art
Gray Filter

*** HALFTONE/LINEART GRAY FILTER***		
ACTUAL	ASSIGNED	PALETTE
WHITE	WHITE	WHITE
GRAY 1	GRAY 1	GRAY 1
GRAY 2	GRAY 2	GRAY 2
GRAY 3	GRAY 3	GRAY 3
GRAY 4	GRAY 4	GRAY 4
GRAY 5	GRAY 5	GRAY 5
GRAY 6	GRAY 6	GRAY 6
GRAY 7	GRAY 7	GRAY 7
GRAY 8	GRAY 8	GRAY 8
GRAY 9	GRAY 9	GRAY 9
GRAY 10	GRAY 10	GRAY 10
GRAY 11	GRAY 11	GRAY 11
GRAY 12	GRAY 12	GRAY 12
GRAY 13	GRAY 13	GRAY 13
GRAY 14	GRAY 14	GRAY 14
BLACK	BLACK	BLACK

H)ISTOGRAM R)ESET
USE OPTION AND ARROW KEYS TO SELECT AND
ASSIGN COLORS. PRESS <RETURN> TO EXIT.

The **Double Res Color Filter** lets you assign different colors to gray-shades (if you have a color monitor and have selected the Color mode), resulting in a color effect for your image. Color allows you to create different and unusual effects with your images.

Figure 3.14
Double Res
Color Filter

*** DOUBLE-HIRES COLOR FILTER***		
ACTUAL	ASSIGNED	PALETTE
WHITE	WHITE	WHITE
GRAY 1	YELLOW	YELLOW
GRAY 2	GRAY 2	GRAY 2
GRAY 3	PINK	PINK
GRAY 4	AQUA	AQUA
GRAY 5	LT BLUE	LT BLUE
GRAY 6	GREEN	GREEN
GRAY 7	DK GREEN	DK GREEN
GRAY 8	PURPLE	PURPLE
GRAY 9	RED	RED
GRAY 10	ORANGE	ORANGE
GRAY 11	BROWN	BROWN
GRAY 12	GRAY 1	GRAY 1
GRAY 13	BLUE	BLUE
GRAY 14	DK BLUE	DK BLUE
BLACK	BLACK	BLACK

H)ISTOGRAM R)ESET
USE OPTION AND ARROW KEYS TO SELECT AND
ASSIGN COLORS. PRESS <RETURN> TO EXIT.

The **Super/Ultra Res Gray/Color Filter** lets you select *either* 16 grays *or* colors from a palette of 16 grays and 16 colors if you have an Apple IIGs and are displaying in the color mode. You can choose all gray, all color, or a combination.

Figure 3.15
Super/Ultra Res
Gray/Color Filter

** SUPER/ULTRA-RES GRAY/COLOR FILTER**			
ACTUAL	ASSIGNED	PALETTE	
WHITE	YELLOW	WHITE	YELLOW
GRAY 1	YEL-GRN	GRAY 1	YEL-GRN
GRAY 2	CYAN	GRAY 2	CYAN
GRAY 3	AQUA	GRAY 3	AQUA
GRAY 4	ORNG-YEL	GRAY 4	ORNG-YEL
GRAY 5	GREEN	GRAY 5	GREEN
GRAY 6	LT BLUE	GRAY 6	LT BLUE
GRAY 7	ORANGE	GRAY 7	ORANGE
GRAY 8	RED-ORNG	GRAY 8	RED-ORNG
GRAY 9	RED	GRAY 9	RED
GRAY 10	MAGENTA	GRAY 10	MAGENTA
GRAY 11	PINK	GRAY 11	PINK
GRAY 12	VIOLET	GRAY 12	VIOLET
GRAY 13	PURPLE	GRAY 13	PURPLE
GRAY 14	MED BLUE	GRAY 14	MED BLUE
BLACK	DK BLUE	BLACK	DK BLUE

H)ISTOGRAM R)ESET
USE OPTION AND ARROW KEYS TO SELECT AND
ASSIGN COLORS. PRESS <RETURN> TO EXIT.

The **Ultra-Res Line Art Filter** provides a palette of four gray-shades.

Figure 3.16
Ultra Res Line Art Filter

*** ULTRA-RES LINEART FILTER ***		
ACTUAL	ASSIGNED	PALETTE
WHITE	WHITE	WHITE
GRAY 1	WHITE	GRAY 5
GRAY 2	WHITE	GRAY 10
GRAY 3	WHITE	BLACK
GRAY 4	GRAY 5	
GRAY 5	GRAY 5	
GRAY 6	GRAY 5	
GRAY 7	GRAY 5	
GRAY 8	GRAY 10	
GRAY 9	GRAY 10	
GRAY 10	GRAY 10	
GRAY 11	GRAY 10	
GRAY 12	BLACK	
GRAY 13	BLACK	
GRAY 14	BLACK	
BLACK	BLACK	

H)ISTOGRAM R)ESET
USE OPTION AND ARROW KEYS TO SELECT AND
ASSIGN COLORS. PRESS <RETURN> TO EXIT.

Important Note

The *Super Res* and *Ultra Res* filters default to gray-shades. Press *R* (for *Reset*) to toggle between between color and gray palettes.

Using Filters to Change Shades

You can adjust the way that shades of gray and colors are displayed on the screen by assigning alternate shades from the palette. First choose the filter you want, then adjust the assigned shades. The histogram (see "Histogram" below) can help you decide which shades to assign.

You can look at the filters when you are displaying an image. To see the filter for your format and mode :

- Press *F* (for *Filter*).

You can choose new gray-shades or colors from the palette to represent the actual gray-shades recorded for an image. The instructions for changing the shades are the same for all filters.

To select the shade you wish to change, you must first make sure the Assigned Shades column is activated by highlighting the Assigned column head:

- If the column head is not already highlighted, press the Left Arrow key.

You may now proceed to select a shade to change. You select a shade by highlighting it:

- Press the Down and Up Arrow keys to move the highlighting up and down in the Assigned Shade column.

Once you've highlighted a shade, you can change it. The currently assigned shade is highlighted in the palette. You can select a different shade from the palette to represent the assigned shade.

To select a different shade from the palette:

- Press the Right Arrow to activate the **Palette** column. The column head will be highlighted.
- Press the Up or Down Arrows to select a different shade.

As you move the highlighting through the shades of the palette, the setting of the assigned shade changes. To change another shade, use the Left Arrow to activate the Assigned Shades column once more, and repeat the above procedure.

Copying Assigned Shades

If you want the image to appear in just a few shades for a posterized effect, you can copy shades, instead of changing each assigned shade individually. To copy an assigned shade:

- Activate the Assigned Shades column, and select the shade you wish to change by highlighting it with the Up or Down Arrow keys.
- Activate the Palette column by pressing the Right Arrow key and selecting the first shade you want to copy.
- Use the left arrow key to return to the Assigned Shades column.
- Hold down the **Option** or **⌘** key and press the Up Arrow to copy up, or the Down Arrow to copy down.

Each time you press the Up or Down Arrow key, you copy the selected palette shade to the adjacent assigned shade.

Resetting the Filter

If you decide you don't like your changes to a filter, you can reset it to normal. To reset a filter:

- Press **R** (for Reset).

The assigned shades become the same as the actual shades once again. If you're using the Super Res or Ultra Res format, pressing **R** more than once will cause a filter to alternate between standard settings for gray-shades and color.

Histogram

ThunderScan's **histogram** shows what percentage of each shade is present in a screen image. It serves as a guide when you are using the filters to assign shades and colors.

You can see a histogram when you are using the filters to assign shades and colors. To see a histogram:

- Press **H** (for Histogram).

A histogram like this one appears:

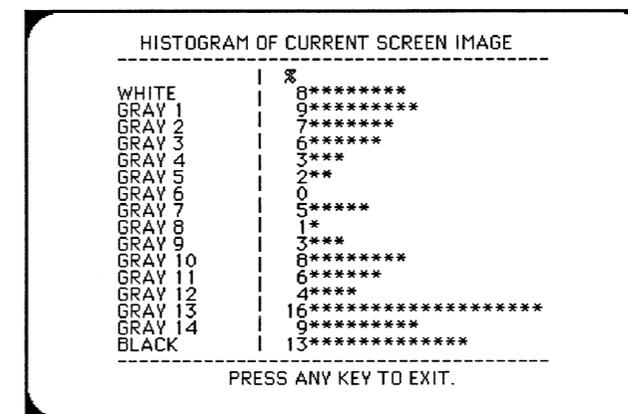


Figure 3.17
The Histogram screen

If you press **H** before a screen is completely refreshed, the histogram will reflect only a portion of the screen showing instead of the entire screen.

To leave the histogram:

- Press any key.

You return to the filter (or image which was on the screen).

Rescanning

Suppose after having tried a variety of contrast and brightness settings you still don't have an image you like. Maybe it's too small and you decide you want an enlargement. Or perhaps you want to reposition the image in the printer. You can always rescan the original image.

- From the Main Menu, type **N** (for New Scan) and press Return.

A message may appear, reminding you that you haven't saved your earlier scan as a Scan Image. Follow the instructions on the screen. If you don't wish to focus again, you may press **ESC** at the focus screen.

Printing

ThunderScan offers many options for printing on your ImageWriter. Before printing an image, you must load a Scan Image file or perform a new scan first. To print with an ImageWriter:

- Make sure you've disconnected the scanner and replaced it with a ribbon cartridge. Insert paper into your printer.
- If you have an ImageWriter II, adjust the paper thickness lever to the proper position for printing.
- Go to the Display screen and use the arrow keys to position the image on the screen. The upper left corner of the screen will be the upper left corner of your printout. If you want to print the entire image, use the arrow keys to move to the upper left corner. (You'll know you've reached an edge when your Apple beeps.)
- Make sure you've adjusted the image to your satisfaction with the contrast and brightness controls.
- Press **ESC** to go to the Main Menu.
- Type **P** (for Print) and press Return.

The Prepare to Print screen appears.

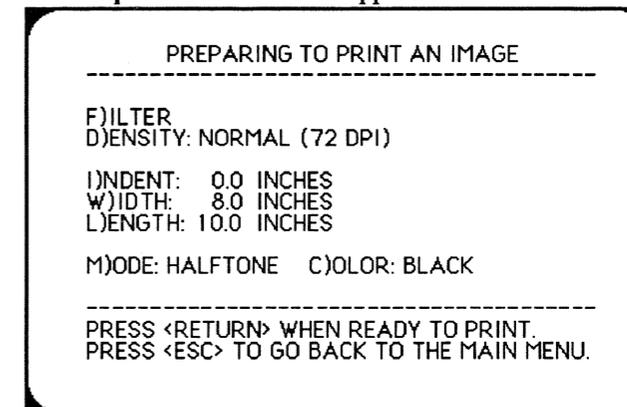


Figure 3.18
Prepare to Print screen

The Prepare to Print screen lets you change the filter for printing, select the print density, specify a location on your page for the image to print, and change styles for printing. ThunderScan prints images in three different styles: halftone, high-contrast, or gray.

- The **Halftone** style is usually best for images that contain gray-shades, such as photographs.
- The **Line Art** style is best for high-contrast images with few or no gray-shades. Maps, schematics, and logos are examples of images that usually print best in the line art style.
- The **Gray** style is usually best for low-contrast images with a lot of intermediate gray-shades. ThunderScan directs the ImageWriter to make extra passes to create a layered effect for more accurate printing of gray-shades. Expect images printed in the gray style to appear darker. For best results, use a well-used printer ribbon to compensate for the increased saturation of gray style printing.

If you're using an Apple IIe configured with an Apple Super Serial Card, the Gray print driver may not print correctly to an ImageWriter I or Wide-carriage ImageWriter. The Gray print style should print correctly to an ImageWriter II printer.

You may wish to experiment with different printing styles to get the effect you desire. The samples shown here illustrate the difference between printing styles.

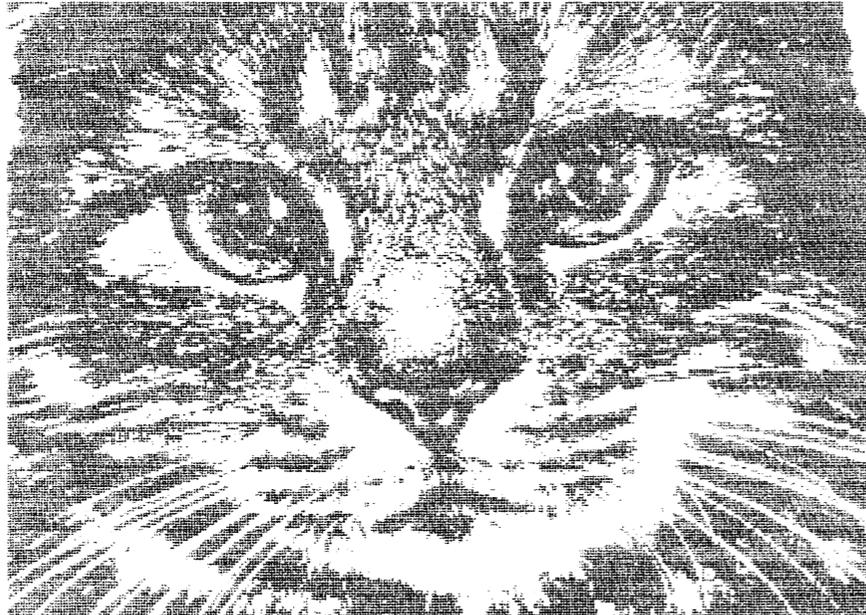


Figure 3.19
Line art

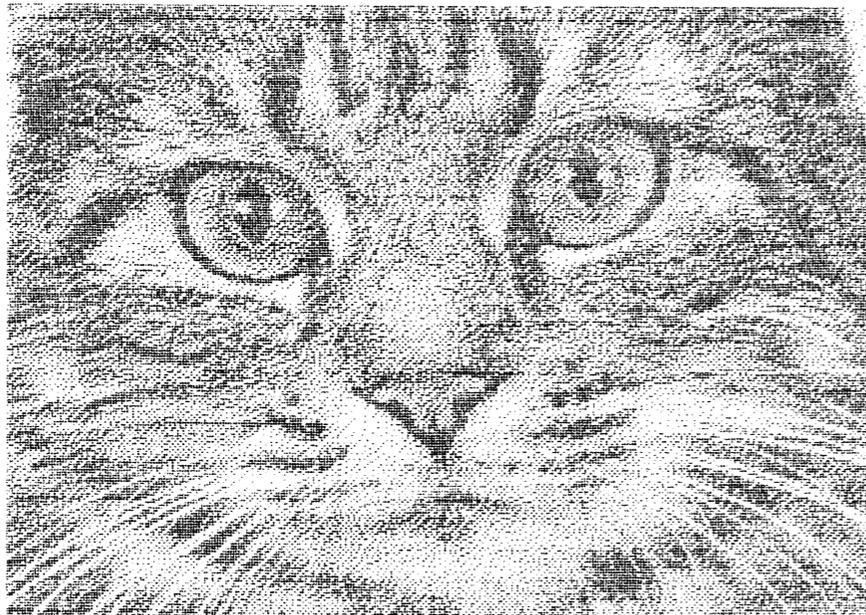


Figure 3.20
Halftone

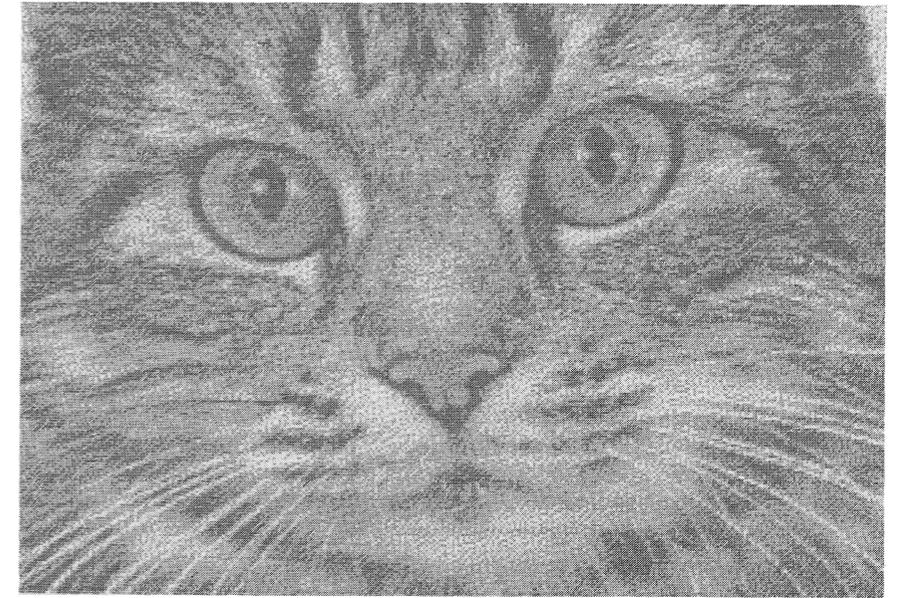


Figure 3.21
Grays (photographed for
more accurate reproduction)

Important Note:

When printed in the Halftone Mode, some images may look slightly different from the way they appear on screen. If at first you don't achieve a desired result, use the contrast and brightness controls to alter the image to your satisfaction and then reprint it.

About Color Printing

If you have an ImageWriter II and a color ribbon, you'll be able to print your images in any single color or in a variety of color combinations. To specify a single color:

- Press **Return** to return to the Prepare to Print screen, if necessary.
- Press **M** (for Mode) until you see the Halftone, Line Art, or Gray style you desire.
- Press **C** (for Color) until you see the color you want.

If you choose to print with your ImageWriter II using the COLORS mode, your image can be printed in up to seven colors. Using the **ImageWriter II Color Filter**, you can assign each of the 16 gray-shades a color:

- Press **M** (for Mode) from the Prepare to Print screen, until you see the colors mode.
- Press **F**. The **ImageWriter II Color Filter** appears.

This filter gives you control over the appearance of your printout. The ImageWriter II Color Filter works in the same way the filters work which control the appearance of an image on the screen. To help you decide which colors to assign to gray-shades, you can use the Histogram and Reset options as outlined in other sections. To achieve other color effects, you may wish to use the printing options found in many painting programs.

Choosing a Density

You can print your image at normal density, or you can specify higher density printing to print at 50% reduction. If you select **High Density**, you'll get an image half the size (1/4 the size by area) but double the resolution. If you choose this option, you may want to increase the brightness and lower the contrast of the image (while the image is on screen) or use an older ribbon with slightly faded ink when printing.

Determining Location and Printout Size

The indentation setting determines how far from the left edge of the page the image will print. The width and length settings determine how much of the image (up to 8" by 10") will be printed. To change indentation, width, or length:

- Press the letter for the setting you want to change.
- Use the Left and Right Arrow keys to adjust the settings.

When you're finished with the printing settings:

- Press **Return** .

A screen appears with some reminders. Be sure to take out the scanner, insert a ribbon cartridge in the printer, and load the printer paper. Replace the printer cover, turn on the printer, and make sure the select light is on. When you're ready to print:

- Press **Return** .

ThunderScan starts to print your image. After printing is finished, you return to the Main Menu.

Tile Printing

Tile printing is necessary when an image is too large to be printed on a single sheet of paper. ThunderScan does not have an automatic tile-printing feature, but it is possible to tile-print an image manually by following the procedure below:

- Display the image in the format it was scanned in.

- Scroll to the upper left hand corner of the image using the arrow keys.
- Press **ESC** to go to the Main Menu.
- Print the image by following the printing instructions above.
- Press **ESC** to return to the Main Menu and redisplay the image.
- Scroll to the right so that the right edge of the portion of the printout that you just printed is on the left edge of the screen.
- Press **ESC** to return to the Main Menu and print the image.
- Continue scrolling and printing until the entire width of the image is printed.

If the image is longer than a single page, you will need to scroll down and begin working your way across the image from left to right again, scrolling and printing each page. After you've printed the entire image, you can tape the pieces together.

Stopping Printing Early

To stop printing before the ImageWriter is finished:

- Press **ESC**.

When you're finished using ThunderScan, go to the Main Menu to quit:

- Type **Q** (for Quit) and press **Return** .

If you haven't saved your Scan Image yet, the Save screen appears. Follow the instructions on the screen. If you've saved an image to a RAM disk, be sure to copy your scan image to disk before turning off your computer.

Quitting ThunderScan

Disconnecting the Scanner

Whenever you leave ThunderScan, you should disconnect the scanner. Other software may not operate properly with the scanner connected. Simply unplug the scanner from the computer and remove the scanner cartridge from the printer before inserting a ribbon cartridge. Be sure to put the scanner in a safe place.

Chapter Four: Reference

Tips for Better Images

Using ThunderScan is like using most devices: the more experience you have, the more proficient you become. Even though ThunderScan is easy to use, there are a lot of variables that can affect the appearance of images. The following reminders and guidelines should help you on your way to mastering ThunderScan:

- Be sure to follow the focus procedures carefully.
- Higher quality originals mean better scanned images. This even applies to photocopies. All are not equal. Use the best originals available.
- For best scan quality, choose originals with straight white left margins of at least 1/4-inch which extend down the full length of the page, or offset a piece of white paper behind your original to create a white edge of at least 1/4-inch.
- Colors in the original will be recorded as shades of gray. Warm colors (like reds, oranges, and yellows) will be lighter shades. Cool colors (like greens, blues, and purples) will be darker shades.
- Folds and wrinkles in the original may show up as dark lines. Try making photocopy of the original and using correction fluid to cover the lines left by the fold or wrinkle.
- Images too small to roll reliably through the ImageWriter can be taped or pasted to a larger piece of paper. Be sure it's attached so that it stays flat. Or get a sheet of matte acetate (available at art supply stores). Tape a small original to the glossy side of the acetate and scan the original through the dull side.
- Some materials may be too thick to roll through your ImageWriter reliably. If you have trouble feeding something around the platen, or if the roller shaft won't hold it firmly against the platen, that's a good indication that it's not appropriate scanning material for ThunderScan.
- Glossy, shiny, and some textured surfaces may not scan well. You may get better results scanning a photocopy. For a glossy original, you might try a matte spray (available at most art supply stores).
- If you see the **CAN'T SAVE SCAN** message but don't want to lower magnification, try inserting a disk with more space available on it, or decrease the size of the area to be scanned — scanning two sections

If You Have Problems...

separately, if necessary. If the image is still too big, use a copy machine to reduce your original before scanning.

- The scanner is a delicate optical instrument. Treat it gently — especially the scanning sensor in the nose. A fingerprint on the scanning lens can cause poor scanning. Care for your scanner as you would any piece of high-quality optical equipment.

If you're having trouble with your scanner, the following sections should help you. Go to the section below that best describes the trouble you're having and see if the suggestions given solve the problem.

Images Too Light

- Try decreasing brightness or increasing contrast settings.
- Be sure you've followed the focus procedures when starting a scan.
- Clean your lens.
- Check to see that your original isn't wrinkled or too thick for the printer.

Images Too Dark

- Try increasing brightness and decreasing contrast controls.
- For a particularly glossy or shiny image, make a photocopy or coat your original with matte spray (available at art supply stores).
- Tape your original to a sheet of matte acetate (available at art supply stores) so that scanner looks at the original through the dull side of the acetate.

Jagged or Uneven Lines

- Try scanning at high quality instead of normal quality.
- Make sure you have a clean white straight left margin of at least 1/4-inch that extends down the entire length of the page (if you don't, set the Edge setting to Rough).
- Try scanning at a higher magnification and reducing during printing.

Poor Quality Images

- Be sure you've followed the focus procedures when starting a scan.
- Clean your lens.

- Check the condition of your original. The type of paper, ink or a glossy finish can affect scanning quality. Try scanning a photocopy of your original, using high-quality white bond paper.
- Try scanning at high quality instead of normal quality.
- Try scanning at a higher magnification and reducing during printing.
- Make sure you have a clean white straight left margin of at least 1/4-inch that extends down the entire length of the page (if you don't, set the Edge setting to Rough).
- If you're using an Apple IIgs, you must disable the print buffering option in the control panel before starting to scan.

Scanner Not Responding

During focusing or scanning, you may get a message saying SCANNER NOT RESPONDING. Check to see that:

- The scanner is properly installed in the ImageWriter.
- The cable from the scanner is plugged into the game port.

Scanner Will Not Move

Check to make sure that:

- The printer is plugged into the printer port (or the IIe super serial port).
- The proper printer type and slot are selected with the Configure command from the Main Menu.
- The cover magnet, modified cover, or special ThunderScan printer cover is in place, that the ImageWriter is turned on, and that the ImageWriter's select light is on.

No Focus Number

If you can't get a focus number, but you are sure everything is properly connected, check to see that your unit is getting power. With your computer turned on and the scanner connected, check to make sure that there is a small red light shining out through the nose of the scan cartridge and onto your image in the printer. If there is no red light, your scanner may be in need of service. Contact Thunderware at the address or phone number on the back of this manual for assistance.

Low Focus Number

If your scanner registers a focus number below 30 on a white original, check to see that the scanner's lens is clean. Refer to "Taking Care of Your Scanner" below. If after cleaning you still have a low focus number, check the alignment of the sensor with the hole in the paper guide of the ImageWriter II. If the scanner is aimed too high, remove the scanning cartridge and gently press down on the center of the plastic ribbon deck. The deck should snap into its correct position.

Three-Digit Focus Number (or Clicking Sound)

If your scanner registers a three-digit focus number (or makes a clicking sound), your original may be too glossy. Either scan a photocopy of the original or spray it with a matte spray. If your problem is not due to a glossy original and you're using an ImageWriter II, the sensor may be misaligned with the hole in the paper guide. Call Thunderware's Technical Support team for assistance.

Scanner Scans Only White

- Be sure to re-focus before a new scan.
- Reset the printer by turning it off and back on.
- Check to see that the settings in the Configure screen are correct.
- The image may be larger than the screen. Use the arrow keys to scroll the image into view.

Reversed or Double Images

- Quit the scan and reset your ImageWriter by turning it off and back on.
- Refocus the scanner and follow the instructions on the screen.
- Make certain you don't touch or move the scanner while adjusting the paper before starting a scan.

Printing Problems

- If your printed image is too small, rescan the image at a higher DPI.
- If your printed image is too faint, readjust the paper thickness lever on your printer to a thinner setting.
- If the printed image looks snowy or clouded and not like the image that appears on the screen, re-display the image. Increase the contrast and brightness settings slightly and try printing again.

Returning Your Scanner for Service

If you are still encountering problems, contact us. If a member of our support staff determines that your scanner is in need of service, he or she will issue a **Returned Material Authorization (RMA) number** for you to note on the outside of your package. Please make a note of your RMA number in case you need to inquire about the status of a returned scanner.

Thunderware will promptly repair scanners and return them postpaid. Any repair work not covered under the warranty must be paid before we can return your scanner. To expedite the return of a scanner which requires an out-of-warranty repair, please provide us with a MasterCard or VISA credit card number, expiration date, and the full name shown on the card, along with your scanner.

Important Note

Thunderware cannot accept any unit without the required RMA number, so be sure to note it clearly on the outside of the package containing your scanner.

File Size Limitations

A scan file can be as large as will fit on the disk. When you select an area to scan, ThunderScan tells you how much disk space is needed to store the resulting image. The REQ'D number is the amount of space required. The AVAIL number is the amount of space available. These figures are expressed in blocks. A block is half a kilobyte (512 bytes). A 5-1/4 inch disk will hold 280 blocks. A 3-1/2 inch disk will hold 1600 blocks. For example, a High Res screen file is 17 blocks, and a Double Res screen file is 33 blocks. A Scan Image file of equivalent size is over 100 blocks.

Making the Best Use of Your Equipment

For your convenience, the ThunderScan application is not copy-protected and is supplied on both 3-1/2 and 5-1/4-inch disks. You may want to move files around to customize for the equipment you have. Scan Images tend to take up a lot of space, so you'll want to make as much room for them on disk as you can. These suggestions will give you more room on disks to store Scan Image files and files in other formats. If you're not sure how to format disks and copy files with your computer, see your Apple owner's manual for details.

3-1/2 Inch Drives

This is the optimal floppy-disk system, since a disk can hold images up to 1600 blocks in size. The ThunderScan application and system files take up about one-eighth of the disk, leaving plenty of room for scanned images on the same disk.

Two 5-1/4 Inch Drives

Put the ThunderScan disk in Drive 1 and put a disk with room for images in Drive 2. If you put a blank disk in Drive 2, you'll have the full 280 blocks available for storing an image.

Hardware Compatibility

One 5-1/4 Inch Drive

ThunderScan works best with two 5-1/4 inch drives or one 3-1/2 inch drive. The ThunderScan application and system files take up about two-thirds of the disk. If you have a single 5-1/4 inch drive, you can only save smaller images. To make more room, delete the file BASIC.SYSTEM from your working disk.

Hard Disk Drives

ThunderScan works with most ProDOS-compatible hard disks. If you want to scan large documents at high magnifications, a hard disk will make things much easier. To move ThunderScan to your hard disk, create a new directory and copy all the files on the ThunderScan disk (except ProDOS and BASIC.SYSTEM) to the new directory. When you want to run ThunderScan, you must use the PREFIX command to set the system prefix to the directory containing ThunderScan's files. Then, start ThunderScan by typing "-TS".

RAM Disks

If you have a RAM disk, you should use it as the SCANFILE volume when you scan. This makes scanning and displaying images significantly faster than any other kind of disk. Don't forget to copy the file to a floppy disk using a utility program like filer before shutting off your computer.

ThunderScan runs using Apple's ProDOS operating system. Disks and RAM disks that are ProDOS-compatible should work with ThunderScan.

Printer Cards

ThunderScan is designed to recognize and work with the standard printer port on the Apple IIc, IIc Plus, and IIgs, and with Apple's Super Serial Card on the Apple IIe. If you have another brand of printer card in your IIe and get the **NOT RECOGNIZED** message when you set your printer slot in the Configure screen, it means your printer card isn't compatible with ThunderScan's software.

Accelerator Cards

ThunderScan is very timing-sensitive while scanning, so it may not be compatible with all accelerator cards. If you have trouble scanning with your accelerator card active, turn it off. The Laser 128EX will not work correctly when accelerated. However, ThunderScan software will work correctly on an Apple IIgs or IIc Plus operating at accelerated system speeds.

Using Files with DOS 3.3

There may be times when you want to use High Res or Double Res screen files created with ThunderScan with programs that run using Apple's old operating system, DOS 3.3. The files ThunderScan creates are always in ProDOS format,

Taking Care of Your Scanner

so they have to be converted and moved to a DOS 3.3 disk. Use a ProDOS to DOS conversion program like CONVERT or Copy II Plus by Central Point software.

Be kind to your scanner. Treat it as you would any piece of precision optical equipment. It's pretty sturdy, but it's not unbreakable. It will hold up well under normal use. Avoid dropping it, of course, and try not to bump it against hard objects. Don't put things on top of the scanner. Do put your scanner in a safe place when it's not in use. You might store the scanner in its original box.

The scanner is virtually maintenance-free. If you notice dust gathering inside the opening in the front of the scanner, use a cotton swab to gently brush out the dust. If you accidentally get dirt or a fingerprint on the lens in the nose, dampen a cotton swab with glass cleaning or lens cleaning fluid and gently wipe it off.

File Formats

Scan Image Files

Scan Image files are the only files ThunderScan software will load. For more information on the Scan Image file format, contact our Technical Support team at the address listed on the back of this manual.

Screen Files

Screen files are binary representations of a screen. Screens may be saved as either simple High Res screens or Double Res screens, depending on the format displayed before saving. High Res screens can be used by programs that work with High Res images (such as MousePaint) and Double Res screens can be used with programs that work with Double Res images (like Dazzle Draw).

The following file formats are available for Apple IIgs users only. You must display your image in Super Res or Ultra Res to save in these formats:

- **Paintworks File:**
Paintworks Plus files are stored as C1 files (single-screen) or CØ files (paint or double-screen). Any program that can work with C1 or CØ files can open these images directly.
- **DeluxePaint II File:**
DeluxePaint II files are stored in the Apple-preferred format for Apple IIgs images. Any program that can work with images in Apple-preferred format can use these files.

Type	Aux. Type	Formats
C0	0	Paintworks
C0	2	DeluxePaint II (a.k.a. Apple Preferred)
C1	0	unpacked screen image

Figure 4.1
Super Res Files

Filters Available for Format and Mode Settings

ThunderScan's filters give you precise control over the appearance of images, both when displayed on the Apple screen and when printed. The filters available depend on the format and mode selected in the Change Display screen. The chart below shows the filter available for each format and mode combination:

Format	Mode	Halftone/ Line art gray	Double Res color	Super/Ultra Res gray/ color	Ultra Res Line art
High Res	Halftone	X			
	Line art	X			
Double Res	Halftone	X			
	Line art	X			
	Color		X		
Super Res	Color			X	
Ultra Res	Line art				X
	Color			X	

Figure 4.2
Format and Mode
Filters Available

ThunderScan Roadmap

Use this roadmap to find your place in the scanning process. An arrow between two screens means you can get from one screen to the other, usually by pressing **ESC** or **Return**. Note that there are one-way arrows and two-way arrows. One-way arrows mean that you can travel only in one direction: you cannot return to the first screen from the second. Two-way arrows mean that you can travel in both directions between screens.

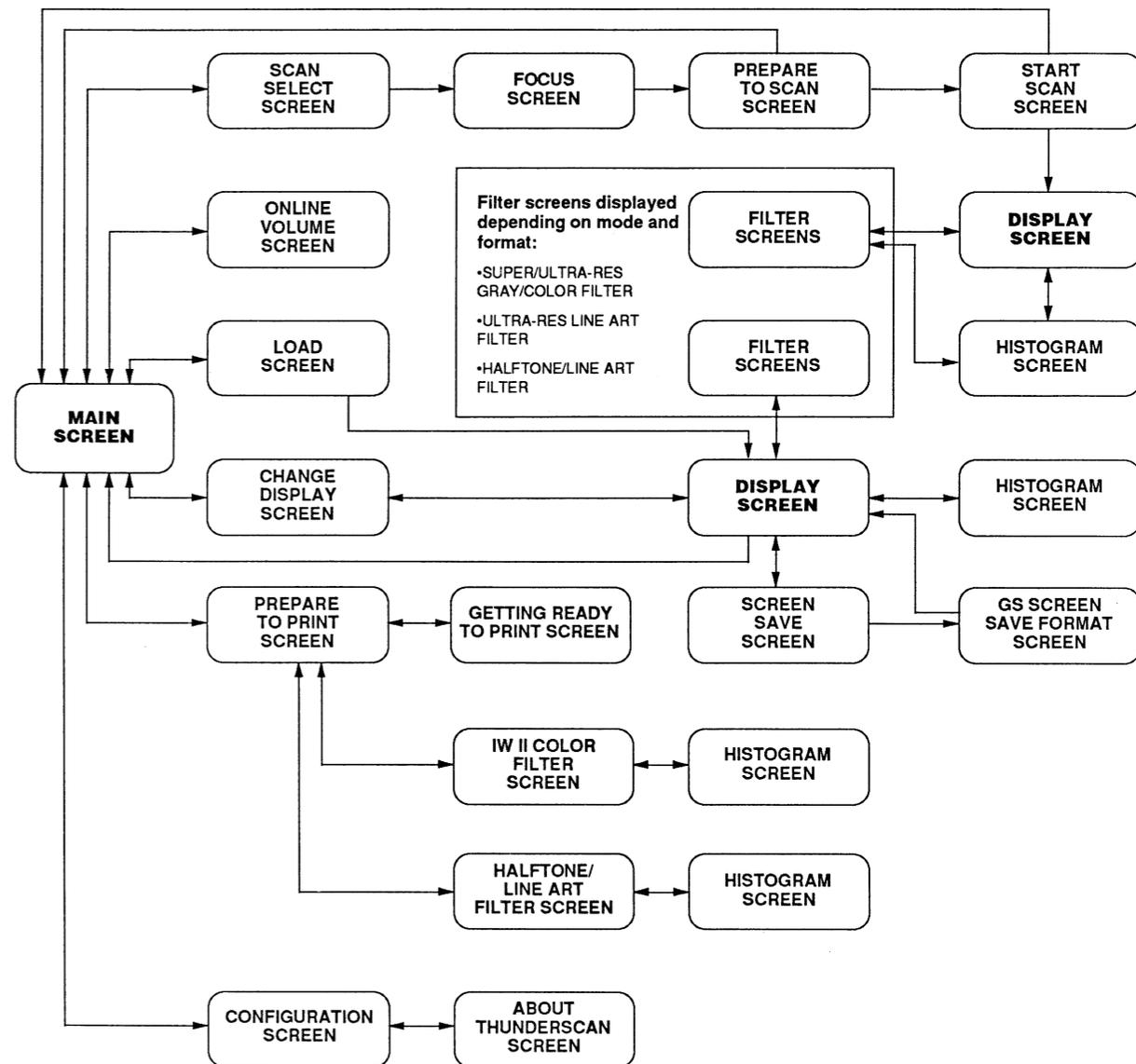


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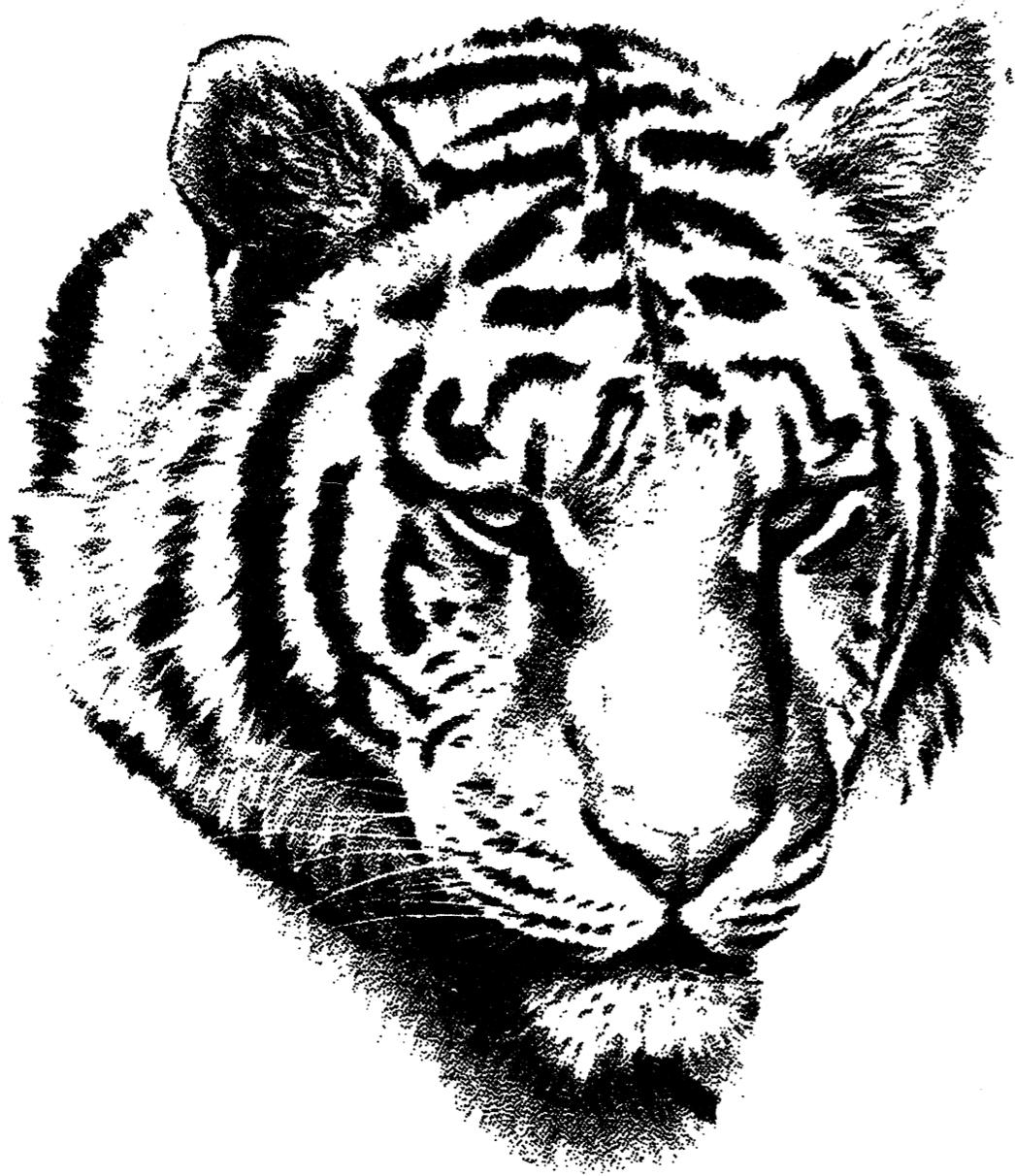


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