

Harmonie TM

v2.11b

*GS/OS Printer Driver Software
for the Apple IIGS*

*Installation and
User's Guide*

Published By
Shareware Solutions II
166 Alpine Street
San Rafael, CA 94901-1008
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All information contained in this manual is for the sole purpose of identifying and suggesting the nature of the products described and does not warrant the nature or quality of the product.

Specifications concerning Harmonie are subject to change without notice.

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Section 1 — Introduction and Overview

Welcome to Harmonie! Harmonie is a collection of printer drivers that unleashes the power of the IIgs for top quality printing. You may choose from among the very best of high-quality laser, inkjet, and dot-matrix printers.

Harmonie supports three high-performance printer classes: (1) laser printers that emulate the widely used Hewlett-Packard LaserJet standard, including the LaserJetIIp and LaserJetIV; (2) inkjet printers that emulate Hewlett-Packard DeskJet printers, including the DeskJet520 and DeskJet560C; (3) 24-pin dot-matrix printers that emulate EpsonLQ printers, including models manufactured by Epson, NEC, Panasonic, and many others. Harmonie also includes drivers for the ImageWriterII and ImageWriterLQ dot-matrix printers.

What is a Driver?

GS/OS (the standard operating system used on the Apple IIgs) does not understand how to communicate with various hardware components such as a printer or disk drives. Therefore, a driver is required to facilitate this communication. A driver is simply a software program that acts as a “middleman” between GS/OS and some hardware component. In this arrangement, GS/OS instructs the driver to carry out some task. The driver then attempts to carry out its assignment and reports back to GS/OS.

What's On The Disk

There are several utilities on the Harmonie disk, in addition to the various printer drivers, that help to simplify installation. These include Installer, Printer.Test, and Read.Me. There is also a special port driver, Printer57.6, that allows the use of a DeskWriter printer with an Apple IIgs.

The Installer is a utility that automates the process of installation. Simply select the appropriate printer and port drivers and Installer does the rest.

Printer.Test is a simple Applesoft BASIC program that ensures that your printer is properly connected to your computer. It does this

by sending the message, “If this text is readable, your hardware is OK,” directly to the printer port.

PLEASE NOTE: Printer.Test cannot be used to test DeskWriter printers connected using the Printer57.6 printer port driver (see below).

Read.Me provides any last-minute updates to the User's Guide. Read.Me is also formatted as ASCII text in the Vitesse folder. You may print a copy of this file by loading it into your favorite word processor.

Printer57.6 is a special port driver that allows the use of a DeskWriter printer with the Apple IIgs. By default, the Apple IIgs cannot support baud rates higher than 19.2 kilobaud. The Printer57.6 port driver accelerates the baud rate of the printer port to 57.6 kilobaud, which in turn allows the IIgs to communicate with the printer.

Section 2 — Getting Started

Installing the Software

The various printer and port drivers included on the Harmonie disk must be located in the “*/System/Drivers” folder of your boot volume. The Installer application automatically copies all necessary files from the Harmonie disk to your System disk.

In order to install Harmonie, you must have enough free disk space on your System disk. If you're using a hard disk, this should not be a problem. If you're installing Harmonie to a floppy disk, however, you may find that there is not enough room for the Harmonie printer drivers.

If you find that there is not enough space, you will need to delete some unnecessary files from your System disk before continuing with installation.

Removing Unnecessary Files from the System Disk

In order to delete a file from the Finder (the application that loads when your computer first boots), drag it to the trash. Next, select “Empty Trash” from the Special pull-down menu. Remember to check how much free disk space is available after deleting an item.

Non-essential system files (in order of likely removal preference):

TUTORIAL folder: This folder, if present, contains files necessary to run the tutorial included with GS/OS. If you are not planning to use the tutorial, you may remove the entire folder.

BASIC.System and BASIC.Launcher: These two files are required to run Applesoft BASIC programs. If you're not planning on running BASIC programs while using this particular System disk, you can delete both files.

Font Files: You may find that there are fonts contained in the System/Fonts folder that are not used. If that's the case, you can remove these fonts. Begin by removing the largest fonts and continue until there is enough free space, or the entire font family has been removed.

Desk.Accs files: The only absolutely essential file contained in the system/Desk.Accs folder is CtlPanel.NDA (Control Panel). If necessary, remove any other unnecessary desk accessory files until there is enough free disk space for the Harmonie drivers.

CDevs files: You can remove many of the CDev (Control Panel Device) files in the System/CDevs folder. However, you may lose the ability to access the functions or options they provide once deleted.

PLEASE NOTE: If it becomes necessary to remove CDev files, do not remove the DirectConnect and Printer files. These files are necessary to configure your system for use with Harmonie.

Using the Install program

The Harmonie disk itself contains no system files, and therefore is not bootable. You'll need to boot your IIGS system disk first, and then run the Installer application on the Harmonie disk by double-clicking the Installer icon. The standard GS/OS Installer window then appears (see Fig. 1).

The upper-left corner of the Installer window displays the disk that will be updated. This should be the volume name of your System disk. If not, press the “Disk” button (below the right listbox) until the proper disk name appears.

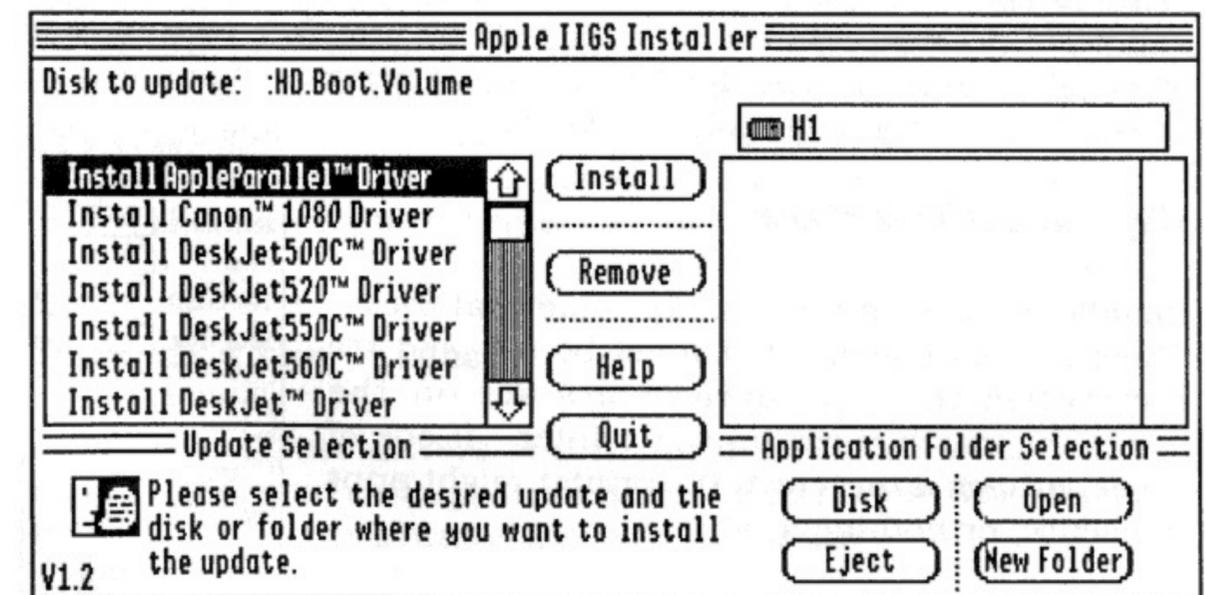


Figure 1

The listbox on the left displays the various printer and port drivers available for installation. Simply highlight the printer and port drivers pertaining to your configuration and press the "Install" button.

Selecting the Driver

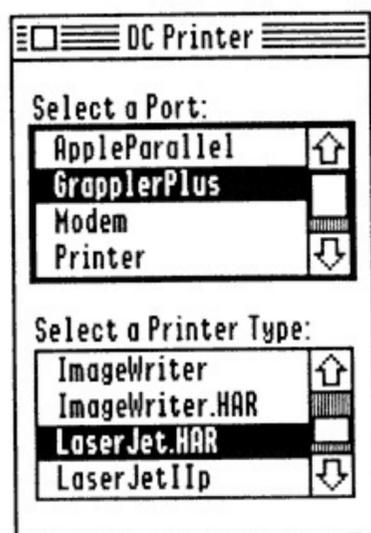


Figure 2

After installing the appropriate driver(s), you'll need to tell GS/OS to utilize them. This is done by activating the Control Panel "DC Printer" option. There are two settings you'll need to make: the port and the printer type.

The port simply identifies how data are transmitted to the printer. This may be the standard printer port, a high speed printer port, or a parallel card. The printer type specifies what printer is attached to the computer. This may be any printer for which there is an appropriate printer driver.

Simply select the appropriate port and printer drivers and click the Close button in the upper left-hand corner.

Setting up the Hardware

Printers and computers communicate in one of two modes: serial and parallel. Most printers are built with an interface port for only one of these modes. The Iigs has a built-in serial port and can be adapted to support a parallel connection.

Iigs Serial Interface

Installing a serial printer can be somewhat tricky. There are parameters that must be set, and it's imperative that the parameters set on the computer match those on the printer. If one of these settings is incorrect, the printer might print nonsense, or nothing at all.

We recommend that you begin by reading the



Figure 3

User's Guide that accompanies your printer. This will help you understand exactly what features your printer supports and how to set them. Then, set the IIGS' serial port parameters to match those of the printer.

Parallel Interface

Connecting a printer with a parallel connection is quite simple. Simply insert the card into a vacant slot, connect the parallel cable to the printer, and select the appropriate parallel port driver.

Installing the Parallel Card

In most cases, installing the parallel card is as simple as plugging the card into a vacant slot. Some parallel cards may require some configuration; please refer to the documentation that accompanies the card. Slot 1 is traditionally set aside for parallel cards, and is preferred in many cases.

Serial to Parallel Interface

Installing a serial to parallel interface is generally quite simply: you connect the smaller, round end to the IIGS' printer port and the other to the printer. Often, there are switches on the device itself that must be set. These switches specify how the device should receive data coming from the computer.

When printing from GS/OS, these settings must match those found on the IIGS' printer port. In addition, you must disable any switches that alter the incoming data. Generally, this is accomplished by setting all switches to the "Off" position or set to "Transparent" mode. Please refer to the documentation accompanying the serial to parallel interface for specific information on making these settings.

Checking the Printer

After the software drivers and the printer are installed, you may use the "Printer.Test" application on the Harmonie disk to ensure that the Iigs is communicating with the printer.

First, activate the Control Panel "Slots" option and set the slot used for the printer to the appropriate mode. If you're using a printer with a serial interface, the slot setting should be "Printer". In the case of a parallel card, the slot setting should be "Your Card". You should reboot the computer to ensure that these changes take effect before continuing.

PLEASE NOTE: Setting the slot to "Your Card" is necessary only when testing the printer. You'll need to reset the slot to "Printer" after testing the connection.

Next, use a capable program launcher (i.e., Finder, Wings) to run the "Printer.Test" program found on the Harmonie disk, respond to the simple prompts, and verify that the printer responds. If all goes well, you'll see a simple message indicating that the connection is good. If not, you'll need to check over your printer hookup to find the problem (see Section 6).

Section 3 — Using the Harmonie Drivers

Standard GS/OS-based applications use two dialogs which allow users to specify how a print job should proceed. The first is generally called "Page Setup" or "Printer Setup". The second is the Harmonie print dialog.

Page Setup

The Page Setup dialog (also called "Printer Setup") allows users to set the paper type, aspect ratio, and orientation (see Fig. 4).

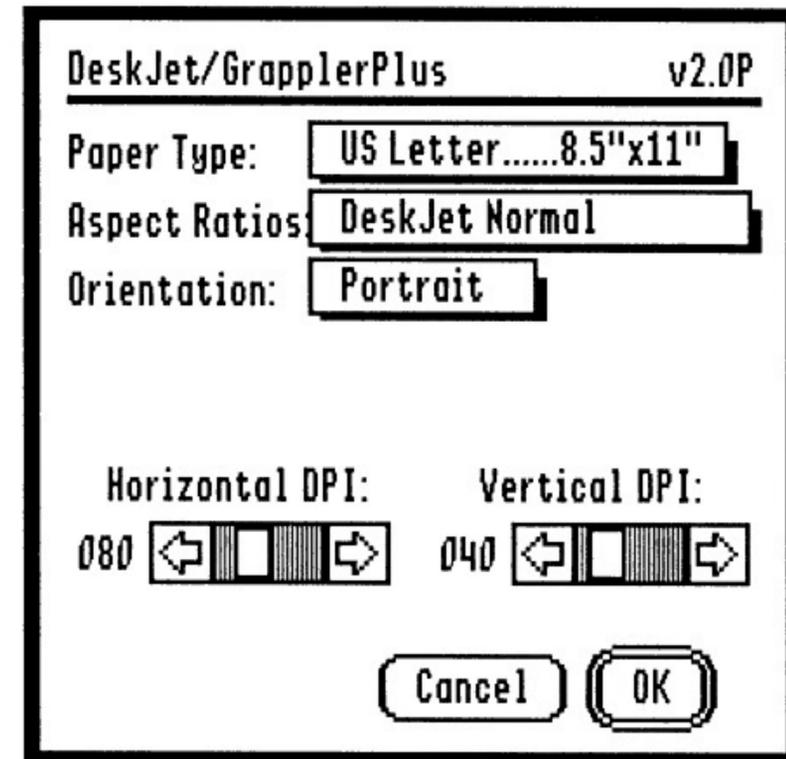


Figure 4

Paper Type: This setting specifies the page size used by the printer. The standard paper sizes generally supported by all printers are:

US Letter 8.5"x11"
US Legal 8.5"x14"
A4 Letter 8"x12"
#10 Envelope 9"x14"

Some printers may support additional sizes; some may offer fewer.

Aspect Ratios: Specifies the length of a printed image in relation to its width. When a particular aspect ratio is selected, the horizontal and vertical scroll bars are updated to display the exact values.

PLEASE NOTE: Since Apple Computer, Inc. manufactures both the IIGS and ImageWriter printer, there is a convenient correlation between the IIGS' display and the ImageWriter. In general, selecting the ImageWriter Normal aspect ratio setting when printing produces an image that fills the page and approximates the aspect ratio of the image on the screen.

Orientation: Specifies whether a Landscape or Portrait orientation. Portrait is a vertical page orientation such that the image prints upright along the length of the page. Landscape is a horizontal orientation such that the image prints upright along the height of the page.

Vert Margin: Some printers allow you to specify a 1/2" margin at the top of the page. Not all printers are capable of printing literally at the top of a page. This top margin is in addition to whatever physical top margin your printer provides.

Horizontal/Vertical DPI: The horizontal and vertical aspect ratio numbers specify the number of dots per printed inch. As these settings get larger, the resulting image becomes smaller. Conversely, as these numbers get smaller, the resulting image becomes larger.

The Harmonie Print Dialog

The Harmonie Print Dialog allows users to control Harmonie's operation (see Fig. 5).

Quality: Specifies the printer resolution. In general, a lower quality setting results in less detailed printing. However, a lower quality image also prints much faster than a high quality image. Conversely, a higher quality setting produces much more detail but takes much longer to print. We recommend that you use a low quality setting when printing draft copies of a document and a high quality setting when printing the final copy.

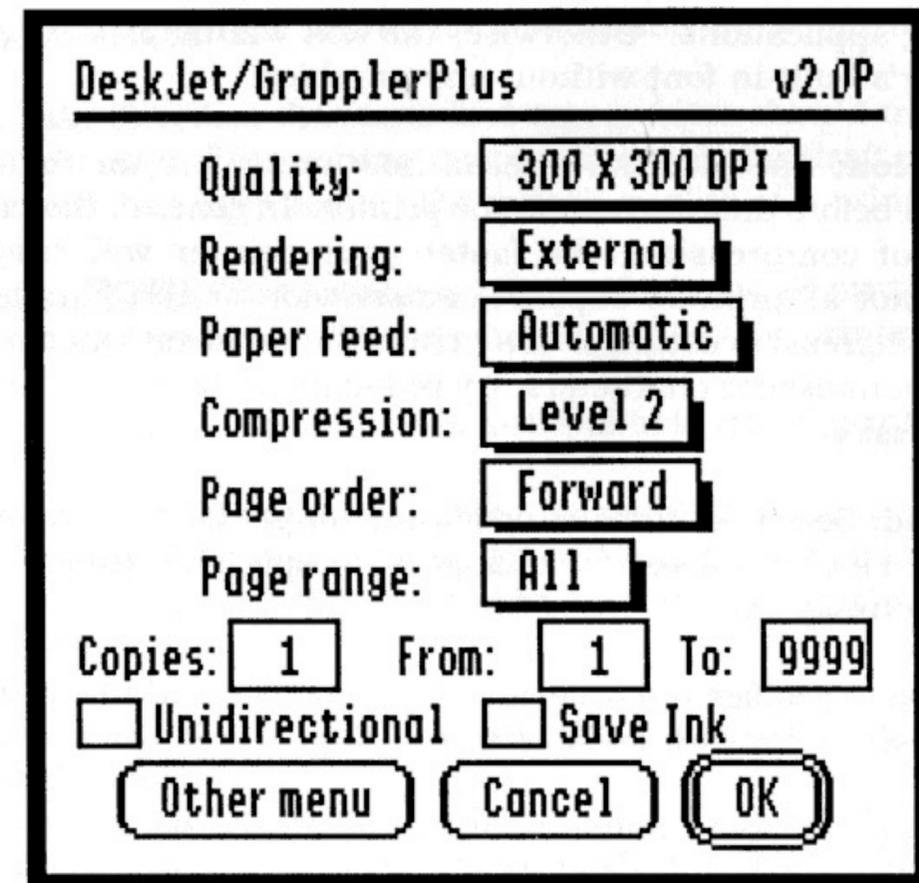


Figure 5

Rendering: Specifies the location of printer data during the printing process. Internal Rendering specifies that the image will be assembled in the IIGS' memory; External Rendering means that the image will be assembled in the printer's memory.

Internal Rendering should be used when printing with IIGS-specific bitmap or TrueType fonts, or when printing any graphic. It is generally slower than External Rendering.

External Rendering should be used when printing with the fonts built-into your printer. However, you must remember that these fonts are not those you see on the screen. Therefore, the resulting printed page may look much different than it does on the monitor. You may use External Rendering to print a pure graphic image, such as one created with a paint program. External Rendering is generally much faster than Internal Rendering.

PLEASE NOTE: You must use Internal Rendering when printing pages created in the "Page Layout" mode in many desktop

publishing applications. Otherwise, the text will be printed using the printer's built-in font without any graphics.

Compression: Specifies the level of how much printer data are compacted before they are sent to the printer. In general, the higher the level of compression, the faster your printer will operate. However, not all printers support compression or can handle the highest compression settings. If a printed image seems incomplete or contains nonsense characters, try reducing or disabling the level of compression.

Paper Feed: Selects automatic or manual paper feed. You should use manual feed if you want to change some specific settings before printing actually starts.

Page Order: Specifies the order in which pages should be printed. You may select Forward or Reverse printing.

PLEASE NOTE: Some nonstandard applications do not support this setting.

Page Range: Specifies which group of pages should be printed. You may select All, Even, or Odd pages.

PLEASE NOTE: Some nonstandard applications do not support this setting.

Copies: Specifies how many copies of each page should be printed.

PLEASE NOTE: Some nonstandard applications do not support this setting.

Unidirectional: Many dot-matrix printers are capable of printing while the print head is moving from left to right and from right to left. This setting specifies that the printer should only print while the print head is moving from left to right, resulting in a sharper, smoother image. However, this does slow the printing process somewhat.

You may want to use this setting when printing an image. This setting produces a sharper printed page, but does slow printing somewhat.

PLEASE NOTE: This setting is not available for all printers.

Save Ink: Specifies that an inkjet type printer should use less ink while printing. This setting may be desirable for draft copies of a document, but does reduce the overall quality of a printed page.

PLEASE NOTE: This setting is not available for all printers.

Color: Enables color printing when using a color printer.

PLEASE NOTE: This setting is not available for all printers.

Other Menu: Harmonie provides so much control over printing that it would be too confusing to put all the controls in a single menu. Therefore, some of the controls were included in a second dialog (see Fig. 6).

Cancel: Press this button to cancel the print operation and return to the desktop.

OK: Press this button after you've made the appropriate settings and are ready to begin printing.

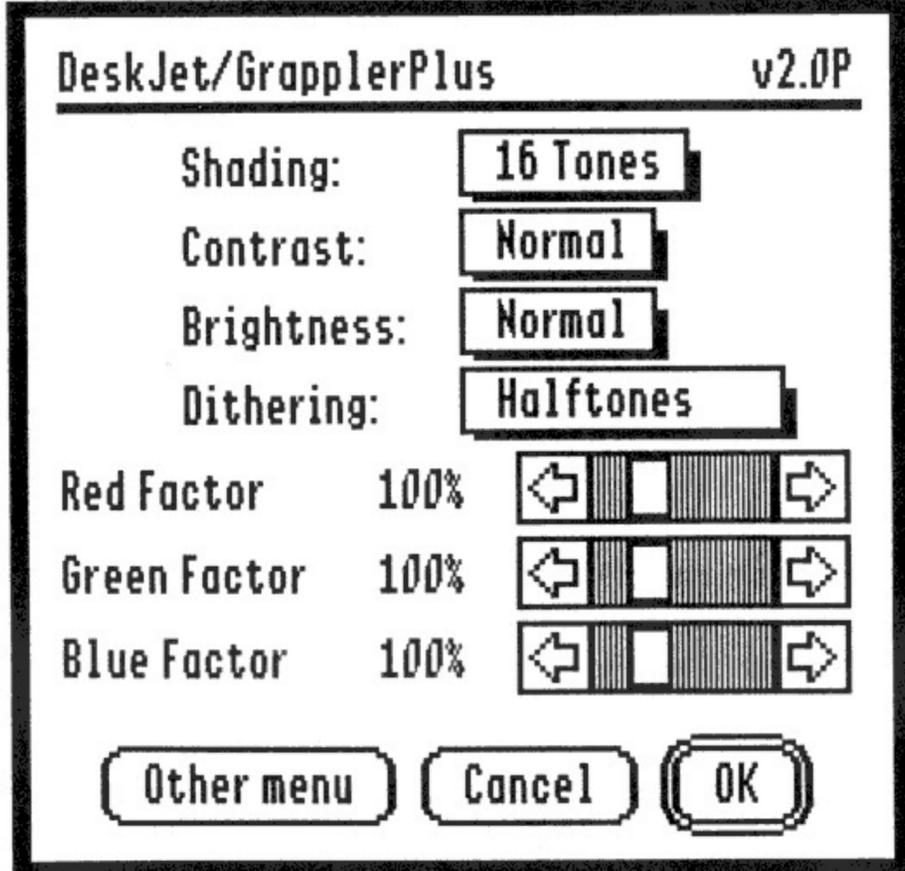


Figure 6

Other Menu

The Other Menu provides access to additional controls that could not be fit in the Harmonie Print Dialog.

Shading: Specifies the number of discrete tones used when printing an image. In general, 2 tones is satisfactory for text-oriented printing and 16 tones is best for graphic printing.

Contrast: Specifies the relation between dark and light tones, and only affects the darker tones of an image. As contrast becomes darker, darker tones in the printed image are accentuated. Conversely, as contrast becomes lighter, the more uniform the page becomes.

Brightness: Specifies the overall lightness or darkness of the printed page, and affects all tones equally. This control is very effective in compensating for the quality of paper that's being used. It may also be used to compensate for dot-matrix ribbons that produce lighter pages as time goes by.

Dithering: A technique in which the colors of adjacent pixels are alternated to create the effects of more colors. For example, a pattern of black and white dots produces the effect of gray, and different patterns of dots can produce different shades of gray. This technique also applies to colors. For example, a pattern of red and yellow dots produces the effect of brown.

There are two different dithering patterns you may choose: halftone and checkerboard. The halftone pattern works well for true-gray images (this is the technique used in newsprint). The checkerboard pattern produces a printed page that is often more pleasing to the eye.

Color Factor: The Color Factor Controls are intended to enhance color printing. It can also be used with non-color printers. Each Color Factor slider control increases or diminishes the intensity of all or part of a graphic image that use a particular color. For example, if the Red Factor slider was moved from 100% to 200%, then every part of the image printed in red will be intensified by a factor of 2. Similarly, if the Red Factor control was decreased from 100% to 50%, then every part of the image printed in red would be

muted by $\frac{1}{2}$.

PLEASE NOTE: The differences in the intensity of the colors is only evident on the printed page. These controls do not affect the appearance of the IIGS screen.

If you are using a color printing, the effect of changing the Color Factor controls is obvious. One thing you'll need to keep in mind is that red, green, and blue colors mix to produce all of the printed colors. For example, magenta (purple) is a combination of blue and red. If you change the Red Factor setting, you'll also affect portions of the image printed in magenta.

If you are not using a color printer, you will still see changes in the printed page. Generally, if a Color Factor is increased, all parts of the image printed in that color are brightened.

PLEASE NOTE: Video information on the IIGS screen is composed of red, green, and blue. This also applies to white portions of the screen, because white is a combination of all colors. Therefore, it is possible to alter portions of an image that do not appear to contain any colors at all.

Section 4 — A Word about Fonts

Larger Fonts and Print Quality

Harmonie allows you to control the print quality, or resolution. For example, the quality settings available for a DeskJet are 75 x 75 DPI, 100 x 100 DPI, 150 x 150 DPI, and 300 x 300 DPI. These values are given in DPI (Dots Per Inch), which simply specifies the density of dots printed in a measured inch.

In the case of the DeskJet, 75 x 75 DPI is considered as the baseline setting. Higher settings are simply multiples of the baseline: 100 x 100 DPI is 1-1/3 times larger, 150 x 150 DPI is 2 times larger, and 300 x 300 DPI is 4 times as large. Whenever you print at a resolution higher than 75 x 75 DPI, Harmonie must use this multiple in selecting the fonts size. For example, if you're using a Wombat.12 point font at 300 x 300 DPI, Harmonie must render a Wombat.48 point font because 300 x 300 DPI is 4 times the baseline 75 x 75 DPI. This technique yields excellent results, with print quality very close to printer-resident fonts.

What happens if you don't have Wombat.48? In this case, GS/OS searches for the next smaller size. Unfortunately, this results in some blocky letters because GS/OS must enlarge the smaller font to the correct size. The process GS/OS uses in enlarging fonts does not produce the same quality as if Harmonie had found Wombat.48. You'll find that in order to achieve the best results, use a font for which there are larger sizes available.

PLEASE NOTE: If you're using Pointless, you won't need to be concerned about larger font types because Pointless has the ability to render a font at nearly any size.

Font List Files

In addition to the Harmonie printer driver, you'll also find a corresponding font list file. The font list file contains an encoded translation table that relates screen fonts to built-in printer fonts. Harmonie uses the corresponding resident printer font whenever you printing using External Rendering.

Ilgs screen fonts are designed to look good when displayed on the

Ilgs screen. The number and shape of screen dots (pixels) determines how font files are created. The width and height of each character is chosen carefully to ensure proper spacing between characters.

Printer resident fonts, however, are created from a different set of considerations. These fonts are designed to look good when printed. Harmonie font files resulted from many trials with different printers and reflect which screen fonts come closet to a printer's built-in resident fonts.

Harmonie font list files support fonts that are permanently resident in the printer itself. Therefore, it cannot utilize fonts stored in font cartridges or "soft" fonts. Harmonie also cannot support some fonts in "workalike" printers, or printers that emulate a printer supported by Harmonie.

PLEASE NOTE: When using External Rendering, if you select a screen font not in the font list for the printer, Harmonie will instruct the printer to use the default font.

In general, a font list file for a printer corresponds to the Ilgs screen font of the same name and point size as a printer's primary font. For example, if a printer usually prints using a Courier-10 point font, the corresponding screen font is Courier.10.

The following tables display the correlation of screen fonts to printer fonts for three of the more widely-used printers: DeskJet500, LaserJetIII, and ImageWriterII.

DeskJet 500 Translation Table

Ilgs "Screen" Font	— translates to —>	DeskJet500 Font
Courier 8	—————>	Courier 16.67
Courier 10	—————>	Courier 10
Geneva 6	—————>	Letter Gothic 6
Geneva 12	—————>	Letter Gothic 12
Times 6	—————>	CG Times 6
Times 12	—————>	CG Times 12

LaserJet III Translation Table

Iigs "Screen" Font	— translates to —————>	LaserJet III Font
Times	—————>	Times
Monaco	—————>	Universal

ImageWriterII Translation Table

Iigs "Screen" Font	— translates to —————>	ImageWriterII Font
Courier 12	—————>	Standard (Draft)
Geneva 12	—————>	NLQ

Section 5 — General Notes and Comments

Printing an image is a rather complex process. This process is further complicated as higher performance printers become more available and affordable. The printer is not the only component in the printing process. The Iigs, GS/OS, Harmonie, printer, and application you're using all work intimately together whenever you print a document.

The Harmonie drivers are responsible for translating print commands for various printers, but they do not act alone. We recommend that you experiment with various settings to determine what works best for a particular document you're printing.

The "Default.HAR" File

Harmonie is used in printing many different types of documents with a wide variety of printers. To make things more convenient, Harmonie creates a small binary file called, "Default.HAR", that saves the settings used by a particular application. Therefore, you won't have to change the settings as you move from one application to another.

Vertical Condensed Text

Many "text-oriented" applications presume that the printer driver condenses text 50% vertically during printing. We recommend that you print a trial page using one of the "Condensed" aspect ratio default settings to determine if a particular application assumes that text printing is automatically condensed vertically.

New HP Printers (600 & 660C)

The 600 series use Deskjet 500C driver, 660C use Deskjet 560C driver, on 540 use either Deskjet 500C or 520 driver. DeskWriter printers use the Deskjet equivalent (DeskWriter 560C = Deskjet 560C) the only difference is the port driver, the DeskWriter uses Printer 57.6 port driver.

Section 6 — Troubleshooting

Non-Standard Applications

Not all GS/OS-based applications follow Apple Computer, Inc.'s guidelines when it comes to printing. Some applications, for example, substitute their own "Page Setup" or "Print" menus in place of Harmonie's. If that's the case, you may not be able to use all the flexibility and control Harmonie provides.

AppleWorks GS

Before printing an AppleWorks GS document for the first time, check the Color Factor controls to ensure that each is set to 100%. We've found that the first time you use a Harmonie driver with AppleWorks GS, the Color Factor controls are reset to some extreme values. Some indications might be a gray or dotted background behind each line, or for color printers, a definite greenish shade to all areas that should be white.

Special Notes — DeskJet

The DeskJet 500-series printer does not allow Landscape printing whenever you select External Rendering.

Special Notes — LaserJet III

We've found that the LaserJet III requires more than 1 megabyte of RAM to support 300 x 300 DPI printing. If there is insufficient memory, you'll see an errors message on the printer's control panel.

Special Notes — ImageWriter II

It is possible to engage the ImageWriter's built-in "debug" mode by holding down the Select button while pressing the On/Off button. The result is that all characters are printed in hexadecimal. Should you accidentally enter debug mode, you'll need to turn the printer off and then on again.

Scaling

One of Harmonie's most powerful features is its ability to command a printer to use various font sizes, heights, and widths. However, please keep in mind that there may be documents with narrow lines that are only one pixel wide or tall on the screen. If you select a print sizing feature that's too small, some of the lines may disappear. This happens because there is not line size smaller than one pixel, except zero. To correct this, select an aspect ratio that produces a larger image or use a higher DPI setting.

There is an interaction between the IIGS's video resolution and the printer resolution that may limit the maximum size font that you can print successfully. In the case of 300 DPI printing, the limit is somewhere around 64 points. In the case of 360 DPI with 24-pin dot-matrix printers, the limit is about 50 points. Unfortunately, this is a nonlinear relationship, so it's not possible to determine any exact numbers.

If the video and printer resolutions combine incorrectly, the result may be a very small font. If that's the case, try selecting a lower printer resolution or a smaller font (point) size.

No Printer Response

One of the most common problems with connecting a new printer is no response from the printer. Here are some reasons why things can go wrong:

If you're using a serial interface, ensure that you're using a serial printer cable, not a modem cable. Unfortunately, the two cables look identical but are not interchangeable. There are two simple ways to determine if the cable you're using is a printer or modem cable. If you have access to a modem that uses a cable with the same connectors, swap the suspicious cable with the modem cable. If the modem works well, the cable is not a printer cable.

The second way of distinguishing between a printer and modem cable requires the use of an ohm meter or flashlight battery, flashlight bulb, and two pieces of wire. A serial printer cable is wired differently than a serial modem cable. The modem cable

connects pin-3 of the 8-pin connector to pin-2 of the 25-pin connector. The modem cable, however, connects pin 3 of the 8-pin connector to pin-3 of the 25-pin connector. Use an ohm meter, or connect the flashlight battery and bulb across pin-3 of the 8-pin connector and pin 3 of the 25-pin connector. If the ohm meter indicates a resistance or the flashlight bulb lights, it's not a serial printer cable.

Another reason that a printer doesn't respond is some printers that support both serial and parallel connections are set for a parallel connection. For example, when cycling through the settings of the liquid crystal display (LCD) menu of the LaserJet II or LaserJet III series printer, both the serial and parallel mode entries are displayed. However, the one with an asterisk (*) next to it is the one that has been engaged. HP printers are preset at the factor for a parallel interface. You may need to change this setting by cycling through the printer's menu options and pressing ENTER to engage the appropriate mode.

The Tiny Font

If you get a printed page with an incredibly tiny font, here's what probably happened: recall the discussion from section 4 regarding how GS/OS and Harmonie work together when printing large-size fonts. If GS/OS is unable to find a particular font in a larger size, it looks for the next largest size and enlarges it — one character at a time. However, GS/OS only allows 64K bytes of memory for rendering fonts. If this process exceeds the 64K byte limit, GS/OS abandons enlarging the font and selects the standard Shaston.8 system font. The problem is that Harmonie does not realize this has occurred and dutifully instructs the printer to print at a reduced size.

The remedies to this situation are to select a screen font with a larger version available (so that GS/OS won't have to enlarge the smaller font), or to reduce the print quality (so that GS/OS won't try to enlarge the smaller font as much).

Print Speed

When Harmonie renders a graphic image in memory (Internal Rendering), it must send an enormous amount of information

instructing the printer exactly where to put the dots on the page. For example, consider a full standard size page (8½" x 11") printed at 300 x 300 DPI. The total number of dots that must be defined is (8½ x 300 DPI) x (11 x 300 DPI) or 8,415,000 dots! Assuming that a single bit represents whether or not there should be a dot, Harmonie must send 1,051,875 bytes to the printer!

Due to this high volume of information, the time it takes to print a high-quality document can be quite high. For example, suppose that a DeskJet is connected in serial mode, and that the baud rate is 19.2 kilobaud or 19,200 bits per second. At this rate, the total amount of time it would take to send an 8½" x 11" page is 8,415,000 bits / 19,200 bits per second = 438 seconds or 7¼ minutes! Add a little time for the Ilgs to render the image in memory, and you can quickly see why Internal Rendering can take on the order of 8 minutes per page.

PLEASE NOTE: An accelerator card does not improve the speed at which data are sent to the printer — the speed is fixed by the baud rate. An accelerator card does speed up the rendering process, but that's the minority of the time required for a print job.

There are several ways around this time crunch. First, use a lower printer quality. This reduces the amount of data that must be transmitted to the printer. Unfortunately, this results in less detail.

A second approach is to use a parallel card. Unlike a serial connection which transmits data one bit at a time, a parallel connection transmits one byte at a time. In addition, a parallel connection is not restricted by a baud rate — it sends data as fast as the printer is capable of receiving it.

If you're printing a pure graphic image, you can use External Rendering which can reduce the total printing time in half. However, you cannot use External Rendering to print documents that combine graphics and text.

"Strange" Characters

Many high-performance printers have the ability to print characters in two different character sets. The first character set is the ASCII character set. It comprises all the standard alpha and numeric

characters. The second is the IBM or "extended" character set. It comprises not only the ASCII characters, but adds 128 additional characters such as phonetic and Greek symbols (hence the phrase, "Looks like Greek to me!").

Another situation in which you may get strange characters is when you attempt to print an image, and instead prints a page of meaningless text or "garbage". This generally results when the interface you're using strips the 8th or "high-bit". When this occurs, a printer switches to its text mode rather than the graphic mode and interprets each byte as a character rather than a collection of dots.

PLEASE NOTE: If you're using a serial connection, ensure that the ligs and the printer are both set to utilize all 8-bits rather than 7. If you're using a parallel card, refer to the documentation that accompanies the card.

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