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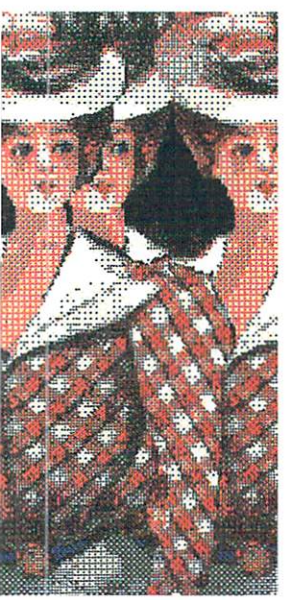
Graphic Hardcopy And the Amiga

By Morton A. Kevelson

No matter how impressive an original Amiga screen display is, I have yet to see one that can be slipped into my portfolio or folded into a letter-size envelope. For these applications, and many others, a quality graphic printout is indispensable. The developers of the Amiga's operating system anticipated this need by including a generic printer device (PRT:). On most computers, it is up to the applications programmer to create printer drivers for each package; the Amiga includes these drivers as part of its operating system. The applications programmer need only follow the Amiga's rules on printer control while the end user simply selects the appropriate printer driver with Preferences.



INSET:

A screen dump made using Grabbit and a Canon PJ1080A.

LEFT:

The same image printed from Aegis Images at 640 wide × 800 high on the Canon PJ1080A.

The Amiga's printer drivers are not just simple text routines. Full graphics capabilities have been included for the dot-matrix printers, which have the ability to print bit-map graphics. Even color graphic printers are supported. As a result, an Amiga fresh out of the box has so much graphic printing potential that it takes many hours to discover just what is available. Version 1.2 of the operating system (which is starting to ship as of this writing) even includes a graphic screen-dump utility right on the distribution disk.

This article is intended to shorten the process of discovering the Amiga's graphic printing capabilities. It presents the results of many hours of experimentation with several printers, some popular graphics packages and some stand-alone screen-dump programs.

Preferences

With very few exceptions, the graphic screen printer-dump parameters will be controlled entirely with the Amiga's Preferences tool. Two of the three Preferences screens are devoted entirely to printer settings. The second screen, accessed by clicking on the Change Printer box, deals primarily with the hardware aspects of the printer. However, the margin and page-length settings on this screen may be used to to control the size of the graphics dump.

The width of the printed image is set by the difference between the right and left margins. Note that this is a relative setting, since the graphic dump always starts at the left edge of the paper. The width of the dump automatically determines its height. The aspect ratio (width divided by height) of the graphic printout is fixed by the characteristics of the printer and its printer driver. It is also possible to set the dump size by adjusting the page-length parameter. However, the fixed aspect ratio will still prevail. Thus, the smaller of the two settings, and the aspect ratio, will determine the size of the printout.

The real fun to be had with graphic dumps is found on the third Preferences screen. This may be reached by clicking on the Graphic Select box in screen two. On this screen take note of the three types of graphic dumps that are available under the Shade category. The Black-and-White option generates a high-contrast dump with screen colors printed as either pure black or pure white. This mode works in conjunction with the Threshold scale at the top of this screen. An understanding of how the Amiga generates its display colors will be helpful in applying the Threshold setting.

The Amiga Color Display

Each of the Amiga's 4,096 colors is composed of a mixture of red, blue and green primary colors, which correspond to the color phosphors of the video display. Each of the primary colors can be set at one of 16 intensity levels (hence the 4,096 possible combinations). Note that an intensity of zero is equivalent to black, or turning off that color entirely. Internally, the Amiga stores a color value in a 12-bit register with four bits devoted to each primary color. The Amiga's custom graphics chip has 32 of these registers, which define the maximum number of different colors on the lo-res screen under normal circumstances.

The relationship between the color values and the threshold scale should now be obvious. For a given setting, eight for example, all colors with a combined intensity that is less than this value print as black. All lighter shades print as white. This relationship holds firm for shades of gray where the red, blue and green are set to the same level. It seems to also hold fairly well for the average value when the primary-colors settings are not all the same. However, I have noticed some anomalies: Using a threshold setting of eight, on a color consisting of 15 red, 0 green and 0 blue prints as black, while 0 red, 15 green and 0 blue prints as white. This corresponds to the maximum sensitivity of the eye to the green portion of the spectrum. ►

The Gray Scale option is exactly as the name implies. The display colors are translated into shades of gray by printing various patterns of black dots. The total number of possible patterns is of course limited by the printer's dot size and the number of pixels composing the screen image. For example, a four-by-four printer pattern may be made to correspond to a single screen pixel. Although this allows for 65,536 possible dot patterns, on the average only 16 unique shades of gray are actually possible. Some additional shading may be obtained by the arrangement of the dots in the matrix. The remaining patterns are merely different arrangements of dots whose differences may be discerned at the pattern boundaries. For example, color 15 red, 7 green and 0 blue (an intense orange) generates the same gray pattern as 0 red, 15 green and 0 blue (pure green) on my Canon PJ1080A and Okidata ML92 printers.

Both the Black-and-White and Gray Scale options may be used with color as well as black-ribbon printers. Note that color printers should use only their black ribbon or ink pack with these modes. If you have an Okimate 20, you will have to make sure that the black-ribbon cartridge is in place.

If you have a color printer, the Color setting will let you produce color-graphic dumps. With *very few* exceptions, do not expect to see the same results on paper as you see on the screen. Printer technology is just not up to the wide range of colors available on the video display tube. Pleasing and useful results are still attainable; however, "serious" applications will demand some experimentation on your part. One approach is to set up test patterns of calibrated colors. Of course, trying out all possible 4,096 colors is quite a project. At 32 colors per screen you will need 128 dumps for a complete selection. Nevertheless, useful results can be obtained from far fewer trials.

Of the remaining settings, one lets you choose between a horizontal or vertical printout. The latter setting will let you make a larger dump than the former. Note that the aspect ratio of the horizontal dump may differ from that of the vertical dump. The last setting applies only to black-and-white or gray-scale graphics dumps. This setting lets you invert the printed relationship between light and dark screen colors. Just click on the Positive box for a dump that corresponds to the screen display. Clicking on the Negative box will generate a photographic inverse of the screen on the printer.

Of course, the Preferences settings may be changed as often as you like. And make sure, when you first customize Preferences to your most used mode and printer, you select the Save option upon exiting if you want to store the settings on the Workbench disk. Clicking on the Use box on the first screen is adequate to make temporary changes.

Setting the Palette

Every paint program has some means for changing colors. In the course of preparing this report, I examined the three most popular Amiga paint programs and noted some differences in their color-setting procedures.

Aegis Images has a color-palette control that is well suited to the type of experimentation described above. Three sliders with numerical settings from 1–15 are displayed, which may be set to control either red, green and blue or hue, luminance and shade. The red, green and blue slider combination is preferred for calibrating the color palette. The numerical settings make it very easy to set up and repeat calibrated colors for experimentation.

DeluxePaint's palette control is also easy to work with. Six sliders for red, green, blue, hue, saturation and value are simultaneously displayed. The three color sliders have tick marks for all sixteen color steps with numerical markings every four steps. Changes in the red, green or blue sliders are immediately reflected in the settings of the hue, saturation and value sliders and

RIGHT:

A Canon PJ1080A printout from DeluxePaint at 320 wide × 800 high.

INSET:

The same image printed on the Canon PJ1080A at 1,024 wide × 200 high using the Preferences Vertical setting.

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vice versa. The arrangement is well suited for setting up calibrated colors.

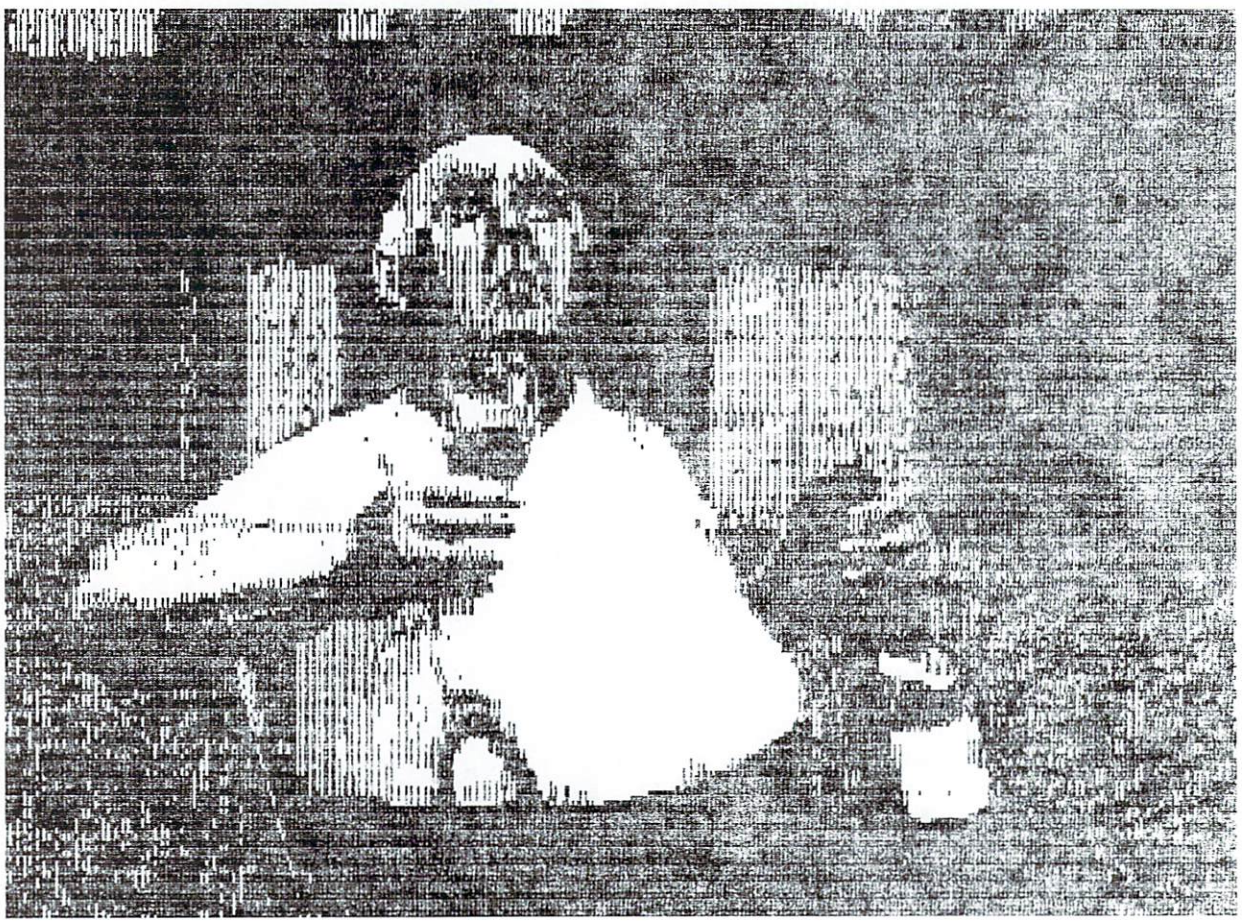
Commodore's Graphicraft also uses red, green and blue sliders for setting the colors. However, these controls lack any visible calibration. To make matters worse, dragging the sliders results in more than 16 possible positions for each slider. I did find that clicking in the space next to the slider changed the setting in 15 discrete intervals. To repeat a setting it is necessary to count the mouse clicks as the slider is stepped along.

Graphic Dumps from Paint Programs

All of the graphic packages mentioned above include built-in graphic dumps that can be controlled by Preferences. Aegis Images 1.2 includes a useful refinement to the margin settings with its graphic screen dump. Images lets you specify the width and height of the printed image in pixels, instead of using the margin settings in Preferences. This feature lets you exercise precise control of the dimensions and aspect ratio of the graphic printer dump.

The range of Aegis Images' printer control is 320–1200 pixels horizontally × 200–800 pixels vertically. These values apply to the screen orientation of the image and not the Horizontal or Vertical printout selection in Preferences. For example, a dump 640 pixels wide × 200 high in Images will print as a horizontal or vertical strip depending on the setting in Preferences.

The actual usable range of Aegis Images' printer controls will depend on the number of dots per line the printer can generate. For example, the Okimate 20 will work with up to 920 pixels across the page while the Canon PJ1080A is limited to 640. The length of a vertical printout is essentially unlimited. A vertical aspect in Preferences will permit the entire 1200-pixel width to be used with any printer. With Images, if you try a dump with more than the possible number of pixels, it simply refuses to print. No indication is given when this happens; this is a bit frustrating, since it ►



OPPOSITE PAGE:

An Okimate 20 printout from DeluxePaint at 640 wide × 602 high.

ABOVE:

The same image printed in gray scale on an Okimate 20 at 957 wide × 800 high.

RIGHT:

The same image printed in gray scale on an Okimate ML92 printer at a threshold of 8.

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normally takes several seconds for a color dump to get started.

Commercial Graphics Utilities

In addition to the screen dumps that are built into the graphic packages, stand-alone screen-dump utilities are available both commercially and in the public domain. One of the most versatile of these programs that I have come across is Grabbit from Discovery Software. Once activated, this program stashes itself in some out of the way place in RAM. Its presence is not felt until invoked by the proper "HotKey" sequence. Grabbit can be used to generate a graphic printer dump of any screen image that is displayed by any program. The only requirement is that the program whose screen is to be dumped should follow the protocols that are set forth in the Amiga's ROM Kernel Reference Manual. Included on the Grabbit disk is a very useful palette-adjustment utility called AnyTime. When activated, AnyTime displays a color palette that is very similar to the ones generated by the dedicated drawing programs. This is a very handy way to fiddle with the shading of a black-and-white or color graphic dump prior to printing.

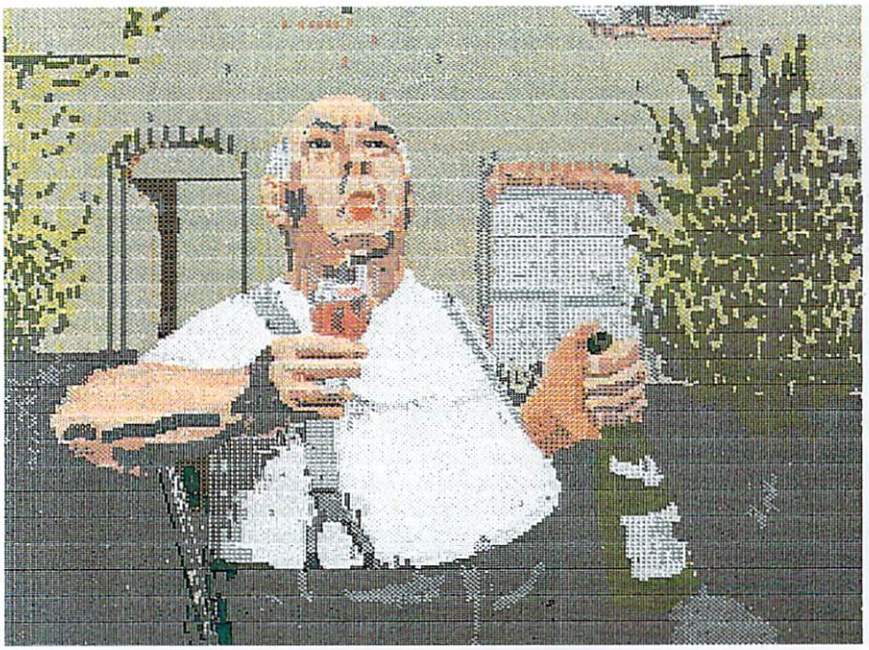
From Electronic Arts, the DeluxePaint Art & Utility Disk Volume 1 contains a number of useful items. Among these is the PrintUtility written by Perry Kivolowitz. This program opens its own minimum height Workbench window to allow for Amiga protocol menus. When activated, PrintUtility will let you cycle through the available screens and pick one for printing. All the Preferences printer controls are available with the exception of the vertical aspect option.

When a screen is selected for printing, PrintUtility looks for enough empty RAM to put it in. If RAM is available, the screen will be copied to it and printed in the background. Otherwise, you are informed of the lack of space and asked to pick direct printing. PrintUtility will also let you print images and text files straight from disk. For images, the barest minimum of memory is used, since only a single line of graphics is read in at a time. This is the reason for the restriction to horizontal aspect dumps. Also on the Utility Disk is a comprehensive slide-show program and the public domain SeeILBM utility. The latter lets you conveniently view individual IFF images without loading up a complete graphics package. The SeeILBM program, used in conjunction with PrintUtility or Grabbit, is a very convenient way to view and print a series of graphic images.

Public Domain Graphic Utilities

Commercial software is not the only source of graphic utilities. Many useful programs may also be found as shareware or in the public domain. A good source of public-domain software is Fred Fish (345 Scottsdale Road, Pleasant Hill, CA 94523). Mr. Fish has single-handedly undertaken the task of compiling a massive public-domain program library for the Amiga. As of this writing, the count is up to disk 35.

I have already come across two graphic screen-dump



programs in the non-commercial sector. Scrimper, for SCReen IMage PrintER, is the predecessor to the Electronic Arts PrintUtility. Scrimper will not print an image from disk; nevertheless, it is well worth the price. Scrimper may be found on Fish disk number 18.

ScreenDump is a shareware offering from Ned Konz (210 Oleeta Street, Ormand Beach, FL 32074). If you find that ScreenDump satisfies your needs, then Mr. Konz requests a minimum donation of $10 to further his efforts.

Conclusion and Comment

The proliferation of graphic and print utilities, so early in the Amiga's life-cycle, is a fitting tribute to its capabilities. All indications are that the selection will continue to grow for the forseeable future.

While I hate to conclude on a sour note, I feel that this may be an occasion where it may do some good. Although the Amiga's printer routines produce satisfying results, their speed leaves something to be desired. Anyone who has actually done a graphic screen dump will recall the anxiety associated with their first attempt. The Amiga seems to go off to some inner limbo for an extraordinary long delay before printing starts. Color graphic dumps are always accompanied by pregnant pauses that punctuate each pass of the printhead.

The fault seems to lie entirely in the Amiga's printer routines and not with the application software. Rumor has it that Commodore is well aware of the problem, but has declined to fix it as, to date, no one has complained. Well, for the record, here is my official complaint! Slow printing, on a machine with the Amiga's capabilities, is a shame and a disgrace. So, go to it Commodore, fix those printer routines! ■

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