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Funnelweb 4.0 Bug Fix

A marked file will NOT show up when
you do a LF in the Formatter. The
corrections can be made using the
Funnelweb Disk Patch program.

Find filename QD
  Goto the third Sector of this file
  At byte >BF change >06 to >07
  At byte >CF change >7B to >72

Find filename UTIL1
  Goto the fifth sector of this file
  At byte >29 change >06 to >07
  At byte >39 change >7B to >72

HIGH RES GRAPHICS AND THE 99/4A, PART II

by Anne Dhein

Section One: The Preliminaries

Part one of this article defines a drawing package as a program or group of programs that will allow the user to create graphics by turning on (or off) the smallest addresable unit of the screen - a single pixel. All of the currently available drawing programs for the 99/4A allow individual pixels to be placed anywhere on the screen and removed as desired, to create very detailed pictures. Drawings can be saved on disk (or in some cases tape) and later be reloaded for editing or printing.

As you know, all the 99/4A paint packages do much more than just this minimum. But the features present in a particular package, and how they are implemented vary widely. Section one of part two provides a chart to allow a feature-for-feature comparison of ten main drawing packages for the 99/4A.

The chart lists the name of each drawing package (in capitals) across the top. The drawing packages are on the chart roughly in reverse order of how they were introduced on the market - that is, the later ones are listed first. You can quickly tell whether a program has a particular function or characteristic by locating that function in the first column and then checking across the row to the column in which the program is listed. Over the next few issues, detailed information will be given for each of these functions.

If you are planning to purchase graphics software the first thing to ask yourself is, "What do I want to do with the program?" Looking at the chart, Program Focus refers to the primary purpose of a package. Three main uses for paint programs are for entertainment (E); as a production tool for producing letterheads, newsletters, flyers, etc. (T); or as a programming utility (U). Some of the programs do all three; others concentrate on just one aspect.

Norton Graphics, for example, is strictly a programming utility, and Paint 'N Print is pure entertainment. TI Artist is the best general purpose program by far, but nothing can beat Graphx for enhancing an artist's creativity. Joy Paint also excels in this area, and although lacking in color has production capabilities not found in Graphx. Draw 'N Plot can be used quite comfortably as a simple drawing board, but its real merit lies in its ability to interface with your own programs.

System Requirements

Before you purchase any program, check to make sure that you have all the hardware necessary to run that particular software. Two of the programs - Paint 'N Print and Super Sketch - can be used with only a console. Norton Graphics Package can also be run on just the console, using Extended Basic. The others require a disk system and 32K memory expansion.

Paint 'N Print, Super Sketch and three of the disk programs also each have an additional disk, sold separately, but which adds substantially to the program's capabilities. These disks are listed in lower case on the chart, under the main Program. The functions they support are starred (*). When Paint 'N Print and Super Sketch are used with their supplemental disks, they also need the expanded system. A cassette version of Extended Graphics is available for Paint 'N Print, but it still requires a 32K memory expansion unit. Paint 'N Print, by the way, won't work properly on my system with the widget. Plug Paint N' Print directly into the console and it works fine.

A few programs may not work with the Myarc and/or CorComp peripherals. Joy Paint, TI Artist and Graphx, along with most new software do work with any of the three controllers. The version of BitMac that I have does not work with a Myarc disk controller, but works with CorComp's. TI Artist works beautifully with the Myarc RAM disk but Joy Paint does not. Since most software companies are working constantly to keep their products updated to work with the newer hardware, peripheral compatibility is not covered on the chart. If you happen to have any of the newer peripherals, consideration to this should be given when buying software.

Printer compatibility is covered further down the chart but should be mentioned here as something to watch out for when buying software. It is very disappointing to get a new drawing package home, only to find the screen dump won't work with your printer!

Loading Requirements - With the exception of the Norton Graphics Package which is programmed in (and requires) Extended Basic, the software listed here is written in assembly language; therefore a module which can access assembly language is necessary. The three "loader" modules are Extended Basic, Editor/Assembler and Mini Memory. TI Writer's Option 3 can also be used instead of Editor/Assembler's Option 5. Some software can use any loader; other packages require a particular module which is listed on the chart.

Ease of Use and Method of Operation

Just as people are different, so, too, does each program seem to have its own "personality", or flavor. This rating should be looked upon as subjective and is given here only to provide one person's idea of how easy the program is for an average user to learn and to use comfortably on a day-to-day basis. The Norton Graphics package rates the lowest because it is slow and takes some patience. It is meant for Basic programmers.

Super Sketch is on the other end of the scale. It is so easy to use that a child who doesn't read well could comfortably use it with a minimum of instruction and supervision. Joy Paint, even though it does a lot more, is also very easy to use. Main drawing functions such as draw, erase, fill, using circles and lines, lettering, paintbrush, etc., are all easily selectable from the drawing board by a representative picture (known as an "icon"). More complex features and file management are immediately selectable by menu.

The other programs fall somewhere in the middle. Draw A Bit and Master Painter require the memorization of a number of function keys to use them properly, or else you had better have a list handy. The manuals for these two are also hard to read. Bitmac requires some key memorization combined with the use of icons, but Bitmac's manual is much better.

Draw 'N Plot uses a simple menu and a few function keys. It doesn't have as many features as the others, but what it has is easy enough to use. The instructions are adequate, especially if you are a programmer.

Paint 'N Print is easy to use on a regular basis but there are a number of keys that need to be memorized which makes it harder to get started.

TI Artist and Graphx are not perfect, but both are comfortable to use on a regular basis, and very easy to begin using. TI Artist makes extensive use of icons for users who prefer them but also allows the faster method of pressing function keys for the various commands for those who want to memorize them. TI Artist does requires switching between two main programs and several auxilliary ones which can get tiresome even though it is all done within the main program. Graphx, like Bitmac, uses some function keys but provides an identifying strip for the top of the keyboard which makes them quite easy to follow. Graphx also uses menu selection for the less used features. Of all the paint programs Graphx has the best manual, which can be used as a tutor as well as a reference.

A final word on two more items which are not covered on our check list: availability and price. Most of the programs listed on the chart are readily available and can be purchased at any number of places, including Ohein's. Prices given are those charged at Ohein's, and may vary from place to place: Joypaint, $39.95; Joy Paint's Pal, $9.95; Bitmac, $19.95; TI Artist, $19.95; Artist Extras, $6.95; Graphx, 39.95; Draw 'N Plot, $14.95; Norton Graphics Package, $7.95.

Paint 'N Print, produced by Navarone Industries, is also readily available. I occasionally see Master Painter 99 by Amerisoft still advertised, and I believe you can still get Draw-A-Bit and Print-A-Bit from Data Force in Illinois. Since these addresses are easily obtainable from your user's group officers (or from me), I won't repeat them here.

Super Sketch, alas, is no longer made. It is included in the chart because there are still a lot of them in use, and you just never know when one might pop up for sale. Super Sketch is unique in that it has been the only pad and pencil type software released for the 99/4A.

Section Two: Getting Down to Details

Let's talk about drawing tools. In these packages the cursor is your "pencil" as well as your "eraser". The pencil can be moved around either by using the keyboard's arrow keys or by using a remote controlled "joystick". Some software requires joystick control. Then the fire button is usually used to turn the drawing tool on or off. To make truly curved lines with just the keyboard is practically impossible - you need the better control that a joystick has. On the other hand, it's harder to draw straight lines with a joystick; the keyboard does a better job there. Luckily, drawing programs can create lines, boxes and circles automatically.

Anywhere a joystick is required, a trackball can be used instead. The phenolic ball offers 360 degree movement for such fine control of the pencil that you can easily write your name in script. (I won't promise how it will look!) However, it is almost impossible to draw a straight line with a trackball. This is where the automatic line function in drawing programs becomes invaluable. If you are using a joystick or trackball be sure the alpha lock is in the UP position.

Cursor Speed Control - In many of the programs the speed of the cursor can be controlled. This is handy because if you are drawing large areas freehand, you can go much faster. When you want to work on painstaking detail then use a slower cursor for more accuracy.

Brush Styles - Instead of leaving a fine line like the single-pixel pencil, a brush applies "paint" for wider or fancier lines. Draw A Bit lets you paint in wide or narrow swatches of color. TI Artist includes angle brushes and brushes that make parallel lines like you would get from painting with a fork. Paint 'N Print, which has 32 brush styles includes circles, squares, and even triangles in a number of sizes.

Automatic Draw Functions - As mentioned earlier, all paint programs listed here will draw lines for you automatically. Select the beginning and end of your line, press a button, and presto - you have a perfectly straight line right where you wanted it. Some programs will also draw circles, ovals, rectangles and rays. A ray is like a line except that you can keep moving the cursor (pencil) around the drawing board, and wherever you choose to press the button, you can have a perfect line between the current cursor position and your original starting point.

Some programs will also draw ellipses and rectangles. For chart purposes, an ellipse includes circles and ovals, and rectangles include squares. Draw A Bit and the Graphics Package draw 90 degree arcs - four

arcs make a circle. The various programs handle this function in different manners, but the principal is the same; select the center position and the size, and the figure is drawn automatically.

Filling, Shading, and Adding Depth - In all but two of the programs, closed shapes can be "filled", or "painted", with a specified color or pattern. The Paint 'N Print cartridge limits the filling to a rectangle only. But with the companion disk, any closed shape may be filled with any texture or solid color.

A manual fill requires the cursor to be moved around the shape as it is being filled, in order to get every little part of it. A semi-automatic fill does most of the shape in one pass; the occasional spots missed must be done manually. A fully automatic fill checks to see that every little corner has been filled - even in convex shapes. Sometimes this is called a "smart" fill.

Some programs provide patterns for shading and depth. Super Sketch has one texture pattern. TI Artist has 18 and Joy Paint has 24 from which to choose. Joy Paint also has an airbrush which works like a can of spray paint. It give a misty, sprayed effect in whatever pattern you are using. Because you can control the amount of "paint" that goes on the drawing, it makes an excellent tool for adding shadows and depth. Almost the same effect can be achieved with Paint 'N Print by using one of the larger brush sizes and switching to the texture mode. Bitmac has a feature called "Life" which can be used for getting a shaded effect.

Joy Paint and Paint 'N Print both have routines on their companion disks for creating new texture patterns. Once you have saved these patterns on disk, they can be used over and over.

Reflections - The chief application of this function is to draw symmetrical figures rapidly and easily. The screen is divided into sections and whatever is drawn in one section will be reflected in all the others. In TI Artist this is called the MIRROR function, and the screen is divided into four parts. Other functions such as circle, frame, line, and zoom can be used while the mirror function is in effect. Paint 'N Print calls this function KALEIDESCOPE and gives you a choice of 2 to 8 reflections. Functions such as square, circle or fill may be used but result in only one image.

Picture Manipulation

Move, Copy, Flip, Rotate, Invert, Magnify and Reduce - When you have your picture underway, and more of an idea of what you want, you will appreciate features that let you alter the look of the drawing. Some programs let you copy one part of a picture to another part, move sections of picture around the screen, rotate, invert, or flip them; magnify or reduce parts. Invert means to turn all the "on" pixels off, and all the "off" pixels on - thus swapping black for white and white for black. Flipping a picture gives you a mirror image, either left to right (horizontal) or up side down (vertical) depending on which way you flip.

The only programs that have functions to enlarge or reduce drawings are Bitmac and Joy Paint, which can each double or halve the size of the selected image. For reducing a Joy Paint image, the companion disk, Joy Paint's Pal must be loaded. It can also be used for reducing parts of TI Artist or Graphx pictures. These pictures can then be resaved in the original format or switched to Joy Paint's file structure.

TI Artist drawings can also have parts saved to disk in an enlarged format by saving the screen when the zoom mode is in effect. This will give you a new picture that is four times the size of the original. For both reducing and enlarging, Joy Paint does the smoothest job.

Text Handling and Special Fonts - The more recent programs all have provisions for text to be used right along with the graphics. The nicest of these are Joy Paint and Bitmac, each with what almost amounts to a mini word processer built right in to the drawing board. With TI Artist, variable sized letters can be easily typed on the screen from the keyboard in 8 different heights and widths, but some of the letters are rather blocky looking. Four of the programs additionally contain special provisions for fancy lettering to be added to the drawings. Paint 'N Print contains a font editor which makes it easy to change the resident lettering. TI Artist provides an alpha numeric load function in the enhancement section of the program. Pre-designed fonts that are stored on the disk may be loaded into the program for an endless variety of lettering. Graphx stores fonts on the clipboard, and again there is an endless variety to choose from among the support disks. The letters to be used are laid out in the clipboard and then transported to the picture where you want them. Joy Paint 99 works much the same way; alphabets are stored in a regular picture file, and the Cut and Paste option is used to add them to your drawing.

Zoom Mode - Four of the programs have the ability to magnify a small part of the picture you are working on so that it temporarily fills the screen. This allows you to work on small details with a high degree of accuracy. Joy Paint calls this mode "fatpixel", Paint 'N Print calls it "magnify". TI Artist and Graphx call it "zoom". Joy Paint also displays a normal sized version of the graphics in the upper right corner of the screen so that you can see what your changes are going to look like as you make them. TI Artist lets you use other drawing functions while in the zoom mode - even to making a zoomed hard copy or saving to disk. While in the zoom mode Graphx provides a marker to show where color boundaries begin and end. If you happen to be using the grey checker board pattern used for marking color boundaries in Graphx, it will still be present in your zoomed in copy.

Paint N Print has a high degree of magnification. Each pixel is shown as a square eight times its original size. Each square is outlined in a fine black line and each block of 64 are outlined in a bold black line. The bold line marks the color boundary for each character

block.

When the zoom function is chosen Joy Paint, TI Artist and Graphx all let the user choose which part of the screen will be zoomed by showing a box with which to enclose the desired area. In the Paint 'N Print environment, the place where the cursor is sitting when zoom is chosen becomes the central point of the screen, with the screen then acting as your "window" to a small but highly magnified part of the drawing. All of the drawing is accessible by scrolling it by this point, but the cursor never moves.

Section Three: Picture Storage, Color, and Unique Features

Scratchpad Memory - Most drawing packages have provisions for setting aside part of a picture and later adding it to another picture. This "scratchpad" memory can be handled in two ways: by saving a permanent version of the clipped picture onto a disk which you can reload as needed; or by storing the picture-part in intermediate memory where you can recall it when you need it, even though you have loaded a new picture files in and out of the program since the picture part was saved.

When this type of picture-part is saved to a disk it should not be confused with a regular picture file. When a picture file is loaded into your program, whatever you had on the screen before is erased and gone, and the new picture takes its place. Picture-parts, however, are loaded IN ADDITION to whatever else is already there. These small pictures have become very popular with the drawing community so that they have their own special ters - clipart.

Each program is unique in its handling of this additional storage. Joy Paint uses internal storage for a Cut and Paste method much like the paint programs for other popular computers do. All screens are saved in the same format. When something is wanted from another picture, save the current picture first, then load in the picture to be borrowed from. "Cut" out the piece you wish to use. Reload the original picture and "Paste" the new part any where on the drawing.

Bitmac uses the "Store" function for internal temporary storage. Current screen graphics can be overlaid with graphics stored on a disk, using what is called "Boolean Input". This allows special graphics effects which are unique to Bitmac.

TI Artist also has unique storage methods. Besides the normal full screen picture files, parts of pictures can be saved as "Instances" or "slides". Slides are a collection of up to 24 miniature designs that can be independently designed, rotated, and moved around on your drawing. Instances are images that can be added to your drawings or combined together in whatever manner you wish. They can become a permanent, editable part of your drawing. The nice thing about instances is that they are saved in a DISPLAY VARIABLE 80 format which can easily be transported to Extended Basic programs or TI Writer files

as well as being used for clipart.

Graphx has a very powerful "Clipboard" feature. With it you can create and store clipart permanently on a disk and it is also possible to copy a portion of one picture into another, much like Cut and Paste. A portion of a picture, or even several pictures, can be stored, then decided on later as to which ones to keep and which ones to erase.

Use of Color

In the high resolution mode each graphic position available to be used on our electronic drawing board is called a pixel. You may remember being told that the screen is like a grid with 256 pixels across and 192 pixel rows; and that each individual pixel on the screen can be turned off or on separately while you are drawing - all 49,152 of them! Right? Wrong, if you are using color!

Color resolution for the 99/4A is not the same as drawing resolution. We still have the same 192 rows of pixels, but instead of 256 pixels across, we have only 32 graphic positions across each row. Each row of pixels is grouped in eights, starting from the left of the screen, and each set must be the same two colors - a foreground and a background.

The foreground is the color assigned to the brush or pencil line in each eight-pixel group. The background is the color assigned to those same eight pixels when the pencil is not used. When you first begin using the drawing board, all of the eight-pixel groups have been assigned the same two colors. The color you see before you begin drawing is your background, and, of course, the pencil line is your foreground color. You may also see a third color in the form of a border around the perimeter of the screen. This is the screen color. If you don't see it, that means the screen has been assigned the same color as the background.

Now you can see why color resolution is 64 X 192 instead of the drawing resolution of 256 X 192. Any given group of eight horizontal pixels MUST be the same two colors. The groups on either side can carry entirely different colors, but each group is limited to two colors. Knowing this, and arranging your drawings according to the color boundaries is important when working with color.

Most programs make full use of the 99/4A's 15 brilliant colors, allowing control over the foreground and background colors, and in many programs over the screen color as well. Sometimes the screen color is called the "backdrop".

All programs using color allow the swapping of one color in a drawing for any other. When the exchange takes place, every incidence of that color on the screen is swapped for the new one. Additionally, some programs like TI Artist and Graphx allow selective repainting of a chosen area.

Some of the programs provide special helps for working with color. TI Artist provides a function that lets a special color cursor move on color boundaries. Graphx does the same; also providing a "Grey and White Checkerboard" function which is handy for planning drawings which will use a lot of different colors. This makes it much easier to plan the various colors in your picture so that they don't bump into each other. When you no longer need the grid simply choose the "Remove Grey Boxes" option.

For special color effects, two programs that shine are Draw-A-Bit with its Redraw feature described elsewhere, and Paint 'N Print which includes five extra rainbow colors in varying widths of horizontal and vertical stripes. Draw 'N Plot makes limited use of color. Only two are used at any one time - foreground and background. These colors can be easily switched so you can see how the various combinations of color look together.

Besides the Graphic Package, which doesn't use color either, Joy Paint is the only major paint program not using color. Here the emphasis is on the manipulating of picture components, and color is used only as a background, with the pencil line alway being your choice of either black or white. Painting refers to filling shapes with the many patterns available, or using the air brush to "spray paint" an area with a chosen pattern.

A Slide Show is a method of presenting pictures in a selected order. Bitmac is the only program with this feature built in; Draw A Bit and Draw 'N Plot have disk demos that you can adapt for your own pictures. TI Artist has an excellent companion disk called Display Master that gives you many options in designing your own slide display. Asgard Software puts out a slide show program for Graphx files.

The Undo command lets you "take back" the last step of a drawing. If something was moved or erased that shouldn't have been, no harm done, just "undo" it. Joy Paint is the 99/4A's only program with this feature but it is quite common in paint programs for other computers.

Like Undo, each program has special features not shared by the others. If you are in the market for a new paint program, one of these might be just the feature you were wishing you could find. For instance, Joy Paint has a drawing area that is actually 92% larger than the screen. To see the rest of the drawing board, the screen is used as a window, and can be moved from side to side or up and down. When the screen dump program is used the whole area, not just what is visible on the screen, is printed.

Do you have a second computer that you have wished you could tie in to your 99/4A? The Bitmac software will let you do just this. When the coprocessor function is in affect, the other computer (not necessarily a TI) can manipulate data while the 99/4A is processing elaborate graphics from that data.

Bitmac has a Cursor Report feature which can be turned on or off as desired. It keeps track of the actual pixel location of the cursor. The program also lets you scroll your picture one pixel at a time to the right or left, up or down on the screen. This is handy for getting a drawing onto color boundaries, and also for special effects using the Boolean inputs AND, OR, and XOR.

The TI Artist instance file was already mentioned above as being excellent additional storage for clipart, because these files can be added so easily to any picture you are currently working on. The instance file is invaluable for using as a vehicle to transport your artwork to other mediums. Many support programs have been built around the ability of these instances to be so easily used, including Font Writer (Asgard), Art Convert (Trio+) and Character Sets and Graphic Design III (Texaments).

Besides being used for planning color in drawings, the unique grey box function in Graphx can be used for designing schematics and other precision drawings which require precise measuring.

The Graphx clipboard also lets you experiment with computer animation. If you store the appropriate images on the clipboard you can create short, animated sequences which you can display against a background of your normal Graphx pictures.

Like the Norton Graphics Package, Draw N Plot is primarily a programmer's tool. Unlike the Graphics package however, Draw 'N Plot has a very nice, full-featured drawing board. Also, the routines in Draw 'N Plot are in assembly language which considerably speeds up operations. Draw 'N Plot makes an excellent program to design your own Extended Basic programs around; however, memory can be a problem.

Draw A Bit is really a full-scale programmer's tool too, but the programmer must be somewhat conversant in assembly language as well as Extended Basic to use it with his own programs.

As you work in the Draw A Bit environment, your picture is automatically saved for you in intermediate memory. Any time you wish you may clear the screen and with the push of the right keys, redraw the picture, line for line. This is a fascinating procedure to watch. Pictures may also be saved in this Draw mode if desired. Also interesting to use is the Connect-Dots option. This is like a line function except that you plot all your dots first; then the lines appear when you are ready for them.

Built right into Paint 'N Print is a font editor that will let you easily change the shape of the resident alphabet. The companion disk additionally allows editing of the texture character for all sorts of special textural effects.

Paint 'N Print is the only drawing package which

allows a screen dump to be in color, providing you have the right printer (the Axiom GP 700).

Super Sketch is the only program that includes a touch tablet. This graphics tablet, although deceptively simple looking, is a precision tool that accepts commands through a control arm which determines screen position. The control arm moves the pointer (your pen) around the tablet, and the computer keeps track of where this pointer is at all times. In this manner, any picture placed on the tablet can be traced onto the screen. The device is so simple that even a child can use it easily.

The Artist Extras package from Inscebot allows the use of the Super Sketch touch tablet with TI Artist. When used this way, the tablet becomes an integral part of the TI Artist program and the is used in place of a joystick or trackball to allow designed traced with the tablet to appear on the screen.

Section Four: Hard Copy, File
Management and Extra Support

Except for Super Sketch and Draw A Bit, which both have supporting disks that contain screen dumps, the drawing packages listed here all include built-in printer routines. The printer and the software package you use must be compatible. All of the programs listed are compatible with the TI Impact Printer which was made by Epson, so any printer that uses the same formats and codes as an Epson is also compatible. Paint 'N Print comes in a choice of three cartridges depending on which printer you have. Cartridge A works with the Axiom GP-100 and GP-700 printers. The GP-700 will give color printouts. Cartridge B is set up to work with the Axiom GP-550 and Okidata printers, and C is for the Epson compatibles, which include Star and IBM. The Extended Graphics Package which supports Paint 'N Print contains the routines from all three cartridges. Other printers that can be used with a particular drawing program are listed on the chart.

Screen dumps vary widely in several important respects, including size, density, and placement on the page. All details given here were gotten from screen dumps using the TI Impact printer. They should more or less apply to all screen dumps but there could be differences. A small size screen dump occurs when the screen image is copied exactly as shown, pixel for pixel. A larger dump has more printer dots per pixel – usually either 4 or 16 dots for each pixel, which can give a blockier effect from up close but looks great when the viewing distance is further away.

The size of the printout is also affected by density. On the TI Impact printer there are normally 60 dots printed horizontally per inch. This would make 480 dots per each 8 inch row. Double density prints 120 dots horizontally per inch, and some printers have an even higher dot resolution than that. Since the graphic image has the same number of pixels no matter what density is used, it will be only half as wide when printed double density as when printed in normal density mode. Most of

the packages listed here handle this factor for you by adjusting the line spacing when double density is used. Because of the difference in printers, and because screen graphics don't match up exactly pixel for dot with printer graphics you may still find some distortion in your printouts. On the whole, though, most paint packages produce a reasonable hard copy of your screen graphics.

Joy Paint gives you a choice of two dump sizes and either size can be single or double density. The small dump is centered on the page, and because Joy Paint uses 92% more area for graphics than other packages, it pretty well extends from one side of the page to the other (5 1/2 inches wide times 3 1/2 inches high). Three of these dumps will nicely center on a page, which, using three screens consectively, will produce a very good flyer. The large dump produces a horizontal picture 8" X 9" in size.

Bitmac also gives you a choice of large or small dump. The small dump places exactly one dot on the paper fo each dot in the screen to give a single density printout 4 1/4 inches wide X 2 5/8 inches high. You have a choice of centering the graphics, or placing thes over to the right or left margin. The large dump is centered and is double density. On the TI Impact printer it is distorted quite badly, however, as it is the same heighth as the smaller picture, but 6 3/8 inches wide.

TI Artist gives you the most control over the final output for your hard copy. You have a choice of up to three magnifications and four densities depending on what your printer is capable of doing. You can also control line spacing when the printing is being set up. Using the TI Impact printer you can have a double density printout as small as 1 3/8 X 2 1/8 using a magnification of 1 and a line spacing of 4; or a printout which will fill an 11" X 15" large size paper with a magnification of 3, a line spacing of 8, and single density. And all this from the same screen image! Printing can also be done from the zoom mode.

All TI Artist printouts are centered no matter what the size. A single density printing that has been magnified twice exactly fills one-half of a standard page; two consecutive printings make a very nice flyer.

Graphx gives you a choice of two sizes, single or double density. The smaller (4 1/4 X 2 5/8) is printed at the left margin. The larger is half of a standard page – again, two screens make a nice flyer. Draw 'N Plot has one size, 4 1/4 X 2 5/8, single density. Paint 'N Print also has one large size single density printout. Paint 'N Print gives a choice of which part of the drawing will be printed – from a very small section up to the whole screen. The drawing will be printed horizontally and in the upper left corner of the paper.

Sketch Mate, the Super Sketch companion disk, and the Master Painter program, both by Acerisoft International, have virtually identical printouts. Each

is 7 3/4 inches wide and 4 5/8 inches high, single density. Each uses a technique whereby colors are assigned a texture (light, medium or dark) to simulate color. This gives pictures a very nice printed appearance. Each color is assigned a default setting which can be changed by the user if desired. The Paint 'N Print program also uses the technique of assigning a different print character for each color. The Draw A Bit companion disk also allows two printout sizes: single or double size, and each can be normal or double density.

The Norton Graphics Package doesn't actually contain a screen dump. Rather, it allows you to print out data that is needed to rebuild your graphics in your own program, either as Sprites or as Call Characters. This graphic data may also be saved in merge format on a disk.

File Management
Disk Catalog - It's handy to have a catalog available if you need to find out just what you did name a certain file, or even if it's on that disk. Only two programs perform this service - TI Artist and Joy Paint. Joy Paint also provides for deleting files.

Conversion Features and Compatibility - If you are intending to use pre-designed graphics either instead of or in addition to creating your own, file compatibility among the various programs becomes important because you will need a ready supply of artwork and clipart. The core program here is TI Artist. Not only is more ready-made artwork available for TI Artist than for the other paint programs, but TI Artist allows picture files from Draw 'N Plot, Graphx and Draw-A-Bit to be loaded in and permanently converted to the TI Artist format. Or, TI Artist files can be converted with TI Artist and loaded from any one of those programs. Instances, which are a very popular form for clipart, can be converted by first saving as a picture, then converting to an instance. CSGD graphics, which are another popular form of clipart, can be converted using any of several available programs including the Artist Extras companion disk. CSGD fonts can also be converted to TI Artist fonts using the same disk.

Joy Paint's Pal allows the conversion of Graphx, TI Artist, and Draw 'N Plot picture files to the Joy Paint format and visa versa. Joy Paint will also load the first of the two output files for Sketch Mate. It will not, however, load Bitmac files, even though Bitmac has the same Internal/fixed/128 format that Joy Paint does. This leaves Bitmac as the only major paint program to lack compatibility with the others.

Graphx does not have a file conversion feature, but it will load TI Artist files that end with _P. If you transfer the picture file this way you do lose the color. If the color is important the file must be converted to Graphx format within the TI Artist program first, then loaded into Graphx. Graphx will also load Joy Paint files that have been through the conversion program on Joy Paint's Pal.

If you are primarily interested in screen graphics then file portability is important. This is the ability to move picture files into another environment without a great deal of programming; for example being able to save a picture you have drawn in TI Artist into your Basic program. This ability is built in to TI Artist's instances, slides and font files, which has caused a great many support programs to be written, both commercial and as shareware.

Draw 'N Plot and the Norton Graphics Package can easily be used by the average Extended Basic programmer. In the same way, Draw A Bit and Graphx adapt easily for assembly language programmers. Portability for the rest of the programs is limited.

Additional Support
In many cases the manufacturers themselves are doing a good job of supporting their paint programs. Great Lakes Software puts out clipart disks for Joy Paint, as well as Joy Paint's Pal, which has routines to allow file conversion, creation of new patterns, and a reduction feature. Great Lakes also supports a user-drawn base of Joypaint clipart. Their Extended Business Graphs II, while a stand alone package, has file compatibility with Joy Paint.

Besides Artist Extras, Inscebot has released Display Master for the TI Artist which lets you add captions to your drawings and show them in any sequence. Quality 99 Software has some disks of very good artwork out for Draw 'N Plot. A volume of artwork was also released for Bitmac.

Other software producers have also done their share. Asgard Software has released several Graphx Companion sets that contain clipart, full pictures, fonts and animated sequences for the Graphx environment. They are a veritable gold mine of art and ideas for your own creations. Asgard has also released a disk for TI Artist that contains some of the same artwork imported to the Artist environment, but you can still use the Graphx Companions with TI Artist or JoyPaint if you don't mind making the conversions. Asgard has also released Graphx Pictures which contains more of their outstanding artwork - 24 pictures - and a Slide Show program with which to show them.

Triot Software has released some excellent artwork for use with TI Artist. Each 2 disk package includes pictures, clipart, fonts and slides.

Texaments handles the Artist Companions authored by Dave Rose as well as the whole CSGD series. One of the best and most prolific sources of instances and fonts for TI Artist actually started out as clipart for another program - Character Sets and Graphic Design by David Rose. But that's a whole new story so it'll be saved for Part three.

Otherwise, the chart has been covered and you should now have a much better understanding not only of what can be expected of paint programs in general but the strengths and limitations of any particular package.

TI 99/4A DRAWING PACKAGES - COMPARISON CHART

FUNCTION	JOYPAINT JoyPaint Pal	BITMAC	TIARTIST Artist Extras	GRAPHX	DRAW 'N PLOT	PAINT 'N PRINT + disk	SUPER SKETCH Skate	MASTER PAINTER	DRAW A BIT Prnt-Bit	ACTION GRAPHIX
Program Focus	E,T	E,T	T,E,U	E,T	U,T,E	E	E,T	E	E,U	U
Requirements	Any	XB EA MM	Any	XB EA MM	XB	StndAl**	StndAl**	XB EX MM	XB	XB
Ease of Use	6	3	5	5	4	4	6	2	2	1
Method of Operation	Icons, Menus	Icons FcnKeys	Menus Icons	Menus Keys	Menu Keys	Keys	Menus	Icons Fnc Keys	Menu Fnc Keys	Menu/ Keys
Joystk Control	Required	Required	Optional	Required	Optional	Required	No	No	Optional	No
Cursr Speed Cnt	No	5 spseds	2 speeds	5 speeds	2 speeds	No	No	No	No	
Brush Styles	7	9	6	1	1	32	9	4	1-pixel	3
Automatic Draw Functions	Lines, rectngls ellipses	Lines, Circles, Rectngls	Line,Ray Circles, Rectngls	Lines, Ellipses	Lines	Line,Ray Circles Squares	Line,Ray Rectngls	Lines, Rays	Lines, Rays,Arc	Lines, Parabola ellipses
Fill	AutoFill 24 Patrn	Manual Color	AutoFill Col/Pat	SemiAuto Color	SemiAuto Solid	SemiAuto	AutoFill Col/Pat	No	Manual	No
Shade, Depth	Airbrosh	Life	Yes	No	No	Yes*	Yes	No	No	No
Reflections	No	No	Yes	No	No	Yes	No	No	No	No
Move, Copy	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No
Flip, Hor/vert	Yes	H only	Yes	No	No	Yes*	No	No	No	No
Rotate	90 deg.	90 deg.	Slides	No	No	No**	No	No	No	No
Invert	Swapbits	Yes	Yes	No	No	Yes*	No	No	No	No
Magnify, Reduce	Yes	Yes	Mgnify**	No	No	No	No	No	No	No
Text handling	Yes	Yes	Yes	Yes	Yes	Yes	No	No		No
Special fonts	Yes	No	Yes	Yes	No	Yes	No	No	No	No
"Zoom" Mode	Fatpixel	No	Yes	Yes	No	Magnify	No	No	No	No
Scratchpad Mem ("Clipboard")	Cut and Paste	Store B. Input	Instance Slides	Clipbrd	No	Yes	No	Symbols, Store	Palette	No
Use of Color	No	Full Use	Full Use	Full Use	Limited	20 colrs	Full Use	Full Use	Full Use	No
Slide Show	No	Yes	No**	No**	Yes	No	No	No	Yes	No
Undo	Yes	No	No	No	No	No	No	No	No	No
Spec. Features	Larger Wrk Spce Pat Edt*	CoProcsr CrsrRprt Pic.Scr	Instance custmize	Animate fre Clpb GridTool	9 Addl Commands for XB	PatrnEd Rainbow Colors	Touch Tablet		Redraw Connect Dots	Cassette version too!
Printer	Epson Axiom	Epson, TI 950.5	Most Printers	Epson	Epson	Most Printers	Epson	Epson	Epson	Most Printers
Screen Dumps	2 sizes 2 dnsty	Small SD Med. DO	Wide Ch Size,Den	2 Sizes 2 Dnsty	1 Med	Large. Norm.ns:	1 Large NormDnst	1 large NormDnst	2 sizes 2 dnst	No
Disk Catalog	Yes	No	Yes	No	No	No	No	No	No	No
File Convrs Ftr	Yes*	No	Yes	No**	No**	No**	No**	No	No**	--
F/Portability	Not at Present	Limited	Easily	Prog Skl In Assem	Prog Skl In XB	No	No	No	Prog Skl In Assem	Easily to XB
Addl Support	Some	No	Lots	Lots	Some	No	No	No	No	No

* Starred features are found on the companion disk listed under the main package   ** See chart notes

FAST

EXTENDED BASIC

LUCIE DORAIS

My Christmas gift to you is a real program, one that you can keep and play with during the holiday season... a cute game full of SPRITES. In a winter landscape, a boy and girl walk or run at random speeds; you can change their direction and speed by pressing any key. Sometimes boy chases girl, sometimes the opposite (she's a woman of the 80's). See what happens when they meet!

```
100 REM ** LOVE STORY / by L.  Dorais / Nov.  1987
110 REM
120 GOTO 140 :: CALL CHAR :: CALL HCHAR :: CALL SCREEN
130 CALL COLOR :: CALL MAGNIFY :: 10P-
140 CALL CHAR(36,"44EBF5FEFB7C3810"&RPT$("0",48)) ! surprise
150 DISPLAY AT(7,4)ERASE ALL:"$ LOVE STORY $" :: RANDOMIZE
160 CALL CHAR(48,"FFFFFFFFFFFFFFFF",136,"FFFFFFFFFFFFFFFF") ::
    CALL COLOR(3,15,1,14,16,1)
170 CALL HCHAR(16,1,136,128):: CALL HCHAR(20,1,48,64) :: CALL
    HCHAR(22,1,136,96) ! landscape
180 CALL CHAR(120,"010307080F170F1F2F1F3F5F0101010080C0A0C0E0D0E
    0F0B4F0F8F4")! trees
190 CALL CHAR(124,"010001080002100004210004400000000000200040108
    0002000AU04")! lights
200 CALL CHAR(194,"0303030701070F1B33070F1F06C060E0EC0C0C0E080E0F0D
    8CC80F0F868607070")! girl
210 CALL CHAR(108,"0303030301070F1B3303070706060E0EC0C0C0C080E0F0D
    8CFCC8D0E060607070")! boy
220 CALL CHAR(116,"930P1F9703010103070F0300031F0F03C0F0F8FCFC9CBEF
    8FE8R3C7CFCF8F0C0")! moon
230 REM
240 DISPLAY AT(7,4):"" :: CALL SCREEN(5):: CALL MAGNIFY(4)
250 CALL SPRITE(#9,120,13,89,26,#7,120,13,110,106,#2,120,
    13,144,200) ! put trees
260 CALL SPRITE(#10,116,11,25,180,0,-1)! put moon
270 CALL SPRITE(#4,108,5,132,64,#5,104,14,132,145)! put couple
280 10P+
290 BV=(RND*50)-25 :: GV=(RND*50)-25 ! velocity
300 CALL MOTION(#4,0,BV,#5,0,GV)! move couple
310 CALL ON :: CALL OFF ( light trees
320 CALL COINC(#4,#5,10,COIN):: IF COIN=-1 THEN CALL KISS ::
    GOTO 300
330 CALL KEY(0,K,S):: IF S=0 THEN 310 ELSE 290 ! press any key
340 REM
350 SUB ON :: CALL SPRITE(#9,124,12,89,26,#6,124,8,110,106,
    #1,124,16,144,2 00):: SUBEND
360 SUB OFF :: CALL DELSPRITE(#6,#1)):: SUBEND
370 SUB KISS :: CALL MOTION(#4,0,0,#5,0,0)
380 CALL POSITION(#4,PR,PC):: IF PC>250 THEN PC=250
390 CALL SPRITE(#3,36,9,PR+6,PC+6,-30,0):: CALL SOUND(300,1900,0)
400 FOR DEL=1 TO 300 :: NEXT DEL :: CALL DELSPRITE(#3):: SUBEND
```

CRAB CANON			
CRAB CANON ++++++++++	9 PRINT :::	22 READ A(D,I)	35 DATA 123,123,123,123,1500 0,196,196,196,196,196,185, 165,185,185,175,175
by: J.S.Bach	10 PRINT TAB(5);"Program by Jim Beck"	23 A(145-D,2)=A(D,I)	
		24 NEXT D	36 DATA 175,175,165,165,165, 165,156,156,156,156,147,147, 139,139,131,131
Programmed by: Jim Beck	11 PRINT ::::::::::	25 FOR DE=1 TO 2	
	12 FOR D=1 TO 13	26 FOR D=1 TO 144	
	13 CALL COLOR(D,2,16)	27 X=(D/10)+1	37 DATA 123,123,98,98,131,13 1,175,156,156,156,156,14 7,147,147,147
1 CALL CLEAR	14 NEXT D	28 CALL COLOR(14,X,1)	
2 CALL SCREEN(16)	15 CALL COLOR(14,5,5)	29 CALL SOUND(-200,A(D,1)#2, 0,A(D,2)#2,0)	38 DATA 131,131,131,131,156, 156,156,156,196,175,196,262, 196,156,147,156,175,196,220, 247,262,156,175,196
3 FOR D=1 TO 14	16 CALL HCHAR(1,1,136,32)	30 NEXT D	
4 CALL COLOR(D,16,16)	17 CALL HCHAR(24,1,136,32)	31 NEXT DE	39 DATA 208,147,156,175,196, 175,156,147,156,175,196,208, 233,208,196,175,196
5 NEXT D	18 CALL VCHAR(2,1,136,22)	32 CALL CLEAR	
6 PRINT TAB(9);"Crab Canon"	19 CALL VCHAR(2,32,136,22)	33 END	40 DATA 208,233,262,277,233, 208,196,220,247,262,294,311, 262,247,220,247,262,294,311, 349,294,196,294,262,294
7 PRINT :::	20 DIM A(144,2)	34 DATA 131,131,131,131,156, 156,156,156,196,196,196,196, 208,208,208,208	
8 PRINT TAB(9);"by J.S.Bach"	21 FOR D=1 TO 144		

MICRO was a real-time operator and dedicated multi-user. His broad-band
protocol made it easy for him to interface with numerous input/output devices,
even if it meant time-sharing.
     One evening he arrived home just as the sun was crashing, and had parked
his Motorola 68000 in the main drive (he had missed the S100 bus that morning),
when he noticed an elegant piece of liveware admiring the daisy wheels in his
garden. He thought to himself, "She looks user-friendly, I'll see if she'd
like an update tonight".
     Mini was her name, and she was delightfully engineered with eyes like COBOL
and a Prime mainframe architecture that set Micro's peripherals networking all
over the place.
     He browsed over to her casually, admiring the power of her twin 32-bit
floating point processors, and enquired "How are you Honeywell?". "Yes, I am
well", she responded, batting her optical fibres engagingly and smoothing her
console over her curvilinear functions.
     Micro settled for a straight line approximation. "I'm stand-alone
tonight", he said, "How about computing a vector to my base address and maybe
we could get offset later on".
     Mini ran a priority process for 2.6 milli-seconds then transmitted "8K,
I've been dumped myself recently, and a new page is just what I need to refresh
my disks. I'll park my machine cycle in your background and meet you inside."
     She walked off, leaving Micro admiring her solenoids and thinking, "Wow,
what a global variable, I wonder if she'll like my firmware".
     They sat down at the process table to a top of form feed of ficce and chips
and a bucket of baudot. Mini was in conversational mode and expanded on
ambiguous arguments while Mico gave occasional acknowledgements, although in
reality he was analysing the shortest and least critical path to her entry
point. He finally settled on the old, "would you like to see my bench-marks
subroutine", but Mini was again one step ahead.
     Suddenly she was up and stripping off her parity bits to reveal the full
functionality of her operating system software. "Lets get BASIC, you RAM", she
said. Micro was loaded by this stage, but his hardware piping system had a
processor of its own and was in danger of overflowing its output buffer, a
hang-up that Micro had consulted his analyst about. "Core", was all he could
say.
     Micro soon recovered however, when she went down on the DEC and opened her
device files to reveal her data set ready. He accessed his fully packed root
device and was just about to start pushing into her CPU stack, when she
attempted an escape sequence.
     "No, no!" she piped. "You're not shielded".
     "Reset", he replied. "I've been debugged".
     "But I haven't got my current loop enabled, and I can't support child
     processes", she protested.
     "Don't run away", he said, "I'll generate an interrupt..."
     "No that's too error prone, and I can't abort because of my design
     philosophy".
     Micro was locked in by this stage and could not be turned off, but Mini
     soon stopped his thrashing by introducing a voltage spike. He then rolled
     over with a head crash and went shut down his system.
     "Computers!", she thought as she c...led her self", "all they ever think
     of is Hex".

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