Image Loader Utility

For NCD RS-232 Networkable Graphic Display Controllers

Icon Storage Utility — WWW.CONTROL...

Bank 15 32x16   [Reload Bank Graphics]
MENU ENTER → ↓ ON OFF RUN STOP GO RESET
MENU ENTER → ↓ ON OFF RUN STOP GO RESET

NCD Image Loader V1.00 — WWW.CONTROLANYTHING.COM

Setup
- Serial Port Settings
- Hardware Settings

Text Commands
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- NCD Graphical CG Text

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- Icon Storage Utility

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- DMF5001 Commands

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- Review Stored Pictures
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Programmer's Guide
- ☑ Guide On/Off
- ⦿ Visual Basic
- ○ Basic Stame II SX

Store Bank 11 ☑ Store Bank 15
Store Bank 12
Store Bank 4   Store Bank 8

Store All Banks   Select All   Clear All   Store S...

Picture Storage Utility — WWW.CONTROLANYTHING.COM

160x128 Optrex LCD   R: 1   C: 1
LED Backlit   FRAME 1   FRAME 1
480x128 Scrollable Image   PART 2   PART 3

Preview Images:
Frame: 0 of 6

Store All Images   Store This Image Only
Store All Images BEFORE the one Shown, Inclusive
Store All Images AFTER the one Shown, Inclusive

Source File: C:\WINDOWS\Desktop\NCD Image Loader\Graphics\DMF5001.bmp

Character Generator Text — WWW.CONTROLANYTHING.CO...

Send Text to the Display

X Start Position of Text: X = 1
Y Start Position of Text: Y = 1

Enter Text Here, Then Click Button Below

Send Text to Display Using Character Generator Built into S...

Programmer's Guide

Paste Icon Function

Pastes a Icon (or small graphic image) on the Screen at a User-Defined Screen Location. Icons are Stored in the Controller Using the Icon Storage Utility.

Send the Following Bytes to Execute This Command:

```
SerOut 0, 16429,[254]   'Enter Command Mode
SerOut 0, 16429,[14]    'Send Paste Icon Command
SerOut 0, 16429,[ 15]   'Set Icon Bank to Paste From
SerOut 0, 16429,[ 9]    'Select an Icon Image to Paste
SerOut 0, 16429,[ 0]    'Set X Position for Icon to Appear
SerOut 0, 16429,[ 0]    'Set Y Position for Icon to Appear
Your Program Should Wait for Device to Reply with ASCII 85
```

○ Visual Basic   ⦿ Basic Stame II SX (Output Pin 0 Sends Data at 38.4K Baud)

Hardware Settings — WWW.CONTROLANYTHING.COM

Non-Programmable Settings

Display Manufacturer
Optrex

Display Model
DMF5001

Virtual Frame Size
X = 479   Y = 127

Viewable Frame Size
X = 159   Y = 127

Maximum Scroll Distances
X = 40   Y = 0

Backlight: **LED**   Frames: **8**

User-Programmable Settings

Display Brightness = 1
Display Contrast
E3C Device Number = 0

Store Display Settings
Set Display Controller to Factory Default Settings

Select a Device to Control
ALL

Serial Communications Setup

Serial Communications
- ⦿ COM 1
- ○ COM 2
- ○ COM 3
- ○ COM 4

38.4K

Connect

www.controlanything.com

Technical Assistance
Technical questions should be e-mailed to Ryan Sheldon at ryan@controlanything.com. Technical questions submitted via e-mail are answered up to 20 times daily. Technical support is also available by calling (417) 646-5644.

NCD Contact Information

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The NCD Image Loader Utility is a custom Windows program used to permanently store images, icons, and fonts in the display controller. The ILU was designed to work under Windows 98, Windows ME, or Windows 2000. NCD Graphic displays MUST be configured with images, icons, and user settings prior to use in an embedded system.

The ILU was also designed to help teach new users how to send commands to the display controller using Visual Basic or the Basic Stamp II SX microcontroller using the Programmer's Guide.
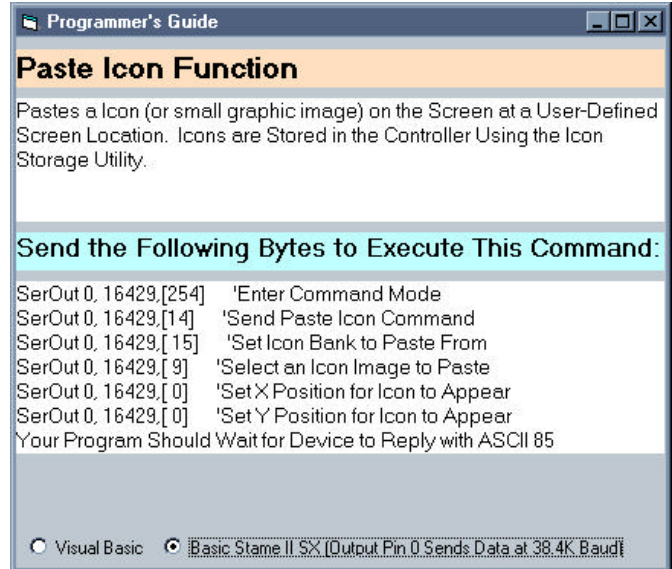
Getting Started
First, connect the display to your windows computer, configure baud rate jumpers, and apply power as shown in the manual for your display controller. Next, install and run the NCD Image Loader Utility. The following window will appear:

Set the com port and communication rate as shown above. Unavailable COM ports will be ghosted. COM ports 3 and 4 were not available to the ILU when the image above was taken, but may be available on your system. Set the baud rate to match the jumper settings on your display controller. For best results, set to 115.2K baud. Once set, click the "Connect" button. If two-way communications was established with the display controller, a windows similar to the one shown below will appear:
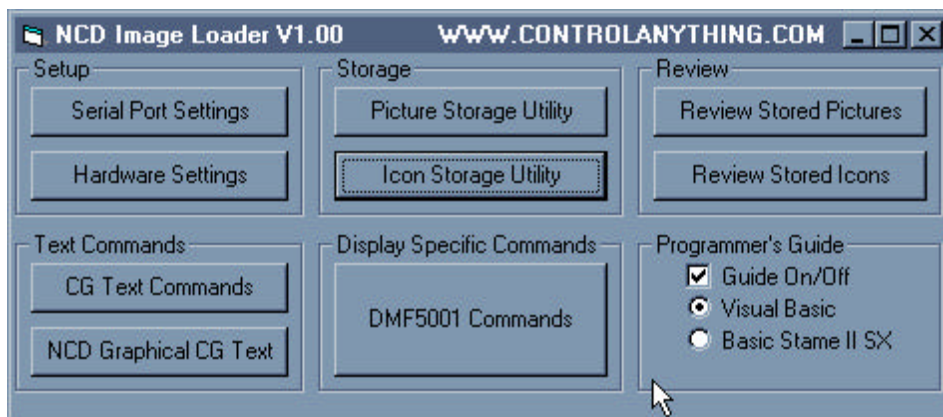
If you are new to the ILU, turn on the programmers Guide to display user commands as they are sent to the display, along with an explanation of their function. Use the radio buttons at the bottom of the windows to format programming examples in your programming language of choice.

Paste Icon Function

Pastes a Icon (or small graphic image) on the Screen at a User-Defined Screen Location. Icons are Stored in the Controller Using the Icon Storage Utility.

Send the Following Bytes to Execute This Command:

```
SerOut 0, 16429,[254]    'Enter Command Mode
SerOut 0, 16429,[14]     'Send Paste Icon Command
SerOut 0, 16429,[ 15]    'Set Icon Bank to Paste From
SerOut 0, 16429,[ 9]     'Select an Icon Image to Paste
SerOut 0, 16429,[ 0]     'Set X Position for Icon to Appear
SerOut 0, 16429,[ 0]     'Set Y Position for Icon to Appear
Your Program Should Wait for Device to Reply with ASCII 85
```

○ Visual Basic ◉ Basic Stame II SX (Output Pin 0 Sends Data at 38.4K Baud)

Leave this window open and set it aside so you can see how commands are sent to the display.

Hardware Settings

Select the Hardware Settings button to display useful information about the graphic display and controller. Many NCD graphic displays have a virtual frame size that is larger than the viewable display area. Later, you will learn how to use the scroll command to reveal the rest of the display area. The Virtual and Viewable frame size and Maximum Scroll Distance Boxes will provide important information when you begin to use the display in your own application.

The E3C device number allows you to control up to 256 displays or other NCD devices on a single serial port. The E3C device number defines its "location" on the chain. The Store Display Settings button is used to store power-up brightness and a device number.

The "Select a Device to Control" box is used to issue E3C commands to the display. Version 1.00 of the ILU does NOT support these commands. The user interface controls are in place for future updates.
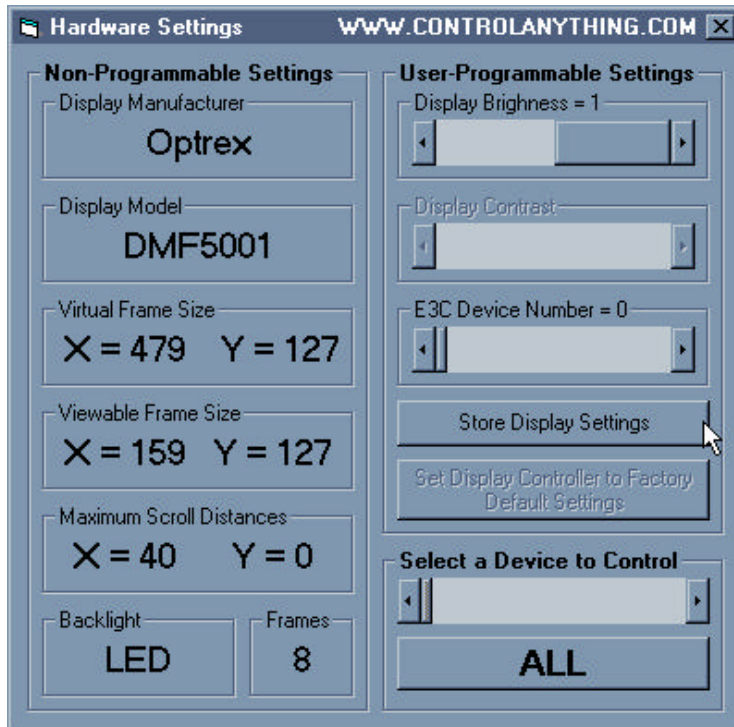

The "Frames" box above shows indicates how many images may be stored in the graphic display controller. The usable range in our example is 0 to 8. Frame 0 stores the startup image, so there are actually 9 frames that may be configured by the user.

This value is always given in Virtual Frames, not actual display frames. For instance, the DMF5001 has a viewable area of 160x128 pixels, but images are stored in the display controllers as 480x128 scrollable bit-maps. The "Frames" box indicates that the display controller is capable of holding nine, 480x128 images. Since the size of our example display is 160x128, each 480x128 virtual frame is actually 3 display frames (480 divided by 160). In other words, 9 480x128 virtual images equates to 27 160x128 viewable images.

The Display Brightness slider allows you to adjust the brightness of the backlight. In most cases, you can only set the backlight to On or Off. Vacuum florescent displays have 16 user-programmable brightness levels. Future display controllers may have more levels of software controlled brightness and contrast settings.

Storing Pictures into the Display Controller

The display controller is capable of holding images in non-volatile EEPROM memory. Frame 0 is ALWAYS the startup image (also known as the "SPLASH" screen). When power is first applied to our example display, the entire 480x128 bitmap is copied from the NCD display controller into display memory. The scroll position is set to display the first 160x128 portion of the image below. Keep in mind that our examples are shown for the DMF5001 display. Other displays models may have slightly different arrangements for storing images.
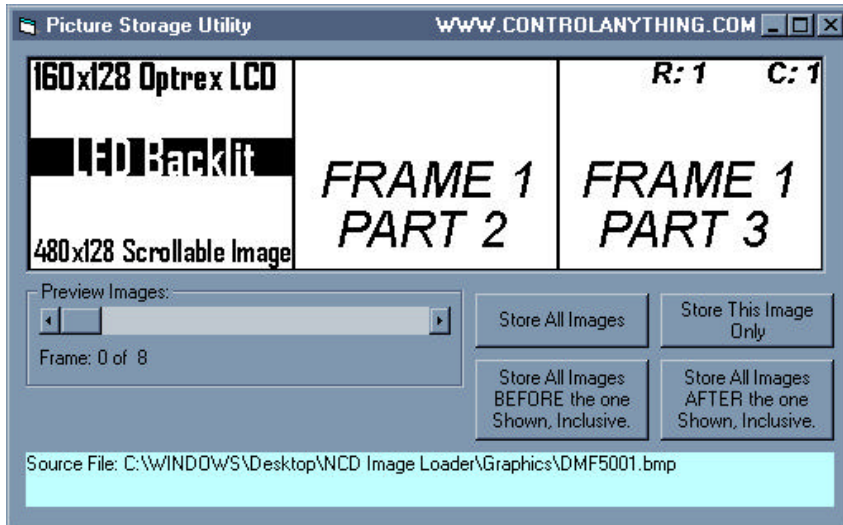
Use your favorite paint program to edit the image shown in the light blue box above. Note that the installation location and file name may be different for your display. This blue box simply indicates the file that is used to hold all images in the display controller. The "Frame" slider lets you view each individual image. Note that ALL images are stored in a SINGLE large BMP image file. We have chosen to do this to minimize the number of files the user must keep track of during graphics development.

If you are running a paint program and the ILU at the same time, it will be necessary to close and reopen the "Picture Storage Utility" window to retrieve your latest saved art work.

Use the image storage buttons to store images in the display controller unattended. If you are updating the startup image, you may hit the reset button on RSIO board to instantly see your new title graphics. The ILU will automatically reconnect to the display after sending a hardware reset.

IMPORTANT NOTE:
Care should be taken when working with this image file. DO NOT RESIZE OR ADJUST THE PALLETTE.

Storing Icons and Fonts into the Display Controller

The display controller is capable of holding icons, or small graphic segments that may be pasted just about anywhere on the display screen. The "Icon Storage Utility" button is used to store icons and fonts into the display controller. The ILU retrieves graphics stored in the "ICONS.BMP" file. This file is located in the same folder shown in the blue box of the "Picture Storage Utility" (see previous page for details). There are 3,076 icons in 9 different sizes. Banks 1-8 can be used as fonts as well as icons. Banks 9-16 can be used for other types of GUI elements.
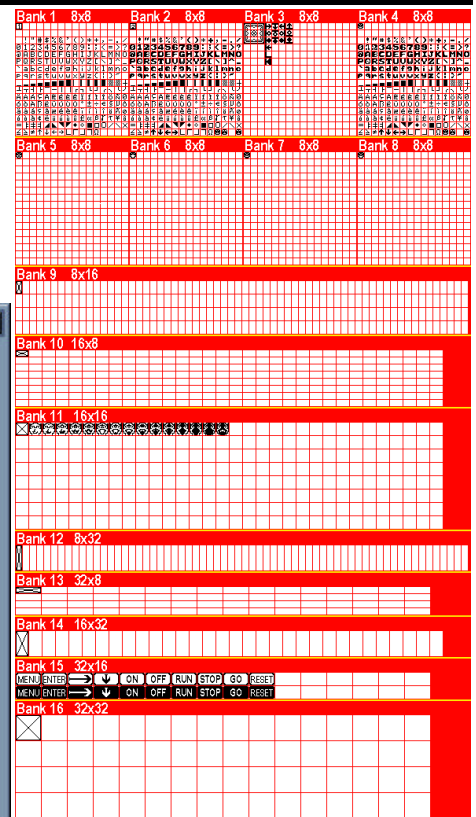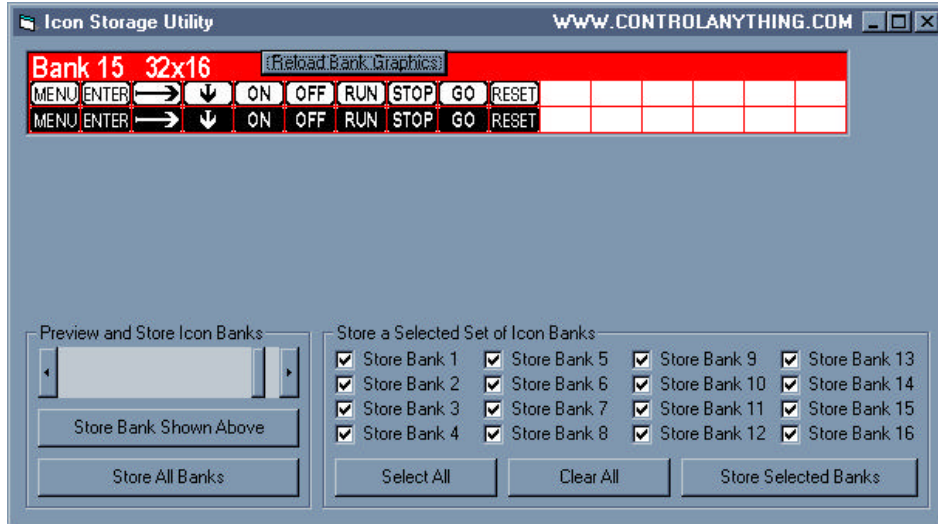
Use the slider above to display the icon banks as they will be stored into the display controller.

Icons are pasted on the display screen using the "Paste Icon" command. Fonts are drawn on the display screen using the "NCD Graphical CG Text" command. See the manual for your individual display for complete details. You may also turn on the "Programmer's Guide" for detailed command information.

IMPORTANT NOTE:
Care should be taken when working with this image file. DO NOT RESIZE OR ADJUST THE PALLETTE.

Reviewing Stored Pictures

The "Review Stored Pictures" button will bring up a window similar to the one shown below. Note that the "Display Specific Commands" brings up the same window. This box will be customized for each display. Our example display supports horizontal scrolling, full-frame copy, and 1/3 copy commands. Other similar commands may be available for your particular model of display.

Dragging the "Horizontal Scrolling" slider will move the 160x128 view port horizontally across the entire 480x128 virtual display area, revealing the entire 480x128 area, showing only a 160x128 portion at a time.
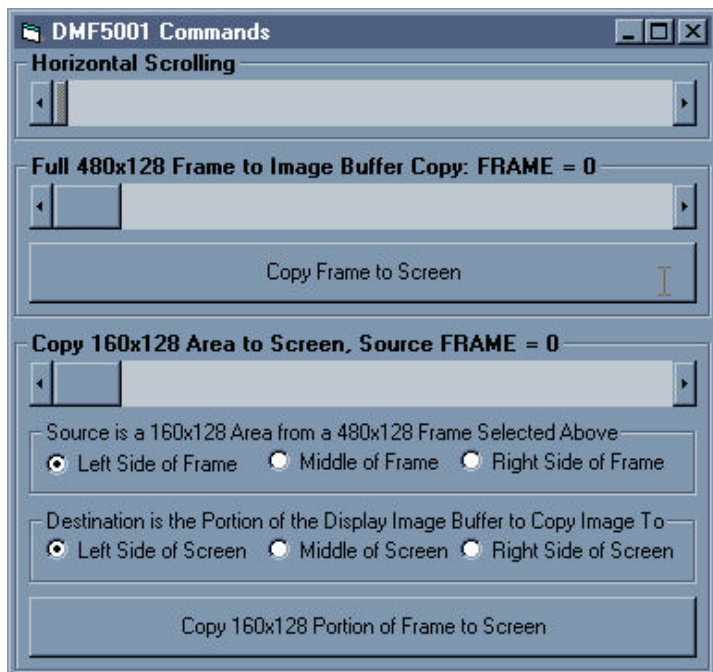
MAKE SURE THE PROGRAMMER'S GUIDE IS TURNED ON TO BETTER UNDERSTAND HOW THESE COMMANDS ARE SENT TO THE DISPLAY.

Using our example display, the "Image Buffer Copy" command can be used to move a 480x128 image from the display controller's EEPROM memory into display memory. Set the frame to be copied, from 0 to 8 in our example, and click "Copy Frame to Screen". After a short delay, the display image will be updated with an entirely new 480x128 scrollable graphic.

Our example display is 160x128 with a virtual display area of 480x128. It is possible to copy any 160x128 portion of a stored 480x128 image to any 160x128 portion of the display screen. Experiment with the One-Third Copy Command (or similar command) for details on how this instruction works. See the manual for your particular display for complete details on copying portions of stored image to virtual or viewable display areas.

These commands will vary slightly depending on the display model you have chosen for your application.

The "Review Stored Icons" button will bring up a window similar to the one shown below.

Review Stored Icons — WWW.CONTROLANYTHING.COM

Select Icon Bank to Paste From BANK = 15 of 16

Select an Icon to Paste on the Screen ICON = 9 of 63

Select Horizontal Position to Paste Icon: X = 0

Select Vertical Position to Paste Icon: Y = 0

☑ Paste Icons on Display Screen as Sliders are Changed (Faster to Review, but Prone to Drawing Errors since your Computer will Send Data WITHOUT Waiting for Display to Complete Previous Command.)

Click Here to Manually Paste Icon onto the Display Screen

Programmer's Guide

Paste Icon Function

Pastes a Icon (or small graphic image) on the Screen at a User-Defined Screen Location. Icons are Stored in the Controller Using the Icon Storage Utility.

Send the Following Bytes to Execute This Command:

```
MSComm1.Output = Chr$(254)    'Enter Command Mode
MSComm1.Output = Chr$(14)     'Send Paste Icon Command
MSComm1.Output = Chr$(15)     'Set Icon Bank to Paste From
MSComm1.Output = Chr$(9)      'Select an Icon Image to Paste
MSComm1.Output = Chr$(0)      'Set X Position for Icon to Appear
MSComm1.Output = Chr$(0)      'Set Y Position for Icon to Appear
Your Program Should Wait for Device to Reply with ASCII 85
```

⦿ Visual Basic   ○ Basic Stame II SX (Output Pin 0 Sends Data at 38.4K Baud)

MAKE SURE THE PROGRAMMER'S GUIDE IS TURNED ON TO BETTER UNDERSTAND HOW THESE COMMANDS ARE SENT TO THE DISPLAY. SEE EXAMPLES AT RIGHT.

Watch the display screen and the "Programmer's Guide" as you move the sliders, you will see user-defined icons appear in user-defined locations. Note that pasting icons is limited to 8-pixel horizontal or vertical increments depending on your display model.

Noritake Vacuum Florescent screens are vertically limited to pasting icons in 8-pixel increments, but may be pasted horizontally in 1-pixel increments.

Optrex LCD screens are horizontally limited to pasting icons in 8-pixel increments, but may be pasted vertically in 1-pixel increments.

Optrex LCDs DMF50426 & DMF50427 are vertically limited to pasting icons in 8-pixel increments, but may be pasted horizontally in 1-pixel increments.

The Programmer's Guide Shows User-Commands as they are sent to the display controller. Examples may be formatted for Visual Basic or for the Basic Stamp II SX. This guide should be used to see how commands are formatted at the hardware level.

Programmer's Guide

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SerOut 0, 16429,[9]      'Select an Icon Image to Paste
SerOut 0, 16429,[0]      'Set X Position for Icon to Appear
SerOut 0, 16429,[0]      'Set Y Position for Icon to Appear
Your Program Should Wait for Device to Reply with ASCII 85
```

○ Visual Basic   ⦿ Basic Stame II SX (Output Pin 0 Sends Data at 38.4K Baud)

Using the Built-In Character Generator

The "CG Text Commands" button is enabled if your display model has a built-in character generator. At the time of writing, only Optrex LCDs with a Toshiba T6963 controller have a built in character generator. If available, text may be pasted on top of graphics without corrupting the graphic images using the "CG Text Commands" button. The user may specify the horizontal and vertical starting position and the text to be displayed. Using the "Send Text to Display…" button, the cursor is positioned and text will be sent to the display screen.

Complete details on the usage of CG Text Commands button can be found in the manual for your display model. This command supports simple positioning and wraps text to the upper left corner of the display once the display is filled.

The font cannot be changed using this display command.

Using the NCD Graphical Character Generator

The NCD Graphical Character Generator is available to all graphic displays, allowing screens that do NOT have an integrated character generator to display text reliant on the NCD display controller hardware. The NCD Graphical Character Generator literally "Draws" text on the graphic layer of any graphic screen. The user may define fonts, position text, and even draw text OUTSIDE the viewable area of some displays. Using powerful scrolling commands of the graphic layer will result in smoothly scrolling text. There are limitations to the use of this command, most notably, it is much slower to draw text and only 84 characters may be sent to the screen at a time using a single command call. Multiple command calls may be used to exceed this limitation. More detailed information on this command may be found in the manual for your display model.