

A Simple Way to Create Bitmap Images for Graphics LCD's

Introduction:

It is often necessary to create a bitmap image to be displayed on a graphics LCD. This may be a background image over which text is displayed or other changeable information. It may be a likeness of a front panel with switches or a map with touch areas. Images such as these are best generated in a "paint" program, but moving the image from the paint program to a source code document can be problematic. This application note describes a relatively simple way of producing such an image and making it ready for inclusion in a program.

The example here prepares and formats the image for inclusion in an assembly code document but can easily be adapted for inclusion in a "C" program. The image is formatted in a way that is compatible with most LCD controllers such as the Toshiba T6963C or the Epson/S-MOS SED1330/1335. Some low-end LCD controllers such as the Epson/S-MOS SED1520 or the Hitachi HD61202 use a paging scheme to map data to the display and do not lend themselves to this method or to the display of full screen bitmap images in general.

Creating the Image:

There are a number of paint programs available on the market and a simple one is usually bundled with the operating system of most computers. Start by setting up a canvas that is the exact size, in pixels, of your LCD. Set the color pallet for 2 color or black and white. You can now generate your image.

When the image is complete, save it in uncompressed TIFF (.tif) format. After the following conversion the image will be correct for a negative mode display. A white pixel will be a logical 1 and a black pixel will be a logical 0 in the image file. A logical 1 will turn "on" a pixel on the LCD display. If the display is a positive mode type the image will look like a photographic negative. For this type of display it will be necessary to "flip" the image in the paint program before saving it. Most paint programs have a command to do this. It is called "flip" or "convert to negative" or something similar.

Converting the Image from Binary to Hexadecimal:

It is possible to include the straight binary code in a program but it would take up an inordinate amount of space. It is more conventional to represent binary data in hexadecimal form. To convert the TIFF file, which is in binary format, to hexadecimal format we can use a simple freeware program called bin2hex.exe. This program is available for downloading from the Hantronix Web site at "www.hantronix.com".

To do the conversion you must change the ".tif" extension to ".bin". Then run the program from DOS or a DOS window with the command line: <bin2hex *filename.bin* *filename.hex*>. The conversion program will create a new file with the extension ".hex".

Formatting the Image Data:

The image file is now a text file which can be opened with any word processor. The data will be 2 digit ASCII coded hex bytes with a space between each byte and 16 bytes per line.

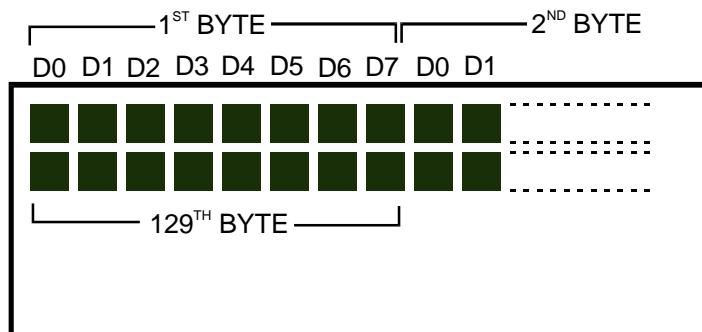
```
a3 ef 01 00 04 96 9a 8c cc bd ff ff 50 67 15 16
```

Delete the first 25 bytes of the file. This is the TIFF header and will not be used. Use the REPLACE command in your word processor to reformat the data to fit your assembler or compiler. An example of the line above reformatted for an assembler is shown below.

```
db    0a3h,0efh,001h,000h,004h,096h,09ah,08ch  
db    0cch,0bdh,0ffh,0ffh,050h,067h,015h,016h
```

The image data can now be placed into your source file.

The data is formatted as shown below. This example applies to a 128x128 LCD display.



As a "reality check" the first byte of data in the above example would be displayed as shown below on a positive mode display.

