AZ DISPLAYS, INC.

TECHNICAL BRIEF
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LCD Software Programming

In today's LCD market, the assortment of controller ICs is continuing to grow. The type of controller used on the module determines how communication is established with the LCD module. While the display specification may contain enough information to allow an engineer to get started, the controller specification provides far more detail and often has flow charts and initialization routines, and even programming examples that can be directly incorporated into the particular application. Controllers have several functions that are required by the LCD module. The controller has memory to constantly refresh the display with data to maintain the image or characters on the display. The LCD fluid will decompose if subjected to prolonged DC voltages, the controller eliminates this by constantly reversing polarity between segments and commons. The duty rate is either fixed or determined by software.

Character Module Programming

The controllers used on LCD Character Modules are almost all based or compatible to the Hitachi HD44780 controller /driver. This coupled with the fact that LCD Manufacturers have standardized electrical pinouts makes it easy to develop hardware and software that is compatible with multiple sources of LCD manufacturers. LCD Character modules can be driven directly from a microprocessor. This controller can be addressed with either 4 or 8 bit microprocessors. The characters generated are based on the standard English/Japanese character patterns burned into the controller ROM. Other character patterns are available (for example: Korean, Russian, Hebrew, Spanish, Arabic, Greek, etc.) and the controller is capable of having eight 5x7 custom characters programmed into RAM.

Graphic Module Programming

Graphic displays from different manufacturers will only be compatible if the electrical pinouts and controller used are exactly the same. This also means that if the application is upgraded to use a different display with a different controller, the hardware and program will most likely have to be modified substantially. Most graphic controllers do not have a character generator, some exceptions are the Toshiba T6963 and RAiO RA8835 (equivalent to Epson SED1335) controllers. Information displayed on the module has to be generated by images developed by a process called Bit Mapping. An image with the resolution matching that of the graphic display is converted to "1's" and "0's" with an on pixel having the value of "1" an off piexel has a value of "0". This pattern of "1's" and "0's" is written to the controller so that the image is reproduced on the display. A future tech brief will provide examples of Bit Mapping.