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Department of Electrical Engineering - Systems

EE 459L - Embedded Systems Design Laboratory

Using the GALEP-4 PLD Programmer

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The GALEP-4 programmer can be used to program a wide variety of programmable logic devices (PLDs) such as EPROM's, PAL's, microcontrollers, etc. Most of the PLDs available for the EE 459 projects can be programmed by this device. The software for using the GALEP-4 is installed on the PC's in the OHE 240 lab and runs under Windows XP.

Initial Set-up

In order to use the GALEP-4 programmers, the following must be done first.

1. The programmer must be connected to the host PC's parallel (printer) port. If the system has more than one parallel port, the programmer must be connected to LPT1.

2. Make sure it is it plugged into its power supply and the power supply is connected to an outlet. There is no power switch on the programmer, simply plug in the power supply cord.

3. The red or green LED should be lit up depending on whether or not the software has found the programmer yet.

Running the GALEP-4 software

The application that controls the programmer is "GALEP32" and can be started in two ways:

- Find the "GALEP32" icon on the desktop and double click on it.

- Or, bring up the "Start" menu, and under the "Programs" submenu, select the GALEP32 application.

Selecting the Device Type

Before doing any programming, the programmer must be told what type of device will be programmed. Click on the "Select Device" button towards the bottom left or select the "Device" item under the "Device Action" menu. This will bring up the device selection information in the upper part of the left side of the window.

If your device is the same as ones that have been programmed before, look in the "Recent Devices" list for your device. Otherwise select which type of device you are programming, such as PLD. Then open up the list for the manufacturer and pick the correct part number.

For the following parts in the EE 459 inventory, use these settings:

Device	Description	Manufacturer	Device Code
PALCE22V10H-15PC	PLD	AMD	PALCE22V10H
GAL16V8A-15LNC	PLD	National	GAL16VA8
GAL22V10B-15LP	PLD	Lattice	GAL22V10B
ATF22V10C-10PC	PLD	Atmel	ATF22V10C
TMS2516	2Kx8 bit EPROM	TI	TMS2516
AM27C256-120DC	32Kx8 bit EPROM	AMD	AM27C256

Load the Data File

The data file for PLDs will probably be a ".JED" (JEDEC) file. For EPROM's the file can be in one of the following formats.

Binary - In this format the file contents are a byte-for-byte image of the EPROM contents. For each byte in the EPROM there is one byte in the file.

Motorola S-Record - Also known as "S19" format, this is a text file containing the EPROM contents. For more information, see "http://www.ezl.com/~rsch/S_Records/". One advantage of this format and the Intex Hex format is that the data files can be viewed in a standard text editor.

Intel Hex - This also a text file containing the EPROM contents. It is similar to the Motorola S-Record format but not identical. For more information, see "http://en.wikipedia.org/wiki/Intel_HEX".

Select "Load" from the File menu and find the data file for the device being programmed and open it.

When programming EPROMs new data can be entered into the buffer or existing data changed by simply moving to a place in the buffer and entering data. Data can be entered in hexadecimal in the "Hex" part of the window, or as ASCII characters in the "ASCII" portion.

Programming the Device

Most of the functions needed to program a device can be run by selecting one of the items in the "Device Action" menu. After you select the first of these operations, the program will ask you to insert the device and show a picture of how the chip should be oriented in the ZIF socket.

The lever on the socket should be in the **up** position when inserting the chip. After the device has been correctly placed in the socket, lower the lever to the **down** position to lock it in.

With the electrically erasable PLDs you need to first do the "Erase" function and then the "Program" function. You can also do a "Blank" operation after the erase to check that it was erased. The program operation automatically does a verify to compare the programmed data with your data.

For EPROMs, the chip must be erased before programming by exposing the window on the chip to UV light by placing the chip inside the UV Eraser and turning it on for 30 minutes.

Reading a Device

The contents of EPROMs and (some) PLDs and MCUs can be read by the programmer and then saved to a file. To do this, follow the above steps for selecting the device and then select the "Read" operation from the File menu. If the device can be read, the contents will be stored in a buffer. For EPROMs, the buffered data can be edited. For other devices it can only be stored in a file. When saving to a file, the program will ask for the file type, either "Binary", "Intel" or "Motorola', as described above.

Remove the Device

To remove the device from the programmer, simply the lift the lever on the ZIF socket to the **up** position and remove the device from the socket.