PROGRAMMABLE LOGIC DEVICES
LABORATORY 7

OVERVIEW:
A PLD or programmable logic device is an array of AND and OR gates with multiple inputs and outputs. The array is in a programmable interconnect matrix that allows you to realize any Boolean algebra logic design possible with the number of input variables and output state variables supported by the device. It is not necessary to simplify the design, since all possible terms are already included in the hardware package.

In this laboratory, we will design a binary to DIE decoder that can be used to make a dice game like CRAPS or YATZEE. A block diagram of how the decoder can be used to make a dice game is shown below in Figure 1.

To realize our design, we will use either a PAL22V10 or the GAL22V10 shown below in Figure 2.

FIGURE 1: A BLOCK DIAGRAM OF A BINARY TO 7 SPOT DIE DECODER
FIGURE 2: THE DIAGRAM OF A GAL22V10 PLD
MATERIALS:
1. Access to a personal computer with the program WINCUPL.
2. Access to a PLD programmer.
3. A USB Jump driver.
4. A PAL22V10 or GAL22V10

PROCEDURE:
1. Generate a truth table that has three input variables and seven outputs, one for each of the spots on a DIE.

2. Use any TEXT editor like the Word Notepad or the DOS "EDIT" program to generate an ABEL program capable of programming your PAL or GAL. Your program should have the following element as described in the text for Module 7:

Components of a CUPL Program:

A CUPL program has the following components:
1. Program name field;
2. Name of device being created;
3. Date;
4. Revision;
5. Designer;
6. Company or Organization;
7. If part of another assembly, which?
8. Location;
9. Device Type;
10. Input Pin Definitions;
11. Output Pin Definitions;
12. Defining Equations (Boolean algebra expressions of outputs in terms of inputs in ABEL format.)

3. Print out your program and submit it as the main part of your lab report.

4. Copy the GAL22V10 diagram shown in Figure 2 and mark "X",s at the intersection that correspond to those locations in the connect matrix that will be connected when your GAL is burned. Submit this diagram also as part of your lab report.

5. Copy your program onto some type of transportable memory media so it can be programmed into a PLD.