

LABORATORY #2

INTRODUCTION TO INTEGRATED CIRCUITS AND DATA BOOKS

OBJECTIVE:

The objective of this experiment is to become more familiar with TTL integrated circuits and the data sheets which describe their electrical characteristics.

PREPARATION:

Read the "Introduction to Logic Families." You can find this on the course website. Next, look at a minimum of two different sources of TTL data sheets. The following chip manufacturers each have websites that allow for the searching of the data sheets you need:

Fairchild Semiconductor (www.fairchildsemi.com)
Texas Instruments (www.ti.com)

Each of these data sheets describes TTL (or Transistor-Transistor Logic) integrated circuit chips. Not all data sheets have the same layout, especially when comparing two from different manufacturers. However, they do contain the same general information about the particular electrical components described. Since you are to be using TTL integrated circuits (ICs) in lab you should become familiar with the organization of a TTL data sheet and how to get information from it. A collection of data sheets, along with any supporting information, is called a data book.

Almost all TTL data books have a general information chapter which usually supplies a numerical index to the devices described, a glossary of symbols, terms, and definitions, and finally any other electrical characteristics that may be common to a group of ICs. This section is usually followed by a Functional Index, which organizes the ICs by their function not just their particular number. The "meat" of the data book is contained in a section on the TTL devices themselves. Usually organized in ascending numerical (sometimes functional) device order, this section provides the detailed information necessary for a designer to use the device.

The websites of chip manufacturers are similar to data books in that they provide a quick yet detailed reference for all the IC's they make but with the addition of a useful search feature that makes finding what you want to know relatively easy. Find data sheets for 74xx00, 74xx32, and 74xx86 TTL integrated circuit devices. The xx here is the code that signifies the technology, such as L for low power or LS for low power Schottky. You may not find a 7486 since this part is obsolete, however, you should be able to find some other technology that is logically equivalent such as a 74AC86. Print out two data sheets for each of the 7400, 7432, and 7486 TTL integrated circuit chips, one from each manufacturer, and include them in your prelab. Only print out useful information like pin assignments, not electrical characteristics, etc. Do not staple the data sheets into your lab notebook.

Provide a procedure on how you would test the three devices that you found data sheets on to verify the IC's logic functionality.

EQUIPMENT REQUIRED:

Global Specialties Design and Prototyping PB-505
Wire Leads
1 unknown TTL Integrated Circuit

PROCEDURE:

For laboratory you will be given a TTL IC mounted on the PB-505. You will not know which TTL IC you will have until you go to lab. Your task is to locate the IC number on the chip and then look up that number both in a TTL data book which will be available in lab (note the data book title and page number you reference) and on the data sheets that you included in your prelab. From the data book you are to obtain the information necessary to connect the IC to power and test the IC for its particular function. You are to note in greater detail the procedure used to identify, connect, and test the given IC.

You are to state the part number of the IC that you were assigned to test, along with its gate symbol and pin assignment. Construct the Boolean function and truth table that describes the functionality of the logic gates within the IC. Describe how you tested the gates within the IC, (i.e., list the value of input signals applied and the value of the outputs obtained). Did the measured functionality match the logic function within the IC?

YOU MUST HAVE THE TA VERIFY YOUR TEST ON YOUR IC!