6.2 First-In, First-Out (FIFO) Memory

First-in, first-out (FIFO) memory refers to a storage element where one or more pieces of data can be stored. Data can also be read from the memory, and it will be read in order from the oldest contents of memory (first-in) to the newest contents of memory (last-in). FIFO memory can be used in computer systems as a data buffer or to queue data for later use.

6.2.1 FIFO Memory Chip

The 74224 digital logic chip has a storage size of sixteen 4-bit words. It has two separate inputs to control writing to and reading from the memory unit. This means that data can continue to be written in to the memory unit before all of the stored data have been read and emptied from the memory contents. If the memory unit is full, attempting to load more data will not do anything. An output signal IR will be HIGH if the contents of the memory are not full. If the memory unit is empty, attempting to read more data will not do anything. An output signal OR will be HIGH if the contents of the memory are not empty.

Circuit 4: Wire up the FIFO memory chip using a DIP switch to control the data inputs (D3–D0) and a 7-segment display to view the data outputs (Q3–Q0). Use a debounced pushbutton with proper output type (active-HIGH or active-LOW) on each of the read and write signals. Wire a status LED to light up when the contents of the memory are full.

In this manner, pressing the load button will write the contents of the DIP switch into the chip's memory. Pressing the unload button will read the first-in value onto the 7-segment display.

Wire up the circuit and verify that it functions properly. Then, demonstrate it to your instructor to receive a stamp.

Instructor Stamp: _____