Testing

7-Segment Display Testing

1. The 7-segment display for the slave unit was designed then built on a breadboard. The driver chip was inserted and voltage was applied. The light on the display was very low. It was realized that the driver chip was active high, whereas the 7-segment display is active low. Therefore, the full voltage wasn’t getting to the 7-segment. An inverter chip was wired to the driver to solve the problem.

2. The microcontroller was attached to the 7-segment display to determine if it could control the display. A test program was written to send voltage to certain segments at certain times to turn them on and off to form numbers.

3. The driver chip and inverter chip were first wired and soldered. They were tested by a power source, oscillator, and multimeter to ensure that correct voltage levels were being outputted. Next, the 7-segment display was wired and soldered. It was attached to the driver and inverter chip and tested. The last step was attaching it to the microcontroller to ensure it could control the display. The test program was used to turn on and off certain segments to form numbers.

LED’s

1. LED’s were wired on a breadboard (according to the diagram) and attached to a power source and multimeter. Voltage was applied to each node to turn on and off lights.

2. The LED’s were wired and soldered. They were again tested using the power generator and multimeter.

3. Lastly, the LED’s were attached to the microcontroller for it to turn on and off the lights.

Keypad Testing

1. The keypad and encoder chip were wired and tested using an oscilloscope. Once it was working, it was attached to the microcontroller and LCD. Code was written to allow only certain buttons to work (the numbers, ENTER, and CLEAR).
**LCD**

The LCD was wired and attached to the keypad and microcontroller. Test code was generated to write to the LCD.

**Operating System**

The operating system is what allows the user to enter timing parameters with the keypad and be displayed on the LCD. The operating system controls the microcontroller to turn on and off the lights of the LED’s, transmit information to the slave, and turn on and off the 7-segment display segments. It what links everything together. The first task was to get the LCD and microcontroller to talk to each other by having a message written to the LCD. The next step was to have the keypad input the data into the microcontroller which would output to the LCD. Then the countdown timer and menus were programmed so input and output could be dynamic. Next, the code to manipulate the LED’s and 7-segment display were added. Once that was working, the code for the master unit to communicate with the slave unit was written and tested.

**Wireless Communication – Testing of entire system**

The master and slave units should be tested in multiple locations. The plan to test the units are as follows:
1) Test in a large auditorium that is empty.
2) Test in a large auditorium that is full of people with all sorts of electronic devices.
3) In both situations, test how far apart the units can be and still communicate.
4) Take the system to the conference center and test.
5) Allow someone who hasn’t seen the system to try and program it with no instruction.