**Testing Procedure**

Following the assembly of the SM-200K Decision Maker, a simple testing plan was devised to ensure the device was fully functional. The first step was to inspect the soldering of all the components to ensure no pins were loose. This was done by using a microscope to carefully magnify the view of each pin for each component. Once all components were properly soldered, the next step of the testing procedure was to power on the device. Using a 9V battery as the power source, the dimple switch was pressed and the output devices were observed. These included the buzzer and LEDs. According to the instruction manual, the device was to randomly alternate between each LED and stop at one location, all while playing a tone through the buzzer. Achieving this state in the testing process would confirm a successful design. If the design did not succeed, however, then the instruction manual provided a set of instructions based on the current state of the system. These instructions were also accompanied by a continuity check using a multimeter.

**Results**

After several testing iterations, the experiment had emulated the expected behavior as documented in the instruction manual. When connecting the 9V battery, one of the six LEDs illuminated and held position until the dimple switch was pressed. This input caused the buzzer to sound and the LEDs to alternate between each other until eventually landing on a new position. Once the new position was illuminated, the buzzer stopped and only repeated whenever the dimple switch was pressed. A picture of the completed SM-200K can be found in APPENDIX LOC HERE.

**Discussion**

The experiment provided a fundamental evaluation of surface mount soldering as well as test driven design. The testing procedure mentioned earlier in this report was fully explored. The first iteration of tests revealed a major experimental error. During the power on test phase, the SM-200K was responding in an unexpected manner. The LEDs were continuously alternating and the buzzer played indefinitely while connected to the 9V battery. Since this scenario wasn’t covered in the instruction manual, our team was tasked with evaluating an unknown condition. The solution was to revert to the first step in the test plan. This step helped trace the issue in our system, which was the misalignment of both ICs. After finding this issue, the chips were desoldered using a heating gun and desoldering wick. They were then properly oriented and soldered onto the board.

The second testing iteration had also proved to fail. The system was unresponsive during the power on test. Our group hypothesized that our circuit was shorted. To test this, we used a multimeter to perform a continuity test on all traces. The test showed that pin 12 on IC1 was floating. This was then confirmed by careful examination though the microscope. The pin was properly soldered and the power on test was repeated.

**Reflection**

This experiment had provided the first real soldering task for each of us. The practice resistors helped introduce the basic concepts of soldering without fear of damaging the circuit. Once this was completed, the rest of the work seemed much easier as the experiment proceeded. The most challenging part of the experiment was tracking system errors. The testing procedure helped fix these errors and complete the given assignment. Based on this experiment, it is right to assume that the design process requires patience and frequent testing to accomplish a given task.