DIGITAL MOBILE OSCILLOSCOPE

TEST PLAN

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1 INTRODUCTION

The Digital Mobile Oscilloscope is a digital oscilloscope measuring AC waveforms between 10Hz and 50kHz. Based off the ATMEGA328P microprocessor, the DMO displays waveforms by use of an LCD. The DMO possesses three pushbuttons providing it with a range of features: add/sub, t/div, and the ability to hold the signal's waveform.

2 TESTING STRATEGY

These tests help our team, allowing us to recognize faults with—and thereby allowing us to bring full functionality to the prototype. Test will begin with power supply test because in the Arduino UNO board, the power supply for this development board is using USB port as power supply, but for us is 4 batteries in series. Initial we will connect the batteries package with microprocessor and LCD directly to test there is enough voltage to power up them. Once them are powered up, we will use a jumper to connect the power supply with Vcc pin of our PCB and use multimeter to measure the voltage through the Vcc pin. The reason why testing the power supply first because the power supply allowed us to program the microprocessor and light up the LCD.

Once the power supply has been tested successfully, we will use the Arduino UNO development board to drive the LCD and let it display "Hello,World!" text. The LCD will connect the development board with jumper and use Arduino IDE to program the code inside the Arduino UNO. The reason why doing this test is checking the LCD part has correct functionality to display want we want.

Finally, we will check the our own microprocessor can be burned in bootloader and programmed. We put the microprocessor on white board and use jumper connect with pinouts of chip through USBasp. If we can programmed it, the Arduino IDE will show burn in successfully. We want to make sure the chip we use can be programmed before soldering.

2.1 POWER SUPPLY TEST

ID#: PST_BTC1

In this test we will power up both the LCD and the PCB. Utilizing four batteries in series, we will first determine their voltage, making sure the value is within tolerance, before powering up the LCD and then the PCB. If the LCD is successfully functioning, then the display should light up. If the PCB is functioning, then examination with a voltage meter will verify this.

The batteries should read as five volts.

The voltage meter should read five volts when testing the PCB.

2.2 LCD TEST 9 (ID#: LCDT_BTC1)

This is your basic "*hello world*" test. Driving the LCD by an Arduino, the text, "Hello,World!" should be made to appear.

2.3 MICROPROCESSOR TEST (ID#: UCT_BTC1)

Here we test whether or not we can program the microprocessor of our DMO. To do this, we utilize a downloadable bootloader called the Arduino IDE. If the test works, then LEDs on our PCB should light up according to a preprogramed arrangement. A large step of this test is the wiring of the PCB to the Arduino.

3 EQUIPMENT

- Keithley triple channel DC Power Supply
- Tekronix DMM 4030 Digital Multimeter
- Arduino Uno Development Board
- LEDs
- Jumpers
- Arduino IDE Tool

4 SETUP

The test location: PSU Capstone Lab

All the equipment is available in the PSU Capstone Lab.

The order of our tests:

1. Power Supply Test (ID#: PST_BTC1)
2. LCD Test 9 (ID#: LCDT_BTC1)
3. Microprocessor Test (ID#: uCT_BTC1)

5 TEST CASES

5.1 POWER SUPPLY TEST

ID#: PST_BTC1

Test Writer	Zhe Lu				
Test Case Name	Power Supply Test		Test ID	PST_BTC1	
Description	Tester will verify that the battery will give enough power to turn on the ATMEGA328P chip and LCD.		Type	Black Box	X
				White Box	
Tester Information					
Name of Tester			Date		
Hardware Version			Time		
Setup	Connect 4 batteries in series and use the pack as power supply Vcc in PCB.				
Additional Equipment	Tektronix DMM 4020 (multimeter), Tektronix MSO 4054 e) (scop				

Step	Action	Expected Result	Pass	Fail	N/A	Comments
1	Place the oscilloscope probe on the output terminal of the battery package with reference to GND.	A voltage of 5V should appear on the multimeter.				
2	Place the output terminal of the battery package with LCD as Vcc	The LCD should turn on				
3	Place the output terminal of the battery package with PCB Vcc pinout	A voltage of 5V should appear on the multimeter in the Vcc pin of microprocessor.				
Overall Test Results						

5.2 LCD TEST 9
(ID#: LCDT_BTC1)

Test Writer		Zhe Lu				
Test Case Name		LCD Test		Test ID	LCDT_BTC1	
Description		Tester will verifiy that the microprocessor can control the LCD.		Type	Black Box	X
					White Box	
Tester Information						
Name of Tester				Date		
Hardware Version				Time		
Setup		Connecting LCD with Arduino UNO development board, programming the chip to talk with LCD.				
Additional Equipment		Arduino UNO development board, jumper				
Step	Action	Expected Result	Pass	Fail	N/A	Comments
1	Connect the correct pinout of LCD to the pin of Arduino UNO	The LCD should light up				
2	Program the Arduino UNO	“Hello,World!” should display in LCD.				
Overall Test Results						

5.4 MICROPROCESSOR TEST (ID#: UCT_BTC1)

Test Writer		Zhe Lu				
Test Case Name		LCD Test		Test ID	uCT_BTC1	
Description		Tester will verifiy that the microprocessor can be burned in bootloader and programmed.		Type	Black Box	X
					White Box	
Tester Information						
Name of Tester				Date		
Hardware Version				Time		
Setup		Connect correct pinouts of microprocessor with USBasp, and using Arduino IDE tool to burn in bootloader and programming.				
Additional Equipment		Arduino UNO development board, USBasp, Arduino IDE tool, jumper, LED				
Step	Action	Expected Result	Pass	Fail	N/A	Comments
1	Connect ICSP pins with USBasp and plug the USBasp with computer which installed Arduino IDE tool.	The Arduino IDE tool display burn in bootloader successfully.				
2	Program the microprocessor by using Arduino IDE with a short code to light up a LED	The LED should light up.				
Overall Test Results						