Team 2 - Epic Dice Roller - Testing Plan

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Test Case Descriptions:

Test 1:

Test one will encompass soldering and testing the 3.3 V power supply. This is to ensure that the debugging process will become drastically more isolated, because we will solder, build, and test the PCB such that each block that is product design specification is tested hierarchically. Once 3.3 V is yielded at a test point, we will test it given a load. Once this is successful, we will ensure that 3.3 V is connected to all pins it should be on the PCB. We will test the power blocks first, because they have the most chance for causing irreversible failure to components if not tested adequately. Test two can be found on page 2.

Test 2:

Test two begins upon the successful completion of test one. Test two includes successful completion of the soldering of the 5 V power supply. For our system, 5 V is Vcc so this test is essential. We will follow a similar procedure as in test one. Once a stable 5 V is detected with and without a load, we will ensure that all Vcc points are supplied with 5 V. Test two can be found on page 3.

Test 3:

Test three entails soldering the rest of the components to the PCB. Once this is done, we can sufficiently test all of I/O. We will now be testing the sensor and actuator portion of our product design specification. On page 4-5, we have developed a test case plan that highlights all expected electrical outputs for a given input, that will ensure that the PCB meets our electrical response specification.

Test 4:

Upon successful completion of tests one through three, the bulk of the hardware is satisfactory. Test four ensures communication to the microcontroller by burning the bootloader and uploading firmware via the ISP pins on the PCB. The remainder of test four assess expected LCD outputs given user input, which is now being solely altered by changes in the source code. See test four on page 6.

Test Author: Braden Harwood, Michael Weston, Stephen Short, Drew Seidel						
	Test Case Name:	Epic Dice Roller Power Supply Test 1			**Test ID #:**	1
	Description:	*This test checks the output of the power supply portion of the circuit dividing output to 3.3V.*			**Type:**	✓ white box □ black box □ _____
Tester Information						
	Name of Tester:	Stephen Short and Group			**Date:**	11/30/2021
	HW/SW Version:	1.0			**Time:**	11:30 AM
	Setup:	*Will need the bare PCBs, parts, soldering and test equipment. Use either a 9V battery or benchtop power supply for input voltage.*				

STEP	**Action**	**Expected Result**	**PASS**	**FAIL**	**N/A**	**Comments**
1	Solder all of the 3.3 V Supply	All components making up the 3.3 V Supply should be soldered.	Y			Successfully soldered parts.
2	Test for continuity	All connections that should be made are made	Y			Successfully tested connections.
3	Test for shorts	No shorts should be found.	Y			Successfully tested connections.
4	Power up board	Power up the 3.3 V supply for the first time and get an output voltage generated by the supply.	Y			2.49V recorded on power up.
5	Adjust potentiometer to generate 3.3 V	After adjusting the potentiometer, the output voltage should measure 3.3 V.	Y			3.3084 V recorded after adjustments.
6	Attach shunt to load resistor.	Measuring output voltage and confirming that it is still near the 3.3 V expected while the output is connected to a 150 ohm load resistor.	Y			Slight increase in voltage to around 3.31 V, voltage remained stable.
7	Confirm 3.3 V connections to level shifter.	When IO9 which will be connected to the software serial port on the arduino controls the LCD screen.	Y			RX pin on the LCD receives 3.3 V logic.
	Overall test result:		Y			3.3 V Power Block Functional

Test Author: Braden Harwood, Michael Weston, Stephen Short, Drew Seidel						
	Test Case Name:	Epic Dice Roller Power Supply Test 2			**Test ID #:**	2
	Description:	*This test checks the output of the power supply portion of the circuit dividing output to 5V*			**Type:**	✓ white box □ black box □ _____
Tester Information						
	Name of Tester:	Stephen Short and Group			**Date:**	11/30/2021
	HW/SW Version:	1.0			**Time:**	1:15 PM
	Setup:	*Will need the PCB with the 3.3 V supply parts soldered on, 5V supply parts, and soldering and test equipment. Use either a 9V battery or benchtop power supply for input voltage.*				

STEP	**Action**	**Expected Result**	**PASS**	**FAIL**	**N/A**	**Comments**
1	Solder all of the 3.3 V Supply	All components making up the 5 V Supply should be soldered.	Y			Successfully soldered parts.
2	Test for continuity	All connections that should be made are made	Y			Successfully tested connections.
3	Test for shorts	No shorts should be found.	Y			Successfully tested connections.
4	Power up board	Power up the 5V supply for the first time and get an output voltage generated by the supply.	Y			2.7V recorded on power up.
5	Adjust potentiometer to generate 5 V	After adjusting the potentiometer, the output voltage should measure as 5 V.	Y			5.002 V recorded after adjustment.
6	Attach shunt to load resistor.	Measuring output voltage and confirming that it is still near the 5 V expected while the output is connected to a 150 ohm load resistor.	Y			5 V was still measured after shunting it across the load resistor.
7	Confirm 5 V connection to VCC points on PCB	When the shunt is now attached to the VCC, measure all VCC points to make sure they read 5 V	Y			5 V is successfully read at all VCC points.
8	Test 3.3 V Supply Again after finishing the 5 V supply.	After soldering the 5 V supply, make sure the 3.3 V supply still works.	Y			3.3 V is still read on LV test points.
	Overall test result:		Y			5 V power block functional.

Test Author: Braden Harwood, Michael Weston, Stephen Short, Drew Seidel						
	Test Case Name:	Epic Dice Roller I/O Connectivity Test 1			**Test ID #:**	3
	Description:	*Check all I/O electrical functionality before attaching ATMega328P.*			**Type:**	✓ white box □ black box □ _____
Tester Information						
	Name of Tester:	Stephen Short and Group			**Date:**	11/30/2021
	HW/SW Version:	1.0			**Time:**	3:15 PM
	Setup:	*With the 3.3 V and 5 V power blocks functional, solder the rest of the components and check expected functionality with a multimeter and oscilloscope. Use either a 9V battery or benchtop power supply.*				

STEP	**Action**	**Expected Result**	**PASS**	**FAIL**	**N/A**	**Comments**
1	Solder on all I/O components	All components on the board should not be soldered. ATMega328P and LCD screen to remain out of sockets for this test	Y			Successfully soldered parts.
2	Test for continuity	All connections that should be made are made	Y			Successfully tested connections.
3	Test for shorts	No shorts should be found.	Y			Successfully tested connections.
4	Test left switch	Left switch is active high, connected to pin 11 of ATMega328P socket. Expect 5 V when pressed, 0 V otherwise.	Y			4.99 V measured with button pressed, 0.12 mV otherwise.
5	Test middle switch	Middle switch is active high, connected to pin 12 of ATMega328P socket. Expect 5 V when pressed, 0 V otherwise.	Y			~5 V measured with the button pressed, ~0 V otherwise.
6	Test right switch	Right switch is active high, connected to pin 24 of ATMega328P socket. Expect 5 V when pressed, 0 V otherwise.	Y			~5 V measured with the button pressed, ~0 V otherwise.
7	Test reset switch	Rest switch is active low, connected to pin 1 of ATMega328P socket. Expect 0 V when pressed, 5 V otherwise.	Y			~0 V measured with the button pressed, ~5 V otherwise.

8	Test toggle switch	Toggle switch is connected to pins 25, and 26 of ATMega328P socket. When connected to pin 26, the two lower positions should read high and the uppermost position should read low. When connected to pin 25, the two up most positions should read high, the lowest position reading low.	Y			When connected to pin 26, two lower positions read ~5 V, uppermost position reads ~0V. When connected to pin 25, two upper positions read ~5 V, the lowermost position read ~0 V.
9	Test tilt switch	When the PCB lies flat, pin 13 on the ATMega328P socket should read low, when the board is tilted, the pin should read high.	Y			With PCB lying flat 0V is measured, when the board is tilted ~5V is observed.
10	Test rotary encoder knob	Jump rotary encoder pins to Vcc with a 1k pull up resistor (this will be done in software later). Test connection with oscilloscope probing pins 4 and 5 while turning knob to observe switching	Y			Expected switching is observed with lows ~0V and highs ~5V.
11	Test rotary encoder button	Rotary switch is active high, connected to pin 23 of ATMega328P socket. Expect 5 V when pressed, 0 V otherwise.	Y			~5 V measured with the button pressed, ~0 V otherwise.
12	Test RX pin on LCD screen	Test that the RX pin on the LCD screen header is 3.3V when nothing is applied to pin 15 on ATMega328P socket, and high when pin 15 is driven low.	Y			When pin 15 on the ATMega328P socket is not driven, the RX pin reads ~3.33V. When pin 15 on the ATMega328P socket is driven low, the RX pin reads ~0V.
	Overall test result:		Y			I/O functional. All electrical connections are functional.

Test Author: Braden Harwood, Michael Weston, Stephen Short, Drew Seidel							
	Test Case Name:	Epic Dice Roller Test 4				**Test ID #:**	4
	Description:	*Attach ATMega328P and LCD screen to dip sockets, attach ISP pins, burn bootloader and write firmware to the Epic Dice Roller. Test functionality of code.*				**Type:**	✓ white box □ black box □ _____
Tester Information							
	Name of Tester:	Group (Test in Progress)				**Date:**	12/1/21 - TBD
	HW/SW Version:					**Time:**	3:00PM
	Setup:	*Set up needed for this test case*					
STEP	**Action**	**Expected Result**	**PASS**	**FAIL**	**N/A**	**Comments**	
1	With the board powered down, put ATMega328P and LCD into their dip sockets Attach ISP pins	Chips should fit firmly into position	Y			ATMega328P and LCD successfully attached.	
2	Check VCC and GNDconnections once more	Adding to ATMega328P and LCD should not alter priorly tested VCC and GND pins. Check once more.	Y			Electrical connections are still sound.	
3	Power on device, burn bootloader	Bootloader should be able to be successfully uploaded.	Y			Burned bootloader successfully.	
4	Upload firmware using the programmer (Pocket AVR, AVR Dragon, Arduino...etc)	Firmware should be successfully uploaded	Y			Firmware uploaded successfully.	
5	Observe LCD Output	LCD output should be formatted as designed. Die choice should be on the top row, in the second row, an option for less die, more die, and roll die.	Y			LCD startup output yields expected result.	
6	Observe button functionality in non-rolling mode	I/O should behave as expected for non-rolling mode. User ability to change number of die, side of die count, reset, and to roll.	Y			I/O is responding accordingly.	
7	Test rolling mode (many cases)	TBD - testing in progress			NA	Testing in progress.	
	Overall test result:					TEST IN PROGRESS.	