**nocLock Test Plan**

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DESCRIPTION OF PROJECT

PROJECT REQUIREMENTS

BLOCK DIAGRAM OF BASIC SCHEMATIC

Test Equipment

1. Basic Oscilloscope
2. Multi-meter
3. Function Generator
4. Two Channel DC Power Supply
5. AVR Dragon Board\*

\* AVR Dragon Boards are limited in supply. Any tests that require an AVR Dragon Board need to be scheduled with enough time to meet the deadline with limited availability.

Personnel Qualifications

**Level 1 Operator:** Ability to use test equipment to perform tests. Needs all equipment setup or requires precise setup documentation. Cannot use AVR Dragon Board.

**Level 2 Technician:** Ability to setup and use test equipment to perform tests. Can load software using AVR Dragon Board but cannot make changes to software.

**Level 3 Engineer:** Ability to setup and use test equipment to perform tests. Has ability to modify or change software and use AVR Dragon Board to actively debug microcontroller. Can make changes to test plan and test cases with approval from Test Plan authors.

TESTS

1. Unit/Module Test

Summary: During this phase of testing each listed module will be tested independent of any other module. For each Unit/Module Test the required test equipment and personnel qualifications will be specified. Test Case names are listed for each test. Refer to test case for test setup, summary of test, test procedure, and expected results when conducting each test.

1. Power Supply Module
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 2
   * Test Case 1.1
2. Solenoid Driver Module
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 2
   * Test Case 1.2
3. Knock Sensor Module
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 2
   * Test Case 1.3
4. LED Drive Module
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 2
   * Test Case 1.4
5. Button Modules
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 2
   * Test Case 1.5
6. ICSP Module
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 3
   * Test Case 1.6
7. Microcontroller Module
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 3
   * Test Case 1.7
8. Integration Test

Summary: During this phase of testing certain modules will be integrated together and tested to determine performance. For each Test the required test equipment and personnel qualifications will be specified. For best results tests should be performed in the order below. Test Case names are listed for each test. Refer to test case for test setup, summary of test, test procedures and expected results when conducting each test.

1. Integrate Power Supply with Microcontroller
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 2
   * Test Case: 2.1
2. Integrate Solenoid Drive with Microcontroller
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 2
   * Test Case 2.2
3. Integrate Microcontroller, Knock Sensor, Solenoid Driver
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 2
   * Test Case 2.3
4. Integrate Microcontroller, Knock Sensor, Solenoid Driver, Button Modules
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 2
   * Test Case 2.4
5. Integrate Microcontroller, Knock Sensor, Solenoid Driver, Button Modules, LED Drive
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 2
   * Test Case 2.5
6. Parametric Test

Summary: During this test phase each test is done using black box testing to measure key performance parameters. This is the fastest way to test the device and the best way to perform manufacturing testing. For clarity tests are broken up into their respected modules listing needed test equipment, personnel qualifications and test case. Refer to test case for test setup, summary of test, test procedures and expected results for conducting each test.

1. Power Supply
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 1
   * Test Case 3.1
2. Solenoid Drive Module
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 1
   * Test Case 3.2
3. Knock Sensor
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 1
   * Test Case 3.3
4. Button Debounce
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 1
   * Test Case 3.4
5. Microcontroller
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 2
   * Test Case 3.5
6. Total Project Test
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 2
   * Test Case 3.6
7. Function Testing

Summary: During this test phase the operations of the nocLock are tested to validate that they are functional. For best practice while performing function tests refer to Use-Case for each operation found in the nocLock System Design Document. Refer to test case for test setup, summary of test, test procedures and expected results when conducting each test.

1. Program Knock
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 3
   * Test Case 4.1
2. Unlock Device
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 3
   * Test Case 4.2
3. Reset Device
   * Test Equipment: 1,2,3,4,5
   * Personnel Qualifications: Requires Level 3
   * Test Case 4.3
4. Use Testing

Summary: Use testing is conducted by having an outside user, who is unfamiliar with the product, use the product as it is intended. These tests are broken up by basic operation to ensure that every operation of this device is tested and useable by the end user. Refer to test case for test setup, summary of test, operation instructions, test procedures and expected results for conducting each test.

1. Program Knock
   * Test Equipment: N/A
   * Personnel Qualifications: Requires Level 1
   * Test Case 5.1
2. Unlock Device
   * Test Equipment: N/A
   * Personnel Qualifications: Requires Level 1
   * Test Case 5.2
3. Reset Device
   * Test Equipment: N/A
   * Personnel Qualifications: Requires Level 1
   * Test Case 5.3
4. Error Testing

Summary: During error testing known errors are purposely applied to the system to understand system failures and eliminate any possible bugs that can result from error failures. Refer to test case for test setup, summary of test, test procedures and expected results when conducting each test.

1. Power Supply Fault
   * Test Equipment: 1,2,3,4,
   * Personnel Qualifications: Requires Level 3
   * Test Case 6.1
2. Button Debounce Error
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 3
   * Test Case 6.2

1. Knock Delay Error
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 3
   * Test Case 6.3
2. Knocks Low Threshold Error
   * Test Equipment: 1,2,3,4
   * Personnel Qualifications: Requires Level 3
   * Test Case 6.4