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**November 24, 2014**

ECE411 HW # 6: Test Plan Rev 2

## Comprehensive Hierarchical Test Plan

***THE USELESS BOX: System Test Plan***

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| --- |
| 1. INTRODUCTION    1. This Document    2. Conduct System Tests 2. REFERENCE DOCUMENTS    1. Design Documentation   • TBU Requirements Document, Rev 3  • TBU Project Schedule, Rev 2  • TBU System Design/Modeling, Rev 2  • TBU Block Level Diagram, Rev 3  • TBU Power Supply Schematic, Rev 2  • TBU Comprehensive Schematic, Rev 3.5  • TBU Board Layout, Rev 3   * 1. Other   • Atmel ATMega328 Design Specifications  • Atmel ATMega328 8-Bit Microcontroller Datasheet  • ON Semiconductor LB1938FA Motor Driver Datasheet   1. TBU Overview    1. Operational Description    2. Definition of Terminology 2. PRETEST PREPARATION    1. Test Equipment   • Tektronix Multimeter DMM4020  4.2 Test Setup and Calibration   1. The Switch    1. Verify Switch is Active High    2. Verify Switch is the only input    3. Switch fires high every time it is thrown on 2. ATMega328    1. Verify signal input each time switch is toggled to high position    2. Verify that servos get signal each time the switch is toggled    3. Verify that Motor Control Chip (MCC) gets sent a signal every eighth time the switch is toggled 3. Motor Control Chip (MCC)    1. Verify that MCC receives signal every eighth time the switch is toggled    2. Verify sequence of forward and reverse on wheel motors 4. Power Supply    1. Verify 5V output    2. Verify input and output current within supply specifications |
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## Test Case # 1: The Toggle Switch

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| **Test Writers:** Ahmad Qazi, Brian Andrews, Patrick Liggett, Thomas Scarpinatto | | | | | | | | | |
| **Test Case Name:** | | The Useless Box Test #1 | | | | **Test ID #:** | | TUB-01 | |
| **Description:** | | Verify that the toggle switch is the only input signal for the whole system. | | | | **Type:** | | Black box | |
| **Tester Information** | | | | | | | | | |
|  | **Name of Tester:** |  | | | | | **Date:** | |  |
| **Hardware Ver:** | | 1.0 | | | | | **Time:** | |  |
| **Setup:** | | Make sure the Switch is in off position and the battery is viable. | | | | | | | |
| **Step** | **Action** | **Expected Result** | **Pass** | **Fail** | **N/A** | | **Comments** | | |
| 1 | Plug lead into test point between switch and ATMega328 | Test lead should fit into point |  |  |  | |  | | |
| 2 | Verify zero signal before engaging switch | Meter should read zero signal |  |  |  | |  | | |
| 3 | Flip switch to on position | Meter should read 5V |  |  |  | |  | | |
| 4 | Record data gathered | Meter readings should be within design parameters |  |  |  | |  | | |
| **Overall Test Result:** | | |  |  |  | |  | | |

## Test Case # 2: ATMega328

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| **Test Writers:** Ahmad Qazi, Brian Andrews, Patrick Liggett, Thomas Scarpinatto | | | | | | | | | |
| **Test Case Name:** | | The Useless Box Test #2 | | | | **Test ID #:** | | TUB-02 | |
| **Description:** | |  | | | | **Type:** | | Black box | |
| **Tester Information** | | | | | | | | | |
|  | **Name of Tester:** |  | | | | | **Date:** | |  |
| **Hardware Ver:** | | 1.0 | | | | | **Time:** | |  |
| **Setup:** | | Plug leads in test points between switch and ATMega328, between ATMega328 and Arm Servo, between ATMega328 and Lid Servo and between ATMega328 and Motor Control Chip. | | | | | | | |
| **Step** | **Action** | **Expected Result** | **Pass** | **Fail** | **N/A** | | **Comments** | | |
| 1 | Plug lead into test point between switch and ATMega328 | Signal should be zero when switch is low and 5V when switch is high. |  |  |  | |  | | |
| 2 | Plug lead into test point between ATMega328 and Arm Servo | Signal through Arm servo should be zero when switch is low and 5V when switch is high. |  |  |  | |  | | |
| 3 | Plug lead into test point between ATMega328 and Lid Servo | Signal through Lid servo should be zero when switch is low and 5V when switch is high. |  |  |  | |  | | |
| 4 | Plug lead into test point between ATMega328 and Motor Control Chip | Signal through MCC should be zero when switch is low and 5V when switch is high. |  |  |  | |  | | |
| **Overall Test Result:** | | |  |  |  | |  | | |

## Test Case # 3: Motor Control Chip

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| **Test Writers:** Ahmad Qazi, Brian Andrews, Patrick Liggett, Thomas Scarpinatto | | | | | | | | | |
| **Test Case Name:** | | The Useless Box Test #3 | | | | **Test ID #:** | | TUB-03 | |
| **Description:** | | Check if Motor Control Chip (MCC) activates when triggered and functions correctly | | | | **Type:** | | Black box | |
| **Tester Information** | | | | | | | | | |
|  | **Name of Tester:** |  | | | | | **Date:** | |  |
| **Hardware Ver:** | | 1.0 | | | | | **Time:** | |  |
| **Setup:** | | Make proper connections to the MCC daughterboard via ATMega328 or Arduino. | | | | | | | |
| **Step** | **Action** | **Expected Result** | **Pass** | **Fail** | **N/A** | | **Comments** | | |
| 1 | Toggle switch every 8th time to verify that MCC activates | TBU moves due to activation. |  |  |  | |  | | |
| 2 | Truth table (TT) verification by using given truth table | Truth table outputs match given TT. |  |  |  | |  | | |
| **Overall Test Result:** | | |  |  |  | |  | | |

## Test Case # 4: Power Supply

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| **Test Writers:** Ahmad Qazi, Brian Andrews, Patrick Liggett, Thomas Scarpinatto | | | | | | | | | |
| **Test Case Name:** | | The Useless Box Test #4 | | | | **Test ID #:** | | TUB-04 | |
| **Description:** | | System should run on a 9V battery but converts to 5V during the process | | | | **Type:** | | Black box | |
| **Tester Information** | | | | | | | | | |
|  | **Name of Tester:** |  | | | | | **Date:** | |  |
| **Hardware Ver:** | | 1.0 | | | | | **Time:** | |  |
| **Setup:** | | Connect 9V battery to IC | | | | | | | |
| **Step** | **Action** | **Expected Result** | **Pass** | **Fail** | **N/A** | | **Comments** | | |
| 1 | Verify output voltage is 5V | Output is found to be 5V |  |  |  | |  | | |
| 2 | Measure I/O current and check if it is within supply specifications | I/O current is found to be 1.5 A |  |  |  | |  | | |
| **Overall Test Result:** | | |  |  |  | |  | | |