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T06 – Test Plan

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NES LockBox

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# Introduction

This test plan is designed to test the performance, functionality, reliability, and usability of NES lock box. The NES lock box employs an NES controller for user input, an LCD screen for user interface, a solenoid to lock and unlock box lid, and simple wood box design.

## Objective

The unit should maintain a locked state until the user enters the appropriate code using the NES controller. The unit should display the user input from the NES controller on the LCD screen. The LCD screen should also display whether the input code was correct or incorrect.

# Testing Equipment

* Power Supply
* Multi-meter
* Atmega Debugger/programmer
* Atmel Studio

# Test Methods

* Pass/Fail result

# Reference Documents

1. Atmega Datasheet

<http://www.atmel.com/Images/doc8161.pdf>

1. LCD datasheet

<http://www.newhavendisplay.com/specs/NHD-C0220BiZ-FSRGB-FBW-3VM.pdf>

1. NES controller Information

<https://github.com/jalcok1/practicum/tree/master/parts/controller>

1. Encoder Datasheet

<http://www.ti.com/lit/ds/symlink/sn74hc148.pdf>

1. Solenoid Info Sheet

<https://github.com/jalcok1/practicum/blob/master/parts/lock/solenoid_driver.pdf>

# System Tests

## Module Tests

* Each button on controller outputs correct 3-bit binary code from encoder
* LCD correctly displays red, green, or blue when correct voltages applied
* Test 12 volt and 3 volt power on board, test at each input to component
* Test output signals of chip to solenoid and RGB of LCD
* Test line, curser and character display on LCD

## Stress Tests

* Check solenoid ability to open and close multiple times in amount of time
* Solenoid ability to remain in unlocked state for length of time

## Integration Tests

* Each button pressed displays correct symbol on LCD
* When correct button combination is pressed, solenoid unlocks

## Error Tests

* Once user input code has been saved, is it still saved after power is removed

## Use Test

* User is able to unlock box when provided with available documentation
* Ability to unplug and plug power to box
* Ability to open and close box lid with wires staying intact
* Box remains securely locked when solenoid is in lock state

# Test Cases

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test Writer: Chelsea Throop** | | | | | | | | |
| **Test Case Name:** | | Controller/LCD Verification | | | **Test ID #:** | | | NES\_1 |
| **Description:** | | Test correct decoding of NES controller buttons to their symbol display on LCD and LCD output | | | **Type:** | | | Black Box |
| **Tester information** | | | | | | | | |
|  | **Name of tester:** |  | | | **Date:** | | |  |
| **Hardware Version:** | | 1.0 | | | **Time:** | | |  |
| **Setup:** | | Microcontroller, NES controller, and LCD are powered on. LCD and controller are connected to microcontroller. | | | | | | |
| **Step** | **Action** | **Expected result** | **Pass** | **Fail** | | **N/A** | **Comments** | |
| 1 | Power on components | LCD should have blue back light on and should say, “Press start to Begin” |  |  | |  |  | |
| 2 | Press Start button on controller | LCD displays “Enter Code KONAMI” |  |  | |  |  | |
| 3 | Press and release each button on NES controller, except start or select. Using the incorrect code. | Each button should display its corresponding symbol on LCD screen. Ten buttons must be pressed. This is the incorrect code. Screen should turn red and display, “Try Again ☹” |  |  | |  |  | |
| 4 | Enter correct code. | LCD screen should turn green, and display, “Open Sesame !!!” |  |  | |  |  | |

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| **Test Writer: Chelsea Throop** | | | | | | | | |
| **Test Case Name:** | | Solenoid Stress Test | | | **Test ID #:** | | | NES\_2 |
| **Description:** | | Will test solenoid ability to open and close rapidly | | | **Type:** | | | White Box |
| **Tester information** | | | | | | | | |
|  | **Name of tester:** |  | | | **Date:** | | |  |
| **Hardware Version:** | | 1.0 | | | **Time:** | | |  |
| **Setup:** | | Solenoid must have power and 3.3 volts to input labeled Arduino\_digital\_out to lock and unlock. Solenoid must have transistors set up for switch. Involves reference document 5. | | | | | | |
| **Step** | **Action** | **Expected result** | **Pass** | **Fail** | | **N/A** | **Comments** | |
| 1 | Set up circuit without 3.3 V input | Solenoid should remain unlocked |  |  | |  |  | |
| 2 | Provide 3.3V for 5 seconds, remove for 5 seconds. Repeat for one minute. | Solenoid should lock and unlock appropriately. May increase in temperature, but not to dangerous level. |  |  | |  |  | |

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| **Test Writer: Chelsea Throop** | | | | | | | | |
| **Test Case Name:** | | EEPROM Verification | | | **Test ID #:** | | | NES\_3 |
| **Description:** | | When user inputs personalized code to unlock box, the code must be saved after power is disconnected. | | | **Type:** | | | Black Box |
| **Tester information** | | | | | | | | |
|  | **Name of tester:** |  | | | **Date:** | | |  |
| **Hardware Version:** | | 1.0 | | | **Time:** | | |  |
| **Setup:** | | Fully assembled box with power and everything assembled. | | | | | | |
| **Step** | **Action** | **Expected result** | **Pass** | **Fail** | | **N/A** | **Comments** | |
| 1 | Press start at “Press start to begin screen” | Should change to screen “Enter code KONAMI” |  |  | |  |  | |
| 2 | Enter correct Konami code to unlock box | Screen should turn green and say, “Open Sesame !!!” Solenoid should unlock |  |  | |  |  | |
| 3 | While screen remains green, press start and select at same time | Screen should remain green, and say “Enter New Code” |  |  | |  |  | |
| 4 | Enter user specified code, 10 symbols | Screen should display each button symbol as it is depressed, then display, “Code saved” |  |  | |  |  | |
| 5 | Unplug box from power | LCD should turn off |  |  | |  |  | |
| 6 | Plug box power in | LCD should turn on, blue screen and display, “Press start to Begin” |  |  | |  |  | |
| 7 | Press start | LCD should display “Enter code KONAMI” |  |  | |  |  | |
| 8 | Enter user specified code, not KONAMI | LCD should turn green, display “Open Sesame !!!” Solenoid should unlock |  |  | |  |  | |

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| **Test Writer: Chelsea Throop** | | | | | | | | |
| **Test Case Name:** | | LCD Background color test | | | **Test ID #:** | | | NES\_4 |
| **Description:** | | Test the RGB backlight of LCD screen | | | **Type:** | | | White Box |
| **Tester information** | | | | | | | | |
|  | **Name of tester:** |  | | | **Date:** | | |  |
| **Hardware Version:** | | 1.0 | | | **Time:** | | |  |
| **Setup:** | | Uses reference document 2. LCD must be wired appropriately. | | | | | | |
| **Step** | **Action** | **Expected result** | **Pass** | **Fail** | | **N/A** | **Comments** | |
| 1 |  |  |  |  | |  |  | |
| 2 |  |  |  |  | |  |  | |
| 3 |  |  |  |  | |  |  | |
| 4 |  |  |  |  | |  |  | |