Test Report

Clear Ballot, Clear Audit System
Accuracy and Mark Sensitivity Testing

Test Report Rev 01
January 9th, 2014

Prepared for:

<table>
<thead>
<tr>
<th>Vendor Name</th>
<th>Clear Ballot</th>
</tr>
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<tbody>
<tr>
<td>Vendor System</td>
<td>Clear Audit</td>
</tr>
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</table>

Prepared by:

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Accredited by the Election Assistance Commission (EAC) for VSTL status.
Revision History

<table>
<thead>
<tr>
<th>Release</th>
<th>Author</th>
<th>Revisions</th>
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<tbody>
<tr>
<td>Rev 01</td>
<td>M. Santos</td>
<td>Initial Revision</td>
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</table>

Disclaimer

The test results reported herein must not be used by the client to claim product certification, approval, or endorsement by any agency of the Federal Government. Results herein relate only to the items tested.

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The tests referenced in this document were performed in a controlled environment using specific systems and data sets, and results are related to the specific items tested. Actual results in other environments may vary.
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1 Introduction

SLI Global Solutions is submitting this report as a summary of the testing efforts for the Clear Ballot "Clear Audit" vote counting system. The purpose of this document is to provide an overview of the testing effort and the resultant findings for the Clear Audit system. The review and testing was performed at SLI’s Denver, Colorado facility.

1.1 References

1. FEC 2005 Voluntary Voting System Guidelines (VVSG) Volumes I and II.
2. SLI VSTL Quality System Manual, Revision v1.16, prepared by SLI, dated December 3rd, 2013

1.2 Terms and Abbreviations

The following terms and abbreviations will be used throughout this document:

Table 1 – Terms and Abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Test Deck</td>
<td>A set of ballots that constitute one full cycle of voting of ballots that results in every ballot marking position having been marked in once.</td>
</tr>
<tr>
<td>Box</td>
<td>A set of Test Decks run through a scanner and grouped together for accumulation.</td>
</tr>
<tr>
<td>Ballot Marking Position</td>
<td>A pre-defined location on a ballot that corresponds to a specific candidate/selection. When marked, assigns an indication of selection for the specific candidate/selection.</td>
</tr>
</tbody>
</table>

1.3 Document Overview

This document contains:

- The Introduction, which discusses the application tested/reviewed
- The Test Background, which discusses the testing process
- The System Identification, which identifies hardware and software for the Clear Audit system
- The Testing Performed section, which is a summary of the testing effort
- The Test Results summary section, which contains the final analysis of the testing effort
2 Test Background

2.1 Accuracy Testing

The purpose of Accuracy testing is to validate that in standard conditions, as defined by VVSG volume 2, section 1.8.2.2.b, that the devices and system under test are able to correctly read a pre-determined number of marked and unmarked ballot marking positions.

In this effort, Clear Audit was tested against six different ballot styles, as listed in section 3.2, “Materials”.

The ballots were marked in a slanted pattern covering every seventh position. In this way a “Test Deck” contained seven ballots which between them had every ballot marking position marked.

2.2 Ballot Mark Sensitivity Testing

The purpose of Ballot Mark Sensitivity testing is to determine that the system under test is able to accurately determine when a mark has been made within a ballot marking position. Any mark, intentional or extraneous, should be brought to the attention of election administrators for their determination as to whether the mark is meaningful or not. For this test, various marks were made within the ballot marking positions, using various colors of ink.

Marks included fully filled boxes, left and right oriented slashes, “X” markings, check marks, horizontal single line marks, and circles of various sizes. Marks also included vertical lines within the marking position that filled approximately ten percent of the designated space. Small dots down to approximately five percent of the ballot marking position were also included.

Inks implemented included red, green, blue and black.

3 System Identification

The Clear Audit system consisted of the following components:

- One ScanServer laptop
- Three ScanStation laptops
3.1 Materials

Items identified below reflect materials required to perform accuracy and ballot mark sensitivity testing.

- Premier Block (8.5x18) – 32x51 front and back for 3264 vote targets per ballot
- Dominion Grid (8.5x17) – 24x59 front and back for 2832 vote targets per ballot
- ESS Electionware Grid (8.5x17) – 24x81 front and back for 3888 vote targets per ballot
- Sequoia (10x18) – 27x3 front and 36x3 back for 189 vote targets per ballot
- ESS Unity Block (8.5x17) - 3x45 front and back for 270 vote targets per ballot
- Hart Block (11x17) - 13x36 front and back for 936 vote targets per ballot

4 Testing Performed

4.1 Accuracy & Mark Sensitivity Configurations Tested

Three different scanner configurations were subjected to Accuracy and Mark Sensitivity testing against six different ballot styles. A supported optical scanner was connected to a laptop containing ScanStation, which in turn was linked to a laptop containing ScanServer.

4.1.1 Fujitsu Scanner 6140z

- Premier Block – 490 Ballots, 1,566,360 ballot marking positions
- Dominion Grid – 490 Ballots, 1,387,680 ballot marking positions
- ES&S Electionware Grid – 427 Ballots, 1,660,176 ballot marking positions
- Sequoia – Not Run against fi-6140z, ballots too large
- ES&S Unity Block – 1470 Ballots, 396,900 ballot marking positions
- Hart Block - Not Run against fi-6140z, ballots too large

In total, 5,011,116 ballot marking positions were exercised.
The same four ballot styles were also successfully tested against the fi-6140z for the Mark Sensitivity testing.

### 4.1.2 Fujitsu Scanner 6670
- Premier Block – 490 Ballots, 1,566,360 ballot marking positions
- Dominion Grid – 490 Ballots, 1,387,680 ballot marking positions
- ES&S Electionware Grid – 427 Ballots, 1,660,176 ballot marking positions
- Sequoia – 3500 Ballots, 661,500 ballot marking positions
- ES&S Unity Block – 1470 Ballots, 396,900 ballot marking positions
- Hart Block – 413 Ballots, 386,568 ballot marking positions

In total, 6,059,184 ballot marking positions were exercised.

The same six ballot styles were also successfully tested against the fi-6670 for the Mark Sensitivity testing.

### 4.1.3 Fujitsu Scanner 6800
- Premier Block – 490 Ballots, 1,566,360 ballot marking positions
- Dominion Grid – 490 Ballots, 1,387,680 ballot marking positions
- ES&S Electionware Grid – 427 Ballots, 1,660,176 ballot marking positions
- Sequoia – 3500 Ballots, 661,500 ballot marking positions
- ES&S Unity Block – 1470 Ballots, 396,900 ballot marking positions
- Hart Block – 413 Ballots, 386,568 ballot marking positions

In total, 6,059,184 ballot marking positions were exercised.

The same six ballot styles were also successfully tested against the fi-6800 for the Mark Sensitivity testing.

### 5 Test Results Summary
A total of 16 tests were run, with 4 tests performed against the fi-6140z and 6 tests each against the fi-6670 and 6800.

#### 5.1 Fujitsu Scanner fi-6140z
The following tests were executed on the Clear Audit system with the Fujitsu fi-6140z.

##### 5.1.1 Accuracy - Premier Block
490 ballots were scanned in boxes of 70 ballots each, for a total of 7 boxes.
Each box reported the correct results, as did the final tallies.

The Fujitsu 6140z successfully passed this test of the Premier Block ballot style.

5.1.2 Accuracy - Dominion Grid

490 ballots were scanned in boxes of 70 ballots each, for a total of 7 boxes. Each box reported the correct results, as did the final tallies.

The Fujitsu 6140z successfully passed this test of the Dominion Grid ballot style.

5.1.3 Accuracy - ES&S Electionware Grid

350 of the ballots were scanned in boxes of 70 ballots each, for a total of 5 boxes. A sixth box was scanned that contained 77 ballots. This totaled 427 ballots.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6140z successfully passed this test of the ES&S Electionware Grid ballot style.

5.1.4 Accuracy - ES&S Unity Block

1344 of the ballots were scanned in boxes of 168 ballots each, for a total of 8 boxes. A ninth box was scanned that contained 126 ballots. This totaled 1470 ballots.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6140z successfully passed this test of the ES&S Unity Block ballot style.

5.1.5 Mark Sensitivity

The following ballot styles were tested on the fi-6140z for ballot mark sensitivity testing:

- Premier Block
- Dominion Grid
- ESS Electionware Grid
- ESS Unity Block

Each ballot style was successfully scanned and interpreted by Clear Audit as expected.
5.2 Fujitsu fi-6670

The following tests were executed on the Clear Audit system with the Fujitsu fi-6670.

5.2.1 Premier Block

The 490 ballots were scanned in boxes of 70 ballots each, for a total of 7 boxes.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6670 successfully passed this test of the Premier Block ballot style.

5.2.2 Dominion Grid

The 490 ballots were scanned in boxes of 70 ballots each, for a total of 7 boxes.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6670 successfully passed this test of the Dominion Grid ballot style.

5.2.3 ES&S Electionware Grid

350 of the ballots were scanned in boxes of 70 ballots each, for a total of 5 boxes. A sixth box was scanned that contained 77 ballots. This totaled 427 ballots.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6670 successfully passed this test of the ES&S Electionware Grid ballot style.

5.2.4 Sequoia

The 3500 ballots were scanned in boxes of 70 ballots each, for a total of 50 boxes.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6670 successfully passed this test of the Sequoia ballot style.

5.2.5 ES&S Unity Block

1428 of the ballots were scanned in boxes of 84 ballots each, for a total of 17 boxes. An eighteenth box was scanned that contained 42 ballots. This totaled 1470 ballots.
Each box reported the correct results, as did the final tallies.

The Fujitsu 6670 successfully passed this test of the ES&S Unity Block ballot style.

5.2.6 Hart Block

350 of the ballots were scanned in boxes of 70 ballots each, for a total of 5 boxes. A sixth box was scanned that contained 63 ballots. This totaled 413 ballots.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6670 successfully passed this test of the Hart Block ballot style.

5.2.7 Mark Sensitivity

The following ballot styles were tested on the fi-6670 for ballot mark sensitivity testing:

- Premier Block
- Dominion Grid
- ESS Electionware Grid
- Sequoia
- ESS Unity Block
- Hart Block

Each ballot style was successfully scanned and interpreted by Clear Audit as expected.

5.3 Fujitsu fi-6800

The following tests were executed on the Clear Audit system with the Fujitsu fi-6800.

5.3.1 Premier Block

308 ballots were scanned in boxes of 77 ballots each, for a total of 4 boxes. A fifth box was scanned that contained 75 ballots, a sixth box was scanned that contained 76 ballots and seventh box was scanned that contained 31 ballots, for a total of 490 ballots scanned.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6800 successfully passed this test of the Premier Block ballot style.
5.3.2 **Dominion Grid**

357 ballots were scanned in boxes of 119 ballots each, for a total of 3 boxes. A fourth box was scanned that contained 133 ballots, for a total of 490 ballots scanned.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6800 successfully passed this test of the Dominion Grid ballot style.

5.3.3 **ES&S Electionware Grid**

278 of the ballots were scanned in boxes of 139 ballots each, for a total of 2 boxes. A third box was scanned that contained 149 ballots. This totaled 427 ballots.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6800 successfully passed this test of the ES&S Electionware Grid ballot style.

5.3.4 **Sequoia**

The 3500 ballots were scanned in boxes of 70 ballots each, for a total of 50 boxes.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6800 successfully passed this test of the Sequoia ballot style.

5.3.5 **ES&S Unity Block**

1344 of the ballots were scanned in boxes of 168 ballots each, for a total of 8 boxes. A ninth box was scanned that contained 126 ballots. This totaled 1470 ballots.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6800 successfully passed this test of the ES&S Unity Block ballot style.

5.3.6 **Hart Block**

350 of the ballots were scanned in boxes of 70 ballots each, for a total of 5 boxes. A sixth box was scanned that contained 63 ballots. This totaled 413 ballots.

Each box reported the correct results, as did the final tallies.

The Fujitsu 6800 successfully passed this test of the Hart Ballot style.
5.3.7 Mark Sensitivity

The following ballot styles were tested on the fi-6800 for ballot mark sensitivity testing:

- Premier Block
- Dominion Grid
- ESS Electionware Grid
- Sequoia
- ESS Unity Block
- Hart Block

Each ballot style was successfully scanned and interpreted by Clear Audit as expected.

5.4 Deficiencies

SLI found no Accuracy or Ballot Mark Sensitivity deficiencies against the Clear Audit system during this testing.

5.5 Conclusion

Based upon SLI’s examination of the Accuracy and Mark Sensitivity of the Clear Audit system with the Fujitsu fi-6140z, fi-6670 and fi-6800 optical scanners, SLI concludes that the Clear Audit system is able to successfully and accurately identify marked and unmarked ballot marking positions of the ballot types used in this effort.

6 Recommendations

SLI has successfully completed the Accuracy and Ballot Marking Sensitivity testing of the Clear Ballot "Clear Audit" vote verification system. It has been determined that the system meets the requirements for accuracy and mark sensitivity.

This recommendation reflects the opinion SLI Global Solutions, based on testing scope and results.

Traci Mapps
Senior Director of Operations
7 Appendix A

The following tables list pertinent files and versions, or digests.

COTS files found on ScanStation

<table>
<thead>
<tr>
<th>Scanner</th>
<th>Version</th>
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<tr>
<td>ScandAll Pro</td>
<td>2.0.5</td>
</tr>
<tr>
<td>Fujitsu fi-6800</td>
<td>10.10.707</td>
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<tr>
<td>Fujitsu fi-6670</td>
<td>9.21.1202</td>
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<tr>
<td>Fujitsu fi-6140z</td>
<td>10.21.310</td>
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Files found on ScanServer

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End of Report
# Appendix A

## Accuracy and Sensitivity Tests

<table>
<thead>
<tr>
<th>Tests</th>
<th>Accuracy</th>
<th>Sensitivity</th>
<th>Voting System / Election Management System</th>
</tr>
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<td>Premier / Gems</td>
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<td>Hart / BallotNow</td>
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<td>A-12</td>
<td>A-13</td>
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<td>Sequoia / WinEDS</td>
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</tbody>
</table>
Premier / GEMS
Accuracy Test
Premier / GEMS
Sensitivity Test

Confidential
ES&S / Unity
Accuracy Test
Hart / BallotNow
Accuracy Test
Hart / BallotNow
Sensitivity Test
Sequoia / WinEDS
Sensitivity Test