Test Report for State Certification Testing
Dominion Voting Systems D-Suite 5.13

Version: 01

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U.S. Election Assistance Commission

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SIGNATURES

Approved by: *Michael Walker*   04/23/2021

Michael Walker, VSTL Project Manager   Date

Approved by: *Wendy Owens*   04/23/2021

Wendy Owens, VSTL Program Manager   Date

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REVISIONS

Revision	Description	Date
00	Final Report-Initial Release	04/23/2021
01	Final Report	04/23/2021

TABLE OF CONTENTS

1.0   INTRODUCTION

The purpose of this Test Report is to document the procedures that Pro V&V, Inc. followed to evaluate the Dominion Democracy Suite (D-Suite) 5.13 Voting System to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0, the Colorado Requirements Gap Analysis Matrix, and the Colorado-specific requirements in the Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21. *Note: Colorado requires testing to the 2002 Voting Systems Standard (VSS) by statute; however, testing to the VVSG requirements was deemed sufficient since the requirements in the VSS and VVSG are almost identical*.

1.1   References

- D-Suite 5.13 Colorado Testing Campaign Scope of Testing Document

- State of Colorado Requirements Matrix

- Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, "Voting System Performance Guidelines"

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume II, "National Certification Testing Guidelines"

- Election Assistance Commission Testing and Certification Program Manual, Version 2.0

- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0

- National Voluntary Laboratory Accreditation Program NIST Handbook 150-2020, "NVLAP Procedures and General Requirements (NIST Handbook 150-2020)"

- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2017 Edition, "Voting System Testing (NIST Handbook 150-22-2017)"

- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002

- Pro V&V, Inc. Quality Assurance Manual, Revision 7.0

- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)

- EAC Notices of Clarification (NOC) (listed on www.eac.gov)

- D-Suite 5.13 Technical Data Package *(A listing of the TDP documents submitted for this test campaign is listed in Section 2.5 of this Test Report)*

1.2 Terms and Abbreviations

This subsection lists terms and abbreviations relevant to the hardware, the software, or this Test Plan.

"ADA" – Americans with Disabilities Act 1990

"BMD" – Ballot Marking Device

"CM" – Configuration Management

"COTS" – Commercial Off-The-Shelf

"EAC" – United States Election Assistance Commission

"EMS" – Election Management System

"FCA" – Functional Configuration Audit

"HAVA" – Help America Vote Act

"ICC" – ImageCast Central

"ICX" – ImageCast X

"ISO" – International Organization for Standardization

"NOC" – Notice of Clarification

"PCA" – Physical Configuration Audit

"PCOS" – Precinct Count Optical Scan

"QA" – Quality Assurance

 "RFI" – Request for Interpretation

"RTR" – Results Tally & Reporting

"TDP" – Technical Data Package

"UPS" – Uninterruptible Power Supply

"VSTL" – Voting System Test Laboratory

"VVSG" – Voluntary Voting System Guidelines

1.3 Background

The D-Suite 5.0 System (the predecessor of the D-Suite 5.2-CO System) was granted certification to the 2005 Voluntary Voting System Guidelines (VVSG) by the Election Assistance Commission (EAC) on February 8, 2017. The D-Suite 5.2-CO System is a modification of the D-

Suite 5.0 System. The D-Suite 5.2-CO System was previously tested to the State of Colorado requirements, the results of which are documented in Pro V&V report v. TR- 01-02-DVS-2017.02. The currently certified D-Suite 5.11-CO test campaign expanded upon the 5.2-CO system. The results of that test campaign are documented in Pro V&V report v. TR- 01-02-DVS-028-01.01. This 5.13 test campaign expands on the D-Suite 5.11-CO campaign.

1.4   Description and Overview of System Being Modified

The system that is the baseline for the submitted modification is described in the following subsections. All information presented was derived from the previous Certification Test Report and/or the System Overview.

Below is the description of the previously Colorado-certified Democracy Suite 5.11-CO baseline system. This configuration contains the same component descriptions as the Democracy Suite 5.13 system.

Election Management System (EMS)

The Democracy Suite 5.13 EMS consists of various components running as either a front-end/client application or as a back-end/server application. A listing of the applications and a brief description of each is presented below.

Front-end/Client applications:

- **EMS Adjudication:** Represents the client component responsible for adjudication, including reporting and generation of adjudicated result files from ImageCast Central tabulators and adjudication of write-in selections from ImageCast Precinct and ImageCast Central tabulators. This client component is installed on both the server and the client machines.

- **EMS Audio Studio:** A client application that represents an end-user helper application used to record audio files for a given election project. As such, it is utilized during the pre-voting phase of the election cycle.

- **EMS Election Data Translator:** End-user application used to export election data from election project and import election data into election project.

- **EMS Election Event Designer:** A client application that integrates election definition functionality together with ballot styling capabilities and represents a main pre-voting phase end-user application.

- **ImageCast Voter Activation:** An application, installed on a workstation or laptop at the polling place, which allows the poll workers to program smart cards for voters. The smart cards are used to activate voting sessions on ImageCast X.

- **EMS Results Tally and Reporting:** A client application that integrates election results acquisition, validation, tabulation, reporting, and publishing capabilities and represents the main post-voting phase end-user application.

- **EMS Logger:** A stand-alone application that runs on client or server machines and is used to gather diagnostics for troubleshooting.

Back-end/Server applications:

- **EMS Adjudication Service:** Represents a server side application which provides ballot information such as contests, candidates and their coordinates from EMS to the Adjudication application.

- **EMS Application Server:** Represents a server side application responsible for executing long running processes, such as rendering ballots, generating audio files and election files, etc.

- **EMS Database Server:** Represents a server side RDBMS repository of the election project database which holds all the election project data, including pre-voting and post-voting data.

- **EMS Data Center Manager:** A server application that represents a system level configuration application used in EMS back-end data center configuration.

- **EMS Election Device Manager:** Application used for production and programming of election files, and other accompanying files, for ImageCast X terminals.

- **EMS File System Service:** A back-end application that acts as a stand-alone service that runs on client machines, enabling access to low level operating system API for partitioning CF cards, reading raw partition on ICP CF card, etc.

- **EMS NAS Server:** Represents a server side file repository of the election project file based artifacts, such as ballots, audio files, reports, log files, election files, etc.

- **Smart Card Helper Service:** A service that is installed on a workstation or laptop at the polling place, and provides required data format for programming smart cards for ImageCast devices, or, for jurisdiction's voting registration system in case of integration.

ImageCast Central (ICC) Count Scanner

The ICC is a high-speed, central ballot scan tabulator based on Commercial off the Shelf (COTS) hardware, coupled with the custom-made ballot processing application software. It is used for high speed scanning and counting of paper ballots.

ImageCast X (ICX) Ballot Marking Device (BMD)

The Democracy Suite ImageCast X ballot marking platform is a solution that is used for creation of paper cast vote records. These ballots can be scanned and tabulated by the ImageCast Central optical ballot scanner. The ImageCast X also supports enhanced accessibility voting through optional accessories connected to the ImageCast X unit. The ICX is a proprietary application which runs on COTS tablets.

1.5   Description of Modification

Dominion Voting Systems has identified the following modifications from the previously certified system:

<u>Election Management System</u>

1. EED - Added ability to store tabulator resources in the NAS project folder

2. RTR - Removed the Byte Order Marker (BOM) from the beginning of the export file

3. ADJ - Added option to only allow adjudication of contests that meet the out-stack criteria as defined in the Adjudication project

4. ADJ – Changed warning message to be clearer when Adjudicator tries to adjudicate a contest that cannot be adjudicated

5. RTR - Added ability to prevent user from overwriting existing images when loading images from the Results folder

6. RTR - When ballot images are loaded during 'Automatic Results Loading', ensure 'Images Loaded' checkbox is selected and counter is incremented

<u>ImageCast Central</u>

1. Modified ICC log entry text to be more descriptive for double feed errors

2. Corrected functionality to allow discarding of batches after 999

3. Modified ICC to not accept a batch without a Poll ID

4. Added ability to print Batch Header Cards from ICC

5. Added support for HiPro firmware 1.0.1074

6. Changed maximum Poll ID length from 6 characters to 32

<u>ImageCast X BMD</u>

1. Added support for ICX BMD to produce a ballot without a barcode

2. Added support for Avision AP3061 printer

3. Added option to display only a 10-key keyboard when only numeric values are required for entry

4. Added option to print a Daily Print Report that provides statistics for auditing but no results

5. Added support for new Aegis USB memory devices

6. Corrected scroll bar display on Samsung device when first voting session after power up is an accessible voting session

1.6   Scope of Testing

The scope of this testing event incorporated a sufficient spectrum of physical and functional tests to verify that certain D-Suite 5.13 features and applications, which have been modified from the previously certified 5.11-CO baseline, conform to the applicable EAC 2005 VVSG 1.0 requirements.

Specifically, the testing event has the following goals:

- Verify that the D-Suite 5.13 System meets both the applicable requirements of the EAC 2005 VVSG 1.0 and the additional Colorado-specific requirements

- Ensure that the D-Suite 5.13 provides support for all Colorado election management requirements (i.e. ballot design, results reporting, recounts, etc.)

- Source Code Review, Compliance Builds, and Build Documentation Review

- Physical Configuration Audit (PCA), including System Loads and Hardening

- Functional Configuration Audit (FCA)

- Security Testing

- System Integration Testing, including Accuracy Testing and Regression Testing

- Usability/Accessibility Testing

- Environmental Testing (Temperature/Power Variation)

1.7   Testing Overview

The evaluation of the D-Suite 5.13 system was designed to evaluate the system to the requirements set forth for voting systems in the EAC 2005 VVSG 1.0. The goals were constructed to verify that the system conforms to the applicable EAC 2005 VVSG 1.0 requirements. The evaluation addressed each of the test goals in the following manner:

Table 1-1: Testing Overview

Test Goal	Testing Response
Verify that the D-Suite 5.13 System meets both the applicable requirements of the EAC 2005 VVSG 1.0 and the additional Colorado-specific requirements	This was tested by evaluating the system to specific election scenarios using a combination of different ballot programming approaches, ballot designs, ballot sizes, languages, and tabulators.
Security testing to verify and validate changes are in compliance to the requirements of the EAC 2005 VVSG	The system was set up as described in the TDP and subjected to physical access security testing.

Table 1-1: Testing Overview *(continued)*

Test Goal	Testing Response
Physical Configuration Audit (PCA), including System Setup, Loads, and Hardening	A PCA and Receipt Inspection were performed to compare the voting system components and materials submitted for testing against the manufacturer's technical documentation. The system setup, loads, and hardening was tested by comparing the voting system submitted for certification testing to the manufacturer's technical documentation.
Ensure that the D-Suite 5.13 provides support for all Colorado election management requirements (i.e. ballot design, results reporting, recounts, etc.)	The system was tested in pre-election, Election Day, post-election and evaluated against documented behavior and expected results for all scenarios.
System Integration Testing, including Functional Configuration Audit (FCA), Accuracy Testing and Regression Testing	The D-Suite 5.13 was tested to address the integration of the hardware and software. This testing focused on the compatibility of the voting system software components and subsystems with one another and with other voting system components. Accuracy testing was performed that included over 1,549,703 ballot positions on the system.
Usability and Accessibility Testing	The D-Suite 5.13 system was evaluated to the usability and accessibility requirements set forth in the EAC 2005 VVSG 1.0.
Perform Source Code Review, Compliance/Trusted Builds, and Documentation Review	Trusted Builds were generated during the test campaign. The source code submitted by Dominion was reviewed by PRO V&V and was successfully built using the submitted COTS and third party software products. Additionally, build documentation was reviewed.
Perform FCA Regression Testing	FCA functional regression testing was performed on all submitted modifications to the baselined system.

2.0   TEST CANDIDATE

The Democracy Suite 5.13 Voting System is a paper-based optical scan voting system consisting of the following major components: The Election Management System (EMS), the ImageCast Central (ICC), and the ImageCast X (ICX).

The following paragraphs provide information for the D-Suite 5.13 evaluated during this test campaign.

<u>Democracy Suite 5.13 EMS Software Platform Components</u>

- Software

    — EMS Election Event Designer (EED) 5.13.14.1

    — EMS Results Tally and Reporting (RTR) 5.13.14.1

    — EMS Election Data Translator (EDT) 5.13.14.1

    — EMS File System Service (FSS) 5.13.14.1

    — EMS Audio Studio (AS) 5.13.14.1

    — EMS Data Center Manager (DCM) 5.13.14.1

    — EMS Application Server (APPS) 5.13.14.1

    — EMS Adjudication Services 5.13.14.1

    — EMS Adjudication Client 5.13.14.2

    — EMS Logger 5.13.14.1

    — Smart Card Helper Service (SCHS) 5.13.14.1

<u>Democracy Suite 5.13 EMS Standard Server Platform Components</u>

- Software

    — Microsoft Windows Server 2016 (Build 1607)

    — Microsoft SQL Server 2016 Standard with SP2

    — Microsoft SQL Server 2016 Management Studio

    — Microsoft IIS (part of Windows installation, not a separate item)

    — Microsoft .NET Framework 3.5

    — Microsoft .NET Framework 4.8

    — Microsoft Visual C++ 2013 Redistributable

    — Microsoft Visual C++ 2015 Redistributable

    — Microsoft Windows Defender

- — Arial Narrow Fonts 2.37a

- — Cepstral Voices (English, Spanish, etc.) 6.2.3

- Hardware

  - — Dell PowerEdge R640

  - — Dell PowerEdge R630

  - — Dell PowerEdge T630

  - — Dell PowerEdge R710

  - — Ethernet Switch: Dell x1026

  - — Ethernet Switch: Dell x1018

  - — Ethernet Switch: Dell N1524

  - — Mini-Server Rack: StarTech RK1236BKF (for rackmount components)

  - — Rack Power Distribution Unit: APC AP9562 (for rackmount components)

  - — UPS: Tripp Lite SMART1500RMXL2U (for rackmount components)

<u>Democracy Suite 5.13 EMS Express Server Platform Components</u>

- Software

  - — Microsoft Windows 10 Professional (Build 1909)

  - — Microsoft Access Database Engine

  - — Microsoft SQL Server 2016 SP2 Express with Advanced Services

  - — Microsoft SQL Server 2016 Management Studio

  - — Microsoft IIS (part of Windows installation, not a separate item)

  - — Microsoft .NET Framework 3.5

  - — Microsoft .NET Framework 4.8

  - — Microsoft Visual C++ 2013 Redistributable

  - — Microsoft Visual C++ 2015 Redistributable

  - — Microsoft Windows Defender

  - — Open XML SDK 2.0 for Microsoft Office

- — Dallas 1-Wire Device Driver version 4.0.5

- — Adobe Reader DC

- — Arial Narrow Fonts 2.37a

- — Cepstral Voices (English, Spanish, etc.) 6.2.3

- — (Optional) Microsoft Excel 2010 or later

- Hardware

  - — Dell Precision 3440 XE

  - — Dell Precision T3420

  - — Dell Precision T1700

  - — Ethernet Switch: Dell x1008

Democracy Suite 5.13 EMS Client Application Platform Components

- Software

  - — Microsoft Windows 10 Professional (Build 1909)

  - — Microsoft Access Database Engine

  - — Microsoft .NET Framework 3.5

  - — Microsoft .NET Framework 4.8

  - — Microsoft Visual C++ 2013 Redistributable

  - — Microsoft Visual C++ 2015 Redistributable

  - — Microsoft Windows Defender

  - — Open XML SDK 2.0 for Microsoft Office

  - — Dallas 1-Wire Device Driver version 4.0.5

  - — Adobe Reader DC

  - — Arial Narrow Fonts 2.37a

  - — (Optional) Microsoft Excel 2010 or later

- Hardware

  - — Dell Precision 3440 XE

- Dell Precision T3420

- Dell Precision T1700

Democracy Suite 5.13 Auxiliary Components Common to EMS Platforms

- Hardware

  - iButton to 1-Wire USB Adapter: Dallas Maxim DS1402-RP8+

  - iButton Reader/Writer: Dallas Maxim DS9490R#

  - Smart Card Reader: Advanced Card Systems ACR38U

  - Smart Card Reader: Advanced Card Systems ACR39U

  - LCD Monitor: Dell P2419H

  - LCD Monitor: Dell P2417H

  - Keyboard, Mouse, Headset with microphone, Audio Adapter – COTS computing accessories

  - UPS: APC SMT1500 Smart-UPS

  - UPS: APC SMT1500C Smart-UPS

  - UPS: CyberPower PR1500LCD

  - UPS: APC BR1000G

  - EMS Report Printer: Canon LBP6230DW laser or equivalent

  - EMS Report Printer: HP LaserJet M404dn or equivalent

Democracy Suite 5.13 Election Media Components

- Hardware

  - iButton (Pollworker): Dallas Maxim DS1963S-F5+ (w/Black Key Ring Mount DS9093A+)

  - USB Memory Device (128GB): ASK3-NX-128GB

  - USB Memory Device (32GB): ASK3-NX-32GB

  - USB Memory Device (120GB): Apricorn Aegis ASK3-120GB

  - USB Memory Device (30GB): Apricorn Aegis ASK3-30GB

  - USB Memory Device (16GB): Centon S4-CM-U3P2-16.1

- USB Memory Device (8GB): Centon S4-CM-U3P2-8.1

- USB Memory Device (16GB): Apacer EH353-M APHA016GAG0CG-3TM

- USB Memory Device (8GB): Apacer EH353-M APHA008GAG0CG-3TM

- Smart Cards: ACOS-6-64

Democracy Suite 5.13 ICVA Platform Components

- Software

  - Microsoft Windows 10 Professional (Build 1909)

  - ImageCast Voter Activation Application 5.13.14.1

  - Smart Card Helper Service (SCHS) 5.13.14.1

  - Microsoft .NET Framework 3.5

  - Microsoft .NET Framework 4.8

  - Microsoft Windows Defender

- Hardware

  - Dell Latitude 3410

  - Dell Latitude 3400

  - Dell Latitude 3490

  - Dell Latitude 3480

  - Dell Latitude 3470

  - Dell Latitude e7450

  - Dell Latitude e7470

  - Smart Card Reader: Advanced Card Systems ACR38U

  - Smart Card Reader: Advanced Card Systems ACR39U

Democracy Suite 5.13 ICC Platform Components

- Software

  - Microsoft Windows 10 Professional (Build 1909)

  - ImageCast Central Application 5.13.2.7

- — Microsoft .NET Framework 3.5

- — Microsoft .NET Framework 4.8

- — Microsoft Windows Defender

- — Microsoft Visual C++ 2015 Redistributable

- — Dallas Maxim 1-Wire driver 4.0.5

- — HiPro 821dd driver 1.3.0.4

- — Canon DR-X10C driver 1.15 SP3

- — Canon DR-G1130 driver 1.2 SP6

- — Canon DR-G2140 driver 1.1 SP2

- — Canon DR-M160II driver 1.2 SP6

- Hardware - Canon

  - — Dell Optiplex 3050 AIO

  - — Dell Optiplex 7440 AIO

  - — Dell Optiplex 9030 AIO

  - — Dell Precision 3440 XE with Monitor: Planar PCT2235

  - — Scanner: Canon DR-G2140 (FW 1.23) with optional post-imprinter

  - — Scanner: Canon DR-G1130 v1 (FW 1.33) with optional post-imprinter

  - — Scanner: Canon DR-X10C (FW 2.8)

  - — Scanner: Canon DR-M160II (FW 2.02)

  - — UPS: APC SMT1500 Smart-UPS

  - — UPS: APC SMT1500C Smart-UPS

  - — UPS: CyberPower PR1500LCD

- Hardware - HiPro

  - — Dell Optiplex XE3

  - — Dell Optiplex 7050

  - — Dell Optiplex 7060

- Monitor: Lenovo 10QXPAR1US

- Monitor: Dell P2418HT

- Scanner: InterScan HiPro 821dd with integrated imprinter

- iButton to 1-Wire USB Adapter: Dallas Maxim DS1402-RP8+

- iButton Reader/Writer: Dallas Maxim DS9490R#

Democracy Suite 5.13 ICX Platform Components

- Software

  - ICX Application 5.13.11.1

  - Android 8.1.0-1.1.11 (ICX Classic)

  - Android 5.0.2 (ICX Samsung Galaxy Note Pro)

  - Android 4.4.2 (ICX Samsung Galaxy Tab Pro)

  - Google TTS 3.15.18

- Hardware

  - ICX Tablet: Avalue SID-21V-Z37 (ICX Classic)

  - ICX Tablet: Samsung Galaxy NotePro (12.2 in. screen) in Armodilo enclosure

  - ICX Tablet: Samsung Galaxy TabPro (12.2 in. screen) in Armodilo enclosure

  - UPS: APC SMT1500 Smart-UPS (for HP M402dne printer configurations only)

  - UPS: APC SMT1500C Smart-UPS (for HP M402dne printer configurations only)

  - UPS: CyberPower PR1500LCD

  - UPS: CyberPower PR1500LCD-VTVM

  - Printer: HP M402dne

  - Printer: Avision AP3061

  - Hub: LavaLink STS-2UE (for Samsung Galaxy tablets only)

  - (Optional) Headphone: Cyber Acoustics ACM-70 or equivalent

  - (Optional) Sip & Puff: Enabling Devices #972

  - (Optional) Sip & Puff Straws: Enabling Devices #970K

— (Optional) Paddle Switches: AbleNet 10033400 (2x)

— (Optional) Paddle Switch Cable: Hosa Technology YMM-261 (for use with AbleNet switches)

— (Optional) Accessible Tactile Interface (ATI) box, v1.1.0

— (Optional) Accessible Tactile Interface (ATI-USB) box

— (Optional) ICX Classic BMD Transport Bag

— (Optional) ICX Samsung Transport Bag

— (Optional) ICX Voting Booth

For COTS equipment, every effort was made to verify that the COTS equipment had not been modified for use. This was accomplished by performing research using the COTS equipment manufacturer's websites based on the serial numbers and service tag numbers for each piece of equipment. Assigned test personnel evaluated COTS hardware, system software and communications components for proven performance in commercial applications other than voting. For PCs, laptops, and servers, the service tag information was compared to the system information found on each machine. Physical external and internal examinations were also performed when the equipment was easily accessible without the possibility of damage. Hard drives, RAM memory, and other components were examined to verify that the components matched the information found on the COTS equipment manufacturer's websites.

A list of the COTS computer components in the D-Suite 5.13 system are included in the table below along with supporting information designating which test campaign the components were tested in (the previous test campaign on the 5.11-CO system or the current test campaign on the 5.13 system).

Table 2-0. D-Suite 5.13 COTS Components

Component	Test Campaign	Service Tag Information (if current test campaign)
Democracy Suite Election Management System (EMS)		
EMS Standard Server Configuration		
Dell PowerEdge R640	D-Suite 5.13	JMP9CM2
Dell PowerEdge R630	D-Suite 5.11-CO	---
Dell PowerEdge R710	D-Suite 5.11-CO	---
Dell PowerEdge T630	D-Suite 5.11-CO	---
EMS Express Server Configuration		
Dell Precision 3440 XE	D-Suite 5.13	H0B3G73
Dell Precision T3420	D-Suite 5.11-CO	---
Dell Precision T1700	D-Suite 5.11-CO	---
Client Workstation Configuration		
Dell Precision 3440 XE	D-Suite 5.13	H0B4773
Dell Precision T3420	D-Suite 5.11-CO	---
Dell Precision T1700	D-Suite 5.11-CO	---
ImageCast Voter Activation (ICVA)		

Client Workstation Configuration		
Dell Latitude 3410	D-Suite 5.13	2G6FC63
Dell Latitude 3400	D-Suite 5.13	DKX4FT2
Dell Latitude 3490	D-Suite 5.11-CO	---

Table 2-0. D-Suite 5.13 COTS Components *(continued)*

Component	Test Campaign	Service Tag Information (if current test campaign)
Dell Latitude 3480	D-Suite 5.11-CO	---
Dell Latitude 3470	D-Suite 5.11-CO	---
Dell Latitude e7450	D-Suite 5.11-CO	---
Dell Latitude e7470	D-Suite 5.11-CO	---
ImageCast Central Count (ICC)		
Canon Scanner Client Workstation Configuration		
Dell Precision 3440 XE	D-Suite 5.13	H0B3773
Monitor: Planar PCT2235	D-Suite 5.13	PL030NTS01037
Dell Optiplex 3050 AIO	D-Suite 5.13	1F8FHQ2
Dell Optiplex 7440 AIO	D-Suite 5.11-CO	---
Dell Optiplex 9030 AIO	D-Suite 5.11-CO	---
InoTec HiPro Scanner Client Workstation Configuration		
Dell Optiplex XE3	D-Suite 5.13	G3N1G73
Dell Optiplex 7060	D-Suite 5.11-CO	---
Dell Optiplex 7050	D-Suite 5.11-CO	---
Monitor: Lenovo 10QXPAR1US	D-Suite 5.13	V302MKYN
Monitor: Dell P2418HT	D-Suite 5.11-CO	---

2.1 System Limits

Table 2-1. D-Suite 5.13 System Limits

Limit (Maximum Number)	Value (by configuration)		Limiting Component
	Express	Standard	
Landscape Ballot Orientation			
Ballot Positions	292	292	22 inch Landscape Ballot (240 candidates + 24 write-ins + 28 Yes/No choices)
Precincts in Election	250	1000	Memory
Contests in Election	250	1000	Memory
Candidates/Counters in Election	2500	10000	Memory
Candidates/Counters in Precinct	240	240	22 inch Landscape Ballot
Candidates/Counters in Tabulator	2500	10000	Memory
Ballot Styles in Election	750	3000	Memory
Contests in a Ballot	38	38	22 inch Landscape Ballot (24

Style			candidacy contests + 14 propositions)
Candidates in a Contests	240	240	22 inch Landscape Ballot
Ballot Styles in a Precinct	5	5	Memory
Number of Parties	30	30	Memory

Table 2-1. D-Suite 5.13 System Limits *(continued)*

Limit (Maximum Number)	Value (by configuration)		Limiting Component
	Express	**Standard**	
Vote For in Contest	24	24	22 inch Landscape Ballot
Supported Languages per Election	5	5	Memory
Number of Write-ins	24	24	22 inch Landscape Ballot
Portrait Orientation			
Ballot Positions	462	462	22 inch Portrait Ballot
Precincts in Election	250	1000	Memory
Contests in Election	250	1000	Memory
Candidates/Counters in Election	2500	10000	Memory
Candidates/Counters in Precinct	462	462	22 inch Portrait Ballot
Candidates/Counters in Tabulator	2500	10000	Memory
Ballot Styles in Election	750	3000	Memory
Contests in a Ballot Style	156	156	22 inch Portrait Ballot
Candidates in a Contests	231	231	22 inch Portrait Ballot (Column Span 3)
Ballot Styles in a Precinct	5	5	Memory
Number of Parties	30	30	No Limitation
Vote For in Contest	30	30	No Limitation
Supported Languages per Election	5	5	Memory
Number of Write-ins	462	462	22 inch Portrait Ballot

2.2   Supported Languages

The following languages have been stated to be supported by the D-Suite 5.13 System:

- Alaskan Native

- Aleut

- Athabascan

- Chinese
- English
- Eskimo
- Filipino
- French
- Hindi
- Japanese
- Khmer
- Korean
- Spanish
- Thai
- Bengali
- Vietnamese
- Native American
  - Apache, Jicarilla, Keres, Navajo, Seminole, Towa, Ute, Yuman

Due to the limited scope of the testing, only English and Spanish ballots were cast during functional testing. The accuracy of the translations between languages was not verified.

2.3 Supported Functionality

The Democracy Suite 5.13 is designed to support the following voting variations:

- General Election
- Closed Primary
- Open Primary
- Early Voting
- Partisan/Non-Partisan Offices
- Write-In Voting
- Primary Presidential Delegation Nominations
- Split Precincts
- Vote for N of M
- Ballot Rotation
- Provisional or Challenged Ballots

2.4 System Overview

The testing event utilized one setup of the D-Suite 5.13 System and its components as configured for normal use by the State of Colorado. A diagram depicting the D-Suite 5.13 is provided in Figure 2-1.
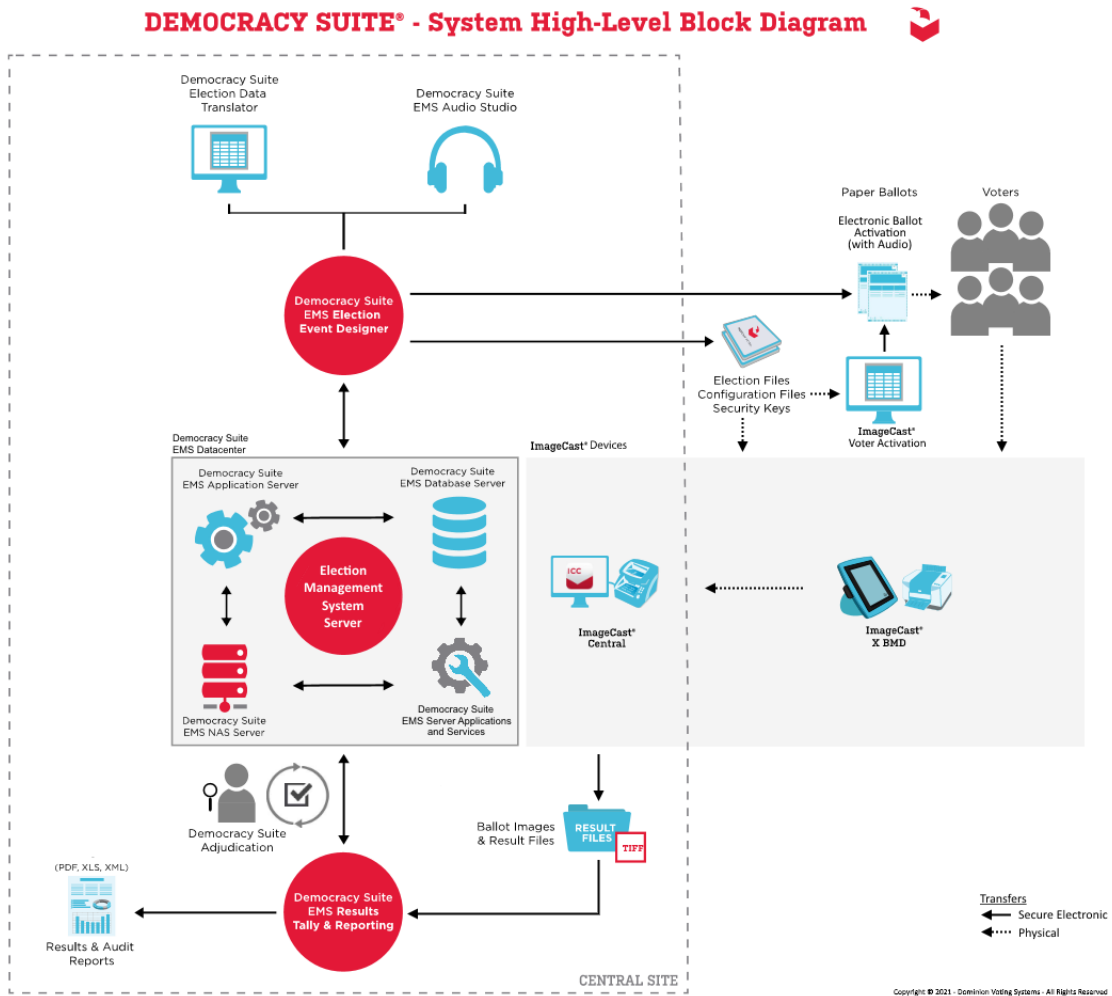

Figure 2-1 System Diagram

2.5 System Technical Data Package

Table 2-2: D-Suite 5.13 TDP Documents

Document Number	Document Description	Document Version
2.02	Democracy Suite System Overview	5.13-CO::8

Table 2-2: D-Suite 5.13 TDP Documents *(continued)*

Document Number	Document Description	Document Version
2.03	Democracy Suite EMS Functionality Description	5.13-CO::4
2.03	Democracy Suite ImageCast Central Functionality Description	5.13-CO::3
2.03	Democracy Suite ImageCast X System Functionality Description	5.13-CO::4
2.05	Democracy Suite Adjudication Software Design and Specification	5.13-CO::2
2.05	Democracy Suite EMS Software Design and Specification	5.13-CO::2
2.05	Democracy Suite ImageCast Central Software Design and Specifications	5.13-CO::2
2.05	Democracy Suite ImageCast X Software Design and Specification	5.13-CO::2
2.06	Democracy Suite System Security Specifications	5.13-CO::3
2.07	Democracy Suite System Test and Verification	5.13-CO::2
2.08	Democracy Suite Adjudication System Operation Procedures	5.13-CO::2
2.08	Democracy Suite EMS System Operations Procedures	5.13-CO::2
2.08	Democracy Suite ImageCast Central System Operation Procedures	5.13-CO::2
2.08	Democracy Suite ImageCast X System Operations Procedures	5.13-CO::2
2.09	Democracy Suite Adjudication System Maintenance Manual	5.13-CO::2
2.09	Democracy Suite EMS System Maintenance Manual	5.13-CO::2
2.09	Democracy Suite ImageCast X System Maintenance Manual	5.13-CO::3
2.10	Democracy Suite Personnel Deployment and Training Requirements	5.13-CO::2
2.11	Democracy Suite Configuration Management Process	5.13-CO::8
2.12	Democracy Suite Quality Assurance Program	5.13-CO::2
2.13	Democracy Suite System Change Notes	5.13-CO::5
Build Documents		
---	Democracy Suite ImageCast X Build	5.13-CO::2
---	Democracy Suite Windows Build Document	5.13-CO::1
DVS Supplemental Documents		
---	Democracy Suite C# Automated Code Review Process	5.13-CO::1
---	Democracy Suite ImageCast C++ Coding Standard	5.13-CO::2
---	Java Coding Standards	5.13-CO::2
---	JavaScript Coding Standards	5.13-CO::2
---	Google Java Style Dominion	1.0

Table 2-2: D-Suite 5.13 TDP Documents *(continued)*

Document Number	Document Description	Document Version
---	Democracy Suite ImageCast Device Configuration Files	5.13-CO::3
---	Democracy Suite ImageCast Configuration File Settings	5.13-CO::2
---	Democracy Suite ImageCast Election Definition Files	5.13-CO::2
---	Democracy Suite ImageCast Printing and Finishing Specifications	5.13-CO::2
---	Democracy Suite ImageCast Tabulator Surface Cleaning Guide	5.13-CO::1
---	Democracy Suite ImageCast Total Results File Format	5.13-CO::2
---	Democracy Suite ImageCast X Machine Configuration File (MCF) Parameters Settings	5.13-CO::7
---	Democracy Suite System ID Guide	5.13-CO::1
---	Usability Test Report Of ImageCast X 5.0 with 36 Participants for VVSG	5.13-CO::1
---	Notice of Protected Information	5.13-CO::2
Installation and Configuration		
---	Democracy Suite EMS Client Workstation Installation and Configuration Procedure	5.13-CO::3
---	Democracy Suite EMS Express Installation and Configuration Procedure	5.13-CO::2
---	Democracy Suite EMS Standard System Installation and Configuration Procedure	5.13-CO::3
---	Democracy Suite ImageCast Central Installation and Configuration Procedures	5.13-CO::3
---	Democracy Suite ImageCast X System Installation and Configuration	5.13-CO::6
---	Democracy Suite ImageCast Voter Activation Installation and Configuration Procedure	5.13-CO::2
User Guides		
---	ImageCast Adjudication User Guide	5.13-CO::4
---	Democracy Suite EMS Audio Studio User Guide	5.13-CO::2
---	Democracy Suite EMS Election Data Translator User Guide	5.13-CO::2
---	Democracy Suite EMS Election Event Designer User Guide	5.13-CO::3
---	Democracy Suite ImageCast Central User Guide	5.13-CO::4
---	Democracy Suite EMS ImageCast Voter Activation User Guide	5.13-CO::3
---	Democracy Suite ImageCast X User Guide	5.13-CO::11
---	Democracy Suite EMS Automated Test Deck User Guide	5.13::1
---	Democracy Suite EMS Mobile Ballot Production User Guide	5.13-CO::2

Table 2-2: D-Suite 5.13 TDP Documents *(continued)*

Document Number	Document Description	Document Version
---	Democracy Suite EMS Results Tally & Reporting User Guide	5.13-CO::7
COTS Manuals		
---	AbleNet_single_switch_manual.pdf	---
---	ACOS6_Reference_Manual_v2.81.pdf	---
---	Advanced_Card_Systems_ACOS6_Functional_Specs.pdf	---
---	Advanced_Card_Systems_ACR38x-RefManual.pdf	---
---	Advanced_Card_Systems_ACR39-Series-RefManual.pdf	---
---	APC_BR1000G_User_Guide.pdf	---
---	APC_SMT1500_OpsManual.pdf	---
---	APC_SMT1500C_User_Guide.pdf	---
---	ApriCorn_Aegis_USB_manual.pdf	---
---	Armodilo-Original-Sphere-Setup-Guide.pdf	---
---	Armodilo-Sphere-Mounting-Instructions.pdf	---
---	Armodilo-Sphere-Specification-Sheet.pdf	---
---	Avalue_SID_21V_FactSheet.pdf	---
---	Avalue_SID_21V_Z37_UserManual.pdf	---
---	Avalue_SID-21V_QuickRef.pdf	---
---	Avision_AP30Series_SpecSheet.pdf	---
---	Avision_AP30Series_UserGuide.pdf	---
---	Canon_DR-G1130_User_Guide.pdf	---
---	Canon_DR-2140_2110_2090_User_Manual.pdf	---
---	Canon_DR-M160II_User_Guide.pdf	---
---	Canon_DRX10C_User_Manual.pdf	---
---	Canon_LBP6230dw_Startup.pdf	---
---	CyberPower_PR1500LCD_User_Manual.pdf	---
---	Dell_Latitude_3400-laptop_owners-manual.pdf	---
---	Dell_Latitude_3410-laptop_owners-manual2_en-us.pdf	---
---	Dell_Latitude_3470-laptop_Owners_Manual.pdf	---
---	Dell_Latitude_3480-laptop_owners manual_en-us.pdf	---
---	Dell_Latitude_E7450-Ultrabook_owners_manual.pdf	---

Table 2-2: D-Suite 5.13 TDP Documents *(continued)*

Document Number	Document Description	Document Version
---	Dell_Latitude_E7470_Ultrabook_Owners_Manual.pdf	---
---	Dell_Networking_N-series_User's Guide10_en-us.pdf	---
---	Dell_Networking_X-Series_Datasheet.pdf	---
---	Dell_Networking_X-series-UG_en-us.pdf	---
---	Dell_OptiPlex_3050 AIO.pdf	---
---	Dell_OptiPlex_7050-desktop_owners-manual.pdf	---
---	Dell_OptiPlex_7060-desktop_setup.pdf	---
---	Dell_OptiPlex_7440-aio_Owners_Manual.pdf	---
---	Dell_OptiPlex_xe3_specifications_en-us.pdf	---
---	Dell_P2417H_Monitor_Users_Guide.pdf	---
---	Dell_P2419HT-monitor_user's-guide.pdf	---
---	Dell_P2419h-monitor_user's-guide_en-us.pdf	---
---	Dell_Poweredge_R630_Owner_Manual.pdf	---
---	Dell_Poweredge_R640_Owner_Manual.pdf	---
---	Dell_Poweredge_R640_Tech_Guide.pdf	---
---	Dell_Poweredge_R710_owner's manual_en-us.pdf	---
---	Dell_Poweredge_T630_owner's-manual_en-us.pdf	---
---	Dell_Precision_3440_specifications_en-us.pdf	---
---	Dell_Precision_T1700-workstation_owners-manual_en-us.pdf	---
---	Dell_Precision_T3420_Workstation_Owner_Manual.pdf	---
---	HP_LaserJet_Pro_M402dne_Datasheet.pdf	---
---	HP_LaserJet_Pro_M402x_M403x_User_Guied.pdf	---
---	HP_LaserJet_Pro_M404_UserGuide.pdf	---
---	Interscan_HiPro_821.pdf	---
---	IOGear_GCS24U.pdf	---
---	Kingston_FCR-HS4_data_sheet.pdf	---
---	Lava_Hub_Manual.pdf	---
---	Lenovo_ThinkCentreTIO24Gen3Touch.pdf	---
---	Lexar_Pro USB 3 Dual Slot Reader.pdf	---
---	OKI_C331_C531_users_guide.pdf	---

Table 2-2: D-Suite 5.13 TDP Documents *(continued)*

Document Number	Document Description	Document Version
---	OKI_C332dn_user_guide.pdf	---
---	OKI_C612_C712_UG.pdf	---
---	OKI_C721_manual.pdf	---
---	OKI_C931_UserManual.pdf	---
---	Planar-PTC2235_user-guide.pdf	---
---	Samsung_Galaxy_Note_Pro_SM-P900__User_manual.pdf	---
---	Samsung_Galaxy_Tab_Pro_SM-T900_User_Manual.pdf	---
---	SCAMAX-8x1-Document-Scanner-Brochure.pdf	---
---	SCAMAX_DocumentScanner_UserManual.pdf	---
---	Tripp_Lite-SMART1500_Owners-Manual.pdf	---
---	Tripp_Smart_Pro_SM1500RMXL2UTAA_Datasheet.pdf	---

3.0   TEST PROCESS AND RESULTS

To evaluate the Democracy Suite 5.13 test requirements, each section of the EAC 2005 VVSG was analyzed to determine the applicable tests. The EAC 2005 VVSG Volume I Sections, along with the strategy of evaluation, are described in the following paragraphs. Brief descriptions of all listed test cases are provided in Table A-1 located in Appendix A.

Section 2: Functional Requirements

The requirements in this section were tested during the FCA and System Integration Test. This evaluation utilized baseline test cases as well as specifically designed test cases and included predefined election definitions for the input data.

The test cases specifically designed to evaluate the modifications are listed below:

— EED - Added ability to store tabulator resources in the NAS project folder

— RTR - Removed the Byte Order Marker (BOM) from the beginning of the export file

— ADJ - Added option to only allow adjudication of contests that meet the out-stack criteria as defined in the Adjudication project

— Modified ICC log entry text to be more descriptive for double feed errors

— Corrected functionality to allow discarding of batches after 999

— Modified ICC to not accept a batch without a Poll ID

— Added ability to print Batch Header Cards from ICC

— Added support for HiPro firmware 1.0.1074

— Changed maximum Poll ID length from 6 characters to 32

— Added support for ICX BMD to produce a ballot without a barcode

— Added support for Avision AP3061 printer

— Added option to display only a 10-key keyboard when only numeric values are required for entry

— Added option to print a Daily Print Report that provides statistics for auditing but no results

— Added support for new Aegis USB memory devices

— Corrected scroll bar display on Samsung device when first voting session after power up is an accessible voting session

Section 3: Usability and Accessibility Requirements

The requirements in this section were tested during the Usability/Accessibility Testing. The test cases utilized during this portion of the test campaign are listed below:

— Add Alternative Language Support To Election

— Create Ballot Layout

— Audio Ballot Activation By Voter Card Insertion

— Make Vote Selection

— Cast Ballot

— Cast Overvoted Ballot

— Cast Undervoted Ballot

— Cancel Ballot Casting

— Make Vote Selection(Audio)

— Return to Previous Contest(Audio)

— Proceed to Next Contest(Audio)

— Cancel Vote Selection(Audio)

— Review Selections(Audio)

— Cast Ballot(Audio)

— Cast Overvoted Ballot(Audio)

— Cast Undervoted Ballot(Audio)

— Cancel Ballot Casting(Audio)

— Text Size and Magnifying Tool

— Fleeing Voter

— Cast Blank Ballot/ Cast Blank Ballot Audio

— Cast Blank Ballot Audio

— Overvoted Vote Selection

— Overvoted Vote Selection(Audio)

— Manually Reset to Defaults

— Dexterity Required for Activation of Controls

— Voter Response

— Accidental Activation

— Skip Referendum Text (Audio)

— Repeat Information (Audio)

— Pause Audio Playback

— Resume Audio Playback

— Adjust Color Settings for Color Screens

— Ambient Contrast Ratio Settings for Color Screens

— Inspect Touch Sensitive Areas of Touchscreen

— Handset Audio Support Inspection

— Mobility

— Auto Reset to Defaults

— Audio Visual Sync

— Page Scrolling

- Audio Acoustic Levels

- Button, Control, and Key Inspection

- Display Refresh Rate (Flicker) Test

- Color Blindness

- Ambient Contrast Ratio

- Privacy Inspection

- Accessibility Inspection

- Audio Comprehension

- Adjust Audio Speed/Volume

- Examine Ballot Images

- Export Ballot Images

Section 4: Hardware Requirements

The 5.13 system introduces support for the Avison AP3061 printer for use with the ICX BMD. For this certification effort Temperature/Power Variation Testing was performed.

Section 5: Software Requirements

The requirements in this section were tested utilizing a combination of review and functional testing during the Source Code Review, Build Documentation Review, and FCA.

Section 6: Telecommunications Requirements

The requirements in this section were not tested due to Colorado Rule 20.6.1(f) prohibiting the use of modems.

Section 7: Security Requirements

The test cases utilized during this portion of the test campaign are listed below:

- Security Access Controls

- Safeguards

- Security Provisions

- ICX Access Privileges

—   Polling Place Security

—   Protection Against Malicious Software

Section 8: Quality Assurance Requirements

The requirements in this section were not tested during this state certification effort as results shall be re-used from previous test campaigns.

Section 9: Configuration Management Requirements

The requirements in this section were not tested during this state certification effort as results shall be re-used from previous test campaigns.

Throughout the test campaign, Pro V&V personnel maintained a test log identifying the system and equipment under test and any records of deviations to the test plan along with the rationale for performing the deviations. Pro V&V shall also utilize an internal bug tracking system to record and track all issues and/or discrepancies noted during the test campaign.

The following sections outline the test process that was followed to evaluate D-Suite 5.13 against the test goals defined in Section 2.0.

3.1   Test Configuration

The testing event utilized one setup of the D-Suite 5.13 System and its components. The following is a breakdown of the D-Suite 5.13 System components and configurations for the test setup:

Standard Testing Platform:

Individual ICX systems were setup at various Voting Service and Polling Centers (VSPCs) for both early and Election Day voting. The VSPC was supplied with an ICX Avalue Classic BMD unit connected to its accompanying printer, ATI handset, headphones, and Binary Input Devices (Sip and Puff device), a ICX Samsung BMD connected to its accompanying printer, ATI handset, headphones, and Binary Input Devices (Sip and Puff device).

The central count location utilized multiple ICC configurations including one InterScan HiPro 821dd high-speed scanner connected to a desktop PC with an iButton Reader/Writer, one Canon DR-X10C, one Canon DR-G2140, one Canon DR-G1130, and one Canon M160-II scanner. Additionally, the central count location housed an EMS Express server with the EMS applications installed, and accompanied by a SmartCard Reader/Writer and an iButton Reader/Writer.

3.2   Summary Findings and Recommendation

Summary findings for the System Level Testing (System Integration Testing, Accuracy, and FCA), PCA (including Security Review), and Source Code Review are detailed in the relevant sections of this report.

3.2.1   Source Code Review

Pro V&V reviewed the submitted source code to the EAC VVSG 1.0 and the manufacturer-submitted coding standards. Prior to initiating the software review, Pro V&V verified that the submitted documentation is sufficient to enable: (1) a review of the source code and (2) Pro V&V to design and conduct tests at every level of the software structure to verify that design specifications and performance guidelines are met. The source code review was based on the source code changes made since the previous system was certified.

A combination of Automated Source Code Review and Manual Source Code Review methods was used to review the changes in the source code from the previously certified system. In addition, 10% of the source code comments were manually reviewed. The automated source code review tools utilized were CheckStyle and StyleCop. These tools were used to review 10% of changed source code comments, sampled at random. ExamDiff Pro was the tool utilized to perform a manual comparison of the previously certified code against the modified code submitted for this test campaign.

Summary Findings

- Automated Source Code Review: The Automated Source Code Review was performed during the D-Suite 5.13 Compliance and Trusted Builds. No source code issues were found during the Automated Source Code review.

- Manual Source Code Review: The Manual Source Code review was performed on 10% of the comments for compliance to VVSG Volume Section 5.2.7. No source code issues were found during the Manual Source Code review.

- Compliance Build: The compliance build was performed following the compliance review. Once the compliance review was performed and the source was deemed stable enough to proceed with testing, the source code and all additional packages were compiled into a Compliance Build.

- Trusted Build: The trusted build consisted of inspecting customer submitted source code, COTS, and third party software products and combining them to create the executable code. This inspection followed the documented process from the "United States Election Assistance Commission Voting System Test Laboratory Program Manual" Section 5.5 – 5.7. Performance of the trusted build includes the build documentation review. The Trusted Build was performed following the completion of the Functional Configuration Audit.

3.2.2 Physical Configuration Audit (PCA)

The Physical Configuration Audit (PCA) compares the voting system components submitted for certification testing to the manufacturer's technical documentation. The purpose of the PCA was to verify that the submitted hardware is unmodified from the previously certified voting system.

The PCA included the following activities:

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system

- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification

- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests

- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

Summary Findings

During execution of the test procedure, the components of the D-Suite 5.13 were documented by component name, model, serial number, major component, and any other relevant information needed to identify the component. For COTS equipment, every effort was made to verify that the COTS equipment had not been modified for use. Additionally, each technical document submitted in the TDP was recorded by document name, description, document number, revision number, and date of release. At the conclusion of the test campaign, test personnel verified that any changes made to the software, hardware, or documentation during the test process were fully and properly documented.

3.2.3 Security Testing

The objective of the security testing was to evaluate the security posture of the system that may have been affected by the changes implemented in this modification. The evaluation of the system was accomplished by utilizing a combination of documentation review, functional testing, and manual inspection. During the execution of a security penetration evaluation, the system was inspected to verify that various controls and measures were in place in order to meet the objectives of the security standards which include: protection of the critical elements of the voting system; establishing and maintaining controls to minimize errors; protection from intentional manipulation, fraud and malicious mischief; identifying fraudulent or erroneous changes to the voting system; and protecting the secrecy in the voting process.

Summary Findings

During the security penetration evaluation, test personnel first verified that the manufacturer's TDP contained documented access and physical controls and then, following the manufacturer's documented procedures, configured the voting system for use and functionally verified that the documented controls were in place and were adequate to meet the stated requirements.

3.2.4 System Level Testing

System Level Testing included the Functional Configuration Audit (FCA), the Accuracy Test, and the System Integration Tests. The Accuracy Test and the System Integration tests were performed as part of the regression test requirements for this campaign. System Level testing was implemented to evaluate the complete system. This testing included all proprietary components and COTS components (software, hardware, and peripherals). For software system tests, the tests were designed according to the stated design objective without consideration of its functional specification.

The system level hardware and software test cases were prepared independently to assess the response of the hardware and software to a range of conditions.

The FCA for this test campaign included an assessment of the submitted modification and included inputs of both normal and abnormal data during test performance. This evaluation utilized baseline test cases as well as specifically designed test cases and included predefined election definitions for the input data. As part of the FCA, three primary and three general elections were executed to verify that each of the submitted modifications had been successfully implemented. The System Integration Tests were performed to verify the D-Suite 5.13 functioned as a complete system.

During System Level Testing, the system was configured exactly as it would for normal field use per the procedures detailed in the D-Suite 5.13 technical documentation. This included connecting all supporting equipment and peripherals as well as any physical security equipment such as locks and ties.

3.2.4.1 Functional Configuration Audit (FCA)

The Functional Configuration Audit (FCA) encompasses an examination of manufacturer's tests, and the conduct of additional tests, if needed, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted in the TDP.

In addition to functioning according to the manufacturer's documentation, tests were conducted to ensure all applicable EAC VVSG 1.0 requirements were met.

Summary Findings

All functional tests were successfully executed. No issues were noted. No manufacturer's test or additional tests were utilized.

3.2.4.2 Accuracy

The Accuracy Test ensured that each component of the voting system could process at least 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The Accuracy Test is designed to test the ability of the system to "capture, record, store, consolidate and report" specific selections and absences of a selection. The required accuracy is defined as an

error rate. This rate is the maximum number of errors allowed while processing a specified volume of data. For this test, the correct number of ballot positions to be processed is derived using a desired error rate of 1 in 10,000,000 and a maximum acceptable error rate of 1 in 500,000.

For paper-based voting systems, the ballot positions on a paper ballot must be scanned to detect selections for individual candidates and contests and the conversion of those selections detected on the paper ballot converted into digital data.

<u>Summary Findings</u>

The D-Suite 5.13 system software successfully passed the Accuracy Test without issue. A total of 3,500 ballots were scanned on each component resulting in 1,573,800 voting positions being voted on each component. All actual results obtained during test execution matched the expected results, resulting in an achieved tabulation error rate of 0% and an accuracy of 100%. The total number of voting positions voted exceeded the minimum required for test performance.

3.2.4.3 System Integration

System Integration is a system level test that evaluates the integrated operation of both hardware and software. System Integration tests the compatibility of the voting system software components, or subsystems, with one another and with other components of the voting system environment. This functional test evaluates the integration of the voting system software with the remainder of the system.

<u>Summary Findings</u>

During test performance, the system was configured as it would be for normal field use. Pro V&V personnel properly configured and tested the system by following the procedures detailed in the D-Suite 5.13 technical documentation.

Three General Elections and two Primary Elections were successfully exercised on the voting system, as described below:

General elections with the following breakdown:

— General Election GEN-01: A basic election held in 4 precincts, one of which is a split precinct. This election contains 19 contests compiled into 4 ballot styles.   5 of the contests are in all 4 ballot styles. The other 15 contests are split between at least 2 of the precincts with a maximum of 4 different contest spread across the 4 precincts.

— General Election GEN-02: A basic election held in 3 precincts. This election contains 15 contests compiled into 3 ballot styles. 10 of the contests are in all 3 ballot styles with the other five split across the 3 precincts.

— General Election GEN-03: A basic election held in two precincts. This election contains eight contests and is compiled into two ballot styles. Four of the contests are in both ballot styles. The other four contests are split between the two precincts. This election is designed to functionally test the handling of multiple ballot styles, support for at least three languages

including a character-based language, support for common voting variations, and audio support for two languages (English and Spanish).

Primary elections with the following breakdown:

— Primary Election PRIM-01: Open Primary Election in two precincts. This election contained thirty contests compiled into five ballot styles. Each ballot style contains 6 contests.

— Primary Election PRIM-02: Open Primary Election held in two precincts. This election contained thirteen contests compiled into three ballot styles. One contest is in all three ballot styles; all other contests are independent.

The D-Suite 5.13 successfully passed the System Integration Test. During execution of the test procedure, it was verified that the D-Suite 5.13 successfully completed the system level integration tests with all actual results obtained during test execution matching the expected results.

3.2.4.4 Regression Testing

Regression testing was conducted on the D-Suite 5.13 to establish assurance that the modifications had no adverse impact on the compliance, integrity, or performance of the system. No new faults or issues were found during regression testing.

3.2.5 Hardware Testing

The addition of the Avison AP3061 printer for use with the ICX BMD to the baselined system underwent Temperature/Power Variation testing, which was utilized to verify compliance for that requirement set forth in the EAC 2005 VVSG 1.0. These results are summarized below.

All testing was performed at the NTS Longmont facility located in Longmont, Colorado. All testing at the NTS Longmont facility was executed on-site by Pro V&V qualified personnel.

<u>Summary Findings</u>

Testing was performed on four Avison AP3061 printers, with two being attached to the Samsung tablets and two attached to the A-value Classic tablet. The first temperature power variation test was halted due to the configurations were not setup correctly by Dominion personnel, which caused the system to not function properly under test. The re-testing of Temperature Power was verified and validated during setup by the Dominion hardware group and passed without issue. The procedures and results for this testing are included in the following test report:

- Test Report No. TR-PR130538-00, *presented in Appendix B*

The test results from this testing are summarized below:

Table 3-1: Environmental Hardware Test Results

Standard/Method	Description	Criteria	Result
MIL-STD-810D, 501.2/502.2 VVSG Vol 1 4.1.2.13, 4.3.3, VVSG Vol 2 4.7.1	Reliability, Temp-Power Variation Testing	Normal Operation & No Data Loss	Halted
MIL-STD-810D, 501.2/502.2 VVSG Vol 1 4.1.2.13, 4.3.3, VVSG Vol 2 4.7.1	Reliability, Temp-Power Variation Testing	Normal Operation & No Data Loss	Pass

3.2.6   Usability and Accessibility

Usability and Accessibility Testing was conducted to verify the D-Suite 5.13 system met the usability and accessibility requirements set forth in the EAC 2005 VVSG 1.0.

Summary Findings

All applicable usability and accessibility requirements were met with no deficiencies noted.

4.0   CONCLUSION

Based on the results obtained during the test campaign, Pro V&V determines the D-Suite 5.13, as presented for evaluation, meets the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0, the Colorado Requirements Gap Analysis Matrix, which incorporates the 2002 VSS requirements, and the Colorado-specific requirements in the Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21. Throughout the test campaign, as tests were executed, resultant data was inspected and technical documentation reviews were performed to ensure that each applicable requirement was met; therefore, fulfilling the test goals.

APPENDIX A

Test Case Descriptions

Table A-1. Test Case Descriptions

Test Case	Description	Result (Pass/Fail)
Functional Requirements		
EED - Added ability to store tabulator resources in the NAS project folder	Specifically designed test case created to evaluate the modification.	PASS
RTR - Removed the Byte Order Marker (BOM) from the beginning of the export file	Specifically designed test case created to evaluate the modification.	PASS
ADJ - Added option to only allow adjudication of contests that meet the out-stack criteria as defined in the Adjudication project	Specifically designed test case created to evaluate the modification.	PASS
Modified ICC log entry text to be more descriptive for double feed errors	Specifically designed test case created to evaluate the modification.	PASS
Corrected functionality to allow discarding of batches after 999	Specifically designed test case created to evaluate the modification.	PASS
Modified ICC to not accept a batch without a Poll ID	Specifically designed test case created to evaluate the modification.	PASS
Added ability to print Batch Header Cards from ICC	Specifically designed test case created to evaluate the modification.	PASS
Added support for HiPro firmware 1.0.1074	Specifically designed test case created to evaluate the modification.	PASS
Changed maximum Poll ID length from 6 characters to 32	Specifically designed test case created to evaluate the modification.	PASS
Added support for ICX BMD to produce a ballot without a barcode	Specifically designed test case created to evaluate the modification.	PASS
Added support for Avision AP3061 printer	Specifically designed test case created to evaluate the modification.	PASS
Added option to display only a 10-key keyboard when only numeric values are required for entry	Specifically designed test case created to evaluate the modification.	PASS
Added option to print a Daily Print Report that provides statistics for auditing but no results	Specifically designed test case created to evaluate the modification.	PASS
Added support for new Aegis USB memory devices	Specifically designed test case created to evaluate the modification.	PASS
Corrected scroll bar display on Samsung device when first voting session after power up is an accessible voting session	Specifically designed test case created to evaluate the modification.	PASS

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)
Usability and Accessibility		
Add Alternative Language Support to Election	Testing EMS support for alternative languages during election definition creation.	PASS
Create Ballot Layout	Testing EMS support for creating a ballot layout.	PASS
Audio Ballot Activation by Voter Card Insertion	Testing the capability of a voting machine to activate an audio ballot by means of inserting a voter card.	PASS
Make Vote Selection	Testing the ability to select a candidate on a ballot.	PASS
Cast Ballot	Testing the ability to cast a ballot that has been voted.	PASS
Cast Overvoted Ballot	Testing the ability to cast a ballot which has more than the allowable number of selections made.	PASS
Cast Undervoted Ballot	Testing the ability to cast a ballot which has less than the allowable number of selections made for a contest	PASS
Cancel Ballot Casting	Testing the ability to cancel the casting of a ballot.	PASS
Make Vote Selection (Audio)	Testing the ability to select a candidate on an audio ballot.	PASS
Return to Previous Contest (Audio)	Testing the ability to return to a previous contest in the current election on an audio ballot.	PASS
Proceed to Next Contest (Audio)	Testing the ability to move to the next contest in the current election on an audio ballot.	PASS
Cancel Vote Selection (Audio)	Testing the ability to cancel vote selection on an audio ballot.	PASS
Review Selections (Audio)	Testing the ability to review selections made prior to casting an audio ballot	PASS
Cast Ballot (Audio)	Testing the ability to cast an audio ballot that has been voted.	PASS
Cast Overvoted Ballot (Audio)	Testing the ability to cast an audio ballot which has more than the allowable number of selections made.	PASS
Cast Undervoted Ballot (Audio)	Testing the ability to cast an audio ballot which has less than the allowable number of selections made.	PASS
Cancel Ballot Casting (Audio)	Testing the ability to cancel the casting of an audio ballot.	PASS
Text Size and Magnifying Tool	Testing the ability to use a magnifying tool to view a ballot and verifying the font size used on ballots	PASS
Fleeing Voter	Testing support for fleeing voters.	PASS
Cast Blank Ballot	Testing the ability to cast an un-voted ballot.	PASS
Cast Blank Ballot Audio	Testing the ability to cast an un-voted audio ballot.	PASS

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)
Overvoted Vote Selection	Testing the ability to select more than the allowable number of choices in a contest.	PASS
Overvoted Vote Selection (Audio)	Testing the ability to select more than the allowable number of choices in a contest (audio).	PASS
Manually Reset to Defaults	Testing the ability to manually reset a voting machine to its default settings.	PASS
Dexterity Required for Activation of Controls	Testing the required dexterity and force required to operate the controls on an accessible voting station.	PASS
Voter Response	Testing the ability of voting system that requires a response from the voter within a specific time frame, to alert the voter twenty seconds in advance of the time expiring.	PASS
Accidental Activation	Testing the voting machine's controls to ensure that accidental activation does not occur.	PASS
Skip Referendum Text (Audio)	Testing the ability to skip the over the reading of the text in a referendum on an audio ballot to facilitate the voter being able to vote immediately.	PASS
Repeat Information (Audio)	Testing the ability to repeat information provided to the voter when voting an audio ballot.	PASS
Pause Audio Playback	Testing the ability to pause audio playback when voting an audio ballot.	PASS
Resume Audio Playback	Testing the ability to resume audio playback after it has been paused, when voting an audio ballot.	PASS
Adjust Color Settings for Color Screens	Testing the ability to adjust the color settings for voting machines with color displays.	PASS
Ambient Contrast Ratio Settings for Color Screens	Testing the ability to adjust the figure-to-ground ambient contrast ratio on voting machines with color displays.	PASS
Inspect Touch Sensitive Areas of Touchscreens	Measuring the touch sensitive areas of a touch screen to ensure that steps have been taken to minimize accidental activation of vote response fields.	PASS
ATI Handset Audio Support Inspection	Inspection of Audio Tactile Interface (ATI) to verify that it supports voters personal assisted listening devices.	PASS
Mobility	Inspecting the voting machine to verify that it is accessible to voters who use mobility aids, including wheelchairs.	PASS
Auto Reset to Defaults	Testing the ability of a voting machine to reset adjustable settings to their default values after a voter's session is completed.	PASS
Audio Visual Sync	Testing the ability of a voting machine to present a ballot in audio/visual mode with correct synchronization.	PASS

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)
Page Scrolling	Verifying that page scrolling is not required for voting a ballot on an accessible voting station which uses an electronic display	PASS
Audio Acoustic Levels	Measuring the acoustic output of a voting machine's audio output, and verifying that the audio is audible only by the voter.	PASS
Button, Control, and Key Inspection	Inspecting buttons, controls, and other user actuated aspects of an accessible voting station to ensure ease of use by individuals with vision or hearing impairment.	PASS
Display Refresh Rate (Flicker) Test	Verifying that a voting system's display screen does not flicker with a frequency between 2 Hz and 55 Hz.	PASS
Color Blindness	Inspecting the voting system interface to verify that steps have been taken to accommodate voters with color blindness via color usage and design decisions.	PASS
Ambient Contrast Ratio	Verifying that a voting system's display utilizes an ambient contrast ratio sufficient to accommodate voter's with perception issues, and is accessible to voters with partial vision.	PASS
Privacy Inspection	Testing the voting machine's ability to protect the privacy of a voter.	PASS
Alternative Language	Testing the accessibility features provided by a voting machine to assist voters who lack English proficiency or have an unwritten language, in the voting process.	PASS
Accessibility Inspection	Inspecting an accessible voting station to verify that support provided for voters with disabilities is intrinsic to the voting station and that means for voter identification or authentication do not render the accessible voting station inaccessible to voters with certain disabilities.	PASS
Audio Comprehension	Inspect audio to verify that verbal information is easily comprehensible to accommodate voters with partial vision.	PASS
Adjust Audio Speed	Testing the ability to change the rate of speech output by the voting machine, which shall support a range of speeds between 75% and 200% of the nominal rate of speech.	PASS
Adjust Audio Volume	Testing the ability to adjust volume settings while voting and audio ballot.	PASS
Security Requirements		
Security Access Controls	Testing the ability to verify that the Voting System implements security access controls.	PASS

Table A-1. Test Case Descriptions *(continued)*

Test Case	Description	Result (Pass/Fail)
Safeguards	Testing the ability to verify that the Voting System provides safeguards against tampering.	PASS
Security Provisions	Testing the ability of the system to provide security provisions compatible with procedures and administrative tasks involved in operation of the voting system	PASS
ICX Access Privileges	Testing the ability of the ICX to ensure that the user can only perform the permissions that were granted to the voter activation card (Tech Advisor, Poll worker, Voter	PASS
Polling Place Security	Verifying that the manufacturer has included measures pertaining to effective Polling Place Security, in their documentation	PASS
Protection Against Malicious Software	Verifying that the manufacturer's documentation has provided procedures for ensuring that protection against malicious software is maintained in a current status	PASS

National Technical Systems Test Report for Environmental Testing of the A-Value ICX BMD & Samsung ICX BDM Test Units

Prepared For

Pro V&V, Inc. | 6705 Odyssey Dr NW Ste C | Huntsville, CO 35806

Prepared By

National Technical Systems | 1601 Dry Creek Drive #2000 | Longmont, CO. 80503 | (303) 776-7249 | www.nts.com

Chase Cunningham	*Robert Polverari*
Chase Cunningham	Robert Polverari
Technical Writer	ENV Department Manager

Revision History

Rev.	Description	Issue Date
0	Initial Release	02/22/2021

Table of Contents

List of Tables

1.0 Introduction

This document presents the test procedures used and the results obtained during the performance of an Electromagnetic Interference test program. The test program was conducted to assess the ability of the specified Equipment Under Test (EUT) to successfully satisfy the requirements listed in Section 2.0.

2.0 References

The following references listed below form a part of this document to the extent specified herein.

- Pro V&V, Inc. Purchase Order(s) 2020-011, dated 12/18/2020
- National Technical Systems (NTS) Quote(s) OP0570154, dated 12/18/2020
- NTS Corporate Quality Policy Manual, Revision 9, dated 9/20/2018
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories,* dated 11/1/2017
- Test Specification: MIL-STD-810D, *Environmental Test Methods and Engineering Guidelines*, dated 7/19/1983

3.0 Product Selection and Description

Pro V&V, Inc. selected and provided the test sample(s) to be used as the Equipment Under Test. Details below:

Table 3.0-1: Product Identification - Equipment Under Test (EUT)

Item	Qty.	Name/Description	Part Number	Serial Number
1	2	A-Value ICX BMD	N/A	RF2GA06RMNZ & RF2GB05GSQT
2	2	Samsung ICX BDM	N/A	E07AQ05200681 & E08A000900392

3.1 Security Classification

Non-classified

4.0 General Test Requirements

4.1 Test Equipment

NTS-provided equipment is calibrated according to ISO/IEC 17025:2017(E) and calibration is traceable to the National Institute of Standards and Technology (NIST). Calibration records are maintained on file at NTS.

4.2 Notice of Deviation

In accordance with NTS' quality procedures, when the EUT is observed to exceed or display susceptibility, a Notice of Deviation (NOD) document is generated by the technician performing the test. This NOD documents the requirement, how the EUT deviated from the requirement, and allows room for resolution of the deviation.

This document is reviewed and approved by the NTS Program Manager or Engineer and the NTS Quality Assurance Representative, and then forwarded to the customer contact. Once mitigated (or passed over), the steps taken to correct the deviation (or simply instruction from the customer to continue testing) are recorded in the NOD and a copy of the NOD is integrated into the body of the report, in the appropriate location.

5.0 Test Descriptions and Results

Table 5.0-1: Summary of Test Information & Results

Section	Test	Specification	Test Facility	Test Date	Part #	Serial #	Test Result
5.1	Temperature/Power Variation	MIL-STD-810D	Longmont	02/08/2021 - 02/11/2021	N/A	RF2GA06RMNZ, RF2GB05GSQT, E07AQ05200681, & E08A000900392	N/A

5.1 Temperature/Power Variation

5.1.1 Test Result

N/A.

5.1.2 Test Procedure

The Temperature/Power Variation exposure was performed in accordance with MIL-STD-810D.

5.1.3 Test Datasheets

Start Date: 02/08/21		End Date: 02/11/21		MJO No: PR130538-00
Customer: Pro V&V/Dominion		Test Performed: Temperature Power Variation Test	Test By: KM	
Part Name:		Serial No: See UUT Details Sheet	Customer Witness: Yes	
Page 1 of 1	Test Specification: MIL-STD_810D		Temp: +10c to +35c Voltage: 105vlts to 129vlts	

Date	Time	Remarks	Initials
02/08/21	08:00	Set VAC to 117vlts & ramp to +10c	RSP
02/08/21	08:15	Start dwell at 117vlts & +10c for 4hrs	RSP
02/08/21	12:15	Lower VAC to 105vlts & dwell for 4hrs	RSP
02/08/21	16:15	Raise VAC to 129vlts & dwell for 4hrs	GM
02/08/21	20:15	Lower VAC to 117vlts & Raise temperature to +35c & dwell for 4hrs	KM
02/09/21	00:15	Lower VAC to 105vlts & dwell for 4hrs	KM
02/09/21	04:15	Raise VAC to 129vlts & dwell for 4hrs	KM
02/09/21	08:15	Lower VAC to 117vlts & Lower temperature to +10c & dwell for 4hrs	GM
02/09/21	12:15	Lower VAC to 105vlts & dwell for 4hrs	GM
02/09/21	16:15	Raise VAC to 129vlts & dwell for 4hrs	GM
02/09/21	20:15	Lower VAC to 117vlts & Raise temperature to +35c & dwell for 4hrs	KM
02/10/21	00:15	Lower VAC to 105vlts & dwell for 4hrs	KM
02/10/21	04:15	Raise VAC to 129vlts & dwell for 4hrs	KM
02/10/21	08:15	Lower VAC to 117vlts & ramp to +23c ambient	GM
02/10/21	08:15	Temperature and power variation portion of test has completed	KM
02/10/21	08:15	Test will continue to run at +23c ambient for another 37hrs	KM
02/11/21	15:30	Customer has made decision to stop testing at this time	KM
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.1.4   Test Photographs
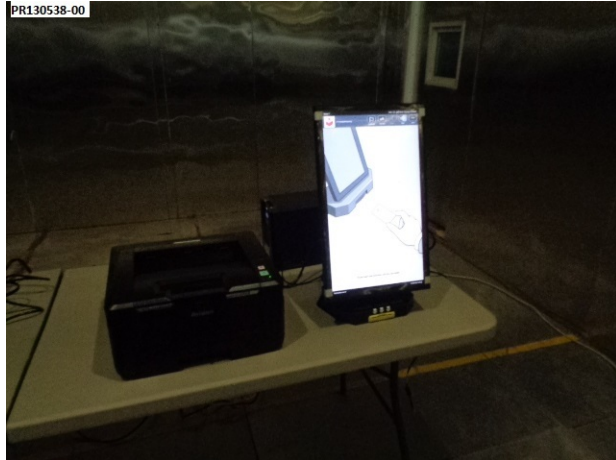
5.1.5   Test Data

Temp/Power_Variation_Graph_Data
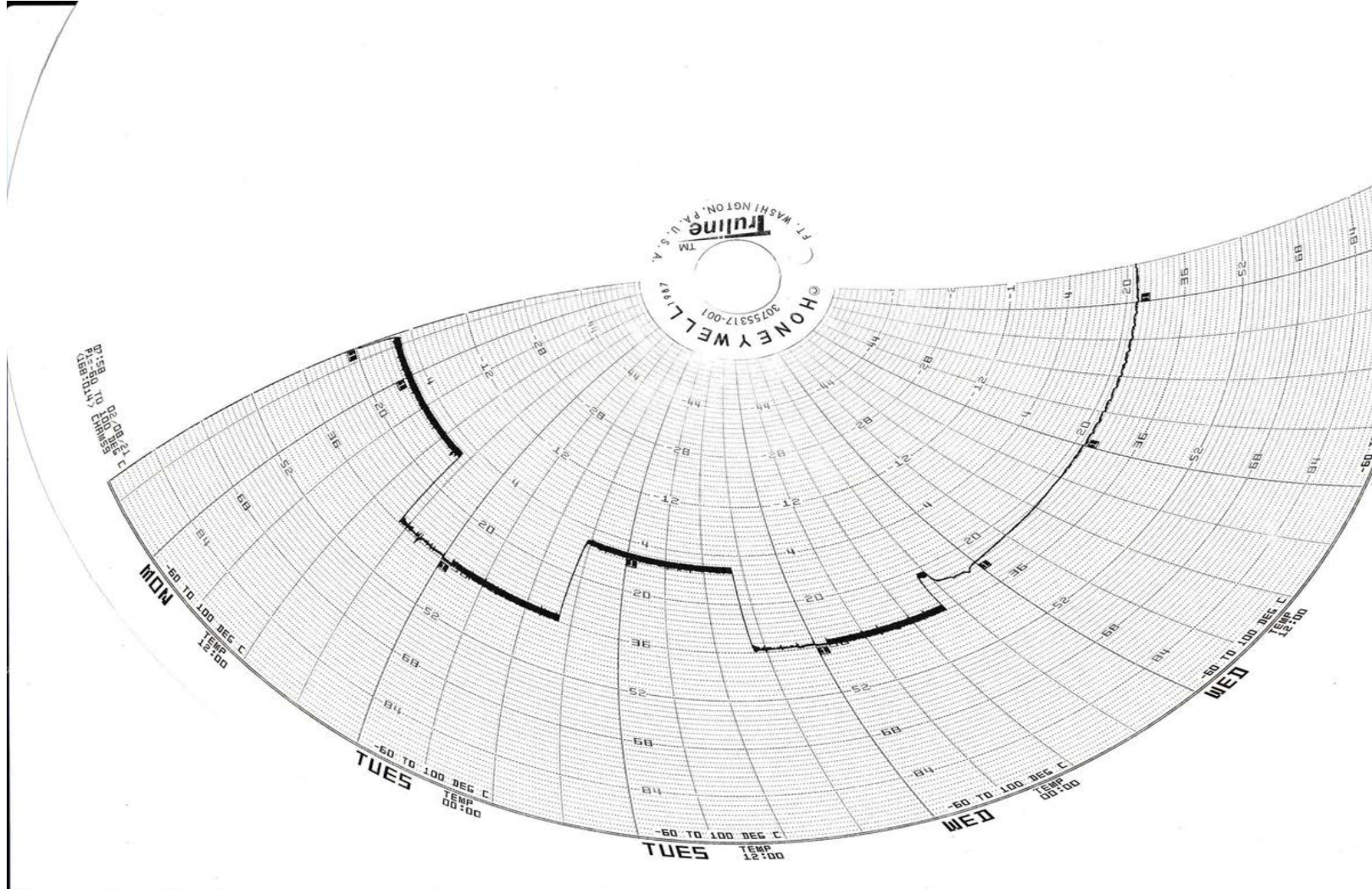
Temp/Power_Variation_Graph_Data pdf_001

5.1.6 Test Equipment List

Table 5.1-1: Temperature/Power Variation Test Equipment List

ID #	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1733	N/A	N/A	N/A	Chamber 59	NCR	NCR
1653	Watlow	F4	N/A	Controller	10/05/20	10/05/21
1654	Honeywell	N/A	N/A	Chart Recorder	10/05/20	10/05/21

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

End of Report