

2.09 - Democracy Suite[®] ImageCast[®] X System Maintenance Manual

Version: 5.11-CO::3

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CHAPTER 1: INTRODUCTION

This chapter provides the following information, which includes a concept of operations that fully describes such items as the following, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II.

- Electrical and Mechanical Functions
- Ballot Handling and Reading
- Vote Selection and Casting of Ballot
- Transmission of Data over Network
- Handling of Data in Processor and Memory Units
- Initiation and Control of Data Output
- Acquisition and Use of Test and Diagnostic Information

1.1 Relevant Disclaimers

This document may make reference to certain Democracy Suite[®] functionalities that are not part of the current 5.11-CO campaign and should be disregarded throughout the document.

For a full list of relevant disclaimers, please see the “Relevant Disclaimers” section in the *2.02 - Democracy Suite[®] System Overview* Document.

1.2 Electrical and Mechanical Functions

This sub-chapter describes the electrical and mechanical functions of the equipment, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II, item a.

The ImageCast[®] X operates as Ballot Marking Device. It is based on COTS parts that include:

- Android device
- Laser printer
- Smart Card Writer/Reader

Optional components:

- ATI
- Tecla

Interactive accessibility is enabled with additional third-party components. Accessible voting is provided by a Tecla or ATI device and additional accessories:

- Four-switch accessible device - joystick

- Two-switch accessible devices - paddles or sips & puff In addition, a headset is included for audio voting sessions.

1.3 Ballot Handling and Reading

This sub-chapter describes how the processes of ballot handling and reading are performed, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II, item b.

This does not apply to the ImageCast® X ballot marking platform.

1.4 Vote Selection and Casting of Ballot

This sub-chapter describes how vote selection and casting of the ballot are performed, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II, item c.

Vote selection is done by allowing the voter to select voting options using a touch-based interface on the touch-screen of the tablet.

Accessible voting is provided by allowing a voter to listen and/or view the voting options and select their choices using a combination of accessible devices.

Once a voter has finished making their selections, a laser printer produces a ballot that is handled as all other paper ballots.

1.5 Transmission of Data over Network

This sub-chapter describes how transmission of data over a network is performed, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II, item d.

Currently, there is no transmission of data over a network.

1.6 Handling of Data in Processor and Memory Units

This sub-chapter describes how data is handled in the processor and memory units, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II, item e.

Currently, no results data is stored on the system.

1.7 Initiation and Control of Data Output

This sub-chapter provides the following information for how data output is initiated and controlled, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II, item f:

Results data is not stored in the system. It is producing marked paper ballots.

1.8 Acquisition and Use of Test and Diagnostic Information

This sub-chapter describes how test and diagnostic information is acquired and used, as specified in paragraph 2.9.1 of the VVSG 1.0 Volume II, item h.

The ImageCast[®] X System is based on COTS modules. All Test and the Diagnostic information are provided by components vendors.

CHAPTER 2: MAINTENANCE PROCEDURES

- Preventive Maintenance Procedures
- Corrective Maintenance Procedures

2.1 Preventive Maintenance Procedures

This chapter defines the following Preventive Maintenance Procedures, as specified in paragraph 2.9.2.1 of the VVSG 1.0 Volume II:

- Equipment Utilized
- Software/Firmware Updates
- Battery Care and Service
- Confirming Correct Software Versions
- Personnel and Skills Required
- Preventive Maintenance Schedule

This includes the following information for each of the above procedures:

- Task(s) - please see the above list.
- Personnel required - the above Tasks require a Maintenance Technician. For more detailed information on the skills required, please see 2.10 Democracy Suite[®] Personnel Deployment & Training Requirements: Personnel: Preventive Maintenance Tasks.
- Maintenance tasks to be coordinated with Dominion Voting Systems - none

2.1.1 Equipment Utilized

All parts of ImageCast[®] X BMD and DRE platforms are as follows:

- ImageCast[®] X (device)
 - Samsung Galaxy Note PRO 12.2 Wi-Fi SM-P900
 - Samsung Galaxy Tab PRO 12.2 Wi-Fi SM-T900
 - aValue SID-15V and SID-21V
 - aValue HID-21V (Prime)
- Smart Card Reader/Encoder - Advanced Card Systems Holdings Limited
- Sphere - Armadillo sphere with enclosure
- Printer:
 - HP LaserJet Pro M402dn
 - HP LaserJet Pro M402dne

- KFI VVPAT VRP3
- SEIKO RPD10
- UPS
 - APC Smart-Ups 1500VA LCD 120V
- Tecla: Device for ADA voters:
 - Paddles
 - Joystick
 - Audio
 - Sip & puff
 - Headphones
- ATI: Device for ADA voters:
 - Paddles
 - Audio
 - Sip & puff
 - Headphones

The ImageCast[®] X BMD and DRE platforms components are easy to maintain because of modern plastics

and durable finishes. The recommended maintenance procedures include:

- Storing ImageCast[®] X equipment in a dry, clean environment
- Keeping the batteries charged
- Checking the ImageCast[®] X devices' battery status on a regular basis.

2.1.2 Software/Firmware Updates

The following update processes apply to both the Voting System Test Lab and jurisdictions using the ImageCast[®] X whenever an update on a system release is required.

- Incorporating hardware upgrades - new hardware upgrades are installed by Dominion Voting Systems - supplied Maintenance Technicians.
- Incorporating new software releases - new software releases are installed by Dominion Voting Systems - supplied Level 1 technician.

2.1.3 Battery Care and Service

This sub-chapter defines the following tasks to be performed for Battery Care and Service, as specified in paragraph 2.9.2.1 of the VVSG 1.0 Volume II, item a:

- Battery care
- Charging the battery
- Disposal of used batteries

Battery Care

It is recommended by Dominion Voting Systems to include the electrical wiring to the storage area so that the ImageCast® X device, Tecla, and Server may be plugged into AC power for periodic battery charging.

To maximize battery life and performance it is important that the devices stored in a storage area are turned off and that the battery is charged periodically.

ImageCast® X Battery Care

Battery charging can be performed while the ImageCast® X devices are stored by making sure that part of the warehouse procedure is to connect power cords to each ImageCast® X device and to a switched AC power source.

Completely empty batteries take up to 12 hours to recharge. Dominion Voting Systems recommends that the warehouse is equipped with switched AC power for the storage area and that each device is charged for 12 hours each month, to ensure they are ready for use.

Tecla Battery Care

Battery charging can be performed while Tecla devices are stored by making sure that part of the warehouse procedure is to connect power cords to each Tecla device and to a switched AC power source. Dominion Voting Systems recommends that the warehouse is equipped with switched AC power for the storage area and that each device is charged for 12 hours each month, to ensure that they are ready for use.

2.1.3.1 Charging the Battery

Charging the ImageCast® X Battery

To charge ImageCast® X device's internal battery, the device must be plugged into an AC power outlet. While the ImageCast® X device is connected to AC power and charging, the battery image briefly displays on-screen to indicate that charging is in progress. Dominion Voting Systems recommends that you perform the charging procedure on the ImageCast® X device once a month and for a period of 12 hours.

Charging the Tecla Battery

To charge the Tecla device internal battery, the Tecla device must be plugged into AC power. While the Tecla device is connected to AC power for charging, the orange light indicator appears to indicate that battery charging is in progress.

2.1.3.2 Disposal of Used Batteries

Dispose of used batteries according to the manufacturer's instructions where applicable. The ImageCast[®] X device and Tecla device use internal batteries. If a laptop computer is used as a server, the laptop computer has a replaceable battery.

NOTE: Danger of explosion if the battery is not correctly disposed of.

2.1.4 Confirming Correct Software Versions

This sub-chapter defines the procedures for confirming the ImageCast[®] X software components are the correct state-certified and Dominion Voting Systems verified versions.

Check the version numbers of the following software components

- Device model and build
- ImageCast[®] X application
- Google Text-to-speech engine

This feature is accessible from the device's Settings screen and is intended for county workers. It shows the software version number for the ImageCast[®] X ballot marking platform device model number, used software components versions and ImageCast[®] X application version.

2.1.4.1 Device Model and Build

Use the following procedure:

1. From the device's Home screen or Applications screen, go to Settings.
2. In the Settings screen, tap the General tab.
3. In the General tab, tap About device.
4. In the Details about device screen, confirm the version numbers for the model number, and build number.

5. The ImageCast® X BMD/DRE platform is tested and verified to work on devices with the following:
 - aValue SID-15V and SID-21V model number - byt_t_crv2
 - aValue SID-15V and SID-21V build number - KTU84P.BCX11-V0.0.98 dev-keys
 - aValue HID-21V (Prime) model number - HID-21V-BTX-01R
 - aValue HID-21V (Prime) build number - LMY48ZaValue-V5.0.0-01.06
 - Samsung Note Pro model number - SM-P900
 - Samsung Note Pro build number - KOT49H.P900XXUAOB1
 - Samsung Tab Pro model number - SM-T900
 - Samsung Tab Pro build number - KOT49H.T900UEUANK1

2.1.4.2 ImageCast® X application

Use the following procedure:

1. From the **Technical Administration** menu, go to **Device Setup**.
2. Under the **Update** column, verify that the version number is 5.11.

2.1.4.3 Google Text-to-speech engine

Use the following procedure:

1. From the device's Home screen or Applications screen, go to Settings.
2. In the **Settings** screen, tap the **General** tab.
3. In the **General** tab, tap **Application manager**.
4. In **Application manager details** screen, tap **Google Text-to-speech engine**.
5. In App info screen for Google Text-to-speech engine, confirm the version number is **3.11.12**.

2.1.5 Personnel and Skills Required

The skill level required for the individual preventive maintenance tasks is indicated in Table 2-1.

Maintenance Task	Skill Level Required	Number of Persons
Internal Battery Charging	Level 0	1
Printer cartridge (toner) replacement	Level 0	1
Software/firmware update	Level 1	1

Table 2-1: Required skill level for individual preventive maintenance

2.1.6 Preventive Maintenance Schedule

There are several maintenance procedures that need to be completed on schedule. The following schedule outlines the activities and when they should be performed.

1. On a monthly basis - recharge the ImageCast[®] X component's batteries.
2. Once every three months - inspect system parts and functions.
3. Prior to each election:
 - a. Perform maintenance diagnostics
 - b. Perform the Pre-LAT
4. Following the election - recharge the system component's batteries.

2.1.6.1 Procedures to Be Performed Once a Month

The Preventive Maintenance procedure to be performed once a month includes recharging the system component's batteries as per sub-section "Battery Care and Service".

2.1.6.2 Procedures to Be Performed Once Every Three Months

The Preventive Maintenance procedure to be performed once a month includes recharging the system component's batteries as per subsection "Battery Care and Service".

2.1.6.3 VVPAT Preventive Maintenance Procedures

To maintain optimum performance, the VVPAT should undergo a routine cleaning. This cleaning will remove any accumulated paper dust or other debris.

The following intervals are DVS recommendations - please follow the detailed cleaning instruction in *Paper Loading and Cleaning the Thermal Head* of the *Voter-verified Paper Audit Trail (VVPAT) User Manual*.

After every 3 rolls of paper:

1. Using a lint free cloth, clean the following parts:
 - The thermal head
 - CIS (contact image sensor) glass
 - Inversion plane top edge
2. Using a cleaning brush, remove any debris from the drive roll (Platen) and gears of the drive roller.

NOTE: Do not use any type of liquid when cleaning the drive roller.

After every 20 rolls of paper:

1. Using a lint free cloth and a small quantity of ethyl or isopropyl alcohol, clean the following parts:
 - The thermal head
 - CIS (contact image sensor) glass
 - Inversion plane top edge
2. Using a clean brush and compressed air, clean the following parts:
 - a. Remove any debris from the drive roll (Platen) and gears of the drive roller.

NOTE: Do not use any type of liquid when cleaning the drive roller.
 - b. If any debris remains, use a small amount of compressed air
 - c. Clean rewriter mechanism gears and slip clutch components with brush and compressed air to remove any accumulated paper dust and debris.

NOTE: Make sure any alcohol used in the cleaning has evaporated before closing the printer cover.

2.1.6.4 Preparing ImageCast[®] X BMD/DRE Platform for an Election

This sub-chapter defines the Preventive Maintenance procedures for preparing the ImageCast[®] X BMD/ DRE platform for an election. For the following preparatory procedures, please see 2.08 - Democracy Suite[®] ImageCast[®] X System Operations Procedures.

2.1.6.5 Procedures to Be Performed After the Devices Return from an Election

This sub-chapter defines the Preventive Maintenance procedure to be performed after the ImageCast[®] X BMD/DRE platform device's return from an election.

1. Check the units for shipping damage. Check for broken or missing legs, power cords and anything else associated with the devices.
2. Power-up the unit and check the LCD/touchscreen assembly for proper operation and cleanliness.
3. Charge the battery for 12 hours.

2.2 Corrective Maintenance Procedures

This chapter identifies the following Corrective Maintenance Procedures, as specified in paragraph 2.9.2.2 of the VVSG 1.0 Volume II:

- Steps to Replace Failed/Deficient Equipment
- Steps to Correct Deficiencies/Faulty Operations in Software
- Necessary Modifications for Software Coordination
- Personnel and Skills Required
- Maintenance Tasks to Be Coordinated with Dominion Voting Systems

2.2.1 Steps to Replace Failed/Deficient Equipment

These steps can be performed by a Level 1 technician:

- Diagnosis of Faulty Hardware
- Testing to Verify Correction of Problems

2.2.2 Steps to Correct Deficiencies/Faulty Operations in Software

These steps can be performed by a Level 1 technician:

- Diagnosis of Faulty Software
- Testing to Verify Correction of Problems

2.2.3 Necessary Modifications for Software Coordination

Please see section “Software/Firmware Updates”.

2.2.4 Personnel and Skills Required

The skill level required for the individual corrective maintenance tasks is indicated in Figure 2-2.

Maintenance Task	Skill Level Required	Number of Persons
Battery Replacement	Level 1	1
Aligning and Testing the Voter Card Reader	Level 0	1
Diagnosis of Faulty Software	Level 1	1
Testing to Verify Correction of Problems	Level 1	1
Printer cartridge (toner) replacement	Level 0	1

Table 2-2: Required skill level for individual corrective maintenance

2.2.5 Maintenance Tasks to Be Coordinated with Dominion Voting Systems

For replacement parts, please contact Dominion Voting Systems at:

Dominion Voting Systems

1201 18th St., Suite 210

Denver, CO, USA

80202

Telephone: 720.257.5209

Facsimile: 720.257.5209

NOTE: These procedures should be performed by a Maintenance Technician.

NOTE: When disassembling the system, or replacing components, verify that the system is disconnected from the AC power outlet.

Troubleshooting the ImageCast[®] X BMD/DRE platform is not an exact science, but more an exercise in common sense.

It is a dynamic process of diagnostics, following a logical sequence of actions that ultimately yields solutions to problems.

This chapter describes common problems and possible solutions, along with discussions on skill levels and tools to aid in the problem resolution.

Rule number one in troubleshooting is to always look for the obvious.

For example, you would not tear your machine apart looking for a defective power supply until you are satisfied that the wall outlet you are plugged into is working.

A good troubleshooting technique is a step-by-step process of elimination, beginning with the most obvious.

Dominion Voting Systems prescribes the part swapping method as a way to isolate problems.

You may suspect that you do have a problem with the power supply - by swapping out the suspect assembly with a known good unit you have a good chance of isolating the problem.

You can use this process for practically any assembly in the system. When you have successfully isolated the defective part, Dominion Voting Systems will aid you in securing a replacement, or you may have spares in stock to use to complete the repair.

CHAPTER 3: MAINTENANCE EQUIPMENT

ImageCast[®] X does not require any special maintenance equipment other than what is listed in section “Parts and Materials” and “Maintenance Facilities and Support”.

CHAPTER 4: PARTS AND MATERIALS

This chapter provides detailed documentation of the parts and materials needed to operate and maintain the system, as specified in paragraph 2.9.4 of the VVSG 1.0 Volume II:

- Common Standards
- Paper-Based Systems - N/A

The supplies and spare parts listed in this chapter are items that will normally require replacement because of usage, loss, or because they have become worn out.

It is recommended that the customer has a quantity in stock.

For parts and materials, please contact Dominion Voting Systems at:

Dominion Voting Systems

1201 18th St., Suite 210

Denver, CO, USA

80202

Telephone: 720.257.5209

Facsimile: 720.257.5209

4.1 Parts List

4.1.1 Samsung Galaxy Note Pro 12.2 (BMD)

- One (1) Multipurpose paper pack, 8 1/2" x 11", 24 Lb, ream of 500 sheets
- One (1) Power supply (6.3VDC Adapter)
- One (1) Lava Link Interface unit
- One (1) USB-A to USB-B cord (printer cable)
- Two (2) USB-A to micro USB-B cords
- One (1) Appropriate laser printer cartridge toner
- One (1) Set of headphones with 3.5 mm stereo jack

4.1.2 Samsung Galaxy Tab Pro 12.2 (BMD)

- One (1) Multipurpose paper pack, 8 1/2" x 11", 24 Lb, ream of 500 sheets
- One (1) Power supply (6.3VDC Adapter)
- One (1) Lava Link Interface unit

- One (1) USB-A to USB-B cord (printer cable)
- Two (2) USB-A to micro USB-B cords
- One (1) Appropriate laser printer cartridge toner
- One (1) Set of headphones with 3.5 mm stereo jack

4.1.3 aValue SID-15V/SID-21V and aValue HID-21V (BMD)

- One (1) Multipurpose paper pack, 8 1/2" x 11", 24 Lb, ream of 500 sheets
- One (1) Power cable
- One (1) USB-A to USB-B cord (printer cable)
- One (1) Appropriate laser printer cartridge toner
- One (1) Set of headphones with 3.5 mm stereo jack

4.1.4 aValue SID-15V/SID-21V and aValue HID-21V (DRE w/o VVPAT)

- One (1) Power cable
- One (1) Set of headphones with 3.5 mm stereo jack
- One (1) Thermal report printer
- Two (2) USB Sticks

4.1.5 aValue SID-15V and SID-21V (DRE w/ VVPAT)

- One (1) Power cable
- One (1) Set of headphones with 3.5 mm stereo jack
- One (1) KFI VVPAT VRP3
- One (1) USB-A to mini USB-B
- One (1) Power Supply 24V DC; 2.7 A
- Two (2) USB Sticks

4.1.6 aValue HID-21V (DRE w/ VVPAT)

- One (1) Power cable
- One (1) Set of headphones with 3.5 mm stereo jack
- One (1) KFI VVPAT VRP3
- One (1) USB-A to mini USB-B
- One (1) VVPAT Printer Power Cable

- Two (2) USB Sticks

CHAPTER 5: MAINTENANCE FACILITIES AND SUPPORT

The measured Availability is greater than 99.5% in implementation These measurements were obtained under situations where:

- MTTR was 0.66 hours.
- The ratio of spare machines to operational machines was 10%.
- One technician was allocated for each set of 25 machines.
- No technician was more than one-hour transit time from any unit.
- All technicians used the Help Desk for any action.
- Help Desk support of one person was provided for every ten technicians.

Help Desk staff must be vendor staff. Field Technicians can be vendor staff, but third party staff or jurisdiction staff can attain accreditation by taking training courses offered by the vendor.

All facilities, furnishings, fixtures, and utilities that are required for equipment maintenance are described in sections “Preventive Maintenance Procedures”, “Corrective Maintenance Procedures”, and “Parts and Materials”.

Details for Operations Support are provided in “Chapter 6: Operations Support, in 2.08 - Democracy Suite[®] ImageCast[®] X System Operations Procedures.

Please check the documentation for each of the hardware components for further details about storage requirements.

REVISION HISTORY

Rev.	Date	Author	Summary
3	04-25-2019	sava.antonijevic	Resolved various discrepancies.
2	04-10-2019	sava.antonijevic	Added new section “Chapter 4.1.2: Samsung Galaxy Tab Pro 12.2 (BMD)”.
1	03-06-2019	sava.antonijevic	Branched for 5.11.

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Table 2-2: Required skill level for individual corrective maintenance 12

VVSG TRACE LIST

VVSG Criteria	Pg.
VVSG 1.0 Vol II - 2.9.1	1
VVSG 1.0 Vol II - 2.9.1.a	1
VVSG 1.0 Vol II - 2.9.1.b	2
VVSG 1.0 Vol II - 2.9.1.c	2
VVSG 1.0 Vol II - 2.9.1.d	2
VVSG 1.0 Vol II - 2.9.1.e	2
VVSG 1.0 Vol II - 2.9.1.f	2
VVSG 1.0 Vol II - 2.9.1.h	3
VVSG 1.0 Vol II - 2.9.2	4
VVSG 1.0 Vol II - 2.9.2.1	4
VVSG 1.0 Vol II - 2.9.2.2	11
VVSG 1.0 Vol II - 2.9.3	14
VVSG 1.0 Vol II - 2.9.4	15
VVSG 1.0 Vol II - 2.9.5	18

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