ELO EPS15E3 Documentation Error

CLEARVOTE 2.2 AND CLEARVOTE 2.3

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Introduction

In late 2023, Douglas County, CO placed an order for additional ClearAccess configurations including the Elo POS model that was introduced in ClearVote 2.2. When staff from the Colorado Secretary of State's office arrived in April 2024 to install the new ClearAccess systems, they noticed that the model number (EPS15E2) on the touchscreen computer did not match the model number (EPS15E3) listed on the ClearVote 2.3 APL. This anomaly was brought to the attention of Clear Ballot staff on April 8, 2024.

In accordance with industry best practices and VVSG 1.0 requirements methodology, Clear Ballot Group generated this Root Cause Analysis (RCA) document to record the measurable methods used to determine the root cause of this anomaly. This document also describes the processes that Clear Ballot Group followed to review and revise Technical Data Package (TDP) documentation and internal policies. This issue was a documentation error and has no impact on the functionality of the voting device.

Anomaly Description

ClearVote 2.2 and ClearVote 2.3 documentation references Elo EPS15E3, which was never independently tested. Elo EPS15E2 was tested by Pro V&V and was tested by Pro V&V in the process of certifying ClearAccess 2.2 and ClearAccess 2.3.

In March of 2020, the Clear Ballot product team was notified that the currently certified touchscreen computer components for the ClearAccess product were at the end of their production lifecycles. The Elo X would no longer be manufactured after March 2020 and the Elo E would no longer be manufactured after December 2020. Clear Ballot began to evaluate alternative Elo touchscreen All-in-One options to replace the existing models, including the Elo POS series. Elo has a variety of options per series based on the specific configuration (processor size, with or without an operating system, memory size and with wall mount or stand). See the following chart.

Ordering Information

Part Number	Part Description	Processor	OS	Memory	Surface Treatment	Touch Interface
E440439	EPS15E2-2UWA-1-MT-4G-1S-NO-00-BK	J4105	None	4GB	Antiglare	USB
E440234	EPS15E2-2UWA-1-MT-4G-1S-W1-64-BK	J4105	Window 10	4GB	Antiglare	USB
E441010	EPS15E2-2UWA-1-MT-4G-1S-NO-00-BK-NS-EXP	J4105	None	4GB	Antiglare	USB
E440808	EPS15E2-2UWA-1-MT-4G-1S-W1-64-BK-NS-EXP	J4105	Window 10	4GB	Antiglare	USB
E441385	EPS15E3-2UWA-1-MT-4G-1S-NO-00-BK	i3-8100T	None	4GB	Antiglare	USB
E441193	EPS15E3-2UWA-1-MT-4G-1S-W1-64-BK	i3-8100T	Window 10	4GB	Antiglare	USB
E441781	EPS15E3-2UWA-1-MT-4G-1S-NO-00-BK-NS-EXP	i3-8100T	None	4GB	Antiglare	USB
E441575	EPS15E3-2UWA-1-MT-4G-1S-W1-64-BK-NS-EXP	i3-8100T	Window 10	4GB	Antiglare	USB
E442161	EPS15E5-2UWA-1-MT-8G-1S-NO-00-BK	i5-8500T	None	8GB	Antiglare	USB
E441968	EPS15E5-2UWA-1-MT-8G-1S-W1-64-BK	i5-8500T	Window 10	8GB	Antiglare	USB
E442550	EPS15E5-2UWA-1-MT-8G-1S-NO-00-BK-NS-EXP	i5-8500T	None	8GB	Antiglare	USB
E442365	EPS15E5-2UWA-1-MT-8G-1S-W1-64-BK-NS-EXP	i5-8500T	Window 10	8GB	Antiglare	USB

As a part of the research and development process, the Clear Ballot product team initially tested a variety of models in the Elo POS series, including the EPS15E3 (i3 processor) and the EPS15E2 (Celeron processor). By April of 2020, Clear Ballot completed its review and determined the EPS15E2 with the Celeron processor was the best choice.

Chronology of Events

Date	Description	Organization: Representatives	Result/Notes
March 2020	Clear Ballot began review of new Elo Touch Screen All-in-One Computers as replacements for the currently certified models	Clear Ballot: Brandon Bell	Samples of new series Elo POS models EPS15E3 (i3 processor) and the EPS15E2 (Celeron processor) were ordered and tested by the hardware development team.
March 2020	Internal draft of the Approved Parts List (APL) for ClearVote 2.2 (Denali) created	Clear Ballot: Brandon Bell	Internal documents were created to reflect the addition of the Elo POS with model EPS15E3 as a placeholder value.
April 2020	Clear Ballot completed hardware review	Clear Ballot: Brandon Bell	Clear Ballot decided to incorporate the EPS15E2 into the product line.
December 2020	Draft of APL created and reviewed internally by Clear Ballot	Clear Ballot: Joe Srednicki, Brandon Bell	Internal documents were formalized as updates to the TDP in advance of submitting for certification.
1/6/2021	ClearVote 2.2 TDP documents submitted for initial review	Clear Ballot: Joe Srednicki, Russ Dawson	Draft was submitted to Pro V&V with EPS15E3 listed as model number with Intel Celeron processor.
1/20/2021	ClearVote 2.2 Testing Application approved	Clear Ballot: Russ Dawson EAC: Jerome Lovato	
3/18/2021	Electromagnetic Interference (EMI) testing of the ClearVote 2.2 (ClearAccess) completed	Clear Ballot: Brandon Bell, Savio Polini Pro V&V: Michael Walker	Elo serial numbers used were I193022848 J193011870 which are model number EPS15E2.
10/8/2021 - 12/23/2021	ClearVote 2.2 test report completed and sent to EAC for approval	Pro V&V: Wendy Owens EAC: Jerome Lovato	ClearVote 2.2 received its Certificate of Conformance.

1/26/2022	ClearVote 2.3 TDP documents submitted for initial review	Clear Ballot: Joe Srednicki, Russ Dawson	
2/2/2022	ClearVote 2.3 Testing Application approved	Clear Ballot: Russ Dawson EAC: Jonathon Panek	
4/7/2022	EMI Testing of the ClearVote 2.3 (ClearAccess)	Clear Ballot: Savio Polini Pro V&V: Michael Walker	Elo Serial Numbers used were I193022853 I193022854, which are model number EPS15E2.
8/1/2022 - 10/31/2022	ClearVote 2.3 test report completed and sent to EAC for approval	Pro V&V: Wendy Owens EAC: Jonathon Panek	ClearVote 2.3 received a Certificate of Conformance
4/8/2024	Colorado State board prepared to install Douglas County's new ClearAccess 2.3 systems	Clear Ballot: Kyle Rulli CO SOS: Danny Casias	The state team noticed a discrepancy between the model number listed on the ClearVote 2.3 APL and the model number on the delivered hardware.
4/8/2024	Clear Ballot team investigated hardware that was submitted to Certification events	Clear Ballot: Elizabeth Broderick, Russ Dawson, Michael Papa	The ClearVote Hardware Test Reports for 2.2 and 2.3 testing listed serial numbers that are model number EPS15E2.
4/9/2024	Clear Ballot notified Pro V&V of the discrepancy	Clear Ballot: Russ Dawson Pro V&V: Ryan Wilson, Brent Bofenkamp	
4/26/2024	Clear Ballot discussed the issue with the EAC	Clear Ballot: Russ Dawson, Jerome Lovato EAC: Jonathon Panek	EAC provided guidance that Clear Ballot should submit updated TDP documents referencing the correct model and prepare this RCA.

Investigative Team and Method

Team Structure

Clear Ballot Group leveraged the following cross-functional team to investigate the root cause, then determine, implement, and validate the proper corrective action for this anomaly.

- Russ Dawson, Federal Certification Program Manager
- Jerome Lovato, Director of Certification
- Elizabeth Broderick, Director of Strategic Procurement
- Helen Michaud, VP of Product
- Kristina Arnold, Documentation Manager

Methodology

Clear Ballot reviewed internal records to determine the origin of the incorrect model number in the TDP documentation. The team faced some challenges because the relevant events happened several years ago, and some of the key players at the time are no longer with the company.

In parallel, Clear Ballot reviewed the TDP to identify references to the Elo EPS15E3. These documents were updated with the correct model number, EPS15E2.

The team met to identify further corrective actions to prevent future mislabeling of items on the APL. Because the error in question happened several years ago with different staff, process improvements had already been made in the area of Commercial Off the Shelf (COTS) management and quality control in general, which are summarized under the "Corrective Action" section of this document. Additional improvements were also discussed and formalized as a result of this incident.

Findings

The team traced the issue to the initial evaluation of new Elo devices to replace certified components in ClearAccess that had reached the end of production life. Two models were evaluated, the EPS15E3 (i3 processor) and the EPS15E2 (Celeron processor).

Internal documents erroneously captured the details of the new hardware with the model number EPS15E3. This error was carried over to the draft APL, although the APL =noted that the certified model features a Celeron processor (which is true of the EPS15E2).

The draft documentation was reviewed internally without the error being caught.

Mitigations

Pro V&V and Clear Ballot each performed an analysis of affected documents. The following tables list the TDP documents and sections that were identified as including the mislabeling error. Clear Ballot updated the affected sections and resubmitted the documents to Pro V&V.

Table 2 - ClearVote 2.2

Document	Sections
ELO TOUCH - EPS15E3 specifications.pdf	Entire document (replaced by correct specifications)
ClearAccess Installation Guide Ver 1.8.4 - 10/06/2021	2.6.1 2.6.2 2.6.3
ClearVote Approved Parts List Ver 1.2.5 - 06/25/21	A.5 A.6 A.7

Table 3 - ClearVote 2.3

Document	Sections
ELO TOUCH - EPS15E3 specifications.pdf	Entire document (replaced by correct specifications)
ClearVote Approved Parts List Ver 2.0.4 - 07/14/22	Section 5 Section 6

Corrective Action

The Clear Ballot team identified multiple areas of corrective action. Because the error occurred several years ago, some of these improvements have already been implemented as part of Clear Ballot's continuous improvement efforts.

Updates to Commercial off the Shelf (COTS) Program Management

In late 2022, management of the COTS program transitioned from the hardware team to the Quality Assurance (QA) team. The QA team process includes initial testing of proposed hardware to determine if it should be incorporated into the product line. COTS-specific Jira tickets are created for each proposed item and linked to affected versions to scope the work. Sub-task tickets are created for each test case to determine if a COTS item will work effectively in each configuration in which it is intended to be used and to track and validate any development work needed to support the new hardware. The thorough recording of the process via tickets assists in projecting workload for the various stakeholders involved. COTS Subject Matter Experts (SMEs) and QA can project End of Life changes and effectively scope the work to maintain continuity of product sales.

Once a COTS product is internally approved for use, additional tickets are created for the documentation team to update the relevant TDP documents and for the SEMs for the product to review the updates. This enhanced process for internal review ensures that APL and all relevant document updates are examined and tracked by the QA team and COTS SMEs. Moving forward, Clear Ballot will also have SMEs review all VSTL test reports to confirm COTS model numbers.

Tickets are created for the Certification team to notify them of the changes and to initiate formal certification activities. These may include identifying the new hardware in the scope of an upcoming release, scheduling hardware testing, or submitting Engineering Change Orders (ECOs). A typical ticket includes links to what was tested, datasheets on the new hardware, and any specific state and customer information to aid in setting timelines for the next steps. The Certification team works with Clear Ballot internal operations to procure new COTS units for the test lab. They work with QA to transfer the relevant drivers and firmware. By tracking the entire process in Jira, COTS management has become more consistent.

Moving forward, Clear Ballot will also take pictures of new hardware that is sent for certification testing as an additional record of the exact equipment that was reviewed by the VSTL.

Also, the Clear Ballot documentation team has reviewed the TDP practices and streamlined references to COTS hardware. The APL is the primary reference to certified hardware and

specific model numbers. Aside from the APL, references to specific model numbers are kept to a minimum and only appear where the configuration or operation of a specific model is distinct from other certified models (for example, in the relevant Installation Guide).

Appendix A: Quality Assurance Program Reference

The following is the relevant extract from the ClearVote 2.5 Quality Assurance Program reflecting the process for review of TDP documents.

2.5 TDP Documentation Review

The Documentation team provides drafts of documentation to the Subject Matter Expert (SME) for their review. The SME may be a hardware or software engineer, quality assurance engineer, product manager, or other Clear Ballot staff. The SME provides feedback to the Documentation team on the content, and the SME and documentation team collaborate on the document until the SME is satisfied with the content. Depending on the content, multiple SMEs may participate in documentation review.

Appendix B: Screenshot of 2.2 Hardware Test Reports showing the serial numbers of the Elo POS machines that were used in testing

NTS

5.1 Radiated Emissions, 30 MHz - 1 GHz

Radiated Emissions, FCC Part 15

Manufacturer:	ProV&V/CBG	Project Number:	PR128128/B80802
Customer Representative:	Michael Walker	Test Area:	10m2
Model:	ClearVote 2.2 (Clear Access)		---
	Ballot Box		2
	UPS		PY3JU2000066
	ATI		20011271
	OKI		BW02001275C0
	ELO		I193022848
			J193011870 (CI)
Standard Referenced:	FCC Part 15	Date:	March 18, 2021
Temperature:	21˚C Humidity: 23%	Pressure:	827mb
Input Voltage:	120Vac/60Hz		
Configuration of Unit:	Normal operating mode		
Test Engineer:	Kevin Johnson		

B80802-22-RE.doc   FR0100

Type	Frequency (MHz)	Level (dBuV)	Transducer (dB/m)	Gain / Loss (dB)	Final (dBuV/m)	Azm(deg)/Pol/Hgt(m)	Margin: FCC Class B QP (dB)
QP	32.742	38.2	23.4	-46.8	14.8	14/V-Pole/1.04	14.78
QP	66.539	57.1	12.0	-46.8	22.3	1/V-Pole/2.24	7.26
QP	139.085	46.4	17.4	-46.9	16.8	100/V-Pole/2.42	16.20
QP	249.999	58.8	15.6	-46.8	27.6	69/V-Pole/1.01	7.90

Appendix C: Screenshot of 2.3 Hardware Test Reports showing the serial numbers of the Elo POS machines that were used in testing

NTS

1.0   Introduction

This document presents the test procedures used and the results obtained during the performance of an Electromagnetic Interference (EMI) 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.

- Test Specification: FCC Part 15 Class B, VVSG
- Pro V&V, Inc Purchase Order(s) 2021-019, dated 12/01/2021
- National Technical Systems (NTS) Quote(s) OP0602148, dated 11/29/2021
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories,* dated 11/1/2017

3.0   Product Selection and Description

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

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

Item	Qty.	Name/Description	Part Number	Serial Number
1	2	ClearAccess, ELO	N/A	193022853
				193022854
2	1	Printer	N/A	460012341W822
3	2	UPS	N/A	AS2126193035
				AS21282906644

3.1   Security Classification

Non-classified

4.0   General Test Requirements

4.1   Test Equipment

The instrumentation used in the performance of these tests is periodically calibrated and standardized within manufacturer's rated accuracies and are traceable to the National Institute of Standards and Technology. The calibration procedures and practices are in accordance with ISO 17025:2017. Certification of calibration is on file subject to inspection by authorized personnel.

4.2   Measurement Uncertainties

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test

Appendix D: Invoice for purchase of Elo POS systems used in hardware testing

This invoice shows the part number of the tested devices: E441010. Refer to the chart on page 4 of this document to confirm that this part number corresponds to model number EPS15E2.

Remit To: **BlueStar** 28487 Network Place Chicago, IL 60673-1284 USA **Ph**: (859) 371-4423 **Fax:** (859) 371-4425	**INVOICE**		
	Number	**Date**	**Page**
	6972182	26-APR-20	1 of 1

Bill To:	Ship To:
CLEAR BALLOT GROUP, INC 2 Oliver St. Floor 2 BOSTON MA 02109 US	CLEAR BALLOT 100 INNOVATIVE WAY STE 3450 NASHUA NH 03062-5739 US

Account Manager	Cust PO #	Sales Order #	Shipped Via	Currency
Overton, Mr. Josh	1991	13107319	OTHER-LTL-Ground	USD

Due On	Payment Terms	Freight Terms	
26-MAY-20	Net 30	Prepaid And Add	

Line	Part Number	Description	Ord Qty	Ship Qty	UoM	Unit Price	Extended Price
1.1	E441010	Elo, Elopos System, 15-Inch Wide, No Os, Celeron, 4Gb Ram, 128Gb Ssd, Projected Capacitive 10-Touch, Zero-Bezel, Antiglare, Black, No Stand, Wall Mount I/O Hub H193006526, I193022841; I193022843, I193022845,; I193022847 - I193022851; I193022853, I193022854; J193011868,	15	15	Each	797.87	11,968.05
	Serial #:	J193011870 J193011873, J193011879					
2.1	FREIGHT-CHARGE	Freight Charge	1	1	Each	115.93	115.93

NOTES: If Payment is NOT received by Due Date, it will attract an additional 1.5% penalty for each month of delay. All claims for shortage, damage and/or credit must be made within 10 days of receipt of merchandise. NO returns are accepted after 30 days. All goods purchased remain the property of BlueStar until full payment is received.	**Sub Total**	12,083.98
	TOTAL:	12,083.98