wyle laboratories

7800 Highway 20 West
Huntsville, Alabama 35806
Phone (256) 837-4411
Fax (256) 721-0144
www.wyle.com

DEMOCRACY SUITE 4.0 SYSTEM ENVIRONMENTAL AND EMI HARDWARE TEST REPORT FOR DOMINION VOTING SYSTEMS CORPORATION

Approved by:

Brian Coppock, Test Supervisor — 2/2/2012

Michael L Walker, Senior Project Engineer — 2/3/2012

Frank Padilla, Voting Systems Manager — 2/3/2012

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Scope

This report documents the test procedures followed and the results obtained during Environmental and Electrical Testing performed on the Democracy Suite Voting System for Dominion Voting Systems Corporation. Upon receipt by Wyle Laboratories, the system was inspected and subjected to a Physical Configuration Audit (PCA). The receiving inspection revealed the systems to be in good condition. All testing was performed at Wyle Laboratories' Huntsville, Alabama, Test Facility.

1.2 Objective

The objective of this test program was to ensure that the Democracy Suite device complied with the applicable hardware requirements of the Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG) as described in this report.

The scope and detail of the test program was tailored to the design and complexity of the hardware submitted for testing. Only results for the required non-operating environmental tests and electrical tests are included in this report.

The tests were designed to evaluate system compliance with the requirements of the VVSG. The examination included hard tests verifying system performance and function under normal and abnormal conditions.

1.3 References

- Dominion Voting Systems Corporation's Purchase Order No. DVS0965.
- EAC 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines", and Volume II, Version 1.0, "National Certification Testing Guidelines"
- United States Election Assistance Commission, "Testing and Certification Program Manual 2006, Ver. 1, January 1, 2007"
- MIL-STD-810D "Military Standard Environmental Test Methods and Engineering Guidelines"
- ISO-9001:2008, "Quality Management Systems – Requirements," Edition 4
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- Wyle Laboratories' Quality Assurance Program Manual, Revision 4
- ISO/IEC 17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories"
- Wyle Laboratories Certification Test Plan No. T57381.01-01, Rev. B, dated October 21, 2011, Certification Test Plan EAC Application Number DVS1001
- UL Standard for Safety for Information Technology Equipment, UL 60950-1, Second Edition dated March 27, 2007

1.4 Test Specimen Description

The test specimen is a Democracy Suite 4.0 Voting System, hereinafter referred to as the DVS. The DVS is a paper based optical scan voting system. The components of the DVS that were subjected to the hardware tests included the following: ImageCast Evolution (ICE) precinct-level optical scanner and tabulator with audio voting and ballot marking capabilities, Imagecast Precinct (ICP) precinct-level optical scanner and tabulator with audio voting capabilities, ImageCast Central (ICC), and Ballot Boxes. The components will be hereinafter referred to as the ICE, ICP, and ICC. The serial numbers tested are listed in Table 1-1. Photographs of the Democracy Suite 4.0 System components taken during the PCA are included in Attachment B.

Table 1-1 Democracy Suite 4.0 Test Component Identification

EQUIPMENT	DESCRIPTION	UNIT/BALLOT BOX S/N
ICE	Precinct Count Optical Scanner PSOS 400A	ICE2P1005, ICE2P1006, ICE2P1007, ICE2P1008
ICP	Precinct Count Optical Scanner PSOS 320A	WLDAFBH0001, WLDAFBH0002, WLDBFH0004, WLDAFBH0005, WLDAFBH0018, WLDAFBH0019, WLDAFBH0023
ICE Ballot Box	Externally Secure Ballot Box	BOX-57381-01, BOX-57381-02, BOX-57381-03, BOX-57381-04
ICP Ballot Box	Externally Secure Ballot Box	BOX-57381-011, BOX-57831-012, BOX-57381-013, BOX-57381-014
ICC	High Speed Scanner, Canon DR-X10C	ED300874. ED300880

1.5 Test Program Summary

The Democracy Suite 4.0 System components were subjected to Non-Operating and Operating Environmental Testing, Electrical Testing, and Product Safety Evaluation in accordance with the hardware requirements set forth in the EAC 2005 VVSG. When operation was required during test performance, the Democracy Suite 4.0 System components were configured as they would be for use in an election precinct.

The ICP had been previously tested and that test program consisted of an earlier version of the EMS and the ICP. Wyle researched this test campaign (See Attachment H) as well as a previous Wyle test program and performed a comparison between the ICP version tested in the provided reports and the ICP version submitted as part of the Democracy Suite 4.0 test campaign and concluded that some hardware tests could be accepted. Any test not accepted would be included as part of the Democracy Suite 4.0 test campaign. Table 1.3 outlines the tests accepted from the previous test campaign (See Attachment H) or the previous Wyle test campaign for the ICP-A as well as those tests performed in this campaign.

The ICC (ImageCast Central Count) consists of a COTS scanner that is used with a COTS workstation PC for ballot image and election rules processing and transfer of results to the EMS Datacenter.

The test components listed in Table 1-1 were subjected to hardware tests as summarized in Table 1-2. Tests that were accepted for the ICP from previous campaigns are noted in Table 1-2. The previous report for which acceptance was made is appended in Attachment H.

Table 1-2 Test Program Requirements

VVSG Vol. II Section	Test Description	Applicability			Results		
		ICE	ICP	ICC	ICE	ICP	ICC
4.6.2	Bench Handling Test	X	[1]	NA	P	P	NA
4.6.3	Vibration Test	X	[1]	NA	P	P	NA

1.5 Test Program Summary (continued)

Table 1-2 Test Program Requirements (continued)

VVSG Vol. II Section	Test Description	Applicable to			Results		
		ICE	ICP	ICC	ICE	ICP	ICC
4.6.4	Low Temperature Test	X	[1]	NA	P	P	NA
4.6.5	High Temperature Test	X	[1]	NA	P	P	NA
4.6.6	Humidity Test	X	[1]	NA	P	P	NA
4.7.1 4.7.1.1 4.7.3	Temperature/Power Variation Test* Data Accuracy* Reliability Test*	X	[1]	X	P	P	P
4.7.2	Maintainability Test	X	[1]	X	P	P	P
4.7.4	Availability Test	X	[1]	NA	P	P	NA
4.8.1	Electrical Power Disturbance Test	X	[2]	NA	P	P	NA
4.8.2	Electromagnetic Radiation Test	X	[2]	NA	P	P	NA
4.8.3	Electrostatic Disruption Test	X	[2]	NA	P	P	NA
4.8.4	Electromagnetic Susceptibility Test	X	[2]	NA	P	P	NA
4.8.5	Electrical Fast Transient Test	X	[2]	NA	P	P	NA
4.8.6	Lightning Surge Test	X	[2]	NA	P	P	NA
4.8.7	Conducted RF Immunity Test	X	[2]	NA	P	P	NA
4.8.8	Magnetic Fields Immunity Test	X	[2]	NA	P	P	NA
4.3.8 **(VVSG Vol. I)**	Product Safety Review	X	X	NA	P	P	NA
3.2.2.2 **(VVSG Vol. I)**	Audio Testing	X	X	NA	P	P	NA
4.1.2.4 **(VVSG Vol. I)**	Electrical Supply	X	[2]	X	P	P	P

1 Successful test results are documented in Wyle Test Report No. T57381.01-02.
2 Successful test results are documented in EMC Integrity, Inc. Test Report No. TRA80606 Rev. A (See Attachment H).
Legend:
P – Pass, NA – Not Applicable

* Performed concurrently.
** Test results accepted from previous test programs.

2.0 TEST PROCEDURES AND RESULTS

2.1 Non-Operating Environmental Tests

The ICE was subjected to various Non-Operating Environmental Tests. Prior to and immediately following each test environment, the ICE was powered and subjected to operability functional checks to verify continued proper operation.

The ICE was not powered during the performance of any of the non-operating tests.

2.1.1 Low Temperature Test

The ICE was subjected to a Low Temperature Test in accordance with Section 4.6.2 of Volume II of the VVSG. The purpose of this test is to simulate stresses associated with the storage of voting machines and ballot counters. This test is equivalent to the procedure of MIL-STD-810D, Method 502.2, Procedure I-Storage, with a minimum temperature of -4°F.

Prior to test initiation, the ICE was subjected to a baseline operability checkout to verify system readiness. The ICE was placed in an environmental test chamber and the chamber temperature was lowered to -4°F

2.1.1 Low Temperature Test (continued)

and allowed to stabilize. Upon temperature stabilization, the temperature was maintained for an additional four hours. The temperature was then returned to standard laboratory ambient conditions at a rate not exceeding 10°F per minute.

The ICE was removed from the chamber and inspected for any obvious signs of degradation and/or damage. None were observed. The ICE was successfully subjected to a post-test operability checkout.

The ICE successfully completed the requirements of the Low Temperature Test. A photograph of the test setup is presented in Attachment B. The Low Temperature Test Chamber Circular Chart is presented in Attachment C. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.1.2 High Temperature Test

The ICE was subjected to a High Temperature Test in accordance with Section 4.6.5 of Volume II of the VVSG. The purpose of this test is to simulate stresses associated with the storage of voting machines and ballot counters. This test is equivalent to the procedure of MIL-STD-810D, Method 501.2, Procedure I-Storage, with a maximum temperature of 140°F.

Prior to test initiation, the ICE was subjected to a baseline operability checkout to verify system readiness. The ICE was then placed in an environmental test chamber where the temperature was raised to 140°F and allowed to stabilize. Upon temperature stabilization, the temperature was maintained for an additional four hours. The temperature was then returned to standard laboratory ambient conditions at a rate not exceeding 10°F per minute.

The ICE was removed from the chamber and inspected for any obvious signs of degradation and/or damage. None were observed. The ICE was successfully subjected to a post-test operability checkout.

The ICE successfully completed the requirements of the High Temperature Test. A photograph of the test setup is presented in Attachment B. The High Temperature Test Chamber Circular Chart is presented in Attachment C. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.1.3 Vibration Test

The ICE was subjected to a Vibration Test in accordance with Section 4.6.3 of Volume II of the VVSG. The purpose of this test is to simulate stresses faced during transport of voting machines and ballot counters between storage locations and polling places. This test is equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier.

Prior to test initiation, the ICE was subjected to a baseline operability checkout to verify system readiness. Upon completion, the ICE was secured to an electrodynamics shaker. One control accelerometer was affixed to the shaker table. The ICE was subjected to the Basic Transportation, Common Carrier profile as depicted in MIL-STD-810D, Method 514.3, Category I, with a frequency range from 10 Hz to 500 Hz and an overall rms level of 1.04, 0.74, and 0.20 G for a duration of 30 minutes in each orthogonal axis. Upon test completion, the ICE was inspected for any obvious signs of degradation and/or damage. None were observed. The ICE was successfully subjected to a post-test operability checkout.

The ICE successfully completed the requirements of the Vibration Test. A photograph of the test setup is presented in Attachment B. The Vibration Test Data Sheets/Plots are included in Attachment C. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.1.4 Bench Handling Test

The ICE was subjected to a Bench Handling Test in accordance with Section 4.6.2 of Volume II of the VVSG. The purpose of this test is to simulate stresses faced during maintenance and repair of voting

2.1.4 Bench Handling Test (continued)

machines and ballot counters. This test is equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI.

Prior to performance of the test, the ICE was subjected to a baseline operability checkout. Following the checkout, each edge of the base of the machine was raised to a height of four inches above the surface and allowed to drop freely. This was performed six times per edge, for a total of 24 drops. Upon test completion, the ICE and ICP were inspected for any obvious signs of degradation and/or damage. None were observed. The ICE was subjected to a post-test operability checkout and continued operability was verified.

The ICE successfully completed the requirements of the Bench Handling Test. Photographs of the test setup are presented in Attachment B. The Bench Handling Test Data Sheet is included in Attachment C. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.1.5 Humidity Test

The ICE was subjected to a Humidity Test in accordance with Section 4.6.6 of Volume II of the VVSG. The purpose of the test is to simulate stresses encountered during storage of voting machines and ballot counters. This test is similar to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid.

The ICE was subjected to a baseline operability checkout to verify system readiness. Upon completion, the ICE was placed in an environmental test chamber and was subjected to a 10-day humidity cycle in accordance with the 24-hour cycle values found in MIL-STD-810D, Method 507.2, Procedure-Natural Hot Humid, as shown in Table 2-1.

Table 2-1 Humidity Test Cycle Values

Time	Hot-Humid (Cycle 1)			Time	Hot-Humid (Cycle 1)		
	Temperature		RH		Temperature		RH
	ºF	ºC	%		ºF	ºC	%
0000	88	31	88	1200	104	40	62
0100	88	31	88	1300	105	41	59
0200	88	31	88	1400	105	41	59
0300	88	31	88	1500	105	41	59
0400	88	31	88	1600	105	41	59
0500	88	31	88	1700	102	39	65
0600	90	32	85	1800	99	37	69
0700	93	34	80	1900	97	36	73
0800	96	36	76	2000	94	34	76
0900	98	37	73	2100	97	33	85
1000	100	38	69	2200	90	32	85
1100	102	39	65	2300	89	32	88

Upon test completion, the ICE was inspected for any obvious signs of degradation and/or damage. None were observed. The ICE was successfully subjected to a post-test operability checkout.

The ICE successfully completed the requirements of the Humidity Test. A photograph of the test setup is presented in Attachment B. The Chamber Circular Charts are included in Attachment C. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.2 Electrical Tests

The ICE and ICP were subjected to various electrical tests to ensure continued system operation and reliability in the presence of abnormal electrical events. The ICE and ICP were powered and actively counting ballots via an automated test script during all electrical tests, allowing for continual ballot processing. Prior to and immediately following each electrical test, an operational status check was performed.

2.2.1 Electrical Power Disturbance Test

Electrical Power Disturbance testing was performed in accordance with Section 4.8 of Volume II of the VVSG. This testing was performed to ensure that the ICE and ICP will be able to withstand electrical power line disturbances (dips/surges) without disruption of normal operation or loss of data.

The ICE and ICP were configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing, and subjected to the voltage dips and surges over periods ranging from 20 ms to four hours.

The ICE and ICP successfully completed the requirements of the Electrical Power Disturbance Test. Photographs of the test setup are presented in Attachment B. The test data sheets are included in Attachment D. The Instrumentation Equipment Sheets for the test are contained in Attachment G.

2.2.2 Electromagnetic Radiation Test (FCC Part 15 Emissions)

ImageCast Evolution (ICE)

Electromagnetic Radiation emissions measurements were performed in accordance with Section 4.8 of Volume II of the VVSG. This testing was performed to ensure that emissions emanating from the unit do not exceed the limits of 47 CFR Part 15, Subpart B, Class B Limits. The ICE was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing. The ICE was subjected to the test requirements detailed in Table 2-2.

Table 2-2 Conducted and Radiated Emissions Requirements (ICE)

Conducted Emissions			Radiated Emissions	
Frequency Range (MHz)	Limits (dBµV)		Frequency Range (MHz)	3 Meter Test Limit (dBµV)
	Quasi-peak	Average		
0.15 to 0.50	66 to 56	56 to 46	30 to 88	40.0
0.50 to 5.0	56	46	88 to 216	43.5
5.0 to 30.0	60	50	216 to 960	46.0
			960 to 1000	54.0

Testing was performed at the Wyle Laboratories' Open Air Test Site 2 (OATS-2) located on the Intergraph Complex in Huntsville, AL. The OATS-2 is fully described in reports provided to the Federal Communication Commission (FCC) (FCC Reference 98597). The site was tested and complies with the requirements of ANSI C63.4-2003.

To perform the Conducted Emissions portion of the test, the ICE was set up as depicted in Figure 2-1.

2.2.2 Electromagnetic Radiation Test (FCC Part 15 Emissions) (continued)

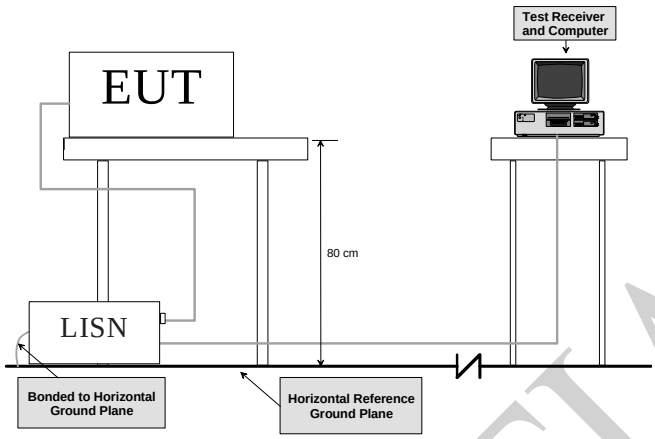


Figure 2-1 Conducted Emissions Test Setup

The ICE was then subjected to the following test procedure:

1. The ICE was placed on a non-metallic table 0.8 meters above the turntable and reference ground plane at the Open-Area Test Site.
2. The ICE AC/DC Power Adapter was connected to the power mains through a Line Impedance Stabilization Network (L.I.S.N.). Other support units were connected to the power mains through another L.I.S.N. The L.I.S.Ns provided 50 ohm/50 µH of coupling impedance for the measuring instrument.
3. The ICE was placed in an active state and monitored for functionality throughout testing.
4. Both Line and Neutral of the power mains connected to the ICE was checked for maximum conducted interference.
5. The frequency range from 150 kHz to 30 MHz was evaluated and recorded. Emissions levels below – 20 dB were not recorded.

To perform the Radiated Emissions portion of the test, the ICE was set up as depicted in Figure 2-2.

2.2.2 Electromagnetic Radiation Test (FCC Part 15 Emissions) (continued)

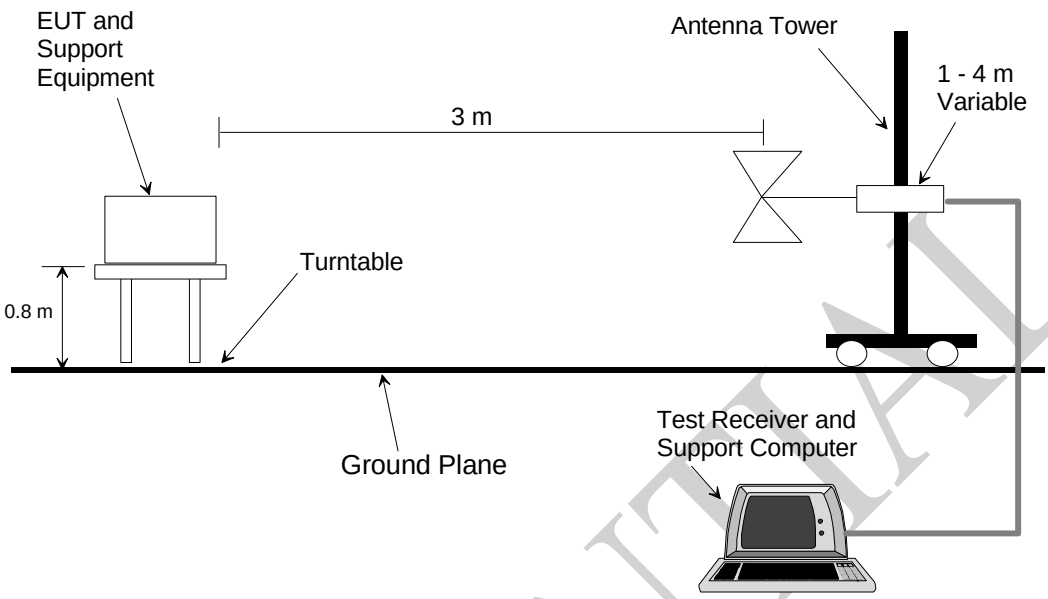


Figure 2-2 Radiated Emissions Test Setup

The ICE was then subjected to the following test procedure:

1. The ICE was each placed on a non-metallic turn-table 0.8 meters above the reference ground plane at the Open-Area Test Site.
2. The ICE was placed 3 meters away from the interference-receiving antenna, which was mounted on a variable-height antenna tower. The interference-receiving antenna used was a broadband antenna.
3. For each suspected emissions point, the ICE was arranged in a worst case configuration. The table was rotated from 0 to 360 degrees and the antenna height was varied from one (1) to four (4) meters to identify the maximum radiation.
4. All emissions points identified within 20 dB of the specified limit were tested individually using the quasi-peak method as specified and then reported in the tabular data.

The ICE was found to comply with the required emissions limits. Photographs of the test setup are presented in Attachment B. The test data sheets are included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G

2.2.2 Electromagnetic Radiation Test (FCC Part 15 Emissions) (continued)

ImageCast Precinct (ICP)

Electromagnetic Radiation emissions measurements were performed in accordance with Section 4.8 of Volume II of the VVSG. This testing was performed to ensure that emissions emanating from the unit do not exceed the limits of 47 CFR Part 15, Subpart B, Class B Limits. The ICP was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing. The ICP was subjected to the test requirements detailed in Table 2-2.

Table 2-2 Conducted and Radiated Emissions Requirements (ICP)

Conducted Emissions			Radiated Emissions	
Frequency Range (MHz)	Limits (dBµV)		Frequency Range (MHz)	3 Meter Test Limit (dBµV)
	Quasi-peak	Average		
0.15 to 0.50	66 to 56	56 to 46	30 to 88	40.0
0.50 to 5.0	56	46	88 to 216	43.5
5.0 to 30.0	60	50	216 to 960	46.0
			960 to 1000	54.0

Testing was performed at the Wyle Laboratories' Open Air Test Site 2 (OATS-2) located on the Intergraph Complex in Huntsville, AL. The OATS-2 is fully described in reports provided to the Federal Communication Commission (FCC) (FCC Reference 98597). The site was tested and complies with the requirements of ANSI C63.4-2003.

To perform the Conducted Emissions portion of the test, the ICP was set up as depicted in Figure 2-2.

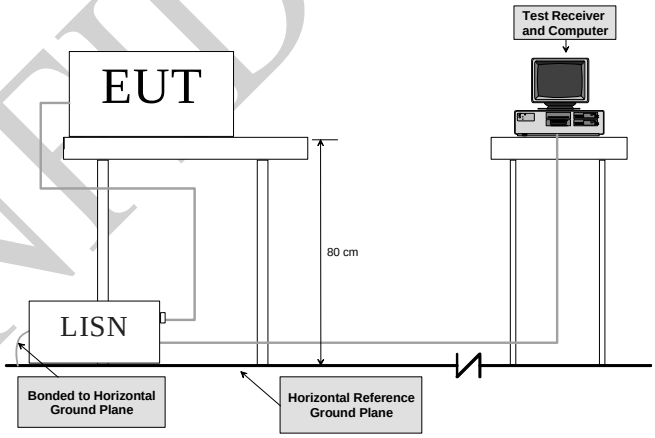


Figure 2-3 Conducted Emissions Test Setup

The ICP was then subjected to the following test procedure:

1. The ICP was placed on a non-metallic table 0.8 meters above the turntable and reference ground plane at the Open-Area Test Site.
2. The ICP AC/DC Power Adapter was connected to the power mains through a Line Impedance Stabilization Network (L.I.S.N.). Other support units were connected to the power mains through another L.I.S.N. The L.I.S.Ns provided 50 ohm/50 µH of coupling impedance for the measuring instrument.

2.2.2 Electromagnetic Radiation Test (FCC Part 15 Emissions) (continued)

3. The ICP was placed in an active state and monitored for functionality throughout testing.
4. Both Line and Neutral of the power mains connected to the ICP was checked for maximum conducted interference.
5. The frequency range from 150 kHz to 30 MHz was evaluated and recorded. Emissions levels below – 20 dB were not recorded.

To perform the Radiated Emissions portion of the test, the ICP was each set up as depicted in Figure 2-4.

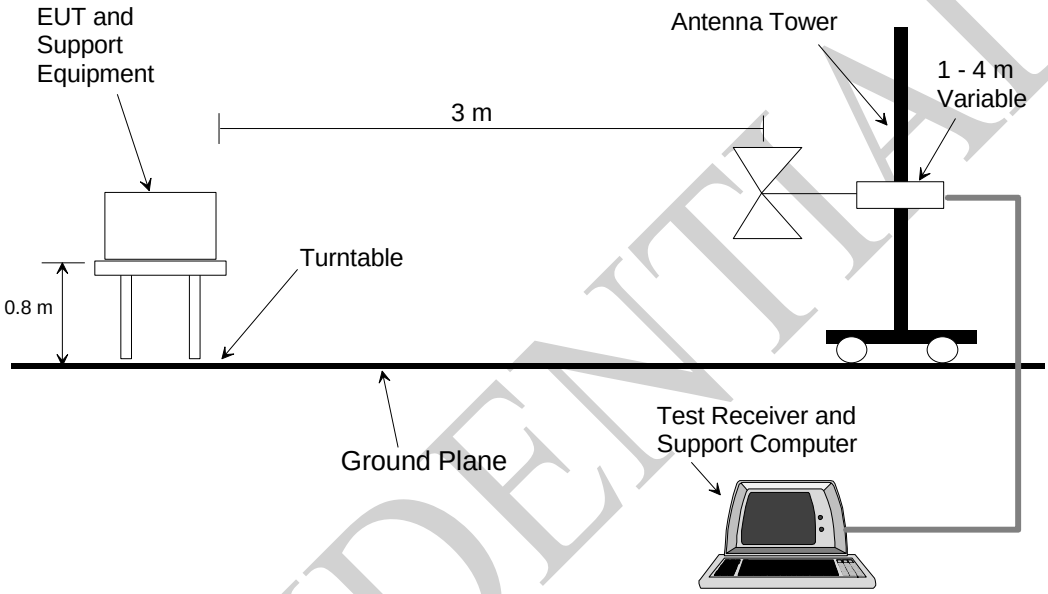


Figure 2-4 Radiated Emissions Test Setup

The ICP was then subjected to the following test procedure:

1. The ICP was placed on a non-metallic turn-table 0.8 meters above the reference ground plane at the Open-Area Test Site.
2. The ICP was placed 3 meters away from the interference-receiving antenna, which was mounted on a variable-height antenna tower. The interference-receiving antenna used was a broadband antenna.
3. For each suspected emissions point, the ICP was arranged in a worst case configuration. The table was rotated from 0 to 360 degrees and the antenna height was varied from one (1) to four (4) meters to identify the maximum radiation.
4. All emissions points identified within 20 dB of the specified limit were tested individually using the quasi-peak method as specified and then reported in the tabular data.

The ICP was found to comply with the required emissions limits. Photographs of the test setup are presented in Attachment B. The test data sheets are included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.2.3 Electrostatic Disruption Test

Electrostatic Disruption testing was performed in accordance with Section 4.8 of Volume II of the VVSG to ensure that should an electrostatic discharge event occur during equipment setup and/or ballot counting, that the ICE and ICP would continue to operate normally. A momentary interruption is allowed so long as normal operation is resumed without human intervention or loss of data.

The ICE was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The ICE and the EMI measuring equipment were then setup per the following conditions:

1. Power lines and power line returns were configured as required by the system configuration.
2. The EUT was raised approximately 10 cm from the ground using isolated stand-offs.
3. Signal/control test cables were positioned approximately 5 cm (2 in.) above the ground.

The ICE was then subjected to the electrostatic discharge transients listed in Table 2-3. Discharges were performed at areas typical of those which might be touched during normal operation, including the touch screen, user buttons, and other likely points of contact.

During the test, an anomaly was identified resulting in the ICE touchscreen becoming unresponsive. Dominion addressed this issue from a hardware and software prospective. For further details, see Notice of Anomaly No. 5, located in Attachment A of this report.

Table 2-3 Electrostatic Discharge Transients

	Requirements		
Characteristic	**Capacitance**	**Resistance**	**Value**
Pulse Wave Shape (RC Network)	150 pf	330 Ω	pf / Ω
Test Levels	**Discharge Types**		**Value**
	Air Gap	**Direct Contact**	
	±15	±8	KV
Rise Time	≤1		nanosecond
Pulse Decay Time	≈30 at 50% height		nanosecond
Pulse Repetition	≥1		per second
Total Injected Pulse at each Test Point	10		per polarity (±)
Temperature	≥15 to ≤35		°C
Relative Humidity	≥30 to ≤60		%

There was no loss of normal operation or loss of data as a result of the applied discharges.

The ICE successfully completed the requirements of the Electrostatic Disruption Test. Photographs of the test setup are presented in Attachment B. The test data sheet is included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.2.4 Electromagnetic Susceptibility Test

Electromagnetic Susceptibility testing was performed in accordance with Section 4.8 of Volume II of the VVSG. This testing was performed to ensure that the ICE and ICP would be able to withstand a moderate level of ambient electromagnetic fields without disruption of normal operation or loss of data.

The ICE and ICP were configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The ICE and ICP were then

subjected to ambient electromagnetic fields at 10 V/m over a range of 80 MHz to 1000 MHz, as shown in Figure 2-3. Testing was conducted utilizing both horizontally and vertically polarized waves.

2.2.4 Electromagnetic Susceptibility Test (continued)

The limits were measured with a maximum scan rate of 1% of the fundamental frequency and the dwell duration was three seconds.

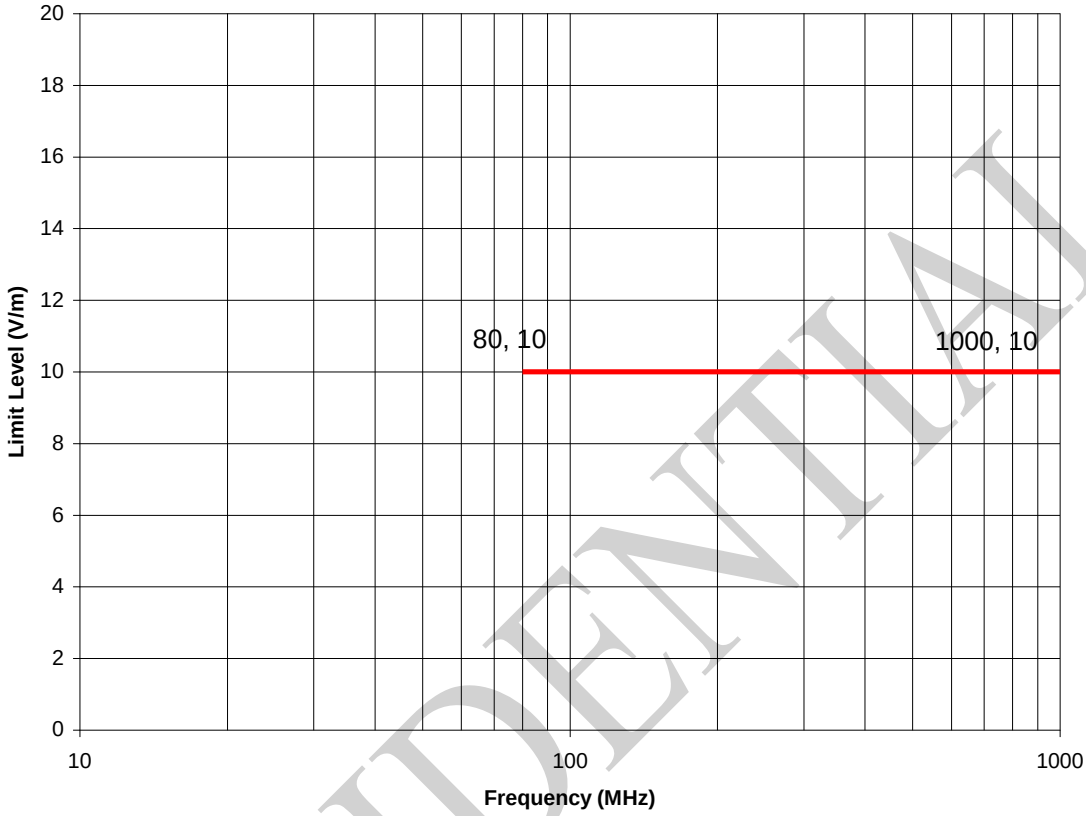


Figure 2-3 Radiated Susceptibility Limit

There was no loss of normal operation or loss of data as a result of the applied electromagnetic fields.

The ICE and ICP successfully completed the requirements of the Electromagnetic Susceptibility Test. Photographs of the test setup are presented in Attachment B. The test data sheet is included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.2.5 Electrical Fast Transient Test

Electrical Fast Transient (EFT) testing was performed in accordance with Section 4.8 of Volume II of the VVSG to ensure that, should an electrical fast transient event occur on a power line, the ICE would continue to operate without disruption of normal operation or loss of data.

The ICE and ICP were configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The ICE and ICP were then subjected to electrostatic fast transients of 2 kV applied to its AC power lines. The pulse characteristics are listed in Table 2-4.

2.2.5 Electrical Fast Transient Test (continued)

Table 2-4 EFT Pulse Characteristics

Pulse Description	Requirements	Units
Pulse Amplitude	+/-2.0	kV peak to peak
Pulse Rise Time	5 ±30%	nanoseconds
Pulse Width	50 ±30%	nanoseconds
Pulse Repetition Rate	100	kHz
Pulse Shape	Double exponential	--
Burst Duration	15	milliseconds
Burst Period	300	milliseconds
Test Duration	60	seconds

There was no loss of normal operation or loss of data as a result of the applied transients.

The ICE successfully completed the requirements of the Electrical Fast Transient Test. Photographs of the test setup are presented in Attachment B. The test data sheet is included in Attachment D. The Instrumentation Equipment Sheets for the test are contained in Attachment G.

2.2.6 Lightning Surge Test

Lightning Surge testing was performed in accordance with Section 4.8 of Volume II of the VVSG to ensure that, should a surge event occur on a power line due to a lightning strike, the ICE will continue to operate without disruption of normal operation or loss of data.

The ICE was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing. The ICE power input lines were then subjected to lightning surge testing at a level of 2 kV applied to its AC power line per the surge characteristics listed in Table 2-5.

Table 2-5 Surge Characteristics

Test I.D.	Cable Type	Number of Interfacing Cables	Description	Injection Signals Summary Characteristics
Surge	Line (L) to Neutral (N)	1	120 VAC Power Lines	Injection at Power Input Sinewave: 0°, 90°, and 270° Combination Wave Test Levels: ±2.0 kV and Ring Wave Test Level = ±2.0 kV
	Line (L) to (G)	1		
	Neutral (N) to Ground (G)	1		
	Line (L) & Neutral (N) to Ground (G)	1		

As the +2 kV lightning pulse was applied, the automated ballot test count mode stopped and the UPS switched to battery backup (reference Notice of Anomaly No. 1, presented in Attachment A, for further details).

2.2.6 Lightning Surge Test (continued)

It was determined that the UPS was defective. The surge rating on the replacement UPS was identical to the original UPS. Using the replacement UPS, the test was repeated with no further anomalies.

The ICE successfully completed the requirements of the Lightning Surge Test. A photograph of the test setup is presented in Attachment B. The test data sheet is included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.2.7 Conducted RF Immunity Test

Conducted RF Immunity testing was performed in accordance with Section 4.8 of Volume II of the VVSG. This testing was performed to ensure that the ICE will be able to withstand conducted RF energy onto its power lines without disruption of normal operation or loss of data.

The ICE was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing without operator intervention. The ICE was then subjected to conducted RF energy of 10 Vrms applied to their power lines over a frequency range of 150 kHz to 80 MHz.

There was no loss of normal operation or loss of data as a result of the applied conducted RF energy. A photograph of the test setup is presented in Attachment B. The test data sheet is included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.2.8 Magnetic Fields Immunity Test

Magnetic Fields Immunity testing was performed in accordance with Section 4.8 of Volume II of the VVSG. This testing was performed to ensure that the ICE will be able to withstand AC magnetic fields without disruption of normal operation of loss of data.

The ICE was configured to run in an automated ballot count test mode, where continual ballot processing would occur during the testing. The ICE was then subjected to AC magnetic fields of 30 A/M at a 60 Hz power line frequency.

There was no loss of normal operation or loss of data as a result of the applied magnetic field.

The ICE successfully completed the requirements of the Magnetic Fields Immunity Test. A photograph of the test setup is presented in Attachment B. The test data sheet is included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.2.9 Electrical Supply Test

Electrical Supply Testing was performed in accordance with Section 4.1.2.4 of Volume I of the VVSG. This test was performed to ensure that the ICE, ICP, and ICC will continue to provide the capability for any voter who is voting at the time of a failure of the main power supply external to the voting system to complete the casting of a ballot. Additionally, it is required that the voting system perform a successful shutdown of without loss or degradation of the voting and audit data, and allow voters to resume voting once the voting system has reverted to back-up power.

To perform the test, the ICE and the ICC were configured as for normal operation. The ICE and the ICC were then operated as designed for fifteen minutes prior to the removal of the AC input power. Once AC power was interrupted, the ICE and ICC were continuously operated for a minimum period of two hours until backup power was exhausted. Following the exhaustion of backup power the AC power was restored and the system was operated for an additional fifteen minutes. For testing of the ICE a total of 100 ballots were cast during the 2 hour period of backup power. For testing of the ICC, it was verified that a successful shutdown was performed following loss of power.

2.2.9 Electrical Supply Test (continued)

The ICE and ICC successfully completed the requirements of the Electrical Supply Test. Photographs of the test setup are presented in Attachment B. The test data sheets are included in Attachment D. The Instrumentation Equipment Sheet for the test is contained in Attachment G.

2.3 Operating Environmental Tests

2.3.1 Temperature/Power Variation Test/Data Accuracy/Reliability Test

The ICE and ICC were subjected to a Temperature and Power Variation Test in accordance with Section 4.7.1 of Volume II of the VVSG. Data Accuracy and Reliability Testing (per Sections 4.7.1.1 and 4.7.3, respectively, of Volume II of the VVSG) were performed in conjunction with the Temperature/Power Variation Test. The purpose of these tests is to evaluate ICE and ICC operation under various environmental conditions. The total cumulative duration of the test is at least 163 hours, with 48 hours in the environmental test chamber. For the remaining hours, the equipment may be operated at room temperature. This test is similar to the low temperature and high temperature tests of MIL-STD-810-D, Method 502.2 and Method 501.2.

To perform the test, the ICE and ICC units were placed inside an environmental walk-in test chamber and connected to a variable voltage power source. Two ICE units were configured to scan 100 ballots per hour, while one ICE unit was configured to generate audio ballots only. Additionally, two ICC units were configured to scan 300 ballots per hour. The temperature inside the chamber and the voltage supplied to the hardware varied from 50°F to 95°F and from 105 VAC to 129 VAC (as depicted in Figures 2-3 through 2-6). During test performance, the operational functions were continuously exercised by the scanning of ballots and the generation of ballots via audio voting.

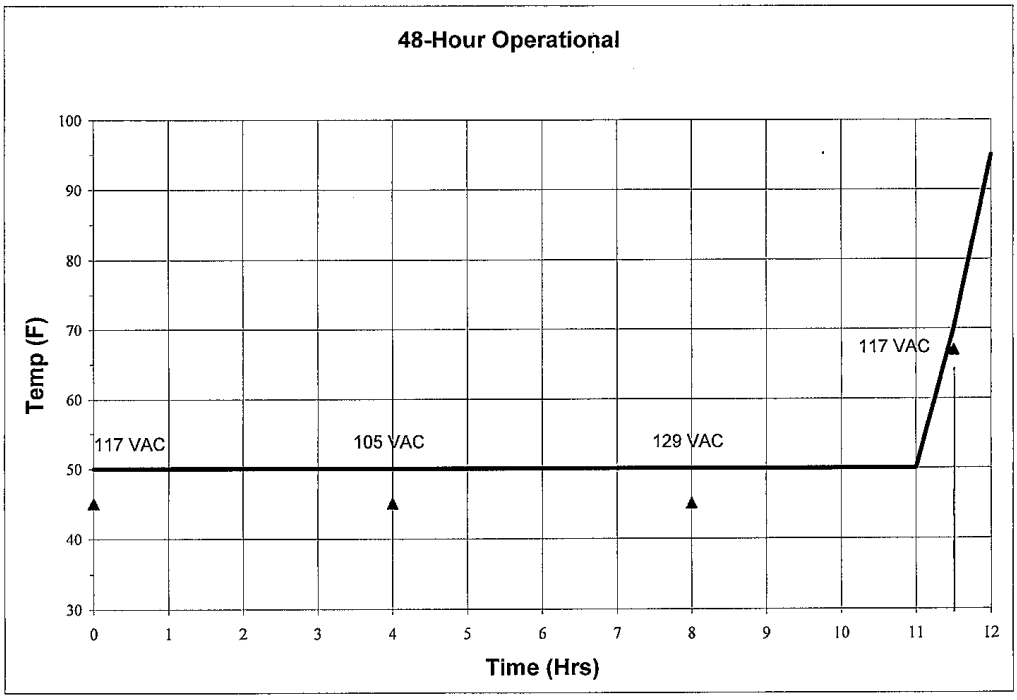


Figure 2-3 Temperature/Power Variation Profile Hours 0-12

2.3.1 Temperature/Power Variation Test/Data Accuracy/Reliability Test (continued)

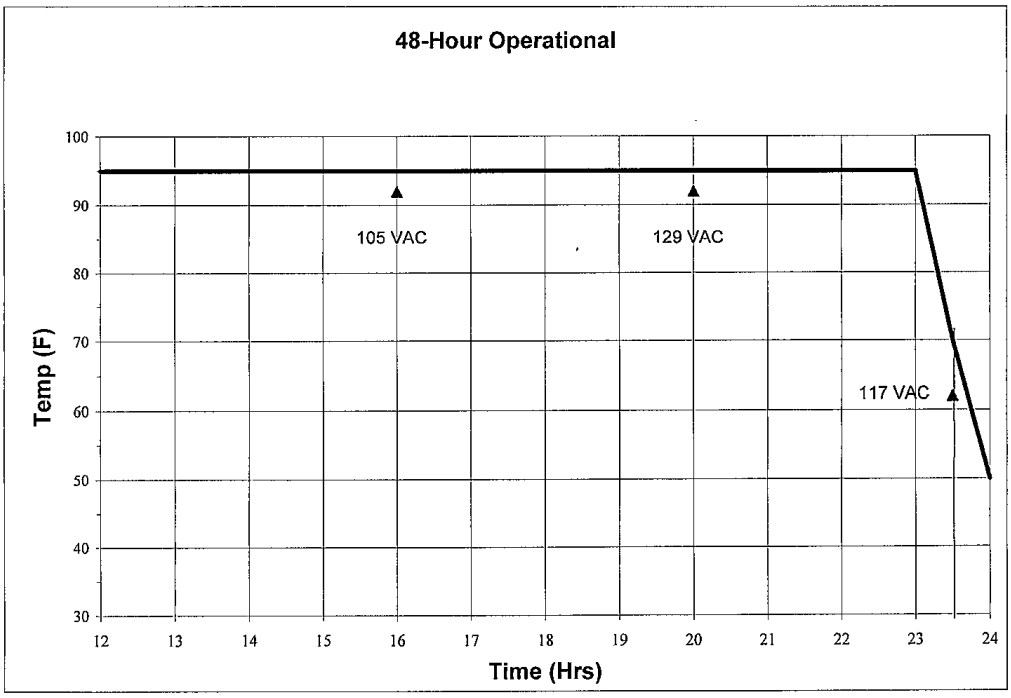


Figure 2-4 Temperature/Power Variation Profile Hours 12-24

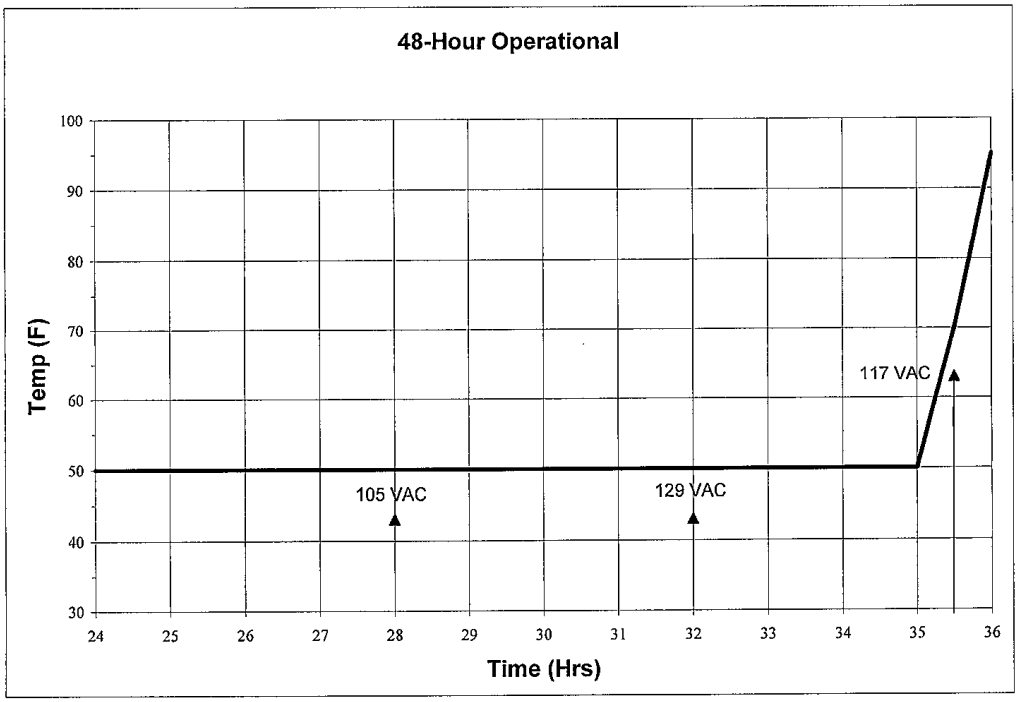


Figure 2-5 Temperature/Power Variation Profile Hours 24-36

2.3.1 Temperature/Power Variation Test/Data Accuracy/Reliability Test (continued)

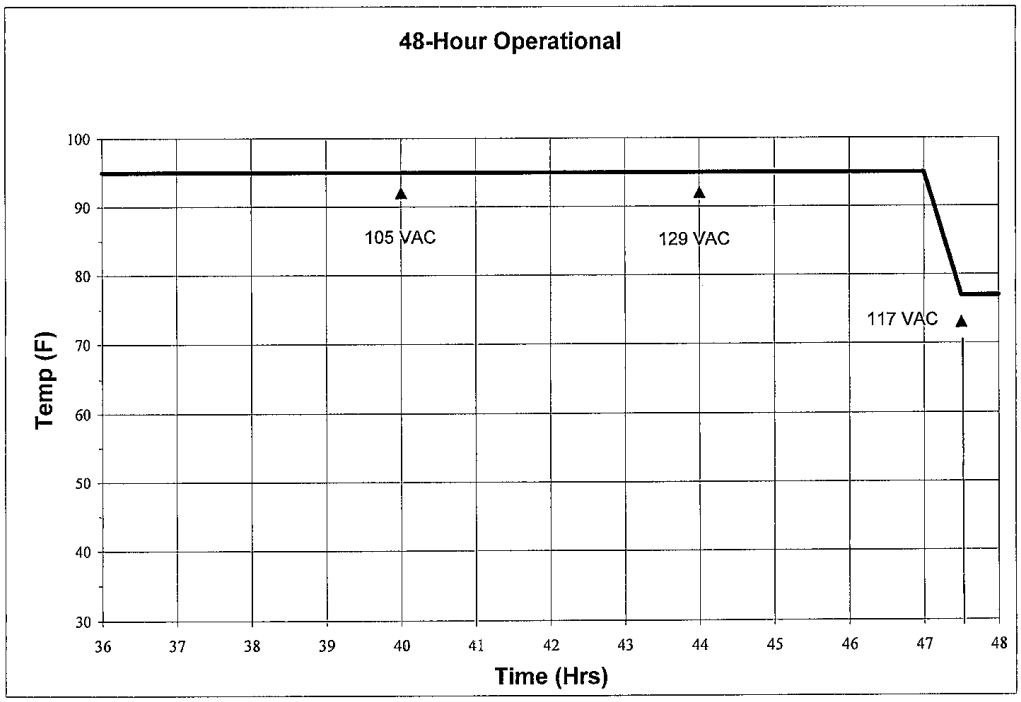


Figure 2-6 Temperature/Power Variation Profile Hours 36-48

The ICC system passed this test during the first run; however, the ICE underwent two test runs prior to a successful test run on the third attempt. Descriptions of each test run are provided in Notice of Anomaly No. 7, located in Attachment A of this report. At the conclusion of each successful run, operational status checks were performed resulting in both the ICE and ICC successfully completing the requirements of the Temperature/Power Variation, Data Accuracy, and Reliability Tests.

The Environmental Test Data which consists of the Chamber Thermal Circular Charts are included in Attachment E. Test setup photographs are included in Attachment B. The Instrumentation Equipment Sheet for the test is presented in Attachment G.

2.3.2 Maintainability Test

Maintainability Testing was performed in accordance with Section 4.7.2 of Volume II of the VVSG. This test was performed to evaluate the ease with which preventive and corrective maintenance actions can be performed based on the design characteristics of equipment and software and the processes the vendor and election officials have in place for preventing failures and for reacting to failures. It includes the ability of equipment and software to self-diagnose problems and make non-technical election workers aware of a problem and addresses all scheduled and unscheduled events which are performed to determine operational status and make component adjustments or repairs.

The ICE and ICC were evaluated with the appropriate vendor documentation, and maintainability was determined based on the presence of specific physical attributes that aid system maintenance activities, and the ease with which system maintenance tasks were able to be performed.

Any difficulties in performing maintenance activities as described in the system maintenance procedures were noted. A listing of all impediments or difficulties encountered were compiled as findings and delivered to Dominion Voting Systems, Inc. for resolution.

2.3.3 Audio Test (Acoustic Level and Hearing Aid Compatibility)

Audio Testing was performed to verify that the amount of noise emitted by the voting machine under normal operating conditions does not interfere with the duties of the election inspectors or voting public and that the voting system achieves at least an ANSI C63.19 category T4 rating for a wireless T-coil coupling for assistive hearing devices. To meet these requirements, the machine shall provide an adjustable volume control from 20 to 100 dB SPL in 10 dB increments with the initial volume level set between 40 to 50 dB, and shall reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.

To perform the test, the ICE and ICP were placed inside a semi-anechoic test chamber and configured as would be for normal operation. One side of the system's headphones was placed at the specified positions and orientations from the T-coil probe. Electromagnetic Coupling and interference from the headphones was measured and recorded. Sound Pressure Level (SPL) was then measured with microphones placed 1.2 meters above the floor and 2 meters from the voting system with the voting system operating. The initial available volume and the adjustable volume level from the headphones were also measured.

Photographs of the test setup are presented in Attachment B. The Test data sheet is included in Attachment E. The Instrumentation Equipment Sheet for the test is presented in Attachment G.

2.3.4 Availability Test

The availability of a voting system is defined as the probability that the equipment (and supporting software) needed to perform designated voting functions will respond to operational commands and accomplish the function. System availability is measured as the ratio of the time during which the system is operational (up time) to the total time period of operation (up time plus down time). Inherent availability (Ai) is the fraction of time a system is functional, based upon Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR), that is: Ai = (MTBF)/(MTBF + MTTR)

The adequacy of the ICE and ICC availability was assessed during the performance of the following voting functions:

a. For all paper-based systems:

   i. Recording voter selections (such as by ballot marking)

   ii. Scanning the marks on paper ballots and converting them into digital data

b. For all DRE systems, recording and storing voter ballot selections

c. For precinct count systems (paper-based and DRE), consolidation of vote selection data from multiple precinct based systems to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data

d. For central-count systems (paper-based and DRE), consolidation of vote selection data from multiple counting devices to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data

During the ICE hardware testing, there were three anomalies encountered (reference Notices of Anomaly No.'s 5, 6, and 7 in Attachment A). Neither of these anomalies constituted a non-recoverable hardware failure, nor resulted in a loss of voting data.

The ICC system did not experience any anomalies during the test campaign.

The ICP system encountered three anomalies which are referenced in Wyle Test Report No. T57381.01-02.

It was determined that all three hardware components of the Democracy Suite system achieved at least 99 percent availability during normal operation for the applicable functions of the system during the test campaign.

2.4 Product Safety Review

The VVSG states that all voting systems shall meet the following requirements for safety:

a. All voting systems and their components shall be designed to eliminate hazards to personnel or to the equipment itself.
b. Defects in design and construction that can result in personal injury or equipment damage must be detected and corrected before voting systems and components are placed into service.
c. Equipment design for personnel safety shall be equal to or better than the appropriate requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910.

To satisfy these requirements, one ICE unit and one ICP unit were subjected to a Product Safety Review in accordance with the applicable requirements of "UL Standard for Safety for Information Technology Equipment, UL 60950-1, Second Edition.

Non-performance evaluation of the accompanying documentation and unit construction were also performed. No anomalies were discovered during these evaluations.

The ICE and ICP were found to be in compliance with the applicable requirements of the Standard for Safety for Information Technology Equipment UL 60950-1, 2nd Edition. The Product Safety Certificates of Compliance are presented in Attachment F.

3.0 TEST RESULTS AND RECOMMENDATION

It was demonstrated that the ICE and ICP, as tested, successfully met the hardware test requirements of the EAC 2005 VVSG.

This evaluation report/recommendation is valid only for the items listed in Section 3.0 of this report. Any changes, revisions, or corrections made to the product after this evaluation shall be reevaluated, and a revised report/recommendation will be issued.

Any anomalies encountered during qualification testing were successfully resolved prior to test completion. All Notice of Anomalies generated during testing are presented in Attachment A.

3.0 TEST RESULTS AND RECOMMENDATION (CONTINUED)

Due to the varying requirements of individual jurisdictions, it is recommended by the VVSG that local jurisdictions perform pre-election logic and accuracy tests on all systems prior to their use in an election within their jurisdiction.

4.0 TEST EQUIPMENT AND INSTRUMENTATION

All instrumentation, measuring, and test equipment used in the performance of this test program shall be calibrated in accordance with Wyle Laboratories' Quality Assurance Program which complies with the requirements of ANSI/NCSL Z540-1, ISO 10012-1, and ISO/IEC 17025. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards or the basis for calibration is otherwise documented.

5.0 QUALITY ASSURANCE PROGRAM

All work performed on this program was in accordance with Wyle Laboratories' Quality Assurance Program and Wyle Laboratories' Quality Program Manual, which conforms to the applicable portions of International Standard Organization (ISO) Guide 17025.

The Wyle Laboratories, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001 International Quality Standard. Registration has been completed by Quality Management Institute (QMI), a Division of Canadian Standards Association (CSA).

Wyle Laboratories is accredited (Certificate No. 845.01) by the American Association for Laboratory Accreditation (A2LA).

ATTACHMENT A
NOTICES OF ANOMALY

wyle laboratories ORIGINAL

NOTICE OF ANOMALY	DATE: 11-29-11

NOTICE NO: 5 P.O. NUMBER: DVS 0965 CONTRACT NO: N/A
CUSTOMER: Dominion Voting Systems WYLE JOB NO: T57381.01
NOTIFICATION MADE TO: Aamer Chaudrey NOTIFICATION DATE: 10-13-11
NOTIFICATION MADE BY: Michael L. Walker VIA: e-mail

CATEGORY: [x] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 10-13-11
PART NAME: ImageCast Evolution (ICE) PART NO. ---
TEST: Electrostatic Disruption I.D. NO. ICE2P1006, ICE2P1007
SPECIFICATION: EAC 2005 VVSG, Volume II PARA. NO. Section 4.8

REQUIREMENTS:

Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

Note: The system hardware shall be operational and processing data, e.g., casting of ballots throughout all testing. The use of an autovote test script is recommended.

DESCRIPTION OF ANOMALY:

10-13-11: Testing was performed on ICE2P1006. At the conclusion of the test it was noted that the touchscreen was non-responsive. The unit was powered down and restarted and successfully subjected to the post-operational status check.

10-21-11: Testing commenced on ICE2P1006. The touchscreen became unresponsive after five pulses at 15kV air on the LCD. The unit was replaced with ICE2P1007, and testing was repeated. It was noted that the touchscreen on this unit became unresponsive after six pulses at 15 kV air on the LCD.

10-27-11: Following a source code revision to re-initialize the touchscreen controller and a hardware modification to include Kapton tape applied to the edges of the touchscreen LCD prior to installing the plastic cover, the test was successfully completed on ICE2P1007.

DISPOSITION • COMMENTS • RECOMMENDATIONS:

Safety Related ☐ YES ☒ NO Potential 10 CFR Part 21 ☐ YES ☐ NO ☒ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☐ WYLE

CAR Required: ☐ YES ☒ NO CAR No.

VERIFICATION:
PROJECT ENGINEER: 11/29/11
TEST WITNESS: N/A
PROJECT MANAGER: Michael L Walker 11/29/11
REPRESENTING:
INTERDEPARTMENTAL COORDINATION:
QUALITY ASSURANCE: 1/25/12

WH 1066, Rev. March '09

Page 1 of 1

wyle laboratories ORIGINAL

NOTICE OF ANOMALY	DATE: 12-1-11

NOTICE NO: 6 P.O. NUMBER: DVS 0965 CONTRACT NO: N/A
CUSTOMER: Dominion Voting Systems WYLE JOB NO: T57381.01
NOTIFICATION MADE TO: Aamer Chaudrey NOTIFICATION DATE: 9-21-11
NOTIFICATION MADE BY: Michael L. Walker VIA: e-mail

CATEGORY: [x] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: 9-21-11
PART NAME: ImageCast Evolution (ICE) PART NO. ---
TEST: Lightning Surge I.D. NO. ICE2P1005
SPECIFICATION: EAC 2005 VVSG, Volume II PARA. NO. Section 4.8

REQUIREMENTS:

Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, surges of:

± 2 kV AC line to line

± 2 kV AC line to earth

Note: The system hardware shall be operational and processing data, e.g., casting of ballots throughout all testing. The use of an autovote test script is recommended.

DESCRIPTION OF ANOMALY:

9-21-11: At the conclusion of the test, it was noted that the unit was operating on battery backup. It was verified that the power supply was not producing power to the unit. The existing power pack/ac adapter was changed. The unit displayed an error message indicating that the battery level was low.

9-27-11: At the first lightning pulse (+2 kV), the power supply lost power and the unit switched to battery backup. Testing was halted per the direction of the Dominion technical representative.

10-11-11: The power brick was replaced with a new brick (same type and model). The test was repeated with no anomalies noted.

DISPOSITION • COMMENTS • RECOMMENDATIONS:

Safety Related ☐ YES ☒ NO Potential 10 CFR Part 21 ☐ YES ☐ NO ☐ N/A

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER ☐ WYLE

CAR Required: ☐ YES ☒ NO CAR No.

VERIFICATION:
TEST WITNESS: N/A
REPRESENTING:
QUALITY ASSURANCE: Patrick Merritt 1/25/12

PROJECT ENGINEER: 12/1/11
PROJECT MANAGER: 12/1/11
INTERDEPARTMENTAL COORDINATION:

WH 1066, Rev. March '09

Page 1 of 1

wyle laboratories ORIGINAL

NOTICE OF ANOMALY		DATE: 12/21/2011
NOTICE NO: 7	P.O. NUMBER: DVS 0965	CONTRACT NO: N/A
CUSTOMER: Dominion Voting Systems		WYLE JOB NO: T57381.01
NOTIFICATION MADE TO: Ed Smith		NOTIFICATION DATE: 12/19/2011
NOTIFICATION MADE BY: Michael Walker		VIA: E-mail
CATEGORY: [ ] SPECIMEN [ ] PROCEDURE [x] TEST EQUIPMENT		DATE OF ANOMALY: 12/19/2011
PART NAME: ImageCast Evolution		PART NO. ICE2P1005
TEST: Temp Power		I.D. NO.
SPECIFICATION: 2005 VVSG Vol II		PARA. NO. Section 4.7.1

REQUIREMENTS:

The EUT shall not demonstrate any signs of operational failure or degradation of performance when subjected to a Temperature and Power Variation Test in accordance with section 4.7.1 of Volume II of the VVSG. The purpose of this test is to evaluate system operation under various environmental conditions. The duration of the test is 163 hours, with 48 hours in the environmental test chamber. For the remaining hours, the equipment may be operated at room temperature. This test is similar to the low temperature and high temperature tests of MIL-STD-810-D, Method 502.2 and Method 501.2.

To Perform the test, the EUT shall be placed inside an environmental walk-in test chamber and connected to a vairiable voltage power source. The temperature inside the chamber and the voltage supplied to the hardware shall be varied from 40°F to 100°F and from 105 VAC to 129 VAC. During test performance, the operational functions shall be continuously exercised by the scanning of ballots and the generation of ballots via audio voting. A minimum of 100 ballots per hour shall be scanned.

The following EUT serial numbers shall be tested:

EUT 1	EUT 2	EUT 3*
ICE2P1005	ICE2P1008	ICE2P1007

***configured to generate audio ballots only**

WH 1066, Rev. March '09

Page 1 of 2

NOTICE OF ANOMALY		DATE: 12/21/2011
NOTICE NO: 7	P.O. NUMBER: DVS 0965	CONTRACT NO: N/A
CUSTOMER: Dominion Voting Systems		WYLE JOB NO: T57381.01
NOTIFICATION MADE TO: Ed Smith		NOTIFICATION DATE: 12/19/2011
NOTIFICATION MADE BY: Michael Walker		VIA: E-mail
CATEGORY: [ ] SPECIMEN [ ] PROCEDURE [x] TEST EQUIPMENT		DATE OF ANOMALY: 12/19/2011
PART NAME: ImageCast Evolution		PART NO. ICE2P1005
TEST: Temp Power		I.D. NO.
SPECIFICATION: 2005 VVSG Vol II		PARA. NO. Section 4.7.1

DESCRIPTION OF ANOMALY:

Anomalies occurred during the first two test runs of the Temperature/Power Variation Test. Summaries of each run are provided below.

Run 1

Testing commenced on 12/19/2011. During test performance the polls were closed to allow for an interim results total verification. Each of the units under test had result tapes printed for visual verification. It was discovered on unit ICE2P1005 that a vote was missing for the County Comptroller Seat A race under candidate Charles Place. The expected result was 238 votes in which this candidate only received 237. It was verified that this was the only race that was affected. The test was halted due to incorrect tally of expected results and data provided to Dominion to research for a root cause.

Run 2

Testing commenced on 12/19/2011. During the 2nd run of the test deck a ballot became jammed inside of unit ICE2P1005. The security key was inserted and the paper jam resolution was engaged with no resolution. This method was attempted 4 times in an effort to clear the ballot. The system indicated via screen discplay message that the ballot was tabulated and therefor the ballot could not be returned throught the input slot returning it to the voter. The ballot box was opened and the ballot was physically removed from the paper path. The test was halted at this time due to the paper jam and increased concern of the unit continuing. Dominion advised this was a mechanical error in which TDP documentation supports the resolution to remove the unit and replace it. The unit was removed from the testing chamber along with data provided to Dominion. Dominion sending a hardware engineer to inspect the unit onsite at Wyle to determine a root cause. It was agreed between Wyle, Dominion, and EAC that this unit would be returned to testing and included in the accuracy testing portion of the campaign.

Run 3

Testing commenced on 12/19/2011. Unit ICE2P1005 was replaced with ICE2P10013. A 3rd unit ICE2P1006 was introduced to the test in order to provide additional data and the test ran for 64 hours completing with no further anomalies.

NOTICE OF ANOMALY	DATE: 12/21/2011
NOTICE NO: 7 P.O. NUMBER: DVS 0965	CONTRACT NO: N/A
CUSTOMER: Dominion Voting Systems	WYLE JOB NO: T57381.01
NOTIFICATION MADE TO: Ed Smith	NOTIFICATION DATE: 12/19/2011
NOTIFICATION MADE BY: Michael Walker	VIA: E-mail
CATEGORY: [ ] SPECIMEN [ ] PROCEDURE [x] TEST EQUIPMENT	DATE OF ANOMALY: 12/19/2011
PART NAME: ImageCast Evolution	PART NO. ICE2P1005
TEST: Temp Power	I.D. NO.
SPECIFICATION: 2005 VVSG Vol II	PARA. NO. Section 4.7.1

DISPOSITION • COMMENTS • RECOMMENDATIONS:

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ☐ CUSTOMER × WYLE

CAR Required: ☐ YES ☒ NO CAR No.

VERIFICATION:

TEST WITNESS: N/A

REPRESENTING:

QUALITY ASSURANCE: 1/25/12

PROJECT ENGINEER: 12/21/11

PROJECT MANAGER: 12/21/11

INTERDEPARTMENTAL COORDINATION:

ATTACHMENT B
PHOTOGRAPHS

Photograph No. 1
ImageCast Evolution (ICE) scanner

The remainder of this page intentionally left blank

Photograph No. 2
ImageCast Precinct (ICP) scanner

The remainder of this page intentionally left blank

Photograph No. 3
ICE Ballot Box

The remainder of this page intentionally left blank

Photograph No. 4
ICP Ballot Box

The remainder of this page intentionally left blank

Photograph No. 5
ImageCast Central (ICC) scanner

The remainder of this page intentionally left blank

Photograph No. 6
ICE Audio Test

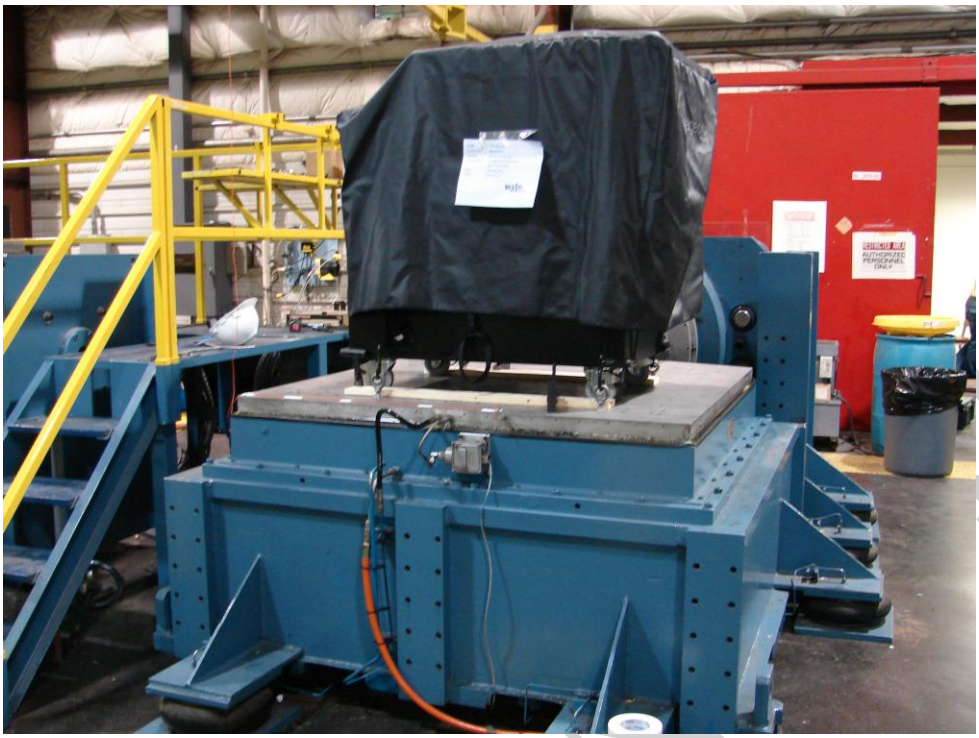
Photograph No. 7
ICE Bench Handling Test

Photograph No. 8
ICE High Temperature Test

Photograph No. 9
ICE Low Temperature Test

Photograph No. 10
ICE Humidity Test

Photograph No. 11
ICE Temperature and Power Variation Test

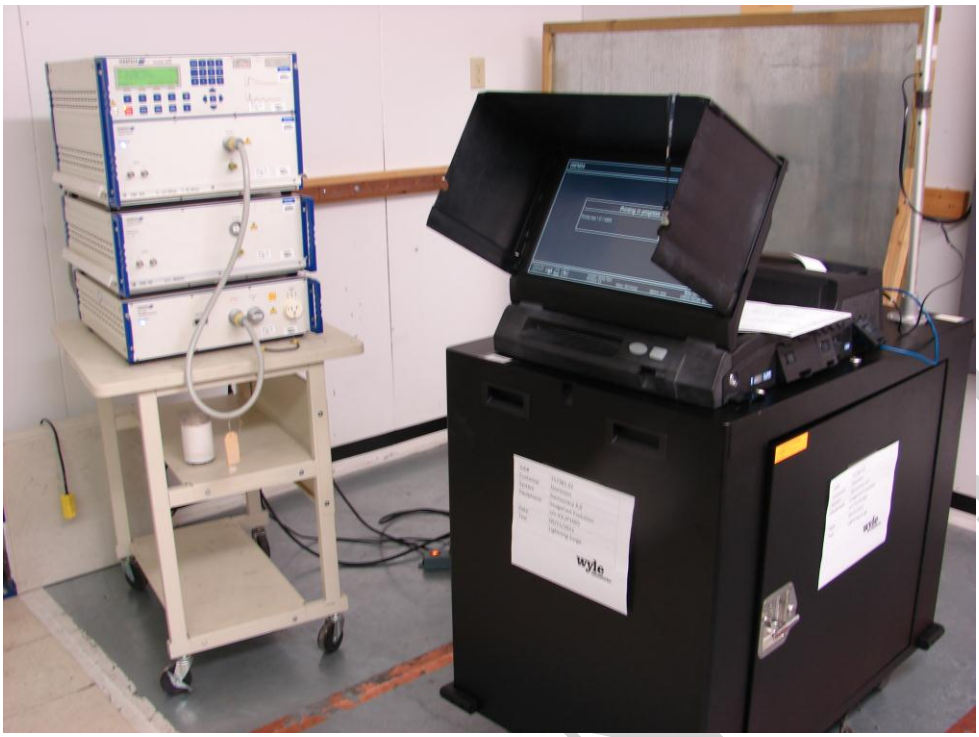


Photograph No. 12
ICE Vibration Test

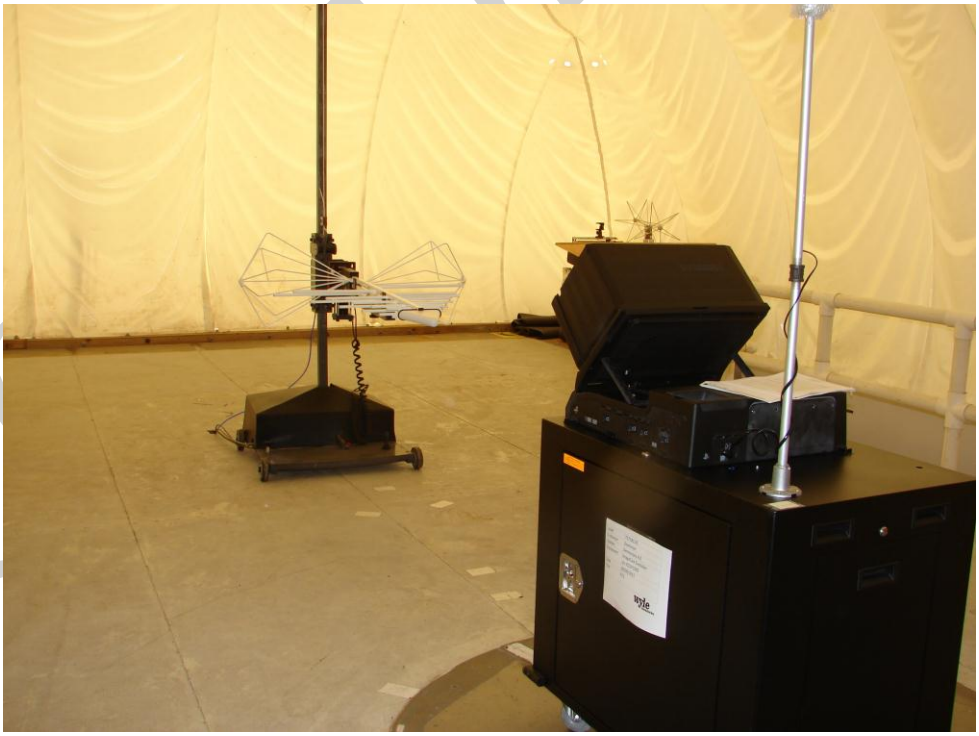
Photograph No. 13
ICE Conducted RF Immunity Test

Photograph No. 14
ICE Electrical Fast Transient Test

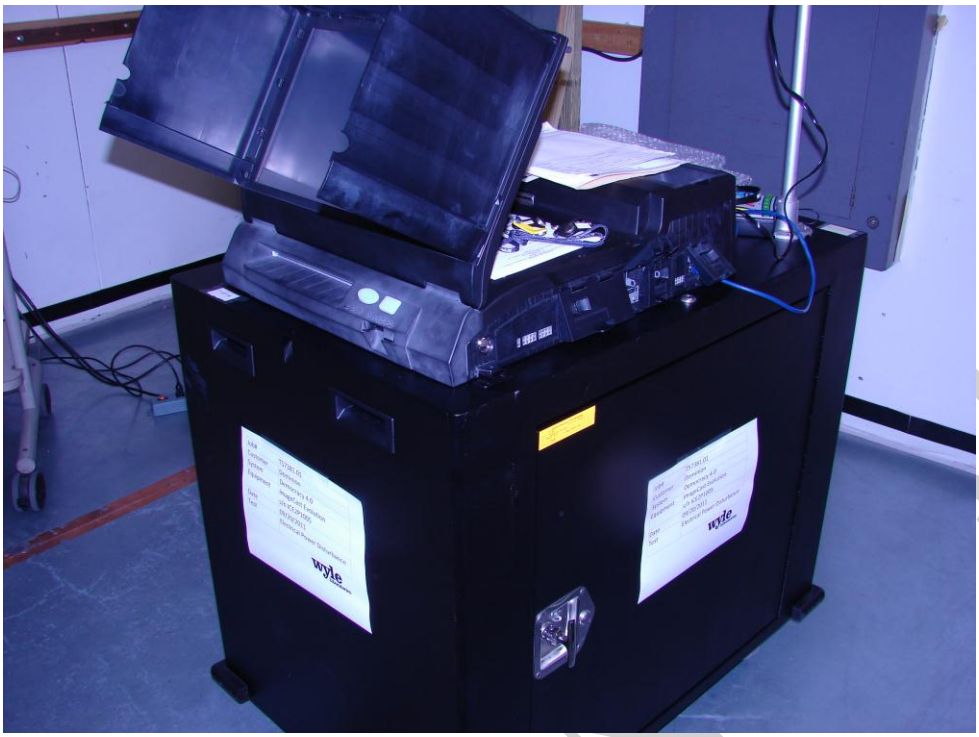
Photograph No. 15
ICE Electrostatic Disruption Test



Photograph No. 16
ICE Lightning Surge Test

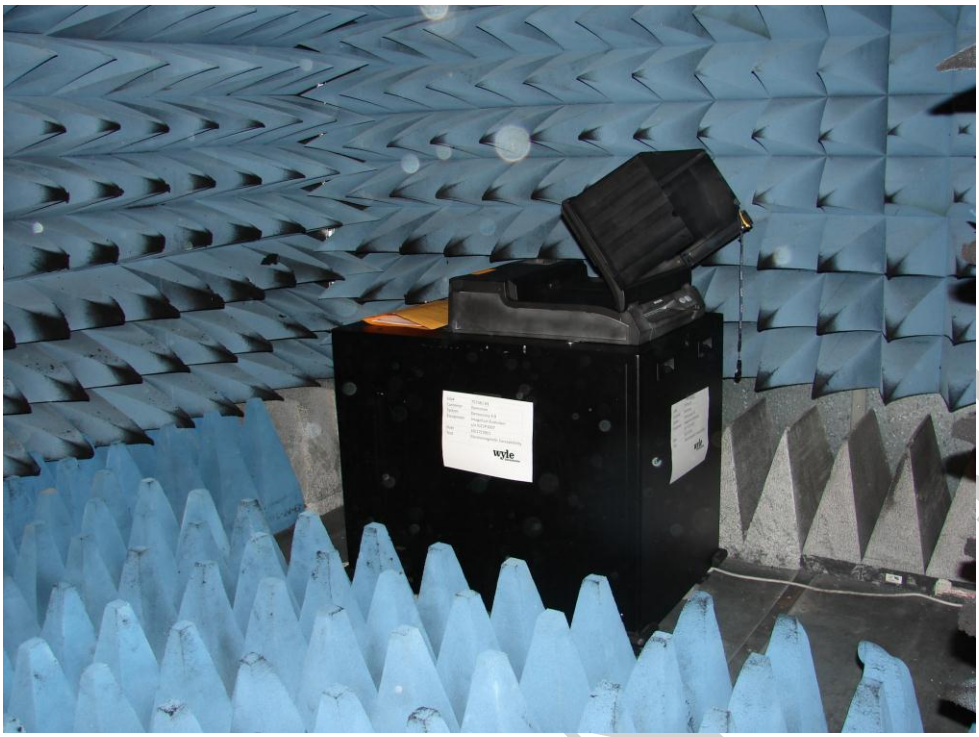


Photograph No. 17
ICE Electromagnetic Radiation Test (FCC Part 15 Emission)



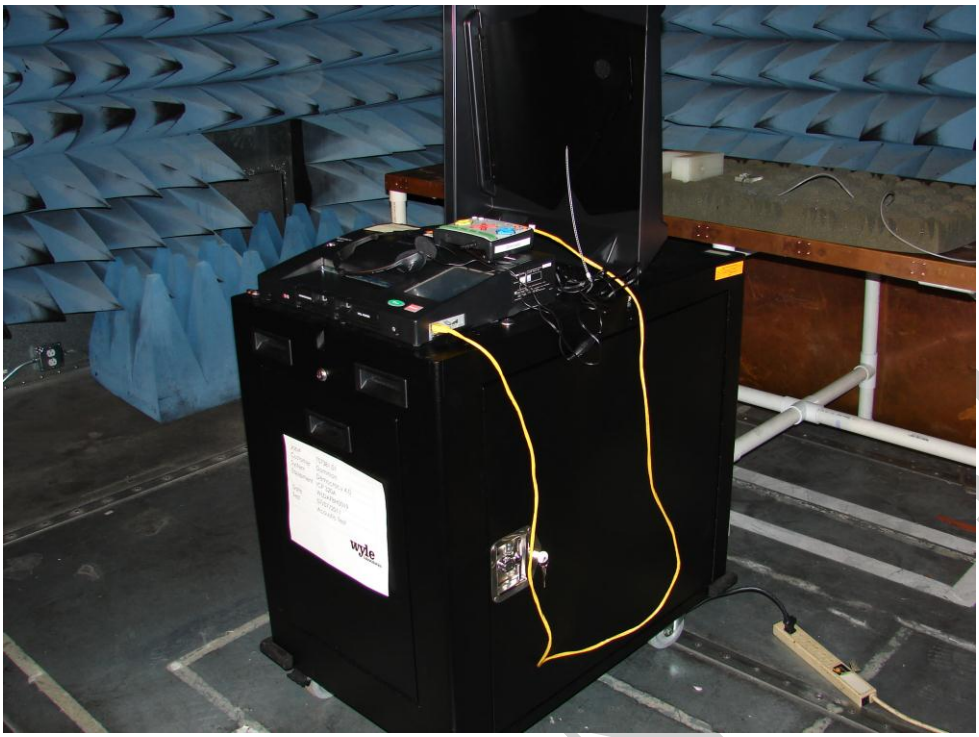
Photograph No. 18
ICE Electrical Power Disturbance Test

Photograph No. 19
ICE Electrical Supply Test



Photograph No. 20
ICE Electromagnetic Susceptibility Test

Photograph No. 21
ICE Magnetic Fields Immunity Test



Photograph No. 22
ICP Audio Test

Photograph No. 23
ICP Bench Handling Test

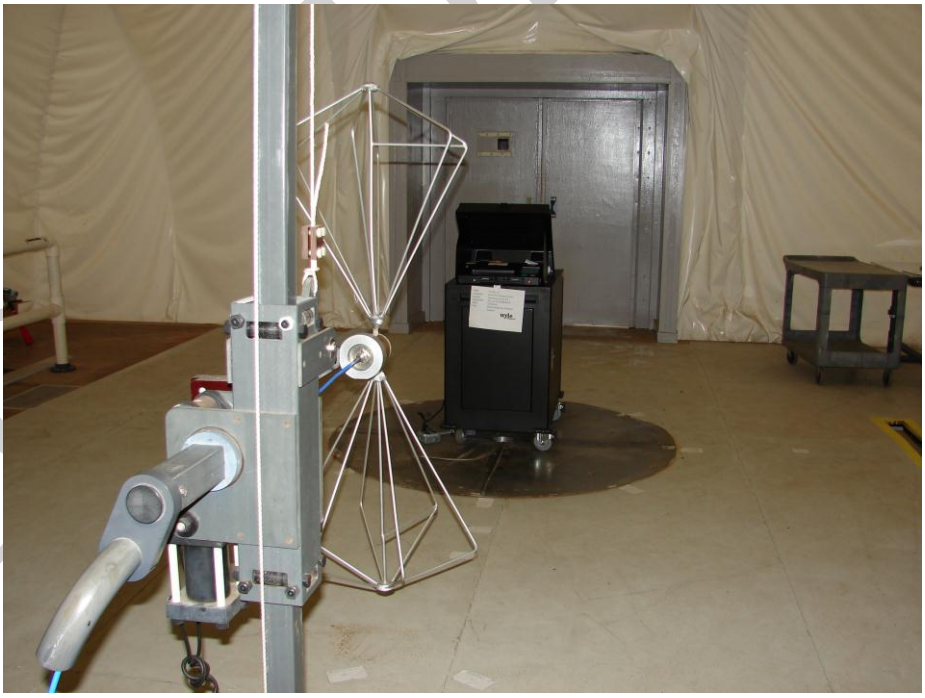
Photograph No. 24
ICP High Temperature Test

Photograph No. 25
ICP Low Temperature Test

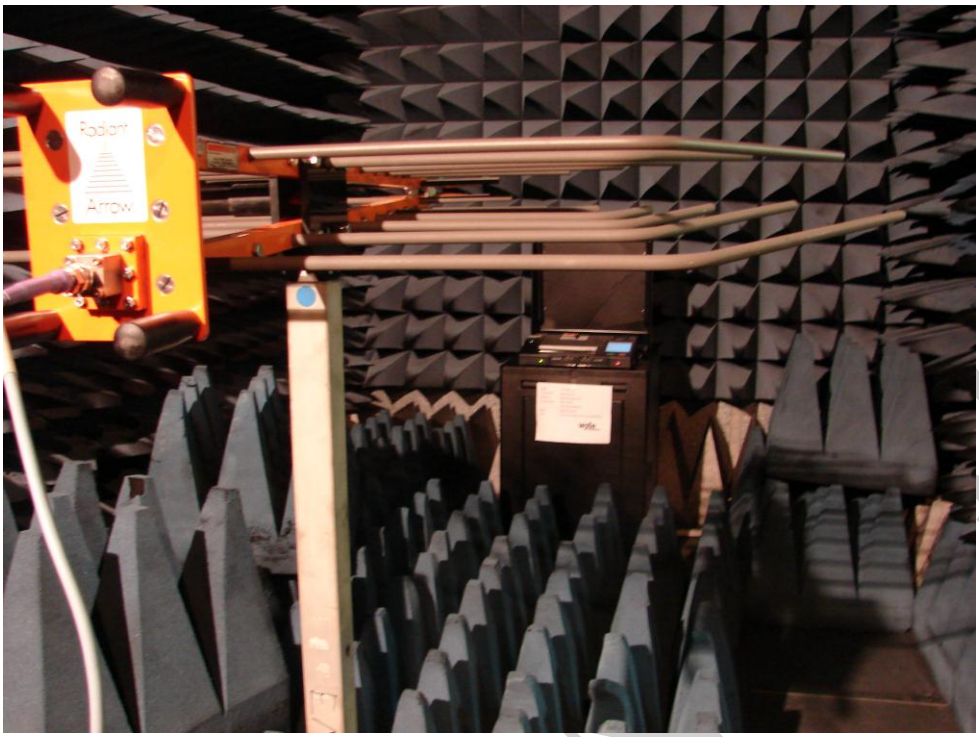
Photograph No. 26
ICP Humidity Test

Photograph No. 27
ICP Temperature and Power Variation Test

Photograph No. 28
ICP Vibration Test



Photograph No. 33
ICP Electromagnetic Radiation Test (FCC Part 15 Emission)

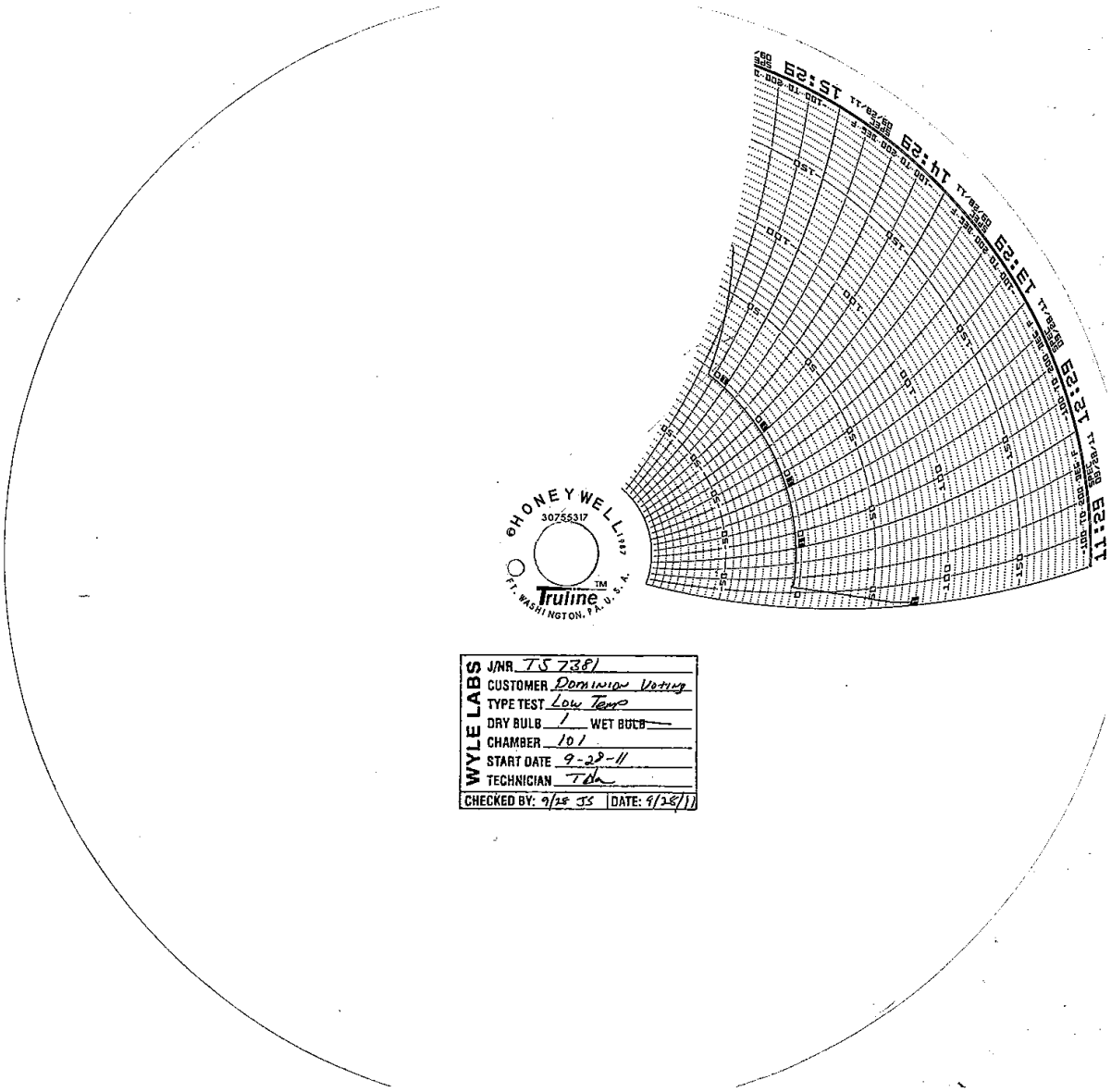


Photograph No. 36
ICP Electromagnetic Susceptibility Test

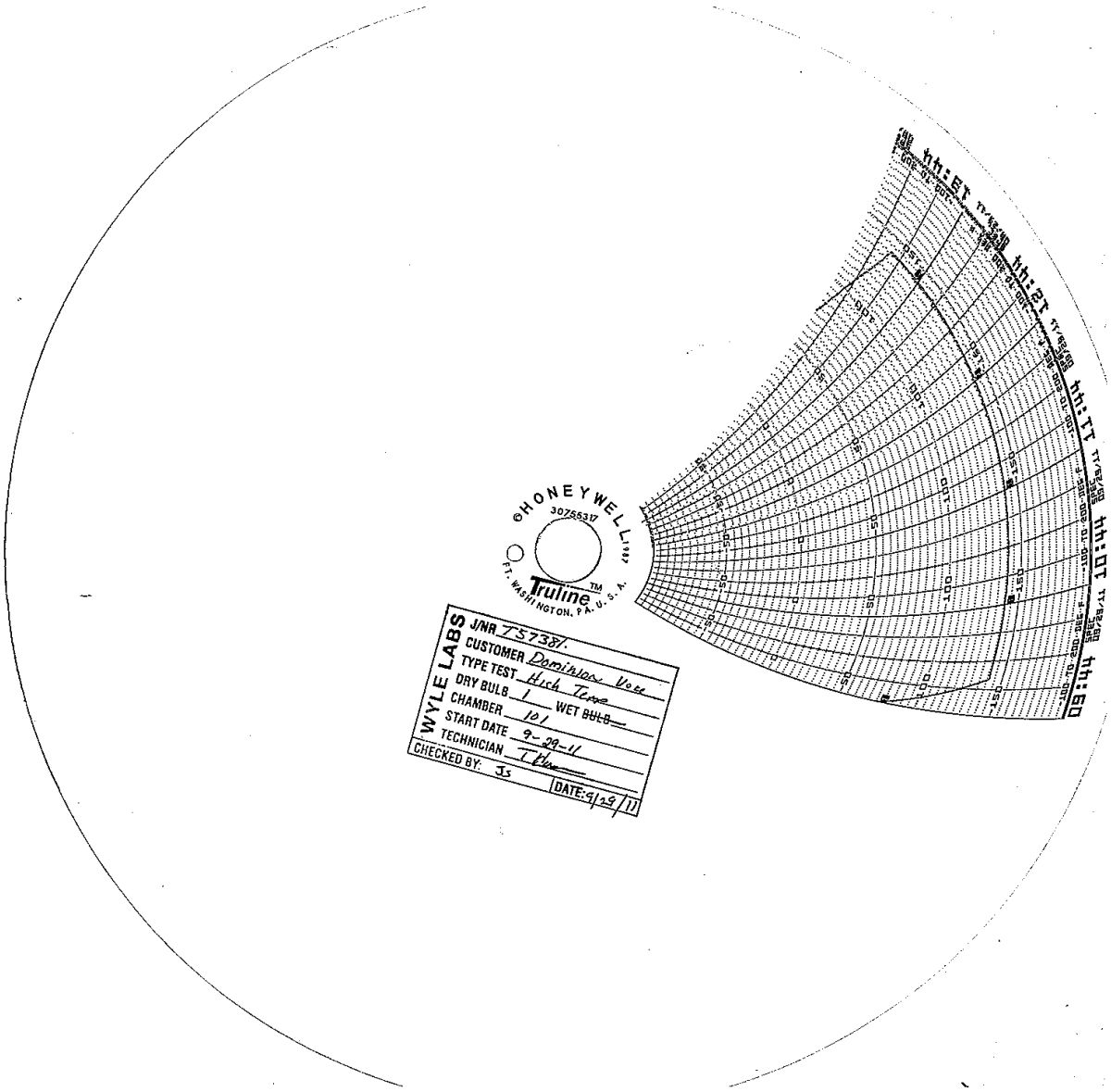
Photograph No. 38
ICC Temperature and Power Variation Test

ATTACHMENT C
NON-OPERATING ENVIRONMENTAL TEST DATA

LOW TEMPERATURE TEST DATA


52:ST
52:HT
52:ET
52:2T
52:1T
HONEYWELL
30755317
Truline
FT. WASHINGTON, PA. U.S.A.
WYLE LABS
J/NR. T5 7381
CUSTOMER Dominion Voting
TYPE TEST Low Temp
DRY BULB 1 WET BULB
CHAMBER 101
START DATE 9-28-11
TECHNICIAN TDa
CHECKED BY: 9/28 JS
DATE: 9/28/11

HIGH TEMPERATURE TEST DATA


HONEYWELL
3075531
Truline
FT. WASHINGTON, PA. U.S.A.
WYLE LABS
J/NR T5738/
CUSTOMER Dominion Voir
TYPE TEST High Temp
DRY BULB 1 WET BULB
CHAMBER 101
START DATE 9-29-11
TECHNICIAN
CHECKED BY: JS
DATE: 9/29/11

VIBRATION TEST DATA

VIBRATION TEST DATA SHEET

Customer DOMINION Spec. VVSG Vol. II Section 4.6.3 Specimen ImageCast Evolution (ICE) Precinct Count Optical Scanner

Job No. T57381 Method NA Part No. ICE Specimen Temp. AMBIENT

GSI Yes ☐ No ☒ Procedure Section 4.6.3 S/N ICE2P1007 Photo Yes ☒ No ☐

Test Title RANDOM VIBRATION

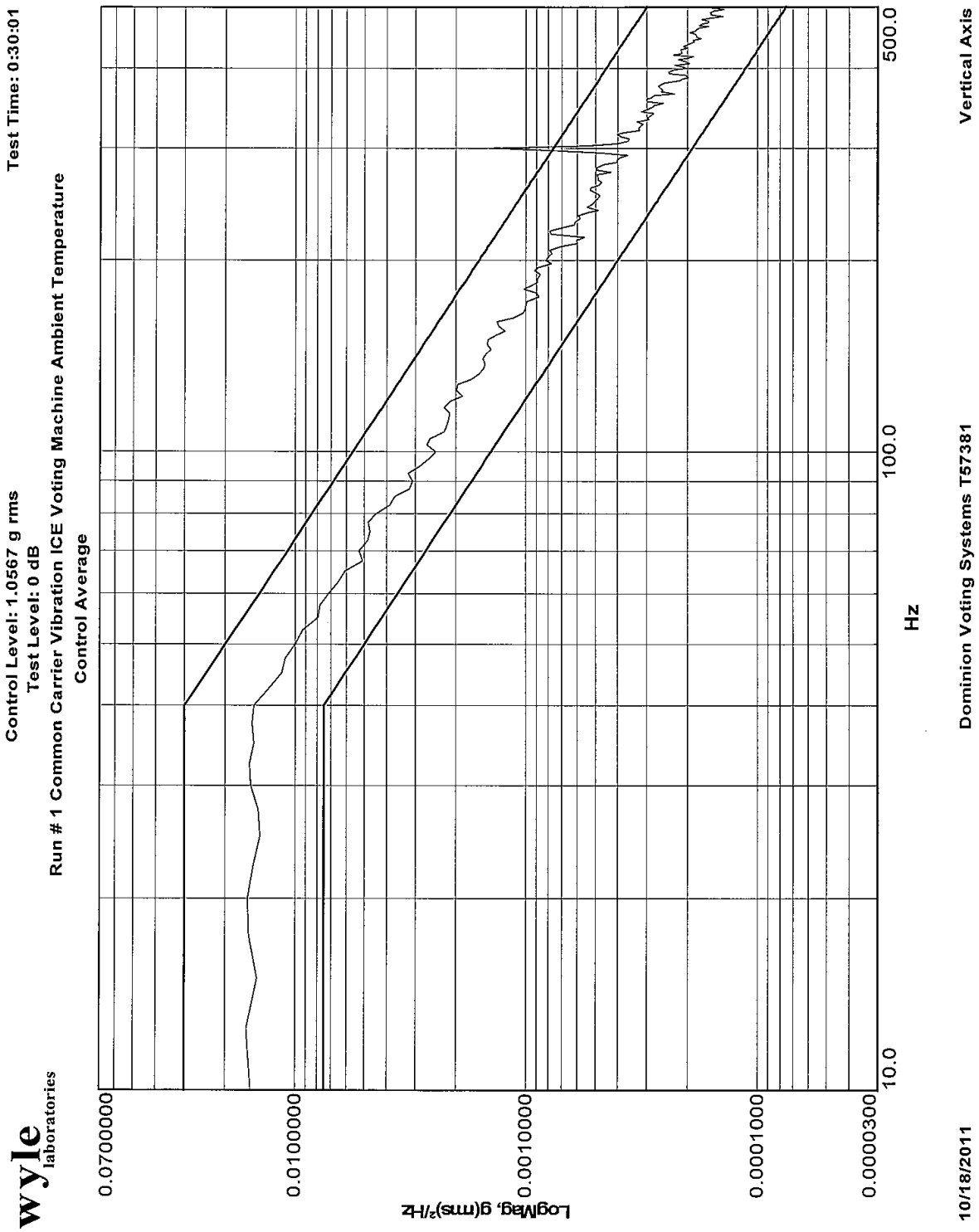
Date	Time	Axis	Temp (F)	SINUSOIDAL Freq. (cps)	SINUSOIDAL Disp. ("da)	SINUSOIDAL Accel. (±g)	RANDOM Freq. (cps)	RANDOM PSD (g2/Hz)	RANDOM Slope (dB/Oct)	TOTAL Accel. (grms)	Test Time (min)	COMMENTS	NAME
												TEST REQUIREMENT	
10/18/11	09:46	VERT	AMB				10	0.015				RUN 1	CT
							40	0.015					
							500	0.00015		1.0567	30		
10/18/11	11:14	LAT	AMB				10	0.015				RUN 2	CT
							40	0.015					
							500	0.00015		1.0660	30		
10/18/11	13:06	LONG	AMB				10	0.015				RUN 3	CT
							40	0.015					
							500	0.00015		1.0507	30		

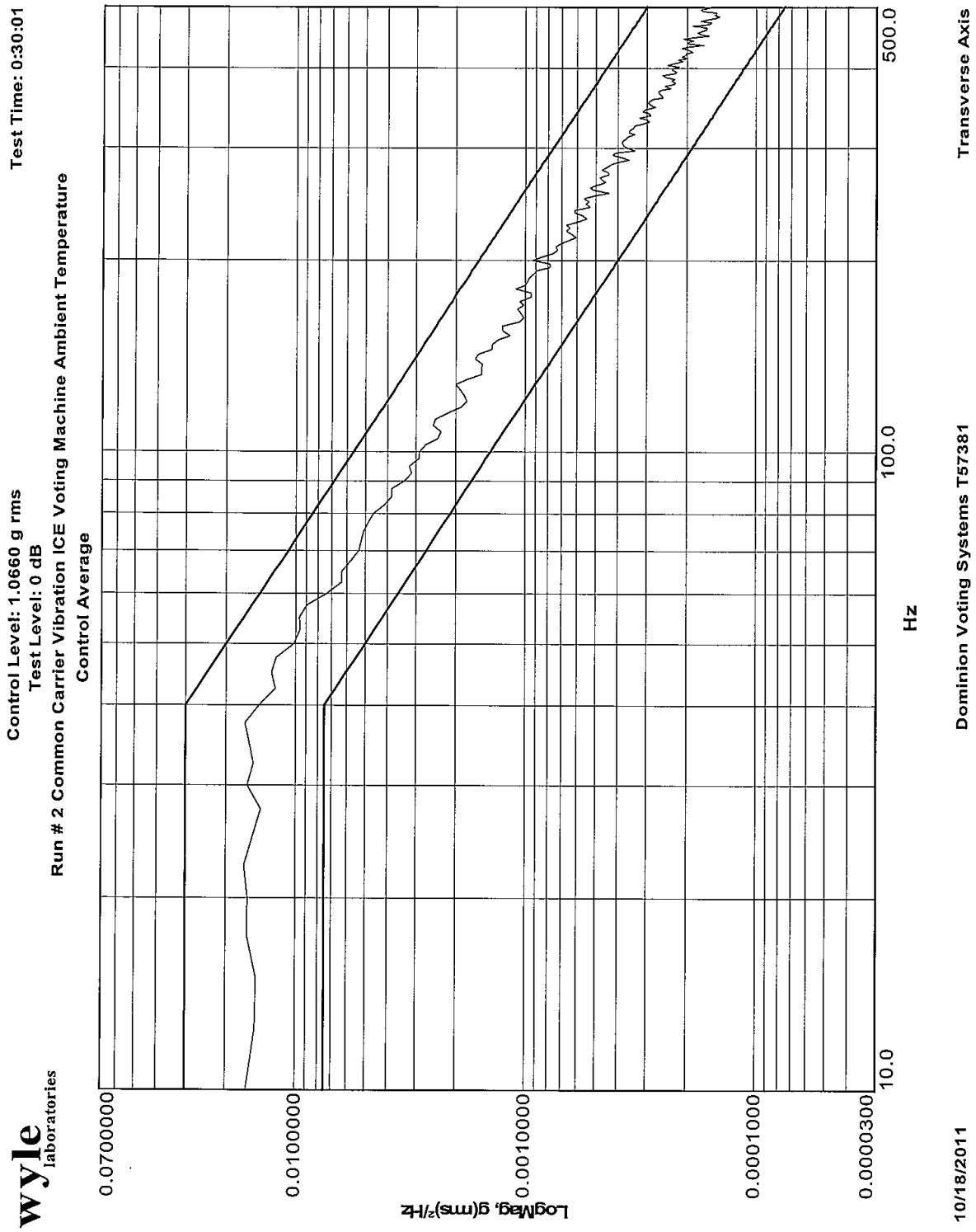
Job No. T57381
Report No. T57381-01 A2
Date 10/18/11
Page No. 1 of 1

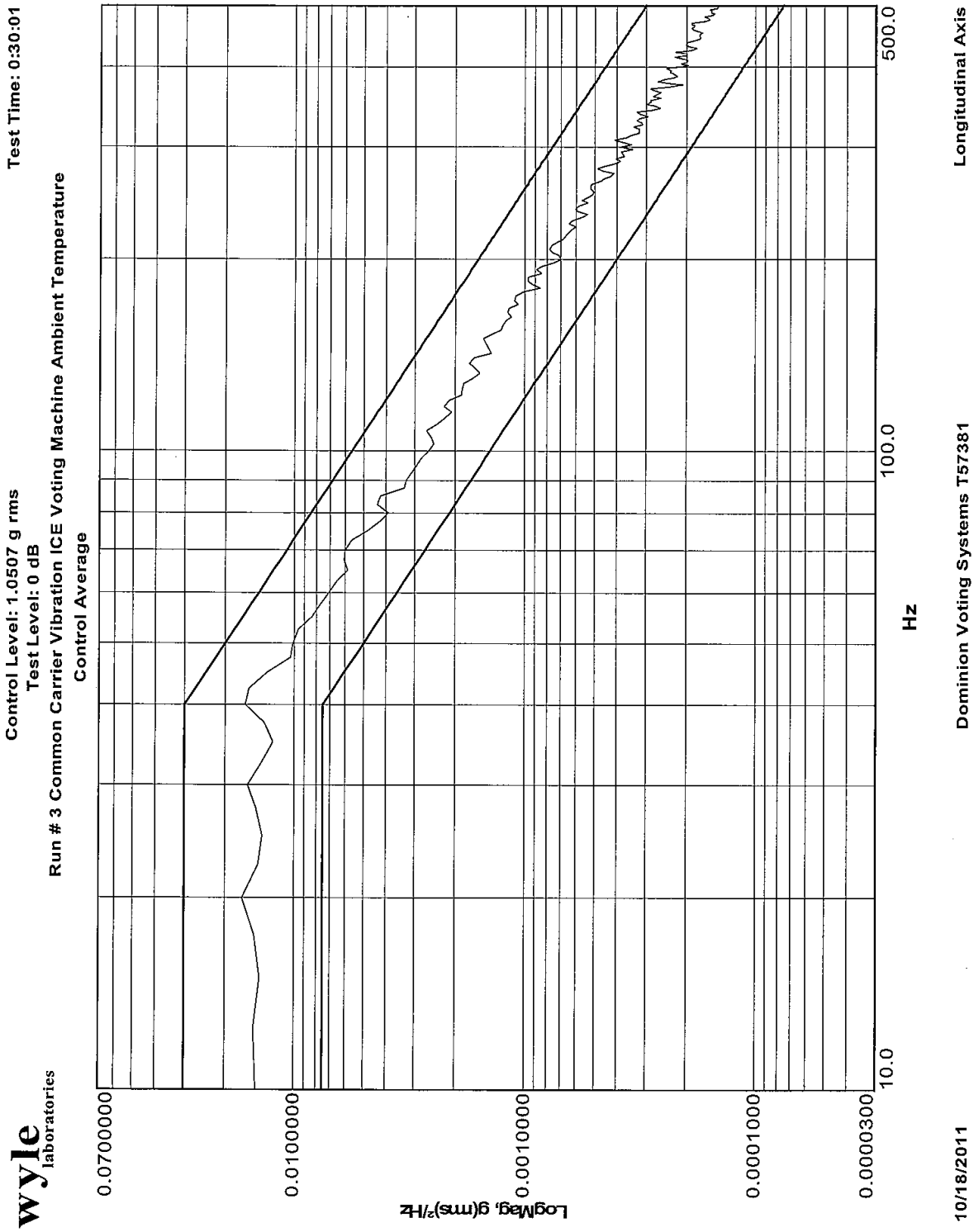
WH-1028A

Signed C. Jinnor 1FEB2012

Approved Michael R Walker 2/1/12


Test Time: 0:30:01
Control Level: 1.0567 g rms
Test Level: 0 dB
Run # 1 Common Carrier Vibration ICE Voting Machine Ambient Temperature
Control Average
wyle laboratories
0.0700000
0.0100000
0.0010000
0.0001000
0.0000300
Log/Deg, g(rms)²/Hz
10.0
100.0
500.0
Hz
Vertical Axis
Dominion Voting Systems T57381
10/18/2011


Test Time: 0:30:01
Control Level: 1.0660 g rms
Test Level: 0 dB
Run # 2 Common Carrier Vibration ICE Voting Machine Ambient Temperature
Control Average
wyle laboratories
0.0700000
0.0100000
0.0010000
0.0001000
0.0000300
Log Mag, g(rms)²/Hz
10.0
100.0
500.0
Hz
Transverse Axis
Dominion Voting Systems T57381
10/18/2011


Test Time: 0:30:01
Control Level: 1.0507 g rms
Test Level: 0 dB
Run # 3 Common Carrier Vibration ICE Voting Machine Ambient Temperature
Control Average
wyle laboratories
0.0700000
0.0100000
0.0010000
0.0001000
0.0000300
LogMag, g(rms)²/Hz
10.0
100.0
500.0
Hz
Longitudinal Axis
Dominion Voting Systems T57381
10/18/2011

BENCH HANDLING TEST DATA

DATA SHEET

wyle laboratories

Customer Dominion Voting Systems
Specimen ImageCast Evolution (ICE)
Part No. 001 Amb. Temp. ~75°F Job No. T57381
Spec. MIL-STD-810D, Method 516.3, Procedure VI Photo Yes Report No. T57381-01
Para. N/A Test Med. Air Start Date 10/18/2011
S/N ICE2P1007 Specimen Temp. Ambient
GSI No

Test Title Bench Handling

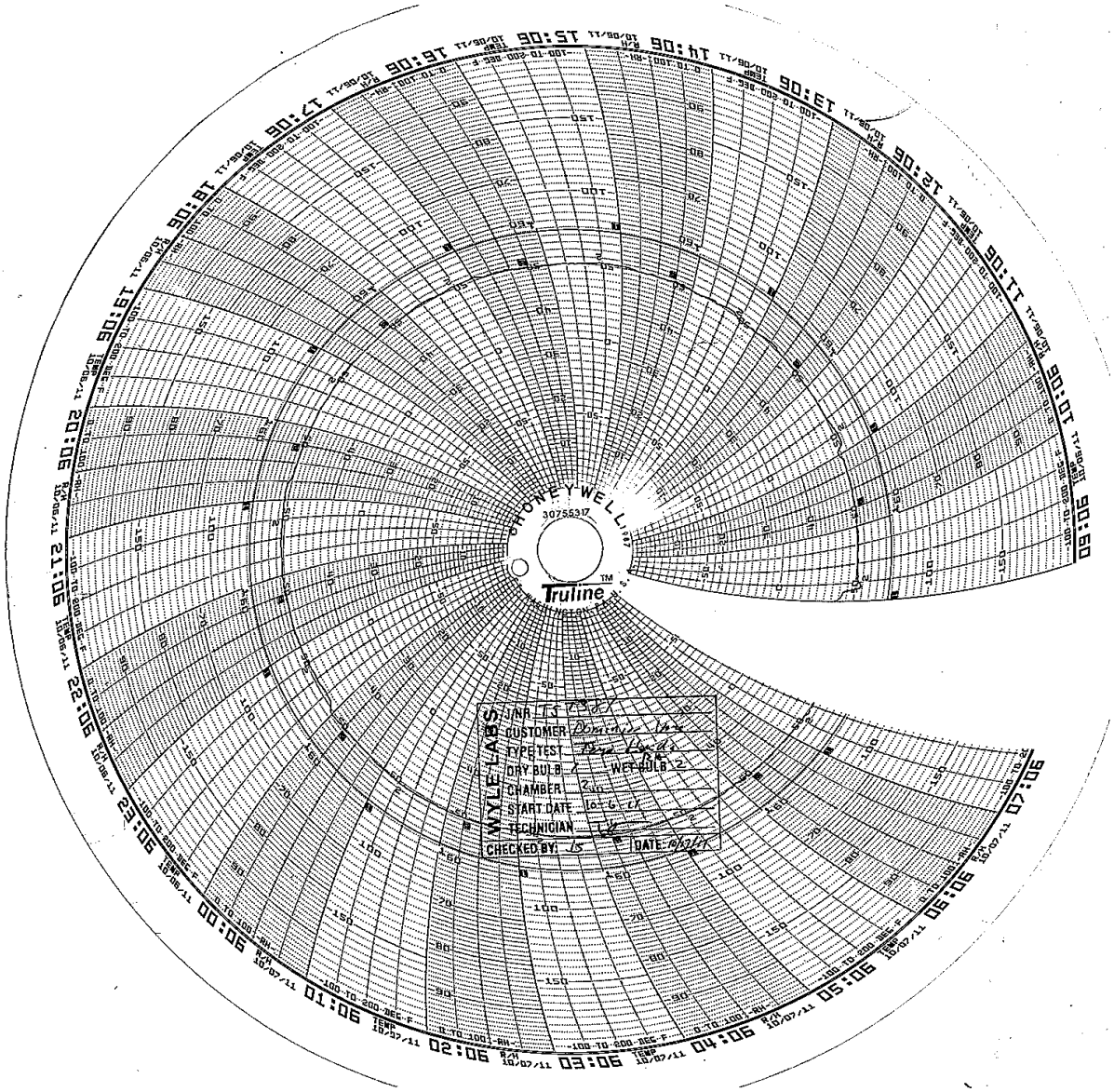
Edge 1: Drops 1-6 4 inches above surface
Edge 2: Drops 7-12 4 inches above surface
Edge 3: Drops 13-18 4 inches above surface
Edge 4: Drops 19-24 4 inches above surface
Post-test Inspection: Results of Post Operational Status Check were successful, the ICE Unit operated at expected.

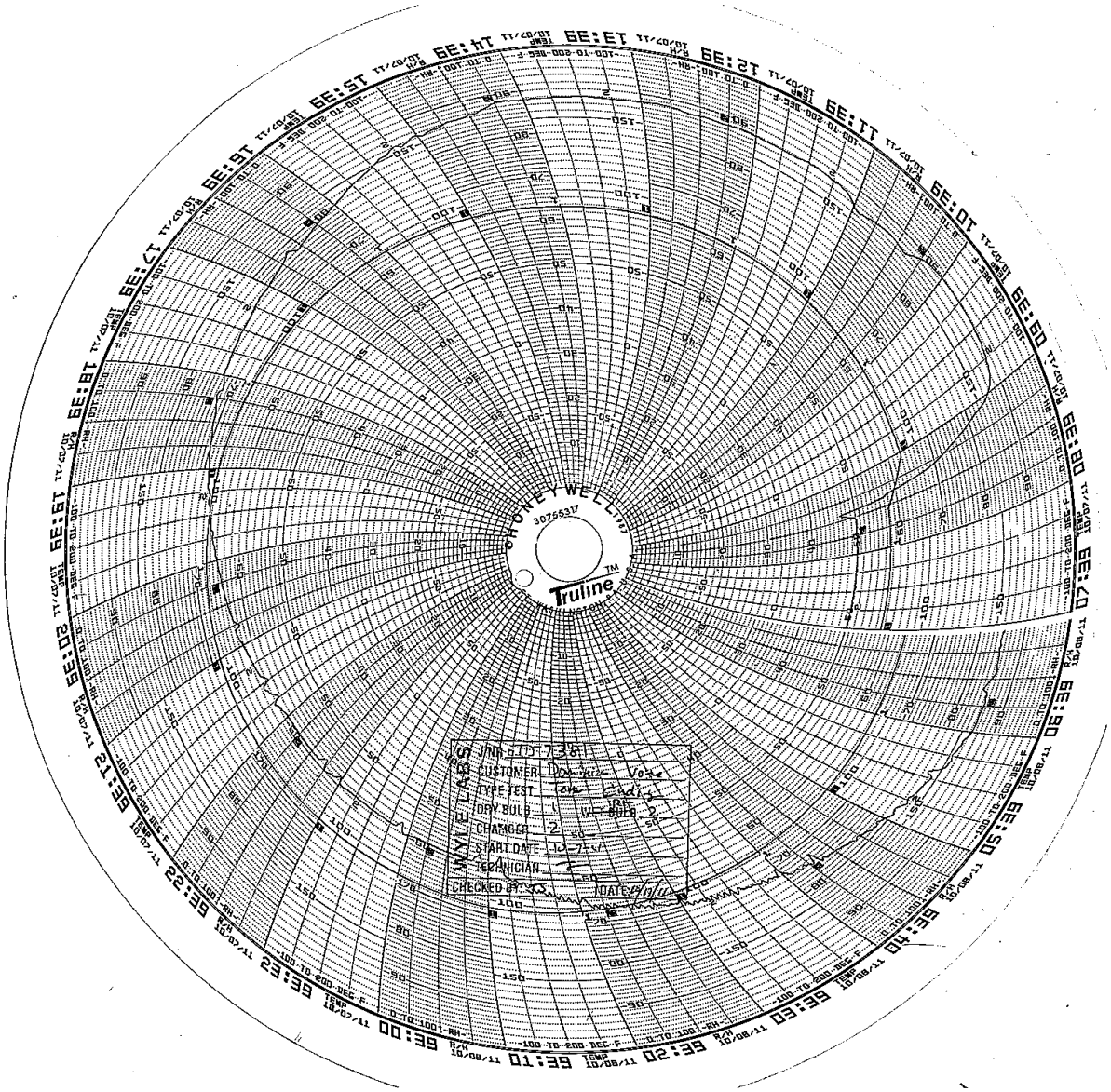
Tested By C. Tannon Date: 10/18/11
Witness _____ Date: _____
Sheet No. 1 of 1
Approved Jon Stevens 10/18/11

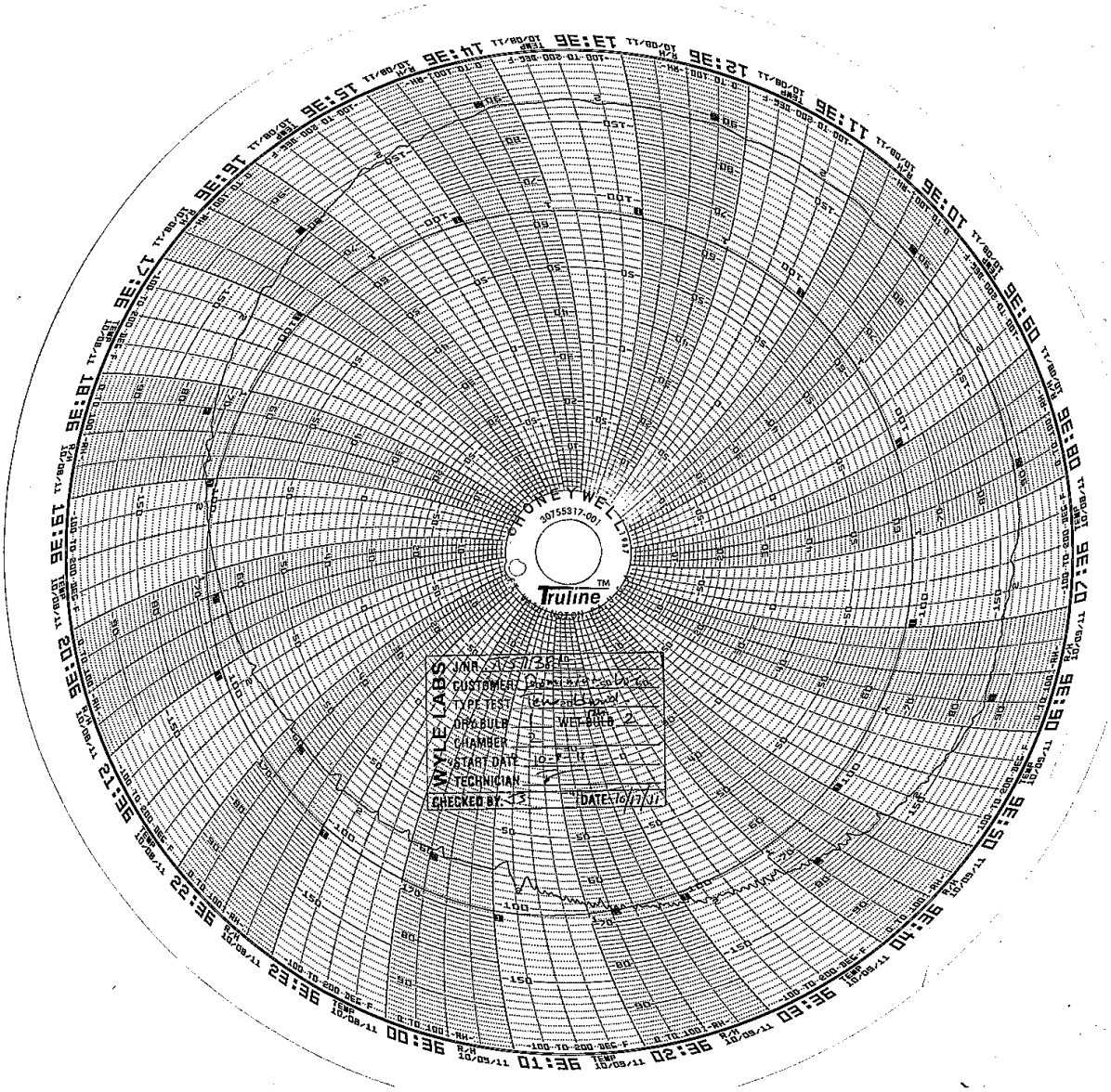
Notice of Anomaly: N/A

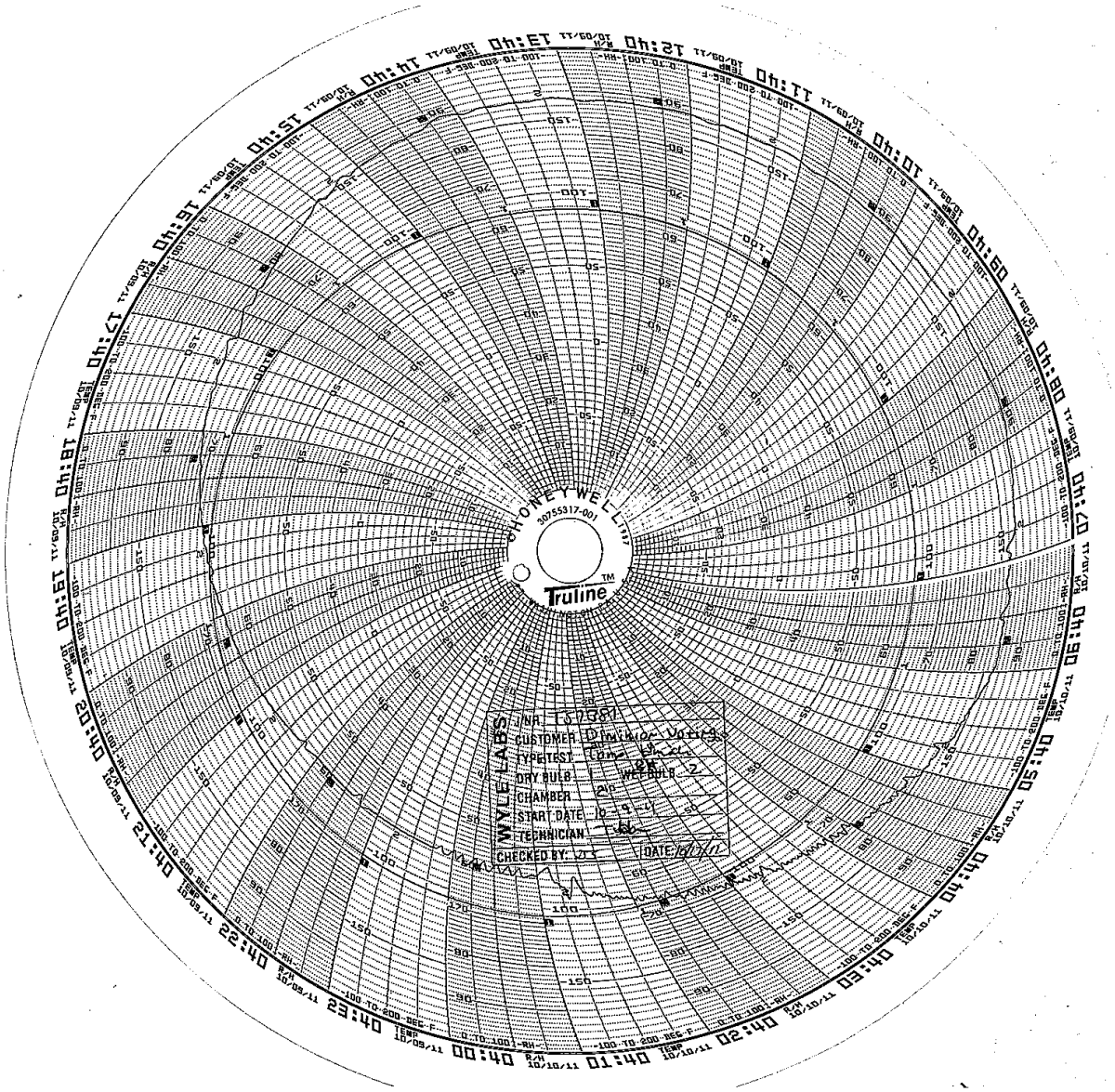
Wyle Form WH 614A, Rev. APR '84

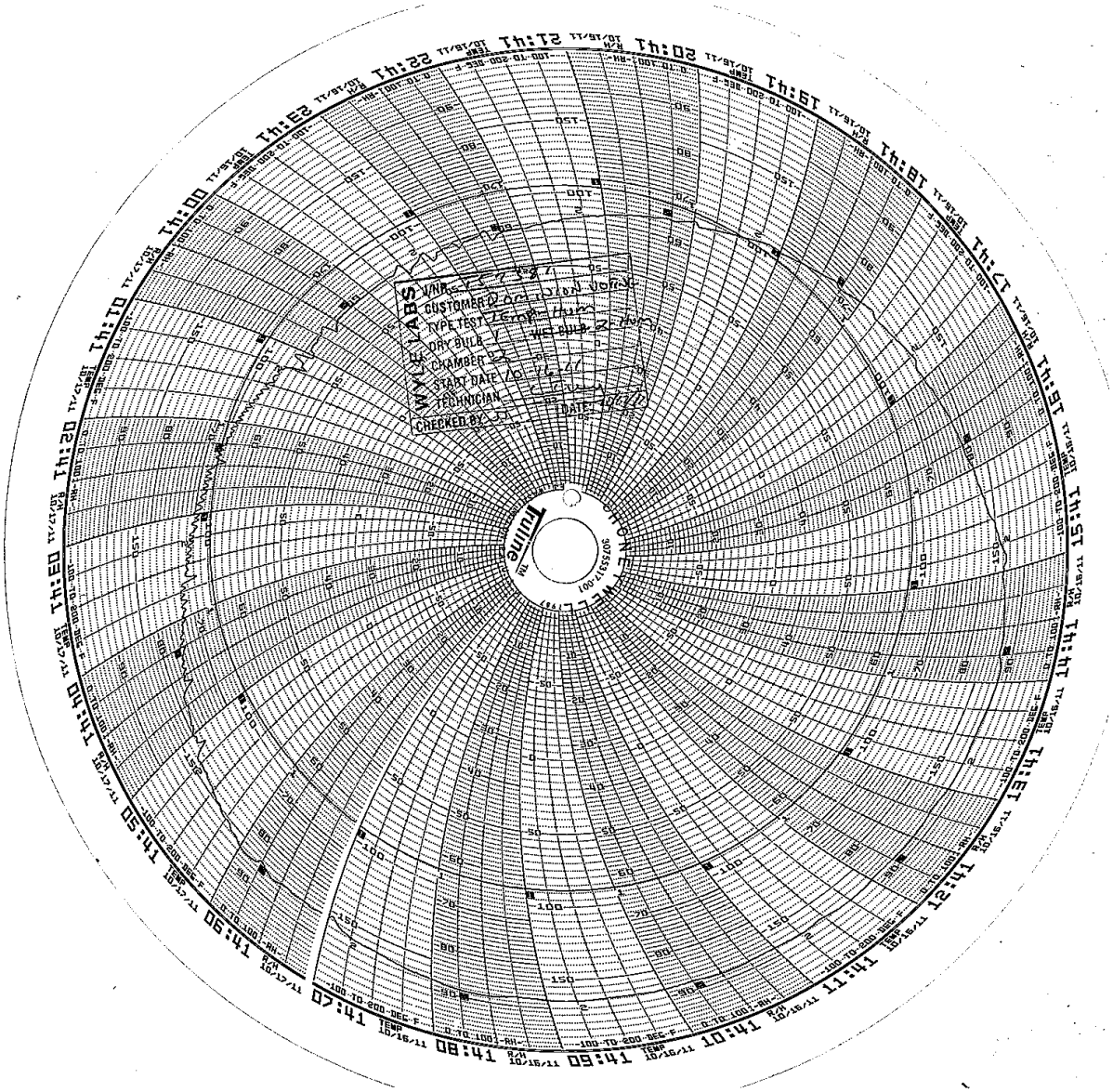
HUMIDITY TEST DATA

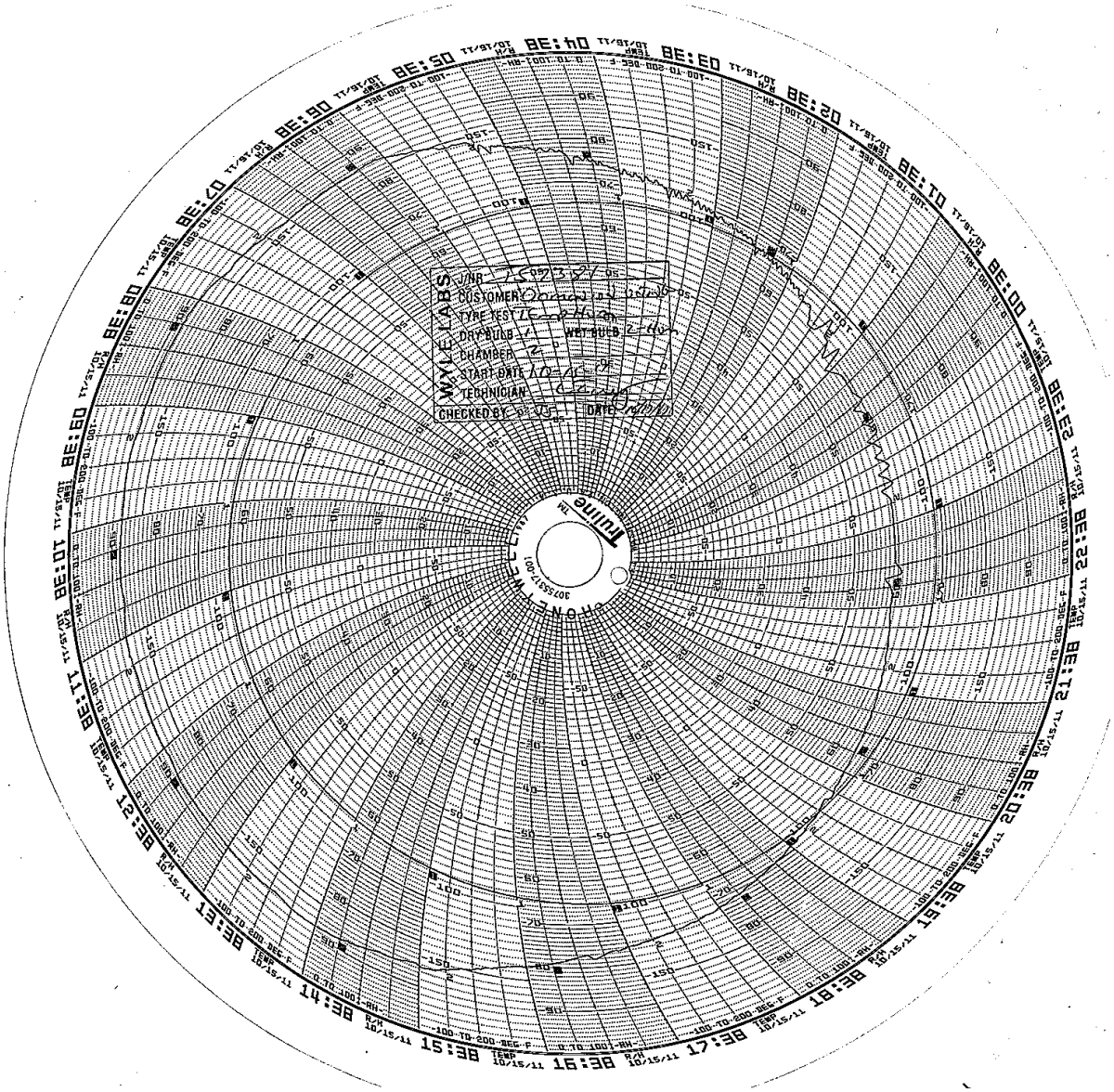

DRONEY WELL
3075317
Truline
WYLE LABS
J/NR 57381
CUSTOMER Dominion
TYPE TEST Rain Leak
DRY BULB 2 WET BULB 2
CHAMBER 2
START DATE 10-6-11
TECHNICIAN
CHECKED BY: JS DATE: 10/7/11

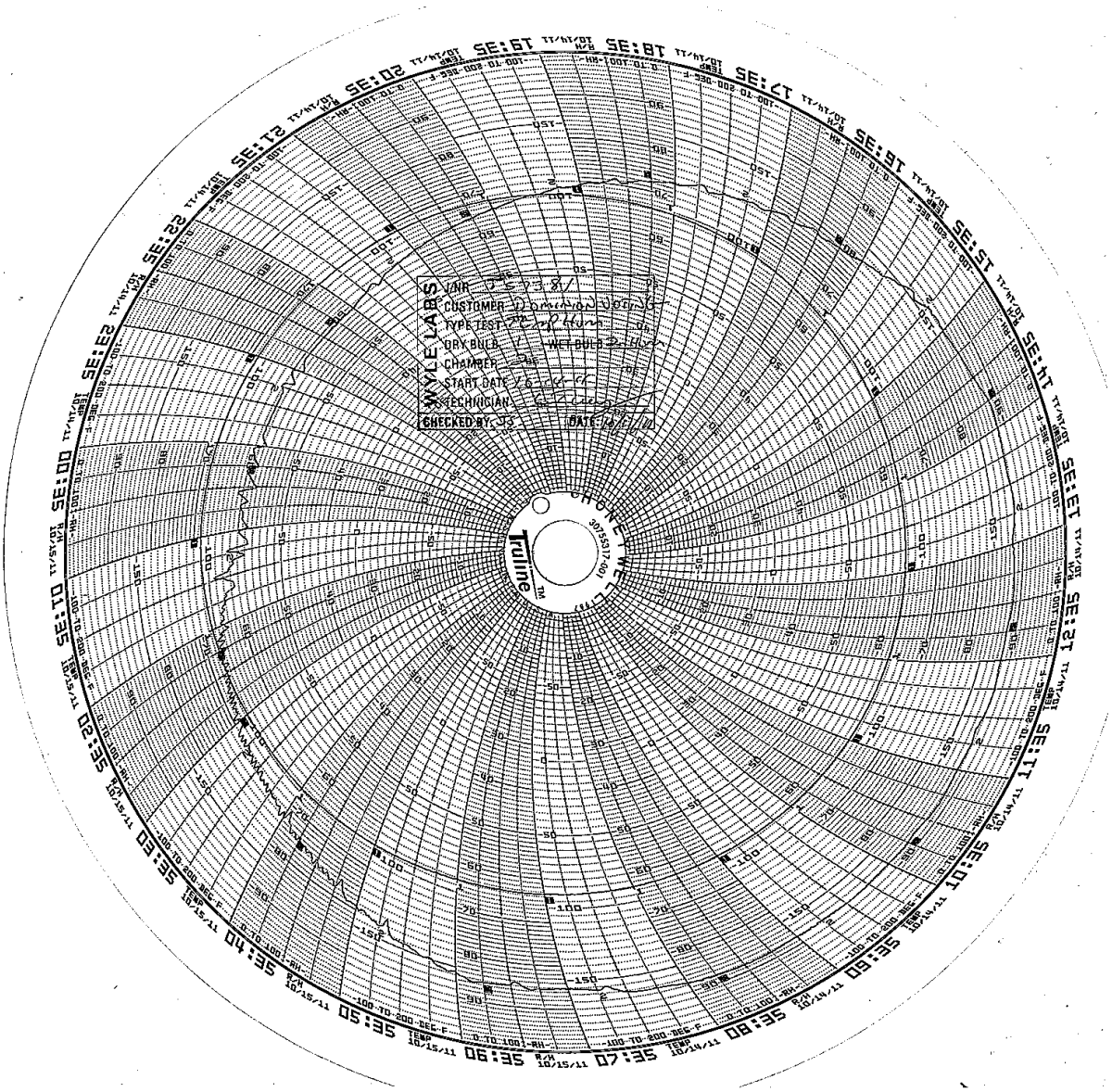

HONEYWELL
Truline
WYLE LABS
JOB NO. T57381
CUSTOMER
TYPE TEST
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE

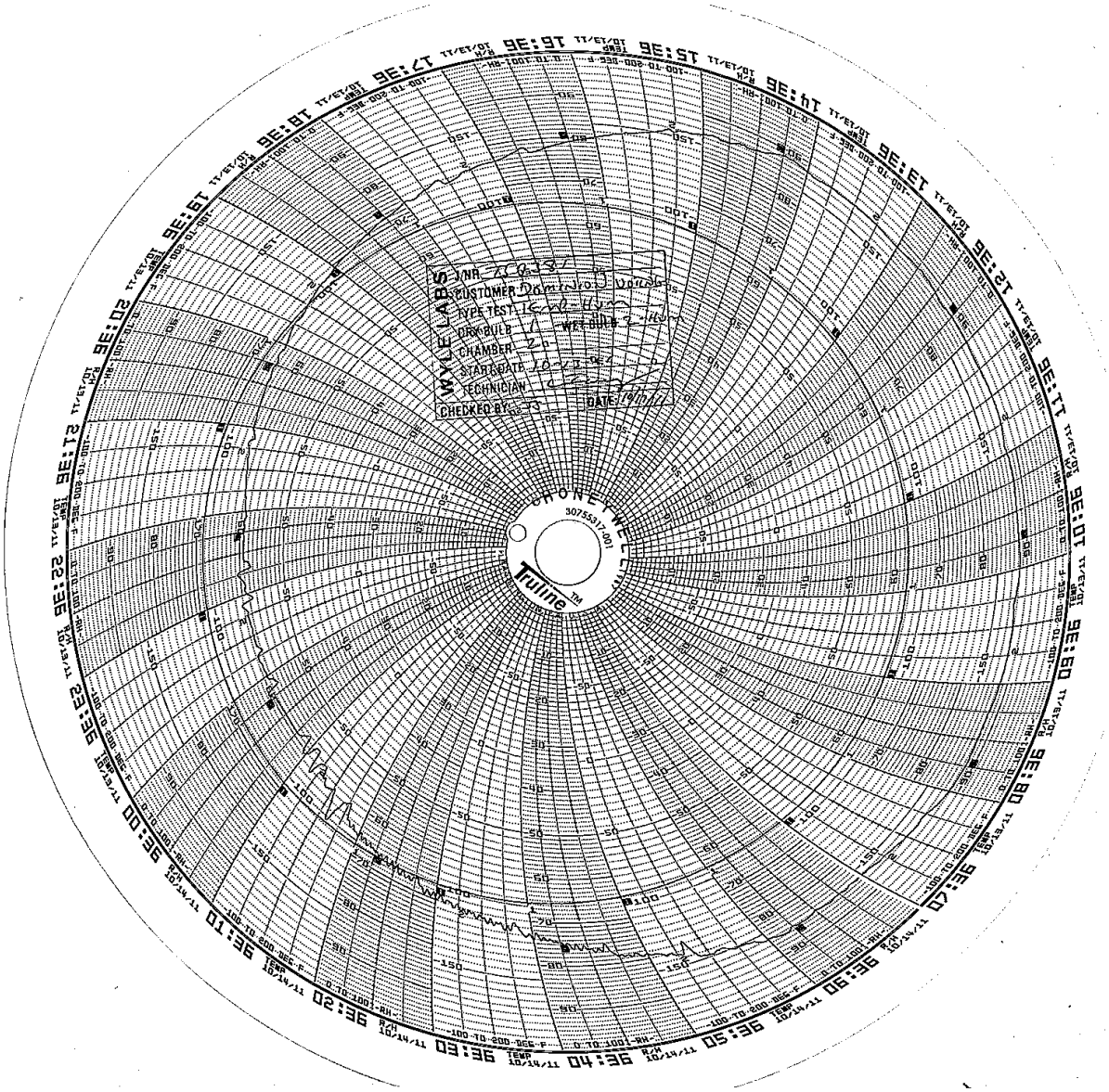

CHAMBER
Truline
WYLE LABS
JNR
CUSTOMER
TYPE TEST
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE

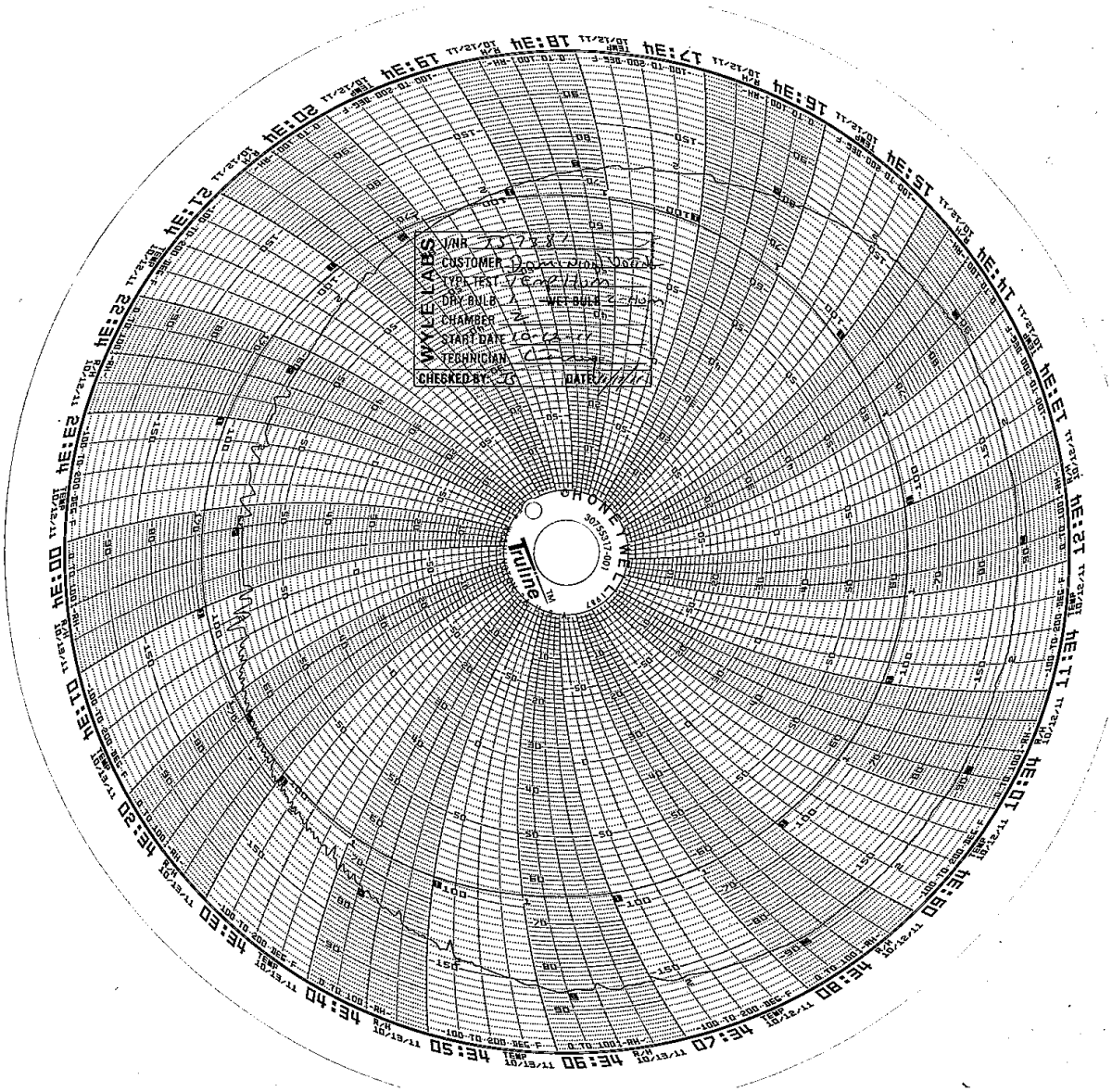

HONEYWELL
30755317-001
Truline
WYLE LABS
J/NR T57381
CUSTOMER Dimmer Valve
TYPE TEST Cone Spray
DRY BULB WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE

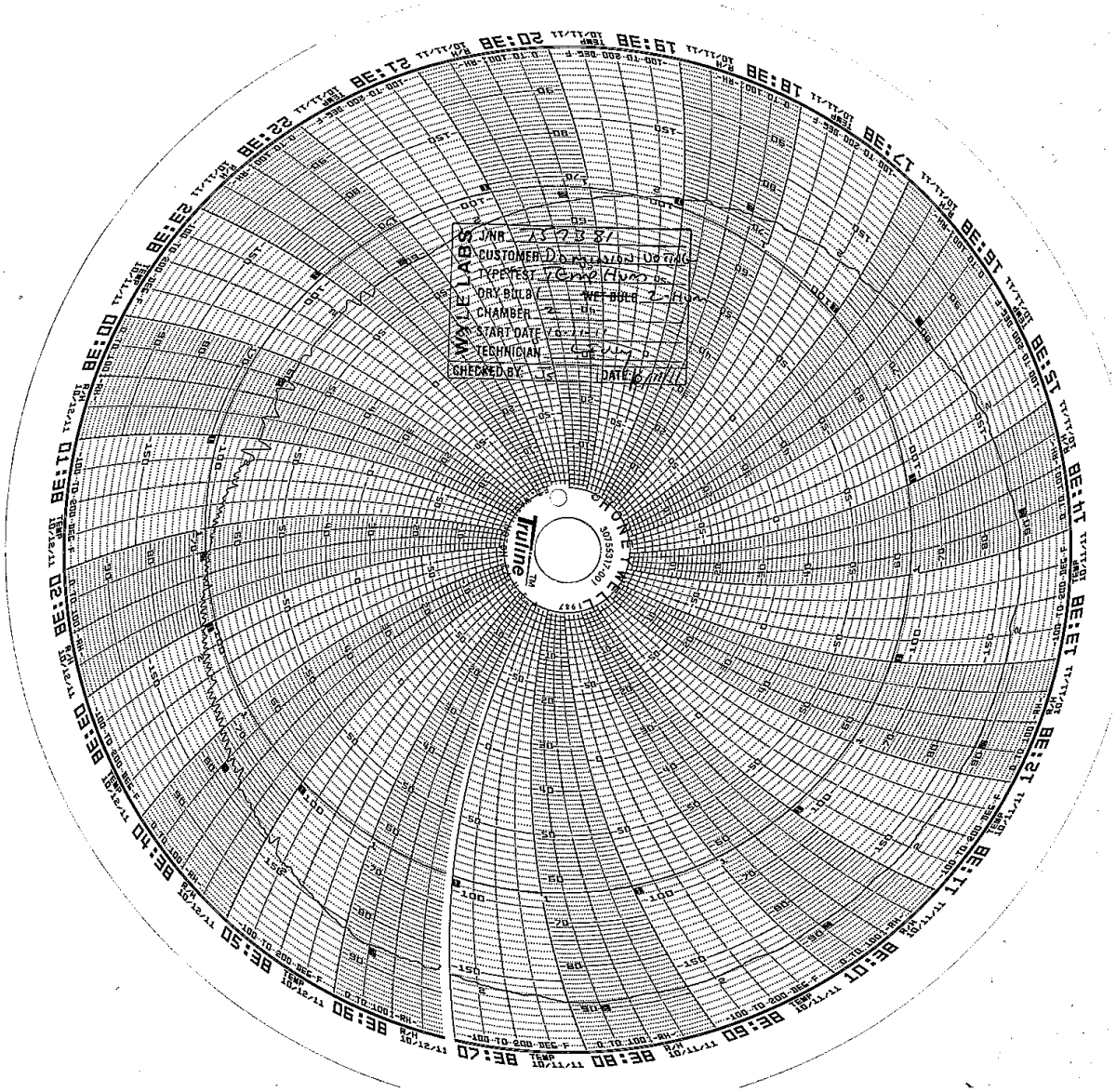

WYLE LABS
CUSTOMER
TYPE TEST
DRY BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE
Fluke
307531-001

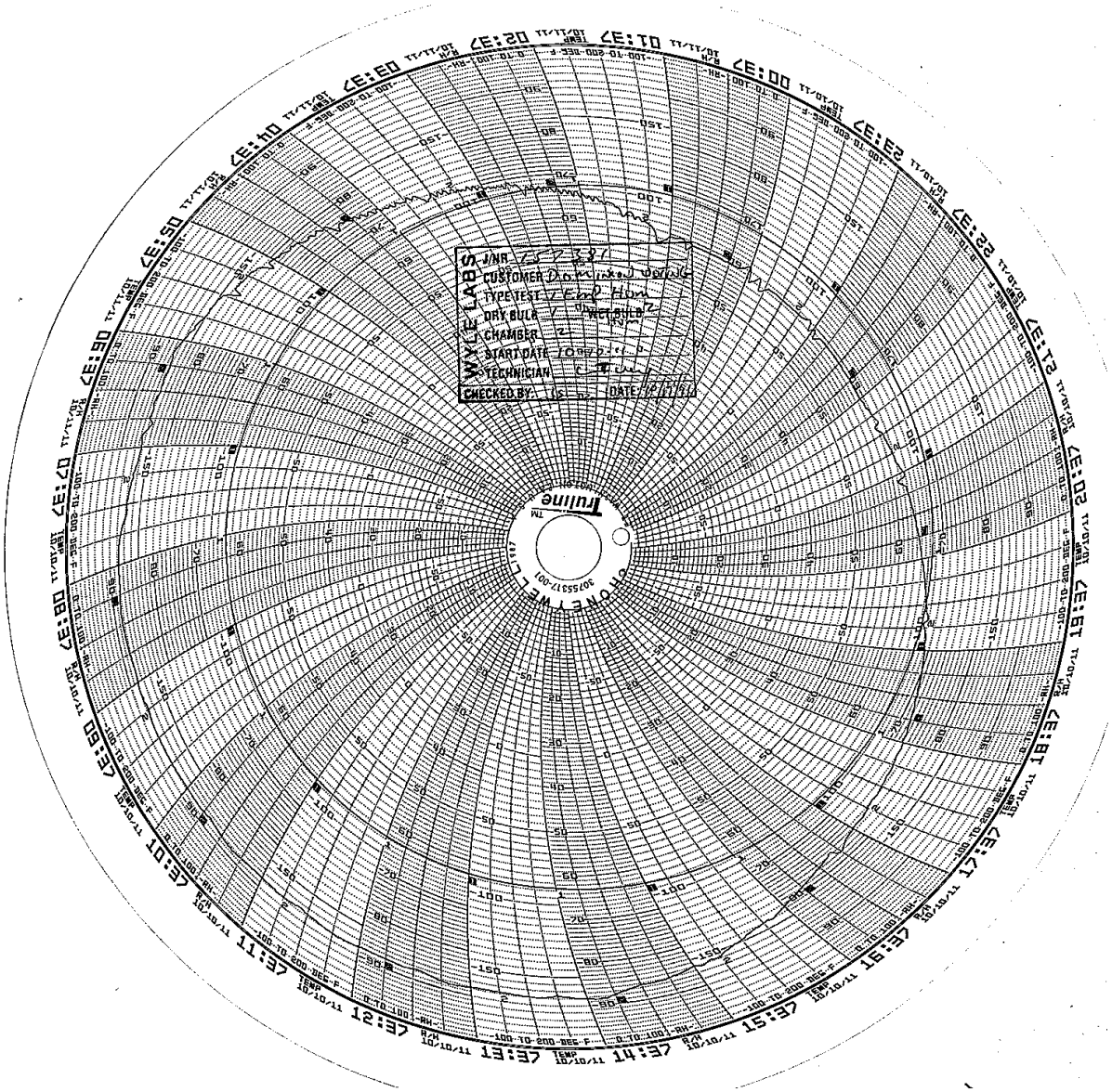

WYLE LABS
J/NR
CUSTOMER
TYPE TEST
DRY-BULB
WET-BULB
CHAMBER
START-DATE
TECHNICIAN
CHECKED BY
DATE
Fluke
HONEYWELL

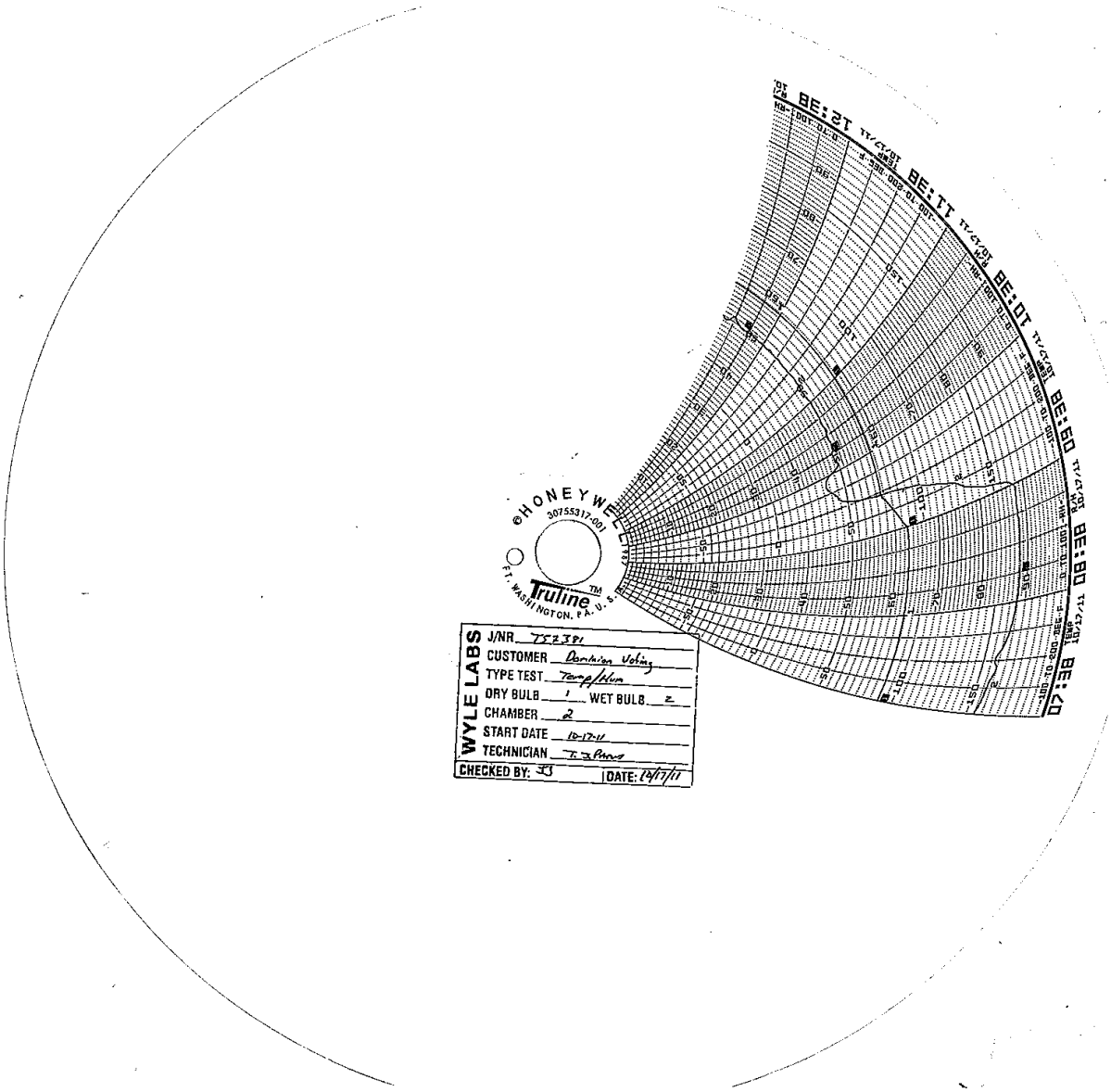

WYLE LABS
CUSTOMER
CHECKED BY
DATE
Truline


WYLE LABS
JNR 770-13
CUSTOMER Dometic
TYPE TEST
DRY BULB
WET BULB
CHAMBER
STARTDATE
TECHNICIAN
CHECKED BY
DATE
CHART RECORDER
Truline


WYLE LABS
V/NR
CUSTOMER
TYPE TEST
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE
CHONE TWELL
Truline


WYLE LAB
JNR
CUSTOMER
TYPE TEST
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE
Truline
CHART


WYLE LABS
J/NR 57381
CUSTOMER Dometic
TYPE TEST Temp Hum
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE
Truline
CHRONE-T-WELL
307553T-001


HONEYWELL
30755317-001
Truline
FT. WASHINGTON, PA. U.S.A.
WYLE LABS
J/NR 752391
CUSTOMER Dominion Voting
TYPE TEST Temp/Hum
DRY BULB 1 WET BULB 2
CHAMBER 2
START DATE 10-17-11
TECHNICIAN T. Brown
CHECKED BY: JJ
DATE: 10/17/11

ATTACHMENT D
ELECTRICAL TEST DATA

ELECTRICAL POWER DISTURBANCE TEST DATA

California Instruments Corp.
Data entry mode: Absolute

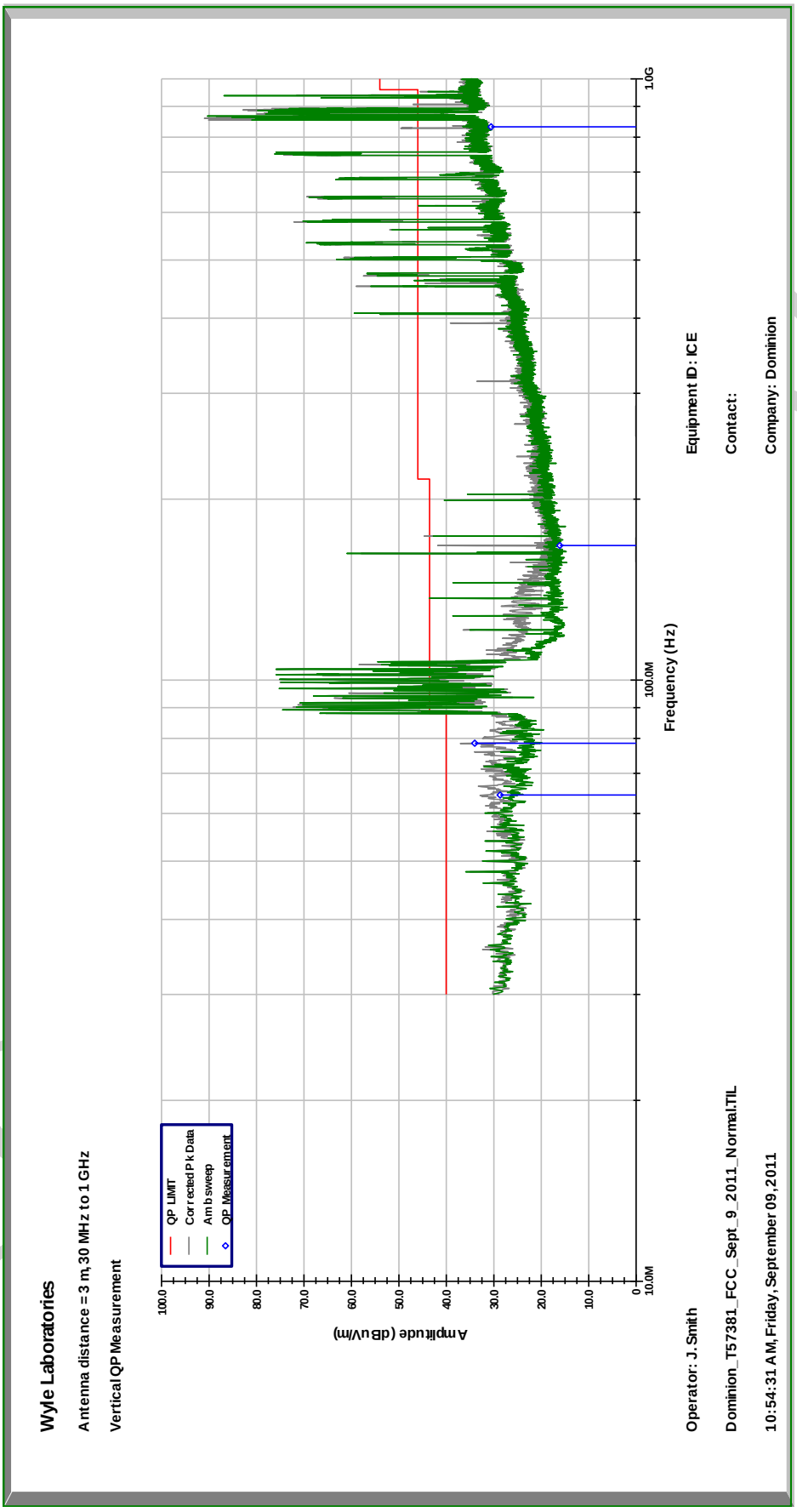
No.	Type	Time (s)	Volt
1	V Step	60.000	120.0
2	V Step	0.020	84.0
3	V Step	60.000	120.0
4	V Step	0.100	48.0
5	V Step	60.000	120.0
6	V Step	1.000	48.0
7	V Step	60.000	120.0
8	V Step	5.000	6.0
9	V Step	60.000	120.0
10	V Step	1.000	102.0
11	V Step	60.000	120.0
12	V Step	1.000	138.0
13	V Step	60.000	120.0
14	V Step	14400.000	129.0
15	V Step	60.000	120.0
16	V Step	14400.000	105.0
17	V Step	60.000	120.0
18	Empty		

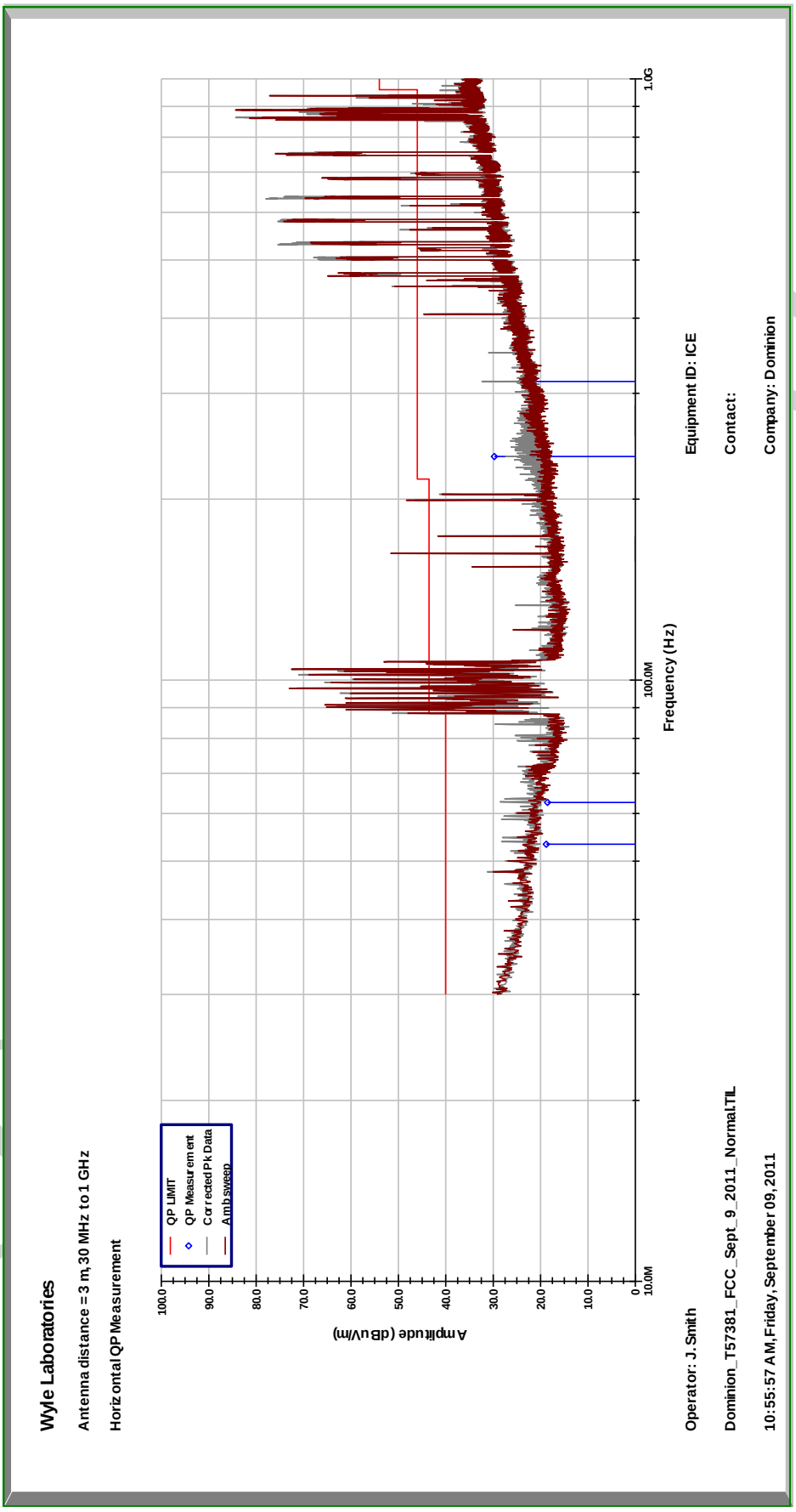
W. Bush 9/20/11

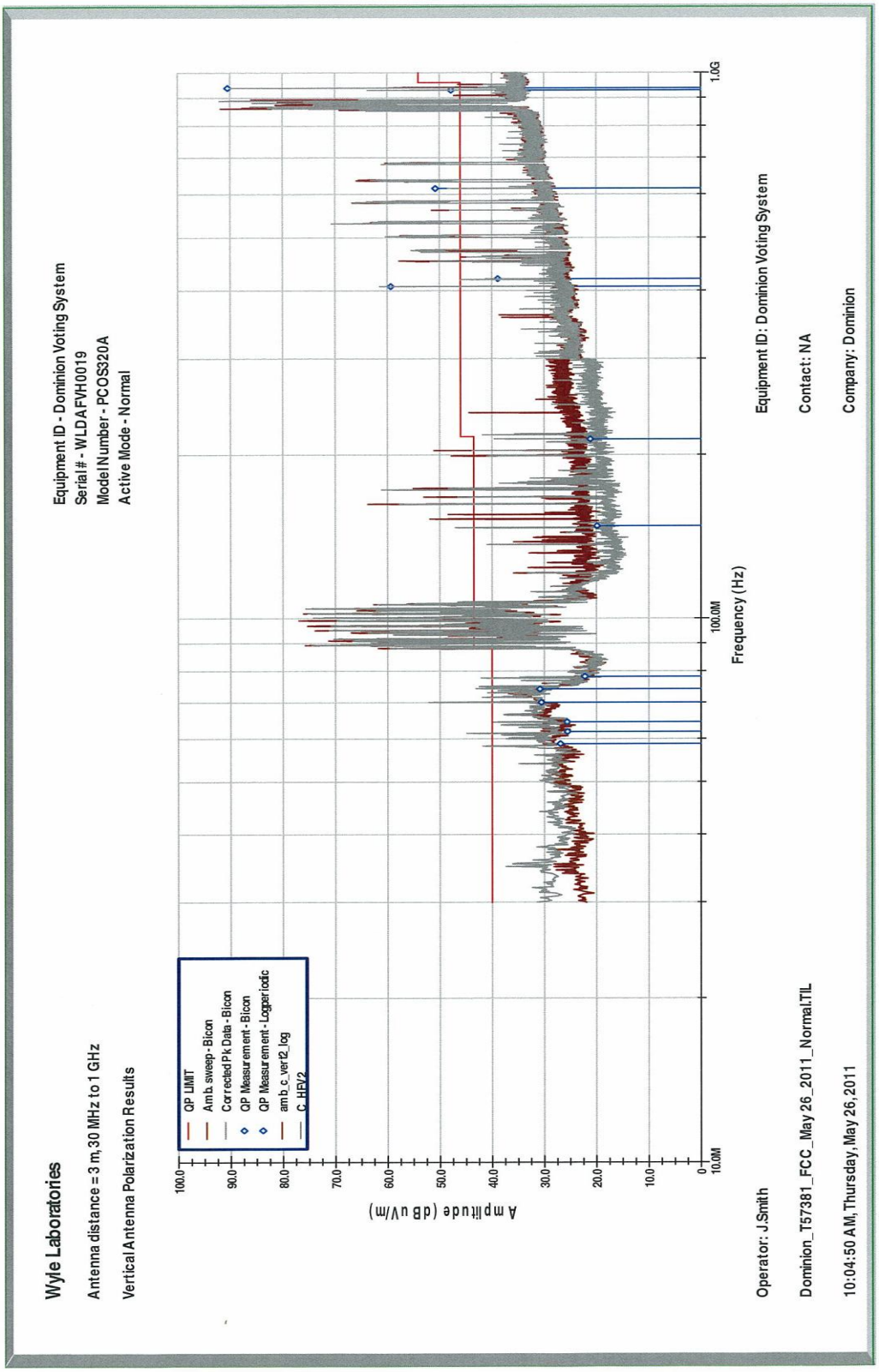
Transient List: C:\Program Files\California Instruments\PGUI32\IEC_Test\Voting Dips.tls
Printed on: Tuesday, September 20, 2011 4:33:14 PM

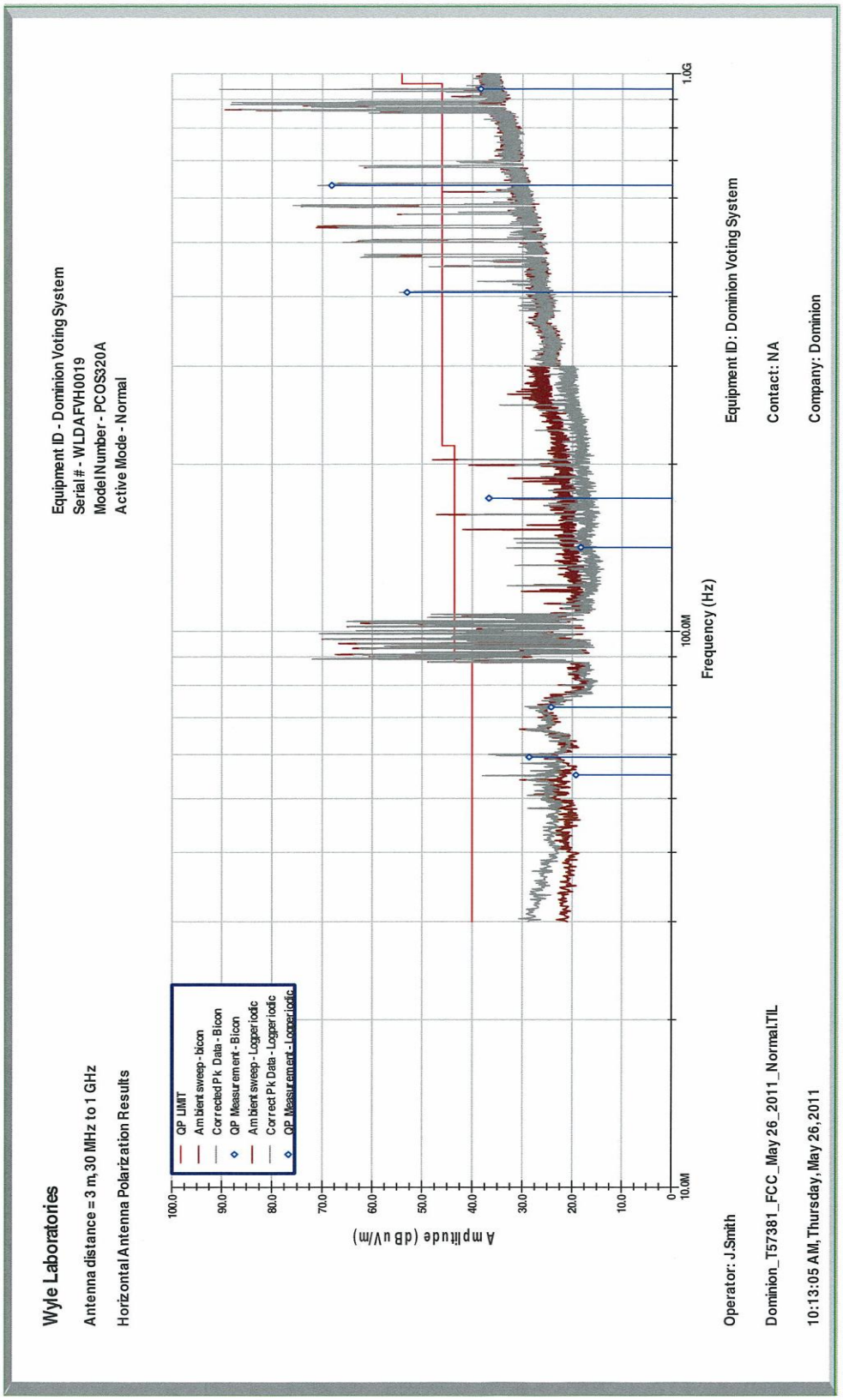
ELECTROMAGNETIC RADIATION TEST DATA

RADIATED EMISSIONS TEST DATA

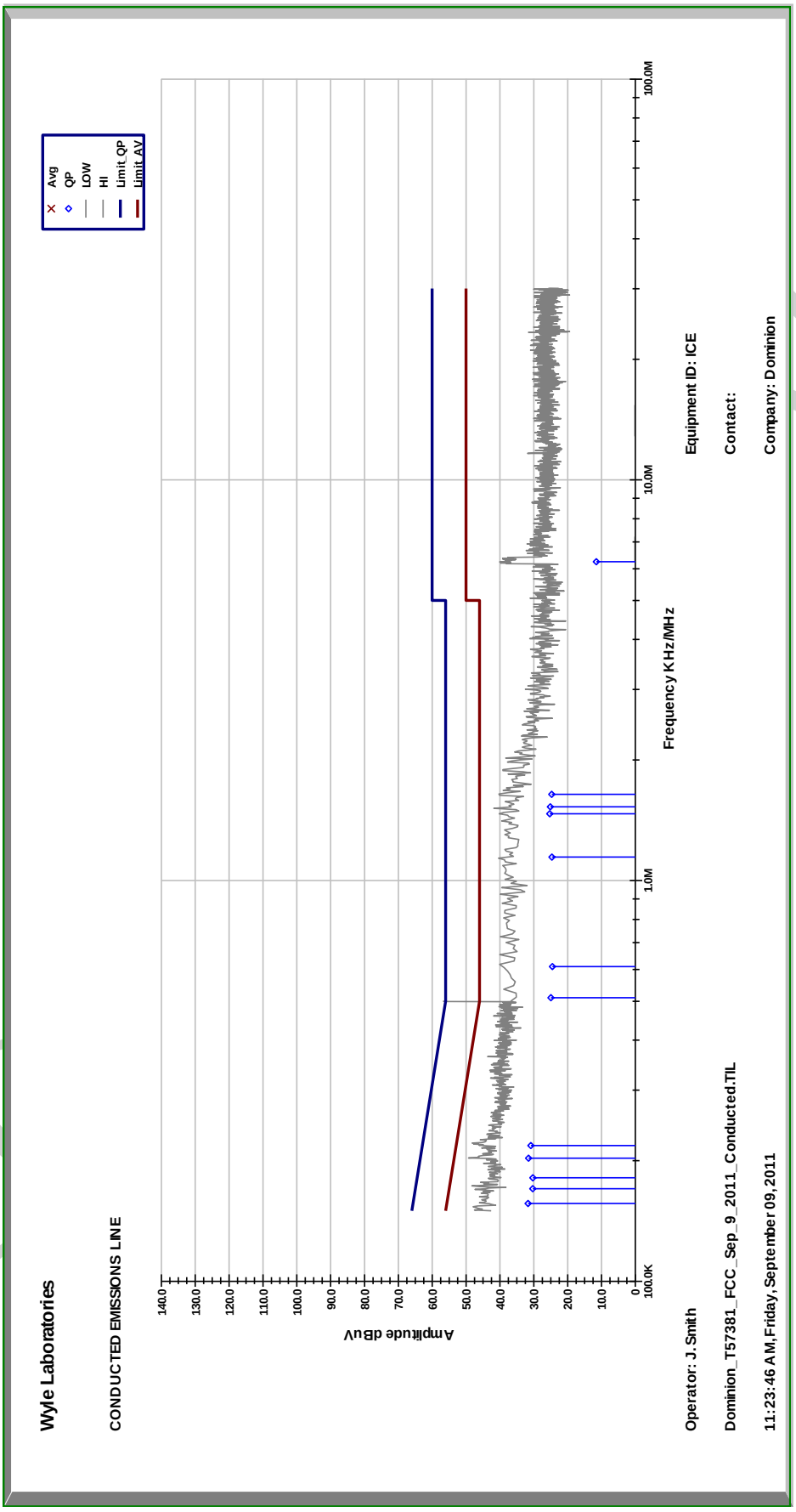

Wyle Laboratories
Antenna distance = 3 m, 30 MHz to 1 GHz
Vertical QP Measurement
QP LIMIT
Corrected Pk Data
Amb sweep
QP Measurement
Amplitude (dBuV/m)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Equipment ID: ICE
Contact:
Company: Dominion
Operator: J. Smith
Dominion_T57381_FCC_Sept_9_2011_Normal.TIL
10:54:31 AM, Friday, September 09, 2011

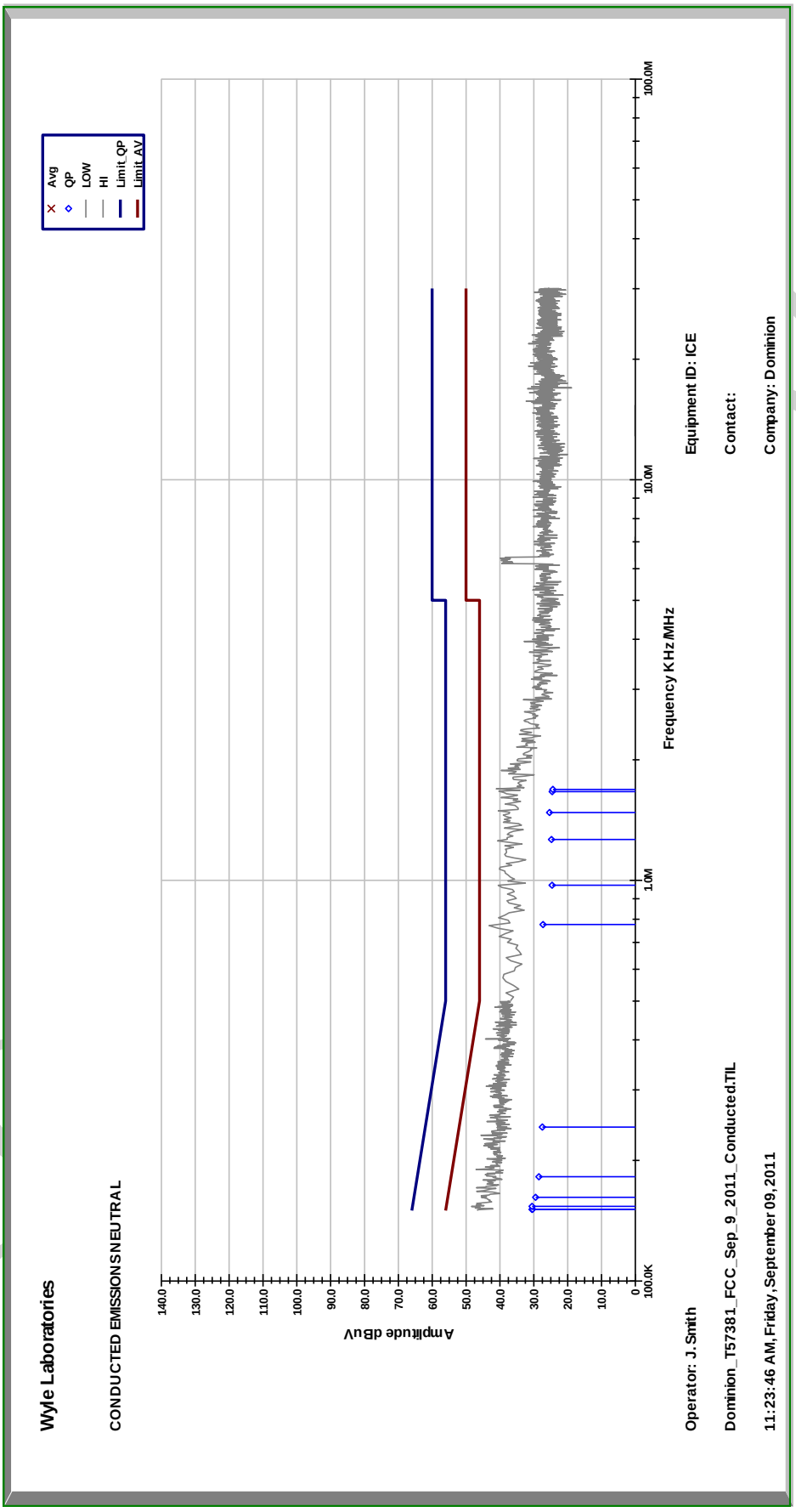

Wyle Laboratories
Antenna distance = 3 m, 30 MHz to 1 GHz
Horizontal QP Measurement
QP LIMIT
QP Measurement
Corrected Pk Data
Amb sweep
Amplitude (dBuV/m)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Equipment ID: ICE
Contact:
Company: Dominion
Operator: J.Smith
Dominion_T57381_FCC_Sept_9_2011_NormalTIL
10:55:57 AM, Friday, September 09, 2011

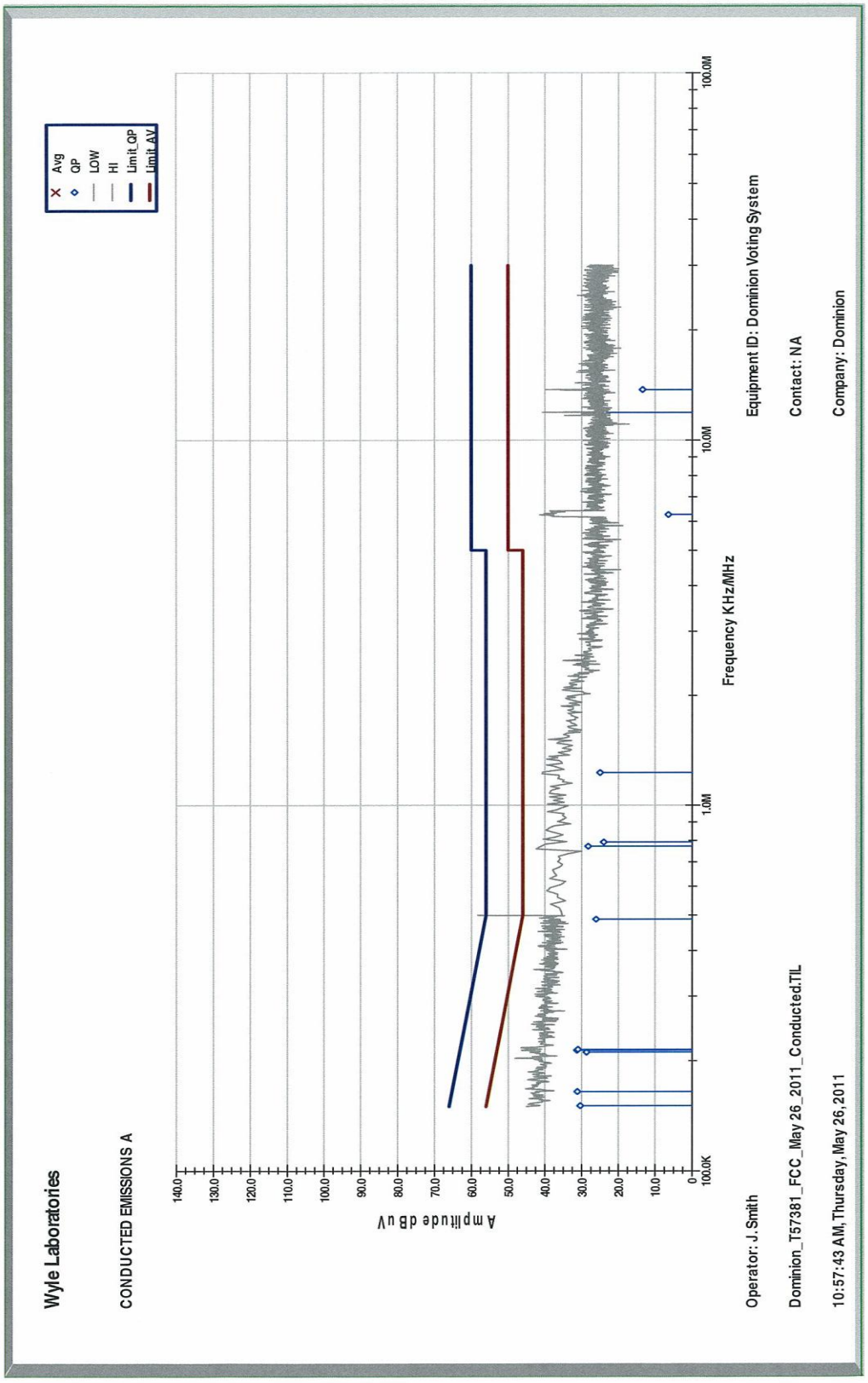

Wyle Laboratories
Antenna distance = 3 m,30 MHz to 1 GHz
Vertical Antenna Polarization Results
Equipment ID - Dominion Voting System
Serial # - WLDAFVH0019
Model Number - PCOS320A
Active Mode - Normal
QP LIMIT
Amb sweep - Bicon
Corrected Pk Data - Bicon
QP Measurement - Bicon
QP Measurement - Logperiodic
amb_c_vert2_log
C_HFV2
Amplitude (dB uV/m)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Equipment ID: Dominion Voting System
Contact: NA
Company: Dominion
Operator: J.Smith
Dominion_T57381_FCC_May 26_2011_Normal.TIL
10:04:50 AM, Thursday, May 26, 2011

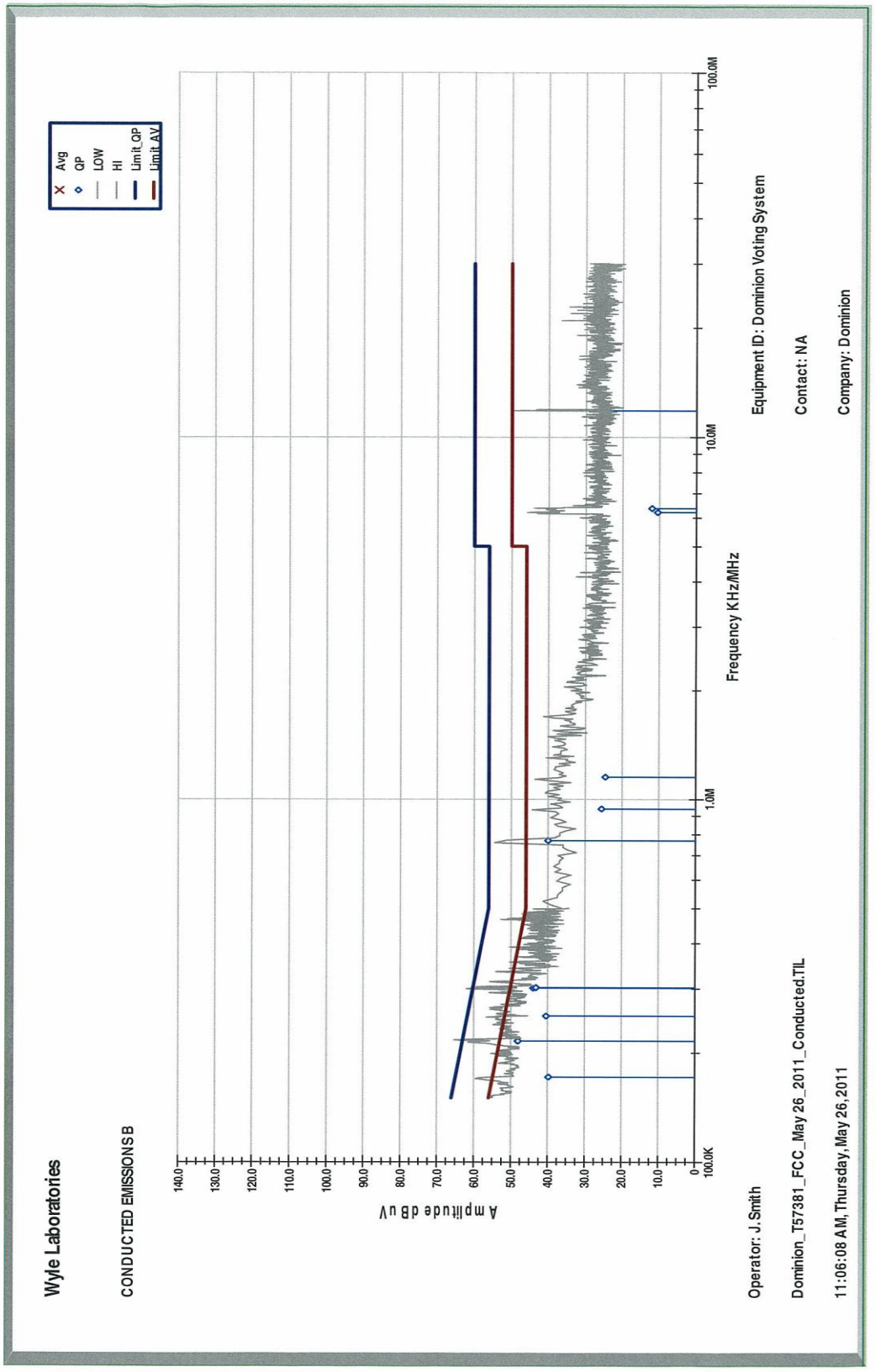

Wyle Laboratories
Antenna distance = 3 m,30 MHz to 1 GHz
Horizontal Antenna Polarization Results
Equipment ID - Dominion Voting System
Serial # - WLDAFVH0019
Model Number - PCOS320A
Active Mode - Normal
QP LIMIT
Ambient sweep - bicon
Corrected Pk Data - Bicon
QP Measurement - Bicon
Ambient sweep - Logperiodic
Correct Pk Data - Logperiodic
QP Measurement - Logperiodic
Amplitude (dBuV/m)
Frequency (Hz)
10.0M
100.0M
1.0G
Equipment ID: Dominion Voting System
Contact: NA
Company: Dominion
Operator: J.Smith
Dominion_T57381_FCC_May 26_2011_Normal.TIL
10:13:05 AM, Thursday, May 26, 2011

CONDUCTED EMISSIONS TEST DATA


Wyle Laboratories
CONDUCTED EMISSIONS LINE
Avg
QP
LOW
HI
Limit QP
Limit AV
Amplitude dBuV
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
100.0K
1.0M
10.0M
100.0M
Frequency KHz/MHz
Equipment ID: ICE
Contact:
Company: Dominion
Operator: J.Smith
Dominion_T57381_FCC_Sep_9_2011_Conducted.TIL
11:23:46 AM,Friday,September 09,2011


Wyle Laboratories
CONDUCTED EMISSIONS NEUTRAL
Avg
QP
LOW
HI
Limit QP
Limit AV
Amplitude dBuV
Frequency KHz/MHz
100.0K
1.0M
10.0M
100.0M
Operator: J.Smith
Dominion_T57381_FCC_Sep_9_2011_Conducted.TIL
11:23:46 AM, Friday, September 09, 2011
Equipment ID: ICE
Contact:
Company: Dominion


Wyle Laboratories
CONDUCTED EMISSIONS A
Avg
QP
LOW
HI
Limit_QP
Limit AV
Amplitude dBuV
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
100.0K
1.0M
10.0M
100.0M
Frequency KHz/MHz
Equipment ID: Dominion Voting System
Contact: NA
Company: Dominion
Operator: J.Smith
Dominion_T57381_FCC_May 26_2011_Conducted.TIL
10:57:43 AM, Thursday, May 26,2011


Wyle Laboratories
CONDUCTED EMISSIONS B
Avg
QP
LOW
HI
Limit_QP
Limit_AV
Amplitude dBuV
Frequency KHz/MHz
100.0K
1.0M
10.0M
100.0M
Operator: J.Smith
Dominion_T57381_FCC_May 26_2011_Conducted.TIL
11:06:08 AM, Thursday, May 26, 2011
Equipment ID: Dominion Voting System
Contact: NA
Company: Dominion

ELECTROSTATIC DISRUPTION TEST DATA

wyle laboratories

DATA SHEET

Job No.: T57381
Start Date: 27 Oct 2011

Customer: Dominion Voting Systems
EUT: ICE
Model No.: ImageCast Evolution 4.6
Serial No.: ICE2P1007

Temperature: 23°C
Measurement Point: See Test Points Below
Interference Signal: See Applied Signal
Frequency Range: N/A

Humidity: 53%

Test Title: Electrostatic Disruption

Test Points	Meets Limit		Applied Level (kV)	Discharge Type	Times Tested	Comments
	Yes	No				
Top Right Corner of Ballot Box	X		±2, ±4, ±8	Contact	60	Front of EUT
Top Left Corner of Ballot Box	X		±2, ±4, ±8	Contact	60	Front of EUT
Top Right Corner of Ballot Box	X		±2, ±4, ±8	Contact	60	Back of EUT
Top Left Corner of Ballot Box	X		±2, ±4, ±8	Contact	60	Back of EUT
Right Side of Ballot Box	X		±2, ±4, ±8	Contact	60	Front of EUT
Left Side of Ballot Box	X		±2, ±4, ±8	Contact	60	Front of EUT
Top Left Corner of LCD	X		±2, ±4, ±8, ±15	Air	80	Front of EUT
Top Right Corner of LCD	X		±2, ±4, ±8, ±15	Air	80	Front of EUT
Bottom Left Corner of LCD	X		±2, ±4, ±8, ±15	Air	80	Front of EUT
Bottom Right Corner of LCD	X		±2, ±4, ±8, ±15	Air	80	Front of EUT
Middle of LCD	X		±2, ±4, ±8, ±15	Air	80	Front of EUT
Middle of ICE Unit	X		±2, ±4, ±8	Contact	60	Front of EUT
Cast Button of ICE Unit	X		±2, ±4, ±8	Contact	60	Front of EUT
Return Button of ICE Unit	X		±2, ±4, ±8	Contact	60	Front of EUT
Volume Down of ATI Device	X		±2, ±4, ±8	Contact	60	

Notice of Anomaly: NOA 5 ESD1

Witness: N/A

Tested By: W. Bush (Technician) Date: 10/27/11

Approved: J. Ferrara (Project Engineer) Date: 10/27/11

WH-1433, Rev. Dec. 2004

Test Points	Meets Limit		Applied Level (kV)	Discharge Type	Times Tested	Comments
	Yes	No				
Volume Up of ATI Device	X		±2, ±4, ±8	Contact	60	
Rate Left of ATI Device	X		±2, ±4, ±8	Contact	60	
Rate Right of ATI Device	X		±2, ±4, ±8	Contact	60	
Contests Left of ATI Device	X		±2, ±4, ±8	Contact	60	
Contests Right of ATI Device	X		±2, ±4, ±8	Contact	60	
Select Button of ATI Device	X		±2, ±4, ±8	Contact	60	
Blue Up Button of ATI Device	X		±2, ±4, ±8	Contact	60	
Blue Down Button of ATI Device	X		±2, ±4, ±8	Contact	60	
Help Bar of ATI Device	X		±2, ±4, ±8	Contact	60	
Vertical Coupling Plane	X		±2, ±4, ±8	Contact	60	All four sides of EUT

Notice of Anomaly: NOA 5 ESD1

Witness: N/A

Tested By: W. Bush **Date:** 10/27/11
Technician

Approved: Jon Stevenson **Date:** 10/27/11
Project Engineer

WH-1433, Rev. Dec. 2004

ELECTROMAGNETIC SUSCEPTIBILITY TEST DATA

wyle laboratories

DATA SHEET

Job No.: T57381
Start Date: 26 Oct 2011

Customer:	Dominion Voting Systems	**Temperature:**	N/A	**Humidity:**	N/A
EUT:	ICE	**Measurement Point:**	EUT @ All Four Sides		
Model No.:	ImageCast Evolution	**Interference Signal:**	1Khz @ 80% AM		
Serial No.:	ICE2P1007	**Frequency Range:**	80Mhz to 1Ghz		

Test Title Electromagnetic Susceptibility

Test Frequency	Meets Limit		Susceptibility Threshold Level	Maximum Signal Applied	Comments
( )kHz (X)MHz ( )GHz	Yes	No	( )A ( )V ( )kV (X)V/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT		
80	X		>3	3	Vertical and Horizontal
↓	↓		↓	↓	↓
1,000	X		>3	3	Vertical and Horizontal

Notice of Anomaly: N/A

Witness: N/A

Tested By: W. Bush (Technician) **Date:** 10/26/11

Approved: Jon Stevens (Project Engineer) **Date:** 10/26/11

Page 1 **of** 1

WH-1432, Rev. Dec. 2004

ELECTRICAL FAST TRANSIENT TEST DATA

wyle laboratories

DATA SHEET

Job No.: T57381
Start Date: 19 Sep 2011

Customer:	Dominion Voting Systems	**Temperature:**	N/A	**Humidity:**	N/A
EUT:	ICE	**Measurement Point:**	See Comments Below		
Model No.:	ImageCast Evolution 4.6	**Interference Signal:**	Test Signal Applied @ 5/50nS		
Serial No.:	ICE2P1005	**Frequency Range:**	See Test Frequencies Below		

Test Title Electrical Fast Transient

Test Frequency	Meets Limit		Susceptibility Threshold Level	Maximum Signal Applied	Comments
(X)kHz ( )MHz ( )GHz	Yes	No	( )A ( )V (X)kV ( )V/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT		
.060	X		>± 2	± 2	AC Power Cable, Line to Neutral
.060	↓		>± 2	± 2	AC Power Cable, Line to Ground
.060	↓		>± 2	± 2	AC Power Cable, Neutral to Ground
.060	X		>± 2	± 2	AC Power Cable, Line to Neutral to Ground

Notice of Anomaly: N/A

Witness: N/A

Tested By: W. Buehler (Technician) **Date:** 9/19/11

Approved: Jon Stevens (Project Engineer) **Date:** 9/19/11

Page 1 **of** 1

WH-1432, Rev. Dec. 2004

LIGHTNING SURGE TEST DATA

wyle laboratories

DATA SHEET

Job No.: T57381
Start Date: 07 Dec 2011

Customer:	Dominion Voting Systems	**Temperature:**	N/A	**Humidity:**	N/A
EUT:	ICE	**Measurement Point:**	See Comments Below		
Model No.:	ImageCast Evolution 4.6	**Interference Signal:**	Test Signal Applied @ 1.2/50uS		
Serial No.:	ICE2P1006, ICE2P1007	**Frequency Range:**	See Test Frequencies Below		

Test Title Lightning Surge

Test Frequency	Meets Limit		Susceptibility Threshold Level	Maximum Signal Applied	Comments
(X)kHz ( )MHz ( )GHz	Yes	No	( )A ( )V (X)kV ( )V/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT		
.060	X		>.5	.5	Line to Neutral @ 0°, 90°, 180°, and 270°
.060	↓		↓	↓	Line to Ground @ 0°, 90°, 180°, and 270°
.060	X		>.5	.5	Neutral to Ground @ 0°, 90°, 180°, and 270°
.060	X		>1	1	Line to Neutral @ 0°, 90°, 180°, and 270°
.060	↓		↓	↓	Line to Ground @ 0°, 90°, 180°, and 270°
.060	X		>1	1	Neutral to Ground @ 0°, 90°, 180°, and 270°
.060	X		>2	2	Line to Neutral @ 0°, 90°, 180°, and 270°
.060	↓		↓	↓	Line to Ground @ 0°, 90°, 180°, and 270°
.060	X		>2	2	Neutral to Ground @ 0°, 90°, 180°, and 270°

Notice of Anomaly: NOA 6 Lightning Surge

Witness: N/A

Tested By: W. Bush **Date:** 12/7/11
Technician

Approved: Jo Stevens **Date:** 12/7/11
Project Engineer

WH-1432, Rev. Dec. 2004

CONDUCTED RF IMMUNITY TEST DATA

wyle laboratories

DATA SHEET

Job No.: T57381
Start Date: 12 Oct 2011

Customer:	Dominion Voting Systems	**Temperature:**	N/A	**Humidity:**	N/A
EUT:	ICE	**Measurement Point:**	See Comments Below		
Model No.:	ImageCast Evolution 4.6	**Interference Signal:**	1Khz @ 80% AM		
Serial No.:	ICE2P1006	**Frequency Range:**	150Khz to 80Mhz		

Test Title Conducted RF Immunity

Test Frequency	Meets Limit		Susceptibility Threshold Level	Maximum Signal Applied	Comments
( )kHz (X)MHz ( )GHz	Yes	No	( )A (X)V ( )kV ( )V/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT		
.150	X		>10	10	AC Power Cable
↓	↓		↓	↓	↓
80	X		>10	10	AC Power Cable

Notice of Anomaly: N/A

Witness: N/A

Tested By: W. Byler (Technician) **Date:** 10/12/11

Approved: Jon Severa (Project Engineer) **Date:** 10/12/11

Page 1 **of** 1

WH-1432, Rev. Dec. 2004

MAGNETIC FIELDS IMMUNITY TEST DATA

wyle laboratories

DATA SHEET

Job No.: T57381
Start Date: 27 Oct 2011

Customer:	Dominion Voting Systems	**Temperature:**	N/A	**Humidity:**	N/A
EUT:	ICE	**Measurement Point:**	See Comments Below		
Model No.:	ImageCast Evolution 4.6	**Interference Signal:**	60Hz at 30 A/m		
Serial No.:	ICE2P1007	**Frequency Range:**	See Test Frequencies Below		

Test Title Magnetic Fields RF Immunity

Test Frequency	Meets Limit		Susceptibility Threshold Level	Maximum Signal Applied	Comments
(X)kHz ( )MHz ( )GHz	Yes	No	(X)A ( )V ( )kV ( )V/m ( )Vrms ( )dBµA ( )dBµV ( )dBµV/m ( )dBpT		
.060	X		>30 A/m	30 A/m	EUT on X, Y, and Z Axis

Notice of Anomaly: N/A

Witness: N/A

Tested By: W. Boothe (Technician) **Date:** 10/27/11

Approved: Jon Lenz (Project Engineer) **Date:** 10/27/11

Page 1 **of** 1

WH-1432, Rev. Dec. 2004

ELECTRICAL SUPPLY TEST DATA

DATA SHEET

wyle laboratories

Customer Dominion Voting Systems
Specimen ImageCast Evolution (ICE)
Part No. N/A Amb. Temp. Amb. Job No. T57381.01
Spec. EAC 2005 VVSG Photo Yes Report No. T57381
Para. 4.1.2.4 Test Med. N/A Start Date 11/2/2011
S/N ICE2P1007 Specimen Temp. Amb.
GSI No

Test Title Electrical Supply Test

Test Parameters:

The purpose of this test is: to ensure that the voting system will continue to provide the capability for any voter who is voting at the time of a failure of the main power external to the voting system to complete the casting of a ballot; to perform a successful shutdown without loss or degradation of the voting and audit data; and to allow voters to resume voting once the voting system has reverted to back-up power. The test shall be performed per the following steps:

Step 1: Configure the system for normal operation per the TDP

Step 2: Allow unit to remain powered on for at least 24 hours.

Step 3: Perform an operational status check.

Step 4: Operate system as designed for fifteen minutes.

Step 5: Remove AC input power.

Step 6: Verify system provides notification for loss of input power and is on battery back-up.

Step 7: Operate the voting system as designed until the system provides notification that it is shutting down or two (2) hours has elapsed.

Step 8: Restore AC power and resume operation for an additional fifteen minutes.

Step 9: Perform an operational status check.

Step 10: Verify election data and ensure all results are accurate and all events were recorded properly.

Notes:

- 100 ballots per hour were scanned and processed accurately.

Tested By _____ Date: 11/2/11
Witness _____ Date: 11/2/2011
Sheet No. 1 of 1
Approved _____ 11/2/11

Notice of Anomaly: None

Wyle Form WH 614A, Rev. APR '84

DATA SHEET

wyle laboratories

Customer Dominion Voting Systems
Specimen ImageCast Central (ICC)
Part No. N/A Amb. Temp. Amb. Job No. T57381.01
Spec. EAC 2005 VVSG Photo Yes Report No. T57381
Para. 4.1.2.4 Test Med. N/A Start Date 12/2/2011
S/N ED300874 Specimen Temp. Amb.
GSI No

Test Title Electrical Supply Test

Test Parameters:

The purpose of this test is: to ensure that the voting system will continue to provide the capability for any voter who is voting at the time of a failure of the main power external to the voting system to complete the casting of a ballot; to perform a successful shutdown without loss or degradation of the voting and audit data; and to allow voters to resume voting once the voting system has reverted to back-up power. The test shall be performed per the following steps:

Step 1: Configure the system for normal operation per the TDP

Step 2: Allow unit to remain powered on for at least 24 hours.

Step 3: Perform an operational status check.

Step 4: Operate system as designed for fifteen minutes.

Step 5: Remove AC input power.

Step 6: Verify system provides notification for loss of input power and is on battery back-up.

Step 7: Operate the voting system as designed until the system provides notification that it is shutting down or two (2) hours has elapsed.

Step 8: Restore AC power and resume operation for an additional fifteen minutes.

Step 9: Perform an operational status check.

Step 10: Verify election data and ensure all results are accurate and all events were recorded properly.

Notes:

- 100 ballots per hour were scanned and processed accurately.

Tested By [signature] Date: 12/2/2011
Witness [signature] Date: 12/2/2011
Sheet No. 1 of 1
Approved Michael L Walker 12/2/11

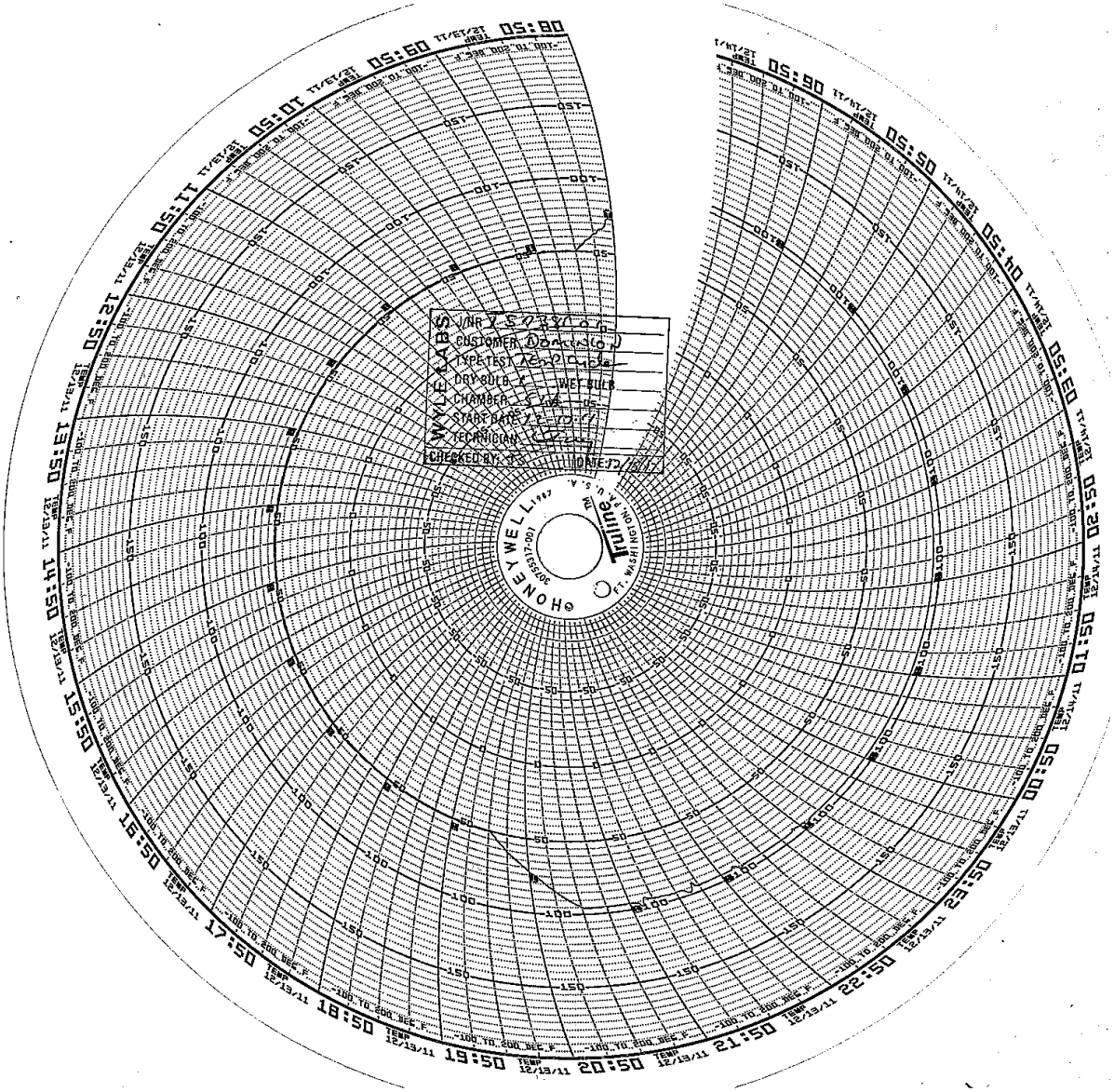
Notice of Anomaly: None

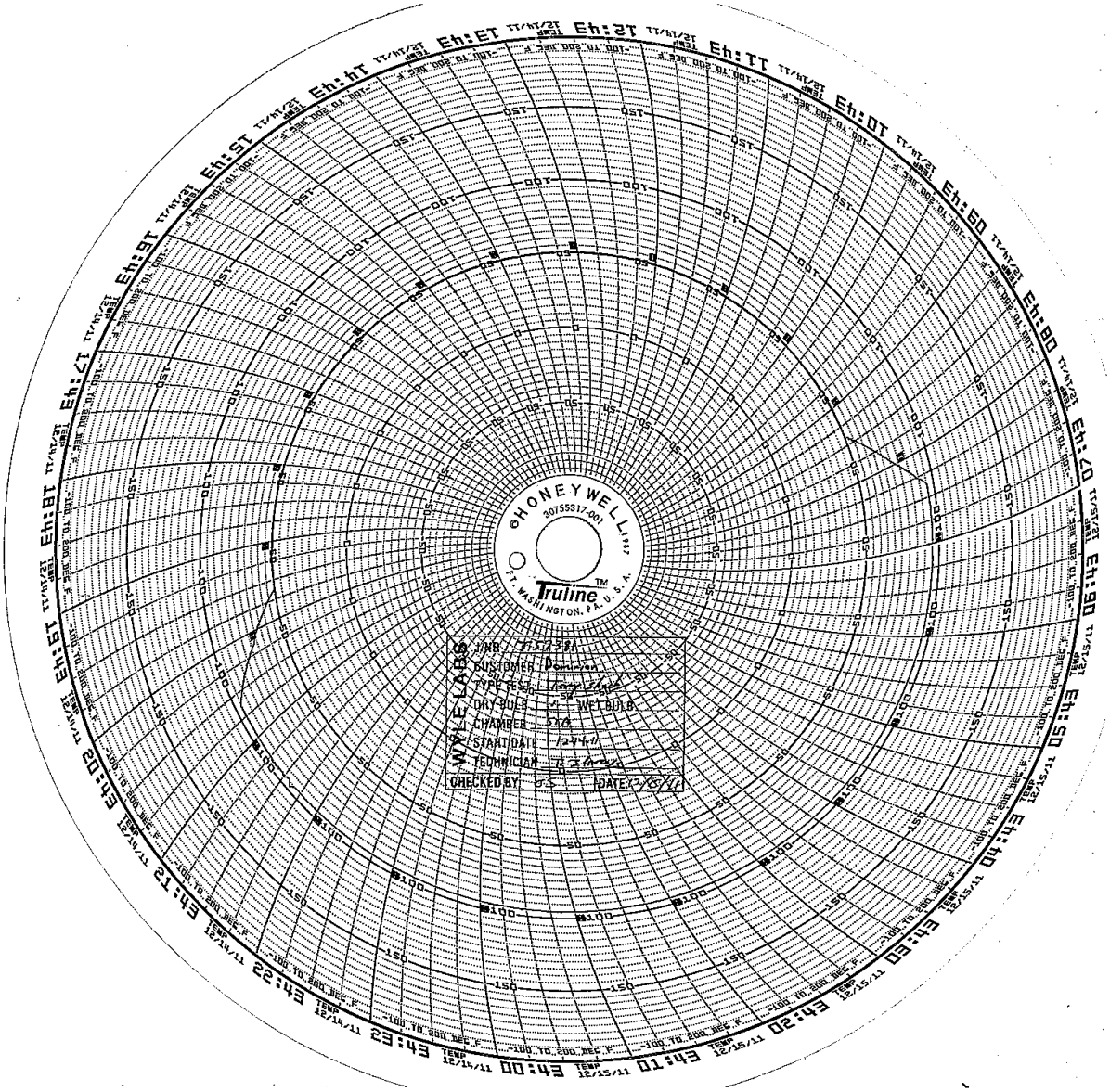
Wyle Form WH 614A, Rev. APR '84

ATTACHMENT E
OPERATING ENVIRONMENTAL TEST DATA

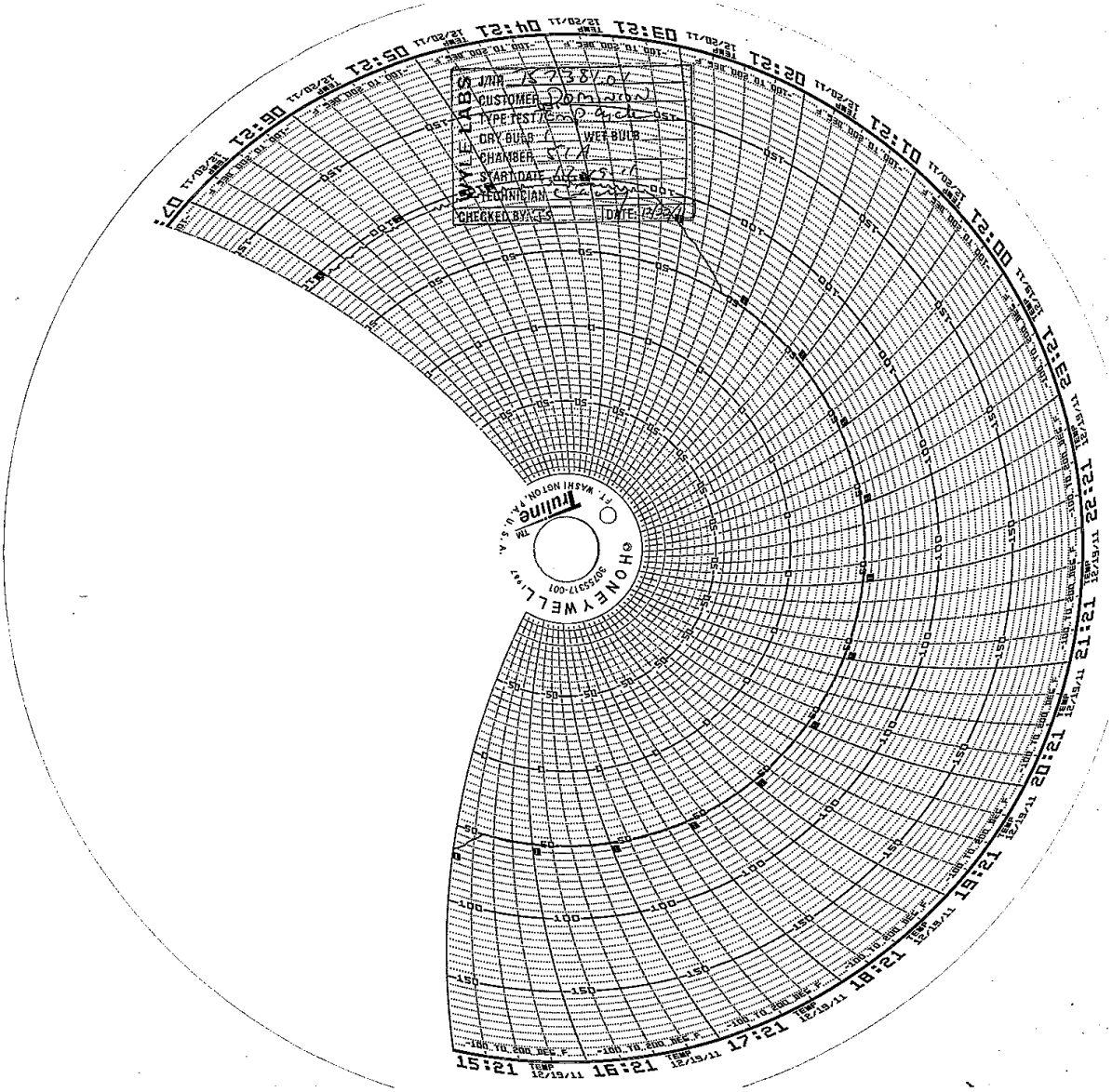
TEMPERATURE/POWER VARIATION TEST DATA

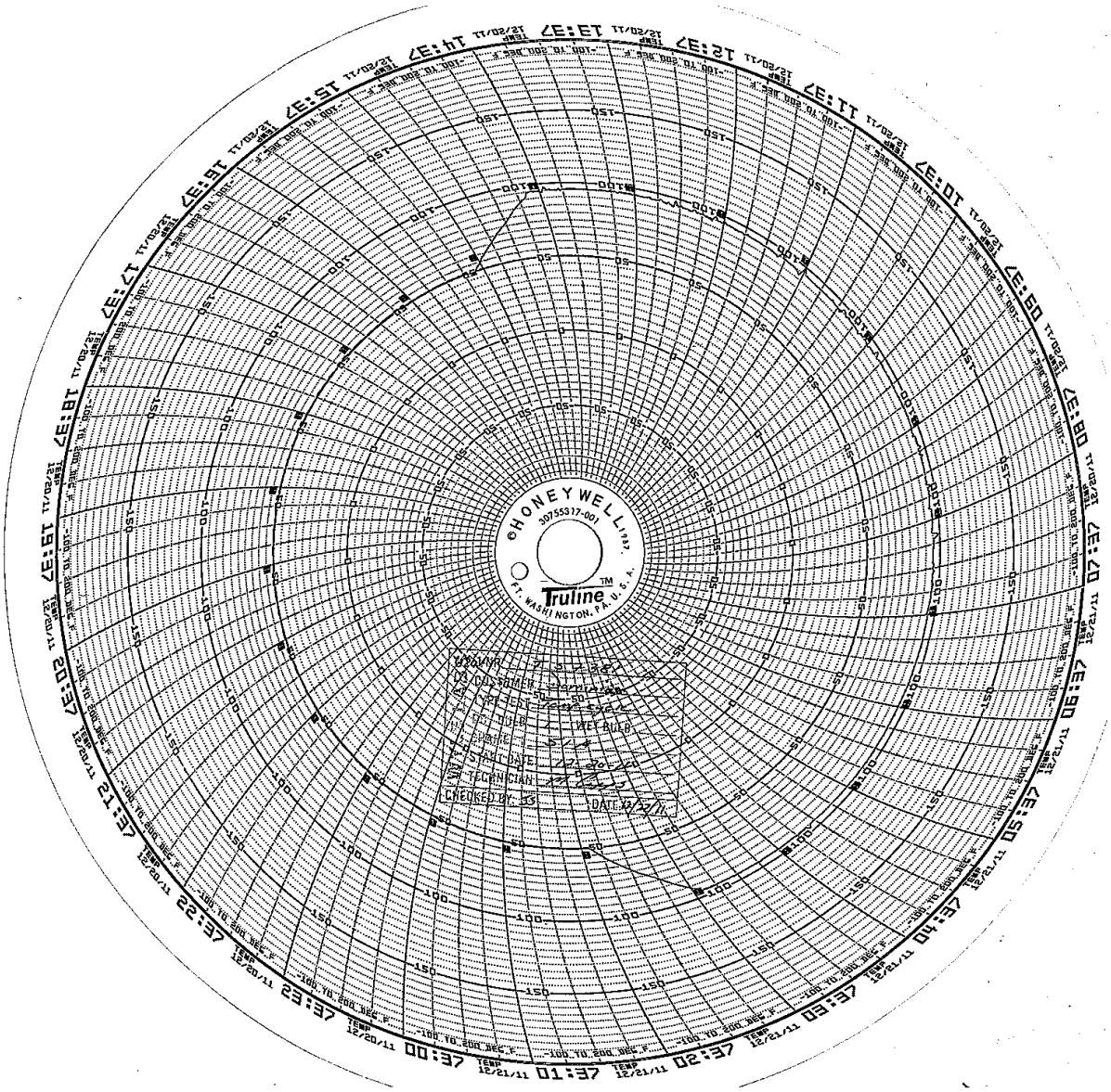
ICC

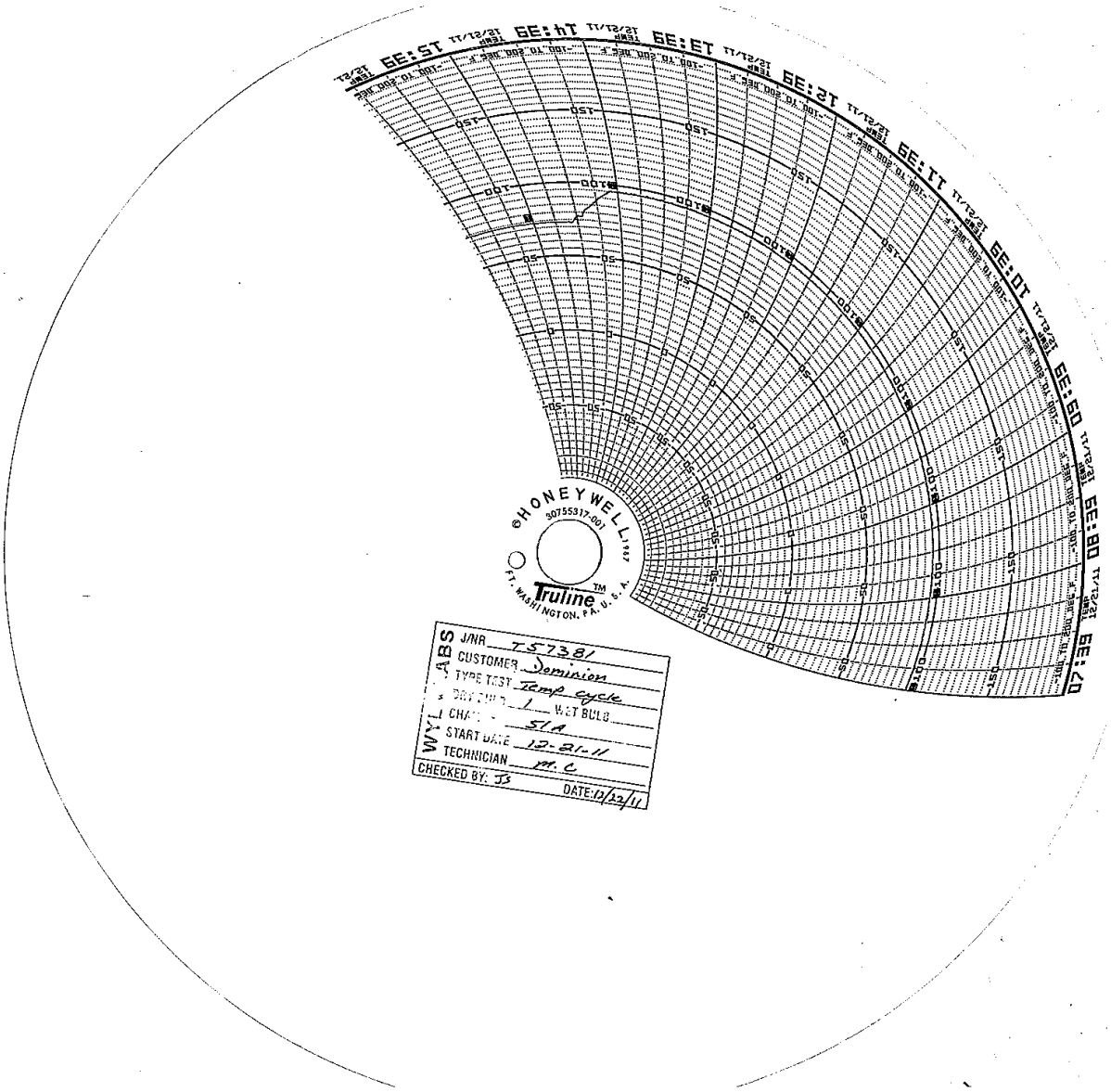

WYLE LAB
CUSTOMER
TYPE TEST
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE
PHONEY WELL
Truline
Ft. Wayne, IN
U.S.A.


©HONEYWELL 1947
30755317-001
Truline™
FT. WASHINGTON, PA. U.S.A.
WYLE LABS
JNR 71357A
CUSTOMER Dominion
TYPE TEST Temp Cycle
DRY BULB WET BULB
CHAMBER 214
START DATE 12/14/11
TECHNICIAN
CHECKED BY DATE 12/15/11

ICE


CUSTOMER
TYPE TEST
DRY BULB
WET BULB
CHAMBER
START DATE
TECHNICIAN
CHECKED BY
DATE
HONEYWELL
Trutrak
FT. WASHINGTON, PA. U.S.A.
15:21
16:21
17:21
18:21
19:21
20:21
21:21
22:21
23:21
00:21
01:21
02:21
03:21
04:21
05:21
06:21
07:21


HONEYWELL
30755317-001
Truline
FT. WASHINGTON, PA. U.S.A.
TEMP
12/20/11
12/21/11


HONEYWELL
50755317-001
Truline
FT. WASHINGTON, PA. U.S.A.
WYLE LABS
J/NR T57381
CUSTOMER Dominion
TYPE TEST Temp cycle
WET BULB
START DATE 12-21-11
TECHNICIAN M. C
CHECKED BY: JS
DATE: 12/22/11

AUDIO TEST DATA

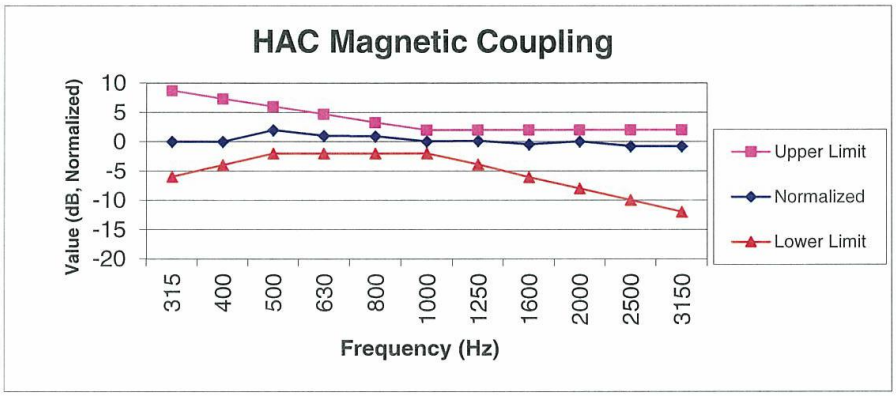
Magnetic Field for Hearing Aid Coupling

Wyle Task No.: T57381 **Customer:** Dominion Voting **Make/Model:** ICE; Radio Shack Headset

Do NOT enter data on this sheet--it is automatically inserted when the data is entered on the "Hi {> -15 dB (A/m)}" sheet. Use this sheet if Axial 1000 Hz Corrected Reading (green cell) is lower than or equal to -15 dB re: 1 A/m.

Magnetic Field for Hearing Aid Compatibility (HAC) per ANSI C63.19-2007, Section 7.3 **94 dB SPL** Gen. Output 105 mVrms

Axial Measurement (dBV)		dB	dB	**dB re: 1 A/m**	dB	dB	dB
Frequency (Hz)	Measured Level	Calib. Factor	Probe Correction	Corrected Reading	Normalized	Upper Limit	Lower Limit
315	-75	-57.68	10	-7.32	0	8.7	-6
400	-73	-57.68	8	-7.32	0	7.3	-4
500	-69	-57.68	6	-5.32	2	6	-2
630	-68	-57.68	4	-6.32	1	4.7	-2
800	-66	-57.68	1.9	-6.42	0.9	3.3	-2
1000	-65	-57.68	0	-7.32	0	2	-2
1250	-63	-57.68	-1.9	-7.22	0.1	2	-3.9
1600	-61.4	-57.68	-4.1	-7.82	-0.5	2	-6.1
2000	-59	-57.68	-6	-7.32	0	2	-8
2500	-57.8	-57.68	-8	-8.12	-0.8	2	-10
3150	-55.8	-57.68	-10	-8.12	-0.8	2	-12



Radial Measurement (dBV)		dB	dB	**dB re: 1 A/m**
Frequency (Hz)	Measured Level	Calib. Factor	Corrected Reading	Max. Corrected
1000	-70.2	-57.68	-12.52	-12.52
1000	-70.6	-57.68	-12.92	
1000	-71.4	-57.68	-13.72	
1000	-71.4	-57.68	-13.72	

Prepared By: 10-20-11

Reviewed By: 10/20/2011

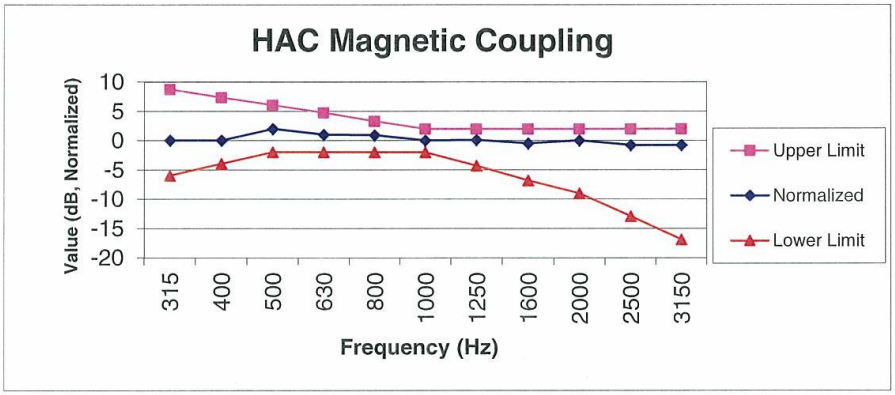
Magnetic Field for Hearing Aid Coupling

Wyle Task No.: T57381 **Customer:** Dominion Voting **Make/Model:** ICE; Radio Shack Headset

Enter data in yellow highlighted cells on this sheet only. Use this sheet if Axial 1000 Hz Corrected Reading (green cell) is higher than -15 dB re: 1 A/m; otherwise use other sheet.

Magnetic Field for Hearing Aid Compatibility (HAC) per ANSI C63.19-2007, Section 7.3 **94 dB SPL** Gen. Output 105 mVrms

Axial Measurement (dBV)		dB	dB	**dB re: 1 A/m**	dB	dB	dB
Frequency (Hz)	Measured Level	Calib. Factor	Probe Correction	Corrected Reading	Normalized	Upper Limit	Lower Limit
315	-75	-57.68	10	-7.32	0	8.7	-6
400	-73	-57.68	8	-7.32	0	7.3	-4
500	-69	-57.68	6	-5.32	2	6	-2
630	-68	-57.68	4	-6.32	1	4.7	-2
800	-66	-57.68	1.9	-6.42	0.9	3.3	-2
1000	-65	-57.68	0	-7.32	0	2	-2
1250	-63	-57.68	-1.9	-7.22	0.1	2	-4.3
1600	-61.4	-57.68	-4.1	-7.82	-0.5	2	-6.8
2000	-59	-57.68	-6	-7.32	0	2	-9
2500	-57.8	-57.68	-8	-8.12	-0.8	2	-12.9
3150	-55.8	-57.68	-10	-8.12	-0.8	2	-16.9



Radial Measurement (dBV)		dB	dB	**dB re: 1 A/m**
Frequency (Hz)	Measured Level	Calib. Factor	Corrected Reading	Max. Corrected
1000	-70.2	-57.68	-12.52	-12.52
1000	-70.6	-57.68	-12.92	
1000	-71.4	-57.68	-13.72	
1000	-71.4	-57.68	-13.72	

Prepared By: 10-20-11

Reviewed By: 10/20/2011

Rev. DEC '09E Acoutsic HAC-mag_cpl_C63 19-2007_Dec09_Dominion_RS 33-276 - Hi {> -15 dB (A|m)}

ATTACHMENT F
PRODUCT SAFETY CERTIFICATES OF COMPLIANCE

MET Laboratories, Inc. Safety Certifications - EMI - Telecom - Environmental Simulation - NRTL/NVLAP
901 Sheldon Drive · Cary, North Carolina 27513 · Ph: (919) 481-9319 or (800) 321-4655· Fax: (919) 481-6716

Certificate of Compliance

Mr. Jimmy Smith
Wyle Laboratories
7800 Highway 20 West
Huntsville, AL 35806

September 29, 2011

Our Reference: Job Number SAFN6470
Your Reference: P.O.# HSV0056830
Initial Review Date: September 27, 2011
Final Review Date: September 29, 2011

Dear Mr. Smith,

We have completed our referenced inspection in accordance with our Labeling program. The inspection included 1 total piece of equipment (unit) as noted below:

	Unit 1
Description	Evolution Tabulator System
Model	ICE2
Serial #	ICE2P1008
Manufacturer	Dominion Voting
Ratings	19Vdc, 6.31A
Mains P.S.	100-240V~, 50/60Hz, 1.8A
Standard(s)	UL 60950-1, 2nd Edition
Label #	155504

The equipment was evaluated in accordance with the applicable sections of UL 60950-1, 2nd Edition, and the Recommended Practice and Procedures for Unlabeled Electrical Equipment Evaluation, 1st Edition (ACES & ACIL). This evaluation is not intended as an endorsement of the equipment or approval of similar equipment.

This completes the work anticipated under our Evaluation Program. If you should have any questions, please do not hesitate to contact us.

Sincerely,

Jay Dunmire
Project Engineer
MET Southeast

Reviewed By,

Brad Collison
Managing Engineer
MET Southeast

The Nation's First Licensed Nationally Recognized Testing Laboratory

MET Laboratories, Inc. Safety Certifications - EMI - Telecom - Environmental Simulation - NRTL/NVLAP
901 Sheldon Drive · Cary, North Carolina 27513 · Ph: (919) 481-9319 or (800) 321-4655· Fax: (919) 481-6716

Certificate of Compliance

Mr. Jimmy Smith
Wyle Laboratories
7800 Highway 20 West
Huntsville, AL 35806

July 14, 2011

Our Reference:	Job Number SAFN6331
Your Reference:	P.O.# HSV0056702
Initial Review Date:	July 12, 2011
Final Review Date:	July 14, 2011

Dear Mr. Smith,

We have completed our referenced inspection in accordance with our Labeling program. The inspection included 1 total piece of equipment (unit) as noted below:

	Unit 1
Description	Precinct Tabulator System
Model	ImageCast Precinct Tabulator PCOS 320A
Serial #	WLDAFBH0018
Manufacturer	Dominion Voting
Ratings	20V~, 1Ø, 60Hz, 2000mA
Mains P.S.	120V~, 1Ø, 60Hz, 84W
Standard(s)	UL 60950-1, 2nd Edition
Label #	155503

The equipment was evaluated in accordance with the applicable sections of UL 60950-1, 2nd Edition, and the Recommended Practice and Procedures for Unlabeled Electrical Equipment Evaluation, 1st Edition (ACES & ACIL). This evaluation is not intended as an endorsement of the equipment or approval of similar equipment.

This completes the work anticipated under our Evaluation Program. If you should have any questions, please do not hesitate to contact us.

Sincerely,

Jay Dunmire
Project Engineer
MET Southeast

Reviewed By,

Brad Collison
Managing Engineer
MET Southeast

The Nation's First Licensed Nationally Recognized Testing Laboratory

ATTACHMENT G
INSTRUMENTATION EQUIPMENT SHEETS

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/20/2011 JOB NUMBER: T57381 TYPE OF TEST ACOUSTIC/HAC

TECHNICIAN: D. LEE CUSTOMER: DOMINION VOTING SYSTEM TEST AREA: PRODUCT SAFETY

No.	Description	Manufacturer	Model	Serial #	WYLE #	RANGE	ACCURACY	Cal Date	Cal Due
1	DRIVING CIRCUIT	COMPLIANCE DES	HAP100	003957	114360	20kH	±1%	10/20/2011	10/20/2014
2	FUNC GEN	AGILENT	33120A	MY40007922	110432	15 MHz	MFG	5/27/2011	5/27/2012
3	OSCILLOSCOPE	TEKTRONIX	TDS2022B	C010264	04615	MULTI	CERT	1/28/2011	1/28/2012
4	SOUND LVL MTR	EXTECH	407736	010305516	116831	35-130 dB	±1.5dB	7/27/2011	7/27/2012

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: Davinder 10/20/11 CHECKED & RECEIVED BY: 10/20/2011

Q.A.: 10/20/11

WH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 12/12/2011 JOB NUMBER: T57381.01 TYPE OF TEST TEMP CYCLE

TECHNICIAN: LARRY IVEY CUSTOMER: DOMINION TEST AREA: ENV CHAMBER 51 A

No.	Description	Manufacturer	Model	Serial #	WYLE #	RANGE	ACCURACY	Cal Date	Cal Due
1	DMM	FLUKE	87	64860172	112627	MULTI	±0.1%+1	8/10/2011	8/10/2012
2	POWER SUPPLY	PACIFIC POWER	345ASX-UPC3M	1101-05116	02553	0-135V 15-12(	MFG	3/8/2011	3/4/2012
3	TEMP	MICRISTAR	828-B11	10033	108416	-400-700°F	.1%FS	12/7/2011	12/6/2012
4	TEMP IND	NEWPORT	Q2001TC	N/A	116533	TYPE T	±1.5%	12/7/2011	12/6/2012
5	TEMP RECORDER	HONEYWELL	DR450T	924488505000	109830	-200-600°F	.4°F	12/7/2011	12/6/2012

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: Larry Ivey 12-12-11 CHECKED & RECEIVED BY: 12/12/11

Q.A.: 12/12/11

WH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/18/2011 JOB NUMBER: T57381 TYPE OF TEST BENCH HANDLING

TECHNICIAN: HIRAM BASS CUSTOMER: DOMINION VOTING SYSTEM TEST AREA: DYNAMICS LABORATORY

No.	Description	Manufacturer	Model	Serial #	WYLE #	RANGE	ACCURACY	Cal Date	Cal Due
1	RULER	PRODUCTION PRC	501-024	NSN	04472	24"	±1/32NDS	6/13/2007	6/12/2012

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

NSTRUMENTATION: Hiram Bass 10/18/11 CHECKED & RECEIVED BY: 10/18/2011

Q.A.: 10/18/11

VH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 9/19/2011 JOB NUMBER: T57381 TYPE OF TEST VSS SECT. 4.1.2.5

TECHNICIAN: G. NEELEY CUSTOMER: DOMINION TEST AREA: PRODUCT SAFETY

No.	Description	Manufacturer	Model	Serial #	WYLE #	RANGE	ACCURACY	Cal Date	Cal Due
1	POWER SOURCE	CALIFORNIA INST	1251P/232	L06627	115806	100-240VAC @	±2% FS	2/1/2011	2/1/2012

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: 09-20-11 CHECKED & RECEIVED BY: 9/20/11

Q.A.: 9/20/11

WH-1029A,REV,APR'99

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/5/2011 JOB NUMBER: T57381 TYPE OF TEST TEMP HUMIDITY

TECHNICIAN: T HARDMAN CUSTOMER: DOMINION VOTING TEST AREA: CH 2

No.	Description	Manufacturer	Model	Serial #	WYLE #	RANGE	ACCURACY	Cal Date	Cal Due
1	HUMIDITY	VAISALA	HMM30C	D413002	02197	0-100%RH	±5.0%RH	8/29/2011	2/29/2012
2	TEMP	THERMOTRON	SE12005	28417	114758	-70-180°C	0.3°C	2/8/2011	2/8/2012
3	TEMP RECORDER	HONEYWELL	DR4500A	9829Y836982(	114837	-184-371°C	.35°C	2/8/2011	2/8/2012

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION: [signature] 10-5-11

CHECKED & RECEIVED BY: [signature] 10/5/2011

Q.A.: [signature] 10/5/2011

WH-1029A,REV,APR'99

Page 1 of 1

wyle laboratories

INSTRUMENTATION EQUIPMENT SHEET

DATE: 10/18/2011 JOB NUMBER: T57381 TYPE OF TEST VIBRATION

TECHNICIAN: HIRAM BASS CUSTOMER: DOMINION VOTING SYSTEM TEST AREA: DYNAMICS LABORATORY

No.	Description	Manufacturer	Model	Serial #	WYLE #	RANGE	ACCURACY	Cal Date	Cal Due
1	ACCELEROMETER	ENDEVCO	7704A-50	12608	04868	50pC/g	±5%	7/27/2011	1/27/2012
2	ACCELEROMETER	ENDEVCO	7704A-50	12607	04869	50pC/g	±5%	7/27/2011	1/27/2012
3	CHARGE	ENDEVCO	2775A	EE42	112650	GAIN	1.5%	5/24/2011	11/20/2011
4	CHARGE	ENDEVCO	2775A	DN38	117798	GAIN	1.5%	8/29/2011	2/29/2012
5	DMM	KEITHLEY	179A	196804	101203	1200VDC	±.04%DC	2/4/2011	2/4/2012
6	DYN SIG	DATA PHYSICS C(	70499	10004048	02760	MULTI	MFG	5/4/2011	5/3/2012

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

NSTRUMENTATION: Hiram Bass 10/18/11 CHECKED & RECEIVED BY: [signature] 10/18/11

Q.A.: [signature] 10/18/11

VH-1029A,REV,APR'99

Page 1 of 1

ATTACHMENT H
EMC INTEGRITY TEST REPORT

emc integrity incorporated
www.emcintegrity.com
1736 Vista View Drive | Longmont, CO 80504 | tel: 303.776.7249 | fax: 303.776.7314 | info@emcintegrity.com

Test Report Number:	**TRA80606, Rev. A**
Report Type:	**Full Compliance Immunity**
Reference Standard:	**Dominion Voting Systems ImageCast Precinct Ballot Counter and Ballot Marker Hardware Test Plan for Compliance with NYSBOE Requirements and 2005 Voluntary Voting System Guidelines (VVSG), Version 1.1**
Date of Report:	**22 July 2008**
Product Name:	**ImageCast Precinct Ballot Counter and Ballot Marker**
Model Number:	**ImageCast Precinct Ballot Counter and Ballot Marker**
Serial Number:	**NYJBB8K1030**
Manufacturer:	**Dominion Voting Systems**
Representative:	**Shawn Singh (SysTest Labs)**
Approved By:	

NVLAP LAB CODE 200737-0

Nemko
ELA No. 215

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Prepared for:

Dominion Voting Systems
20 Mowat Ave., Suite 100
Toronto, Ontario, Canada M6K 3EB
Phone: (416) 762-8683
Contact: Aamer Chaudhry (x227)

Customer Representative:

Shawn Singh
Project Manager (SysTest Labs)

Tested at:

EMC Integrity, Inc.
1736 Vista View Drive
Longmont, Colorado 80504

Tested by:

Bill Norton
EMC Test Technician

Report Prepared by:

Mary Burback
Office Manager

Report Approved by:

Chris Poore
Laboratory Manager

Revision	Description of Revision	Date:
Rev. -	Initial Release	16 July 2008
Rev. A	Incorporated changes per client request	22 July 2008

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 TEST SUMMARY

1.1 Product Description

The unit under test (UUT) was the ImageCast Precinct Ballot Counter and Ballot Marker. The serial number tested was NYJBB8K1030. It is manufactured by Dominion Voting Systems located in Toronto, Ontario, Canada. This product is an electronic voting machine. The product was continually exercised during testing, as documented in the "configuration" field of the test data sheet. Additional information regarding this product may be found in the Hardware Test Plan, located in Appendix H of this report.

1.2 Immunity Test Standards Used

This product was tested to the levels specified in the Hardware Test Plan, authored by SysTest Labs. This test plan was based on NYSBOE Requirements and the 2005 Voluntary Voting System Guidelines (VVSG). The normative references of this standard define the test methods used for the immunity testing. This information is summarized in Tables 1-1.

Table 1-1

Requirement	Specification	Test Method	Performance Criteria
Dominion Voting Systems ImageCast Precinct Ballot Counter and Ballot Marker Hardware Test Plan for Compliance with NYSBOE Requirements and 2005 Voluntary Voting System Guidelines (VVSG), Version 1.1	Electrostatic Discharge	IEC 61000-4-2, Ed. 1.2, 2001-04	Note 2
	Radiated RF Immunity	IEC 61000-4-3:, Ed. 3.1, 2008-04	Note 1
	Electrical Fast Transient/Burst	IEC 61000-4-4, Ed. 2.0, 2004-07	Note 1
	Surge Immunity	IEC 61000-4-5, Ed. 2.0, 2005-11	Note 1
	Conducted RF Immunity	IEC 61000-4-6, Ed. 2.2, 2006-05	Note 1
	Power Frequency H-field Immunity	IEC 61000-4-8 Ed. 1.1 2001-03	Note 1
	Voltage Dips, Interrupts	IEC 61000-4-11, Ed. 2.0: 2004-03	Note 1

Note 1: The EUT shall be able to withstand the test without disruption of normal operation or loss of data.
Note 2: The EUT shall be able to withstand the test without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

1.3 Test Results

The UUT **complied** with all the immunity requirements defined by the hardware test plan. Test results are summarized in Table 1-2.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Table 1-2

Specification	Test Method	Test Conditions	Compliance
Electrostatic Discharge	IEC 61000-4-2	± 8 kV Contact / HCP, VCP / ± 15 kV Air	Compliant
Radiated RF Immunity	IEC 61000-4-3	80 - 1000 MHz, 10 V/m, 80% 1 kHz AM	Compliant
EFT/Burst	IEC 61000-4-4	± 1.0 kV I/O, ± 2.0 kV AC mains	Compliant
Surge Immunity	IEC 61000-4-5	± 2 kV common mode, ± 2 kV differential mode, AC mains	Compliant
Conducted RF Immunity	IEC 61000-4-6	150 kHz to 80 MHz, 10 Vrms, 80% 1 kHz AM, power and I/O	Compliant
Power Frequency H-field Immunity	IEC 61000-4-8	30 A/m, 50/60 Hz, 3 axes	Compliant
Voltage Dips and Interrupts	IEC 61000-4-11	30% dip: 10 msec 60% dip: 100 msec & 1 sec >95% dip: 5 seconds ±15% variation of nominal line voltage +7.5% & -12.5% variation of nominal power	Compliant

1.4 Modifications Required for Compliance

No modifications were required for compliance with immunity.

2.0 SCOPE

2.1 Purpose

This report documents the test efforts performed on the ImageCast Precinct Ballot Counter and Ballot Marker to verify compliance to Version 1.1 of the SysTest Hardware Test Plan. This was a formal qualification test and was conducted on the days of 16 through 18 June 2008.

2.2 Test Plan

Testing was performed in accordance with Version 1.1 of the SysTest Hardware Test Plan. This document defines the critical operational parameters for testing, as well as providing general product information, and is contained in Appendix J of this report.

2.3 Test Parameters

For RF immunity testing, the UUT was placed in a completely anechoic lined chamber (CALC). Support equipment was placed outside the CALC and I/O to the UUT was connected through a penetration panel.

Critical parameters of this product, which were monitored during testing, were defined by Version 1.1 of the SysTest Hardware Test Plan, contained in Appendix J of this report.

2.4 Definition of Performance Criterion for the UUT

The performance criteria for this product are defined in Version 1.1 of the SysTest Hardware Test Plan, contained in Appendix J of this report.

3.0 TEST ENVIRONMENT

3.1 Immunity Test Site

The immunity testing was performed at EMCI's test facility in Longmont, Colorado. The radiated field immunity testing was performed in a ferrite lined, shielded enclosure. The enclosure is 10' high x 12' wide x 20' long in size and meets the field uniformity requirements of IEC 61000-4-3. The size of the chamber allows 2-meter separation between the antenna and the UUT.

All other immunity testing was performed on a ground plane measuring approximately 3.0 meters by 4.5 meters (13.5 m^2) and made of 0.125" thick aluminum. The ground plane extended beyond the UUT by 0.5 meters on all sides, was bonded to the facility ground and configured in accordance with the applicable standards.

4.0 IEC 61000-4-2, Electrostatic Discharge

4.1 Summary of Test Results

Electrostatic discharge (ESD) testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-2. Contact discharge was performed at levels of ± 2 kV, ± 4 kV and ± 8 kV at applicable (conductive) test points. Air discharge was performed for non-conductive surfaces of the product at levels of ±2 kV, ± 4 kV, ± 8 kV and ± 15 kV. Indirect discharge to the horizontal coupling plane (HCP) and the vertical coupling plane (VCP) were also performed to levels of ± 2 kV, ± 4 kV and ± 8 kV.

The UUT exhibited no malfunctions or degradations in performance, and therefore, complies with the requirements of this test.

4.2 Test Setup

The UUT was set up per IEC 61000-4-2 and tested to the levels specified in Version 1.1 of the SysTest Hardware Test Plan.

4.3 Special Configurations

N/A

4.4 Performance Criteria – Note 2

The EUT shall be able to withstand the test without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

4.5 Deviations from Test Procedures

N/a

4.6 Test Data

See APPENDIX A for data sheets, discharge points and test setup pictures.

4.7 Temperature and Humidity

Temperature, relative humidity and barometric pressure are located in the header table for the IEC 61000-4-2 test data sheet.

5.0 IEC 61000-4-3, Radiated RF Immunity

5.1 Summary of Test Results

Radiated RF immunity testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-3. The UUT was placed on the ferrite floor of the completely anechoic-lined chamber. The frequency range for this testing was 80 - 1000 MHz. The UUT was placed 2 meters from the radiating antenna; which was 1.5 meters above the floor of the chamber. Testing was performed in both horizontal and vertical antenna polarizations. The frequency was incremented in 1% steps, with a 3 second dwell time for each test frequency. The UUT was rotated on the table so that all four sides were illuminated in the 10 V/m field. The field was amplitude modulated with a 1 kHz sine wave to a depth of 80%. In addition, the UUT was tested for a 900 MHz field, pulse modulated at a frequency of 200 Hz with a 50% duty cycle. Performance of the unit was monitored with a video camera.

During all testing, the UUT exhibited no malfunctions and operated within specified tolerances and therefore, complies with the requirements of this test.

5.2 Test Setup

The UUT was set up per IEC 61000-4-3 and tested to the levels specified in Version 1.1 of the SysTest Hardware Test Plan.

5.3 Special Configurations

N/A

5.4 Performance Criteria – Note 1

The EUT shall be able to withstand the test without disruption of normal operation or loss of data.

5.5 Deviations from Test Procedures

N/a

5.6 Test Data

See APPENDIX B for data sheets and test setup pictures.

5.7 Temperature and Humidity

Temperature, relative humidity and barometric pressure are located in the header table for the IEC 61000-4-3 test data sheet.

6.0 IEC 61000-4-4, Electrical Fast Transient/Burst

6.1 Summary of Test Results

Electrical fast transient/burst immunity testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-4. The UUT AC power was tested via direct injection at a level of ± 2.0 kV. As the UUT had no external I/O greater than 3 meters in length, no I/O testing was performed.

During all testing, the UUT exhibited no malfunctions and operated within specified tolerances and therefore, complies with the requirements of this test.

6.2 Test Setup

The UUT was set up per IEC 61000-4-4 and tested to the levels per Version 1.1 of the SysTest Hardware Test Plan.

6.3 Special Configurations

N/A

6.4 Performance Criteria – Note 1

The EUT shall be able to withstand the test without disruption of normal operation or loss of data.

6.5 Deviations from Test Procedures

N/a.

6.6 Test Data

See APPENDIX C for data sheet and test setup pictures.

6.7 Temperature and Humidity

Temperature, relative humidity and barometric pressure are located in the header table for the IEC 61000-4-4 test data sheet.

7.0 IEC 61000-4-5, Surge Immunity

7.1 Summary of Test Results

Surge immunity testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-5. The UUT AC power was tested via direct injection at levels of ±0.5 kV, ±1.0 kV and ±2.0 kV for differential mode and at levels of ±0.5 kV, ±1.0 kV and ±2.0 kV for common mode. Surges were injected at 0 degrees, 90 degrees, 180 degrees and 270 degrees of the input AC waveform at a rate of one pulse per minute. Five pulses were injected for each test configuration.

During all testing, the UUT exhibited no malfunctions or degradations in performance and therefore complies with the requirements of the test.

7.2 Test Setup

The UUT was set up per IEC 61000-4-5 and tested to the levels specified in Version 1.1 of the SysTest Hardware Test Plan.

7.3 Special Configurations

N/A

7.4 Performance Criteria – Note 1

The EUT shall be able to withstand the test without disruption of normal operation or loss of data.

7.5 Deviations from Test Procedures

N/A

7.6 Test Data

See APPENDIX D for data sheets and test setup pictures.

7.7 Temperature and Humidity

Temperature, relative humidity and barometric pressure are located in the header table for the IEC 61000-4-5 test data sheet.

8.0 IEC 61000-4-6, Conducted RF Immunity

8.1 Summary of Test Results

Conducted RF immunity testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-6. The UUT was subjected to injected RF signals on its input AC power cable. Injection on the AC leads was performed via a coupling/decoupling network (CDN). As the UUT had no I/O cabling greater than 3 meters in length, no I/O testing was performed. The frequency range for this testing was 150 kHz to 80 MHz. The test frequency was stepped in 1% increments with a three second dwell time for each injection frequency. The injection level used for all testing was 10 Vrms with 1 kHz AM to a depth of 80%.

At no time did the UUT exhibit any malfunctions or degradations in performance; thus, the UUT passed all portions of this test.

8.2 Test Setup

The UUT was set up per IEC 61000-4-6 and tested to the levels specified in Version 1.1 of the SysTest Hardware Test Plan.

8.3 Special Configurations

N/A

8.4 Performance Criteria – Note 1

The EUT shall be able to withstand the test without disruption of normal operation or loss of data.

8.5 Deviations from Test Procedures

N/A

8.6 Test Data

See APPENDIX E for data sheets and test setup pictures.

8.7 Temperature and Humidity

Temperature, relative humidity and barometric pressure are located in the header table for the IEC 61000-4-6 test data sheet.

9.0 IEC 61000-4-8, Power Frequency H-field Immunity

9.1 Summary of Test Results

Power frequency H-field immunity testing was performed on the UUT in accordance with the test methods specified by IEC 61000-4-8. The UUT was exposed to a 1 A/m field at both 50 and 60 Hz. All three axes (x, y, and z) were subjected to the field for a period of 60 seconds for each configuration. A 13-cm coil was used for this test and the proximity method was used.

These magnetic fields had no effect on the UUT, which passed the requirements of this test.

9.2 Test Setup

The UUT was set up per IEC 61000-4-8 and tested to the levels specified in Version 1.1 of the SysTest Hardware Test Plan.

9.3 Special Configurations

N/A

9.4 Performance Criteria – Note 1

The EUT shall be able to withstand the test without disruption of normal operation or loss of data.

9.5 Deviations from Test Procedures

N/A

9.6 Test Data

See APPENDIX F for data sheets and test setup pictures.

9.7 Temperature and Humidity

Temperature, relative humidity and barometric pressure are located in the header table for the IEC 61000-4-8 test data sheet.

10.0 IEC 61000-4-11, Voltage Dips and Interrupts

10.1 Summary of Test Results

Voltage dip and interrupt testing was performed on the UUT in accordance with IEC 61000-4-11. The UUT was subjected to the following voltage fluctuations on its AC power input:

30% dip: 10 msec
60% dip: 100 msec & 1 sec
>95% dip: 5 seconds
±15% variation of nominal line voltage
+7.5% & -12.5% variation of nominal power

These variations in AC line voltage had no effect on the UUT, which passed the requirements of this test. (It should be noted that the UUT was equipped with a UPS.)

10.2 Test Setup

The UUT was set up per IEC 61000-4-11 and tested to the levels specified in Version 1.1 of the SysTest Hardware Test Plan.

10.3 Special Configurations

N/A

10.4 Performance Criteria – Note 1

The EUT shall be able to withstand the test without disruption of normal operation or loss of data.

10.5 Deviations from Test Procedures

N/A

10.6 Test Data

See APPENDIX G for data sheets and test setup pictures.

10.7 Temperature and Humidity

Temperature, relative humidity and barometric pressure are located in the header table for the IEC 61000-4-11 test data sheet.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX A

Electrostatic Discharge Test Data

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008
Temperature:	20°C Humidity: 53%	Pressure:	841mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-2.doc FR0100

Test Location	Voltage Level (kV)	Polarity +	Polarity -	Number of Pulses	Pulses Per Second	Comments	Criteria Met	Pass / Fail
Indirect Discharge Points								
VCP	2, 4, 6, 8	x	x	10	1	Front Side	A	Pass
VCP	2, 4, 6, 8	x	x	10	1	Left Side	A	Pass
VCP	2, 4, 6, 8	x	x	10	1	Right Side	A	Pass
VCP	2, 4, 6, 8	x	x	10	1	Back Side	A	Pass
VCP	2, 4, 6, 8	x	x	10	1	Top Side	A	Pass
Not Performed on EUT because it is a floor mounted unit.								
HCP	2, 4, 6, 8	x	x	10	1	Edge of HCP at Front of UUT	---	---
Contact Discharge Points - **RED** Arrows.								
Figure A2	2, 4, 6, 8	x	x	10	1	At all Contact Voltages at various points on all figures EUT gave a warning and incorrect ballot reading, but EUT self recovers.	B	Pass
Figure A3	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A4	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A5	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A6	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A7	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A8	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A9	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A10	2, 4, 6, 8	x	x	10	1		B	Pass
Figure A11	2, 4, 6, 8	x	x	10	1		B	Pass
Air Discharge Points - **BLUE** Arrows.								
Figure A2	2, 4, 8, 15	x	x	10	1	No Discharges	---	---
Figure A3	2, 4, 8, 15	x	x	10	1	No Discharges	---	---
Figure A4	2, 4, 8, 15	x	x	10	1	No Discharges	---	---
Figure A5	2, 4, 8, 15	x	x	10	1	No Discharges	---	---
Figure A6	2, 4, 8, 15	x	x	10	1	No Discharges	---	---
Figure A7	2, 4, 8, 15	x	x	10	1	Discharges at +/-8, 15kV At all Contact Voltages at various points on all figures EUT gave a warning and incorrect ballot reading, but EUT self recovers.	B	Pass
Figure A8	2, 4, 8, 15	x	x	10	1		B	Pass
Figure A9	2, 4, 8, 15	x	x	10	1		B	Pass
Figure A10	2, 4, 8, 15	x	x	10	1		B	Pass
Figure A11	2, 4, 8, 15	x	x	10	1		B	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

Figure A1. Electrostatic Discharge Test Setup.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

Figure A2. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

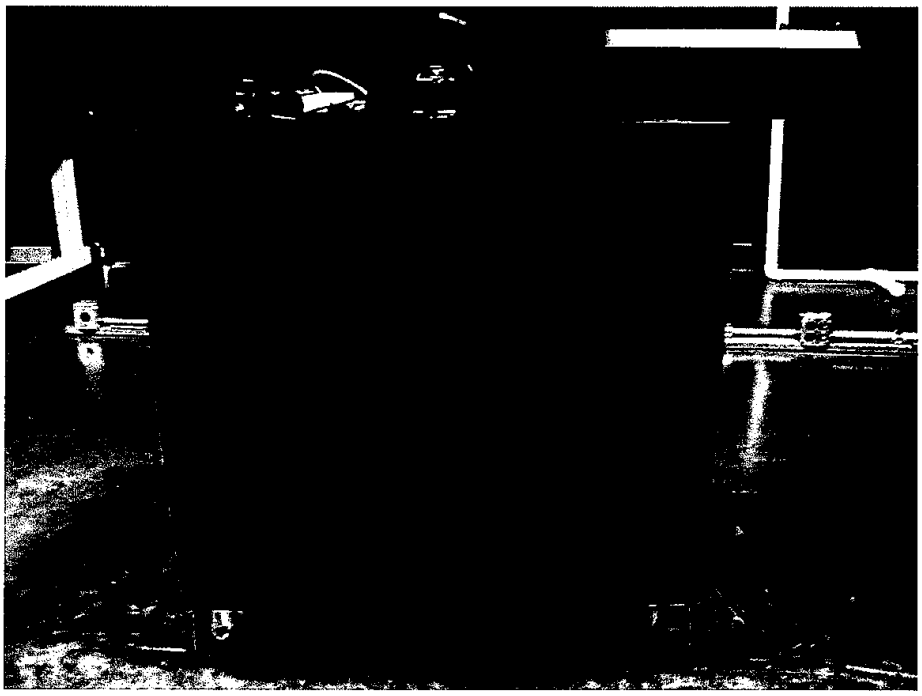


Figure A3. Electrostatic Discharge Test Points.

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

Figure A4. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

Figure A5. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

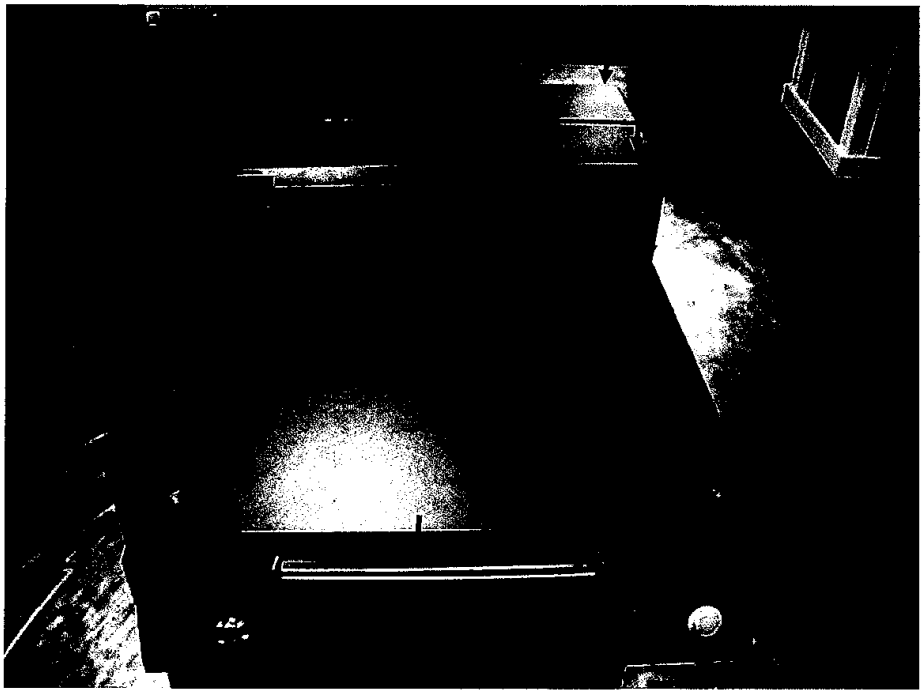


Figure A6. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

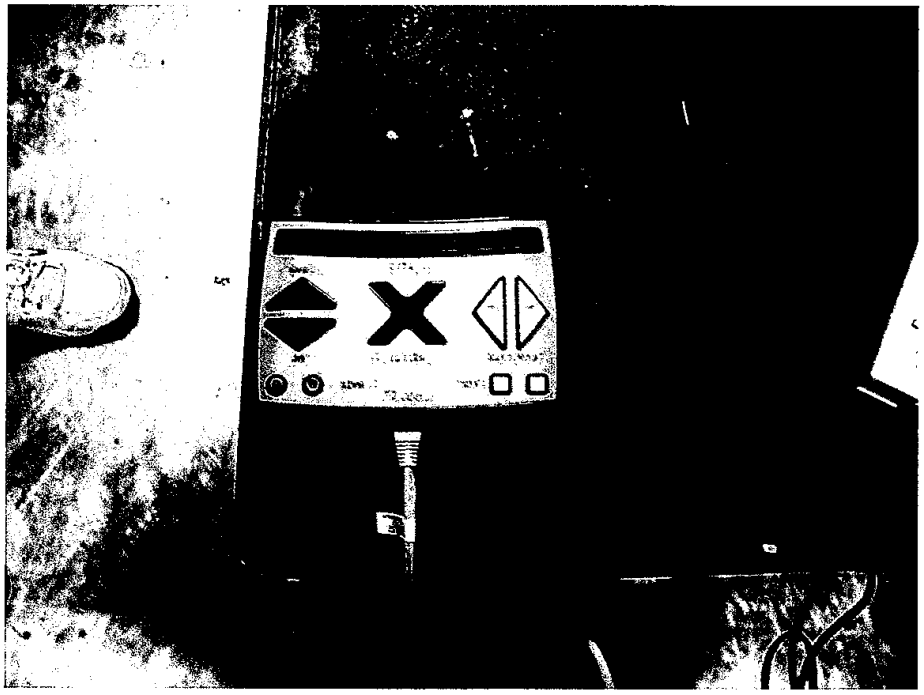


Figure A7. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emci
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

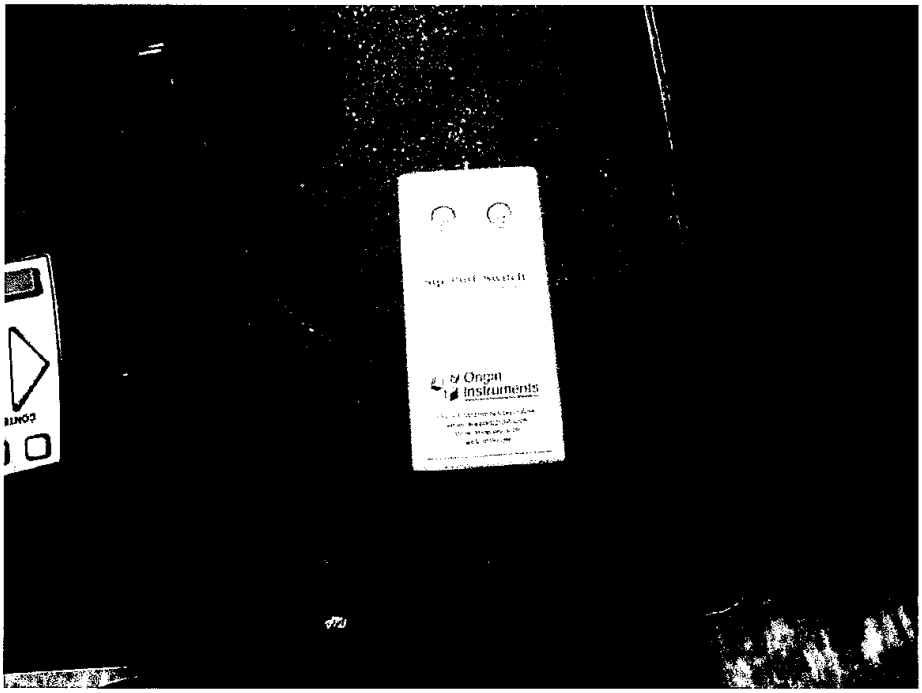


Figure A8. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emci
emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

Figure A9. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

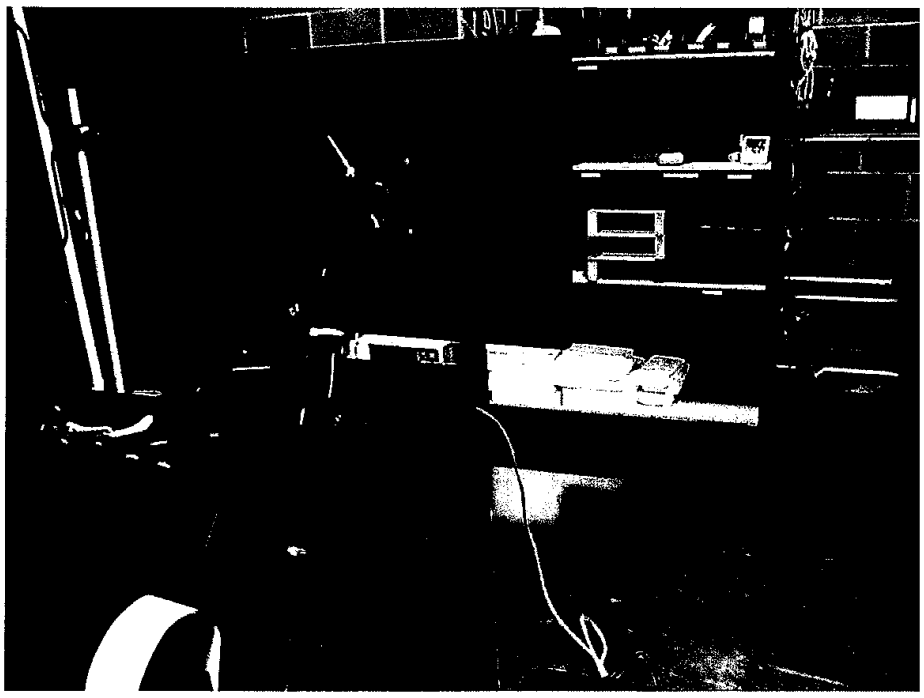


Figure A10. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

Figure A11. Electrostatic Discharge Test Points.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrostatic Discharge per IEC / EN 61000-4-2

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-2.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1015	KeyTek	MZ-15/EC	0010280	Mini Zap ESD Gun	12/13/2007	12/13/2008
1272	EXTECH	445715	NA	Hygro-Thermometer	01/18/2008	01/18/2009

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX B

Radiated RF Immunity Test Data

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Radiated RF Immunity per IEC / EN 61000-4-3

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	CALC
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 18, 2008
Temperature:	24°C Humidity: 44%	Pressure:	838mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-3.doc FR0100

Frequency (MHz)	Modulation Type	%	Freq	Form	Field (V/m)	Polarity (V or H)	Dwell (sec)	Comments	Criteria Met	Pass / Fail
80 - 1000	AM	80	1kHz	Sine	10	V	3	Front Side	A	Pass
140	AM	80	1kHz	Sine	10	V	10		A	Pass
900	AM	99	200Hz	Square	10	V	10		A	Pass
80 - 1000	AM	80	1kHz	Sine	10	H	3		A	Pass
140	AM	80	1kHz	Sine	10	H	10		A	Pass
900	AM	99	200Hz	Square	10	H	10		A	Pass
80 - 1000	AM	80	1kHz	Sine	10	V	3	Right Side	A	Pass
140	AM	80	1kHz	Sine	10	V	10		A	Pass
900	AM	99	200Hz	Square	10	V	10		A	Pass
80 - 1000	AM	80	1kHz	Sine	10	H	3		A	Pass
140	AM	80	1kHz	Sine	10	H	10		A	Pass
900	AM	99	200Hz	Square	10	H	10		A	Pass
80 - 1000	AM	80	1kHz	Sine	10	V	3	Back Side	A	Pass
140	AM	80	1kHz	Sine	10	V	10		A	Pass
900	AM	99	200Hz	Square	10	V	10		A	Pass
80 - 1000	AM	80	1kHz	Sine	10	H	3		A	Pass
140	AM	80	1kHz	Sine	10	H	10		A	Pass
900	AM	99	200Hz	Square	10	H	10		A	Pass
80 - 1000	AM	80	1kHz	Sine	10	V	3	Left Side	A	Pass
140	AM	80	1kHz	Sine	10	V	10		A	Pass
900	AM	99	200Hz	Square	10	V	10		A	Pass
80 - 1000	AM	80	1kHz	Sine	10	H	3		A	Pass
140	AM	80	1kHz	Sine	10	H	10		A	Pass
900	AM	99	200Hz	Square	10	H	10		A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Radiated RF Immunity per IEC / EN 61000-4-3

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	CALC
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 18, 2008

A80606-4-3.doc FR0100

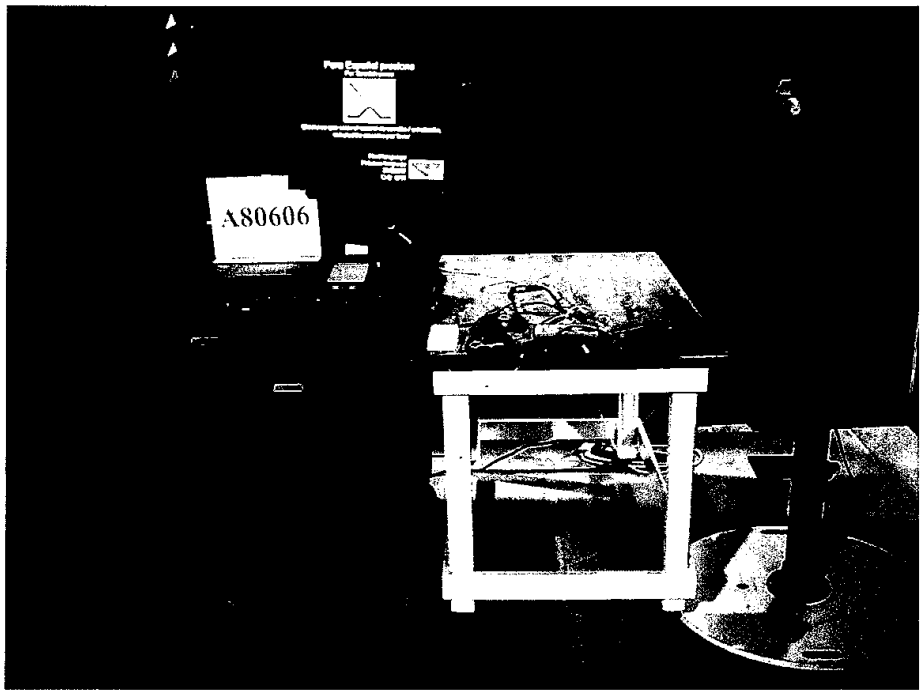


Figure B1. Radiated RF Immunity Test Setup – Front Side.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Radiated RF Immunity per IEC / EN 61000-4-3

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	CALC
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 18, 2008

A80606-4-3.doc FR0100

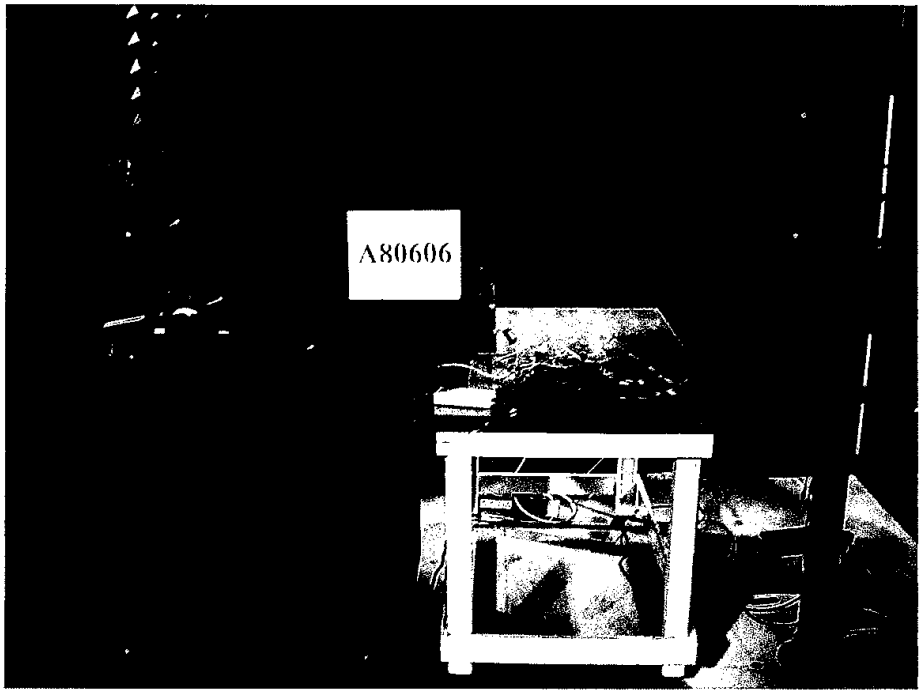


Figure B2. Radiated RF Immunity Test Setup – Right Side.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Radiated RF Immunity per IEC / EN 61000-4-3

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	CALC
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 18, 2008

A80606-4-3.doc FR0100

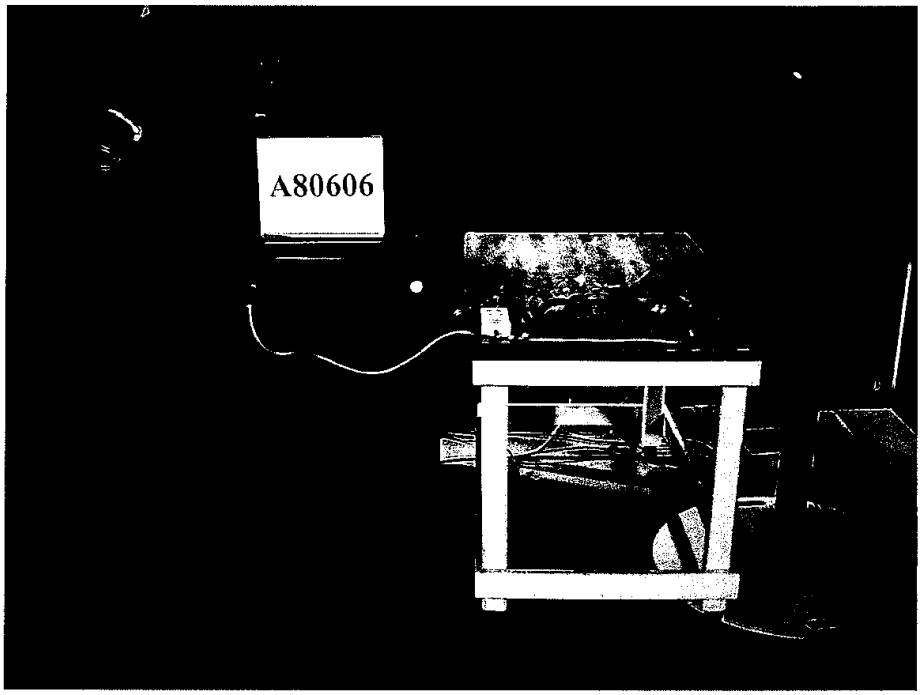


Figure B3. Radiated RF Immunity Test Setup – Back Side.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Radiated RF Immunity per IEC / EN 61000-4-3

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	CALC
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 18, 2008

A80606-4-3.doc FR0100

Figure B4. Radiated RF Immunity Test Setup – Left Side.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Radiated RF Immunity per IEC / EN 61000-4-3

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	CALC
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 18, 2008

A80606-4-3.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1005	EMCO	3140	1012	Biconilog Antenna	NA	NA
1056	Marconi	2041	119332/001	Signal Generator 10kHz - 2.7GHz	01/30/2008	01/30/2009
1058	Ray Proof	RF Shield Room	6698	Completely Anechoic Lined Chamber	05/22/2008	05/22/2009
1061	Stanford Research Systems	DS345	29373	30 MHz Function Generator	07/24/2007	07/24/2008
1181	EMCI	RFS	NA	Release 02 July 2004	NA	NA
1192	Amplifier Research	FP4000	308963	RF Field Probe 10 KHz - 1GHz	01/28/2008	01/28/2009
1206	Extech	445715	252866	Hygro-Thermometer	04/10/2008	04/10/2009
1250	OPHIR	5127F	1034	RF Power Amplifier 20-1000MHz, 200 Watts	NA	NA

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX C

Electrical Fast Transients/Burst Test Data

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrical Fast Transient/Burst per IEC / EN 61000-4-4

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008
Temperature:	20°C Humidity: 60%	Pressure:	841mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-4.doc FR0100

Voltage (kV)	Polarity +	Polarity -	Time (sec)	Injection Type	L 1	L 2	L 3	N	P E	Comments	Criteria Met	Pass / Fail
2.0	x		60	CDN	x					AC	A	Pass
2.0		x	60	CDN	x						A	Pass
2.0	x		60	CDN				x			A	Pass
2.0		x	60	CDN				x			A	Pass
2.0	x		60	CDN					x		A	Pass
2.0		x	60	CDN					x		A	Pass
2.0	x		60	CDN	x			x	x		A	Pass
2.0		x	60	CDN	x			x	x		A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrical Fast Transient/Burst per IEC / EN 61000-4-4

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-4.doc FR0100

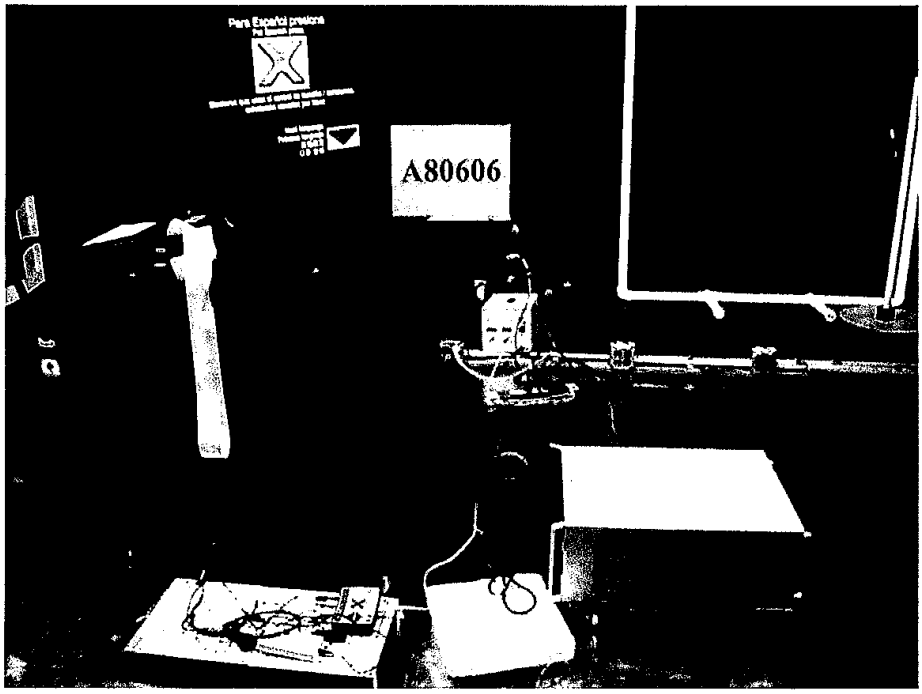


Figure C1. Electrical Fast Transient Test Setup – AC Mains.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Electrical Fast Transient/Burst per IEC / EN 61000-4-4

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-4.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1013	KeyTek	EMC Pro	0008347	Advanced EMC Immunity Tester	12/20/2007	12/20/2008
1184	KeyTek	CEWare32	NA	KeyTek EMCPro Control Software for EFT, Surge, H-F	NA	NA
1272	EXTECH	445715	NA	Hygro-Thermometer	01/18/2008	01/18/2009

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX D

Surge Immunity Test Data

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emci
emc integrity incorporated

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 17, 2008
Temperature:	22°C Humidity: 46%	Pressure:	840mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-5.doc FR0100

Voltage (kV)	Polarity +	Polarity -	L 1	L 2	L 3	N	P E	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
0.5	x		x			x		0	5	30	Differential Mode	A	Pass
0.5		x	x			x		0	5	30		A	Pass
0.5	x		x			x		90	5	30		A	Pass
0.5		x	x			x		90	5	30		A	Pass
0.5	x		x			x		180	5	30		A	Pass
0.5		x	x			x		180	5	30		A	Pass
0.5	x		x			x		270	5	30		A	Pass
0.5		x	x			x		270	5	30		A	Pass
0.5	x		x				x	0	5	30	Common Mode Line	A	Pass
0.5		x	x				x	0	5	30		A	Pass
0.5	x		x				x	90	5	30		A	Pass
0.5		x	x				x	90	5	30		A	Pass
0.5	x		x				x	180	5	30		A	Pass
0.5		x	x				x	180	5	30		A	Pass
0.5	x		x				x	270	5	30		A	Pass
0.5		x	x				x	270	5	30		A	Pass
0.5	x					x	x	0	5	30	Common Mode Neutral	A	Pass
0.5		x				x	x	0	5	30		A	Pass
0.5	x					x	x	90	5	30		A	Pass
0.5		x				x	x	90	5	30		A	Pass
0.5	x					x	x	180	5	30		A	Pass
0.5		x				x	x	180	5	30		A	Pass
0.5	x					x	x	270	5	30		A	Pass
0.5		x				x	x	270	5	30		A	Pass
1.0	x		x			x		0	5	60	Differential Mode	A	Pass
1.0		x	x			x		0	5	60		A	Pass
1.0	x		x			x		90	5	60		A	Pass
1.0		x	x			x		90	5	60		A	Pass
1.0	x		x			x		180	5	60		A	Pass
1.0		x	x			x		180	5	60		A	Pass
1.0	x		x			x		270	5	60		A	Pass
1.0		x	x			x		270	5	60		A	Pass
1.0	x		x				x	0	5	45	Common Mode Line	A	Pass
1.0		x	x				x	0	5	45		A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 17, 2008
Temperature:	22°C Humidity: 46%	Pressure:	840mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-5.doc FR0100

Voltage (kV)	Polarity +	Polarity -	L 1	L 2	L 3	N	PE	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
1.0	x		x				x	90	5	45		A	Pass
1.0		x	x				x	90	5	45		A	Pass
1.0	x		x				x	180	5	45		A	Pass
1.0		x	x				x	180	5	45		A	Pass
1.0	x		x				x	270	5	45		A	Pass
1.0		x	x				x	270	5	45		A	Pass
1.0	x					x	x	0	5	45	Common Mode Neutral	A	Pass
1.0		x				x	x	0	5	45		A	Pass
1.0	x					x	x	90	5	45		A	Pass
1.0		x				x	x	90	5	45		A	Pass
1.0	x					x	x	180	5	45		A	Pass
1.0		x				x	x	180	5	45		A	Pass
1.0	x					x	x	270	5	45		A	Pass
1.0		x				x	x	270	5	45		A	Pass
2.0	x		x			x		0	5	60	Differential Mode	A	Pass
2.0		x	x			x		0	5	60		A	Pass
2.0	x		x			x		90	5	60		A	Pass
2.0		x	x			x		90	5	60		A	Pass
2.0	x		x			x		180	5	60		A	Pass
2.0		x	x			x		180	5	60		A	Pass
2.0	x		x			x		270	5	60		A	Pass
2.0		x	x			x		270	5	60		A	Pass
2.0	x		x				x	0	5	60	Common Mode Line	A	Pass
2.0		x	x				x	0	5	60		A	Pass
2.0	x		x				x	90	5	60		A	Pass
2.0		x	x				x	90	5	60		A	Pass
2.0	x		x				x	180	5	60		A	Pass
2.0		x	x				x	180	5	60		A	Pass
2.0	x		x				x	270	5	60		A	Pass
2.0		x	x				x	270	5	60		A	Pass
2.0	x					x	x	0	5	60	Common Mode Neutral	A	Pass
2.0		x				x	x	0	5	60		A	Pass
2.0	x					x	x	90	5	60		A	Pass
2.0		x				x	x	90	5	60		A	Pass
2.0	x					x	x	180	5	60		A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 17, 2008
Temperature:	22°C Humidity: 46%	Pressure:	840mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-5.doc FR0100

Voltage (kV)	Polarity +	Polarity -	L 1	L 2	L 3	N	PE	Phase (deg)	Number of Pulses	Delay (sec)	Comments	Criteria Met	Pass / Fail
2.0		x				x	x	180	5	60		A	Pass
2.0	x					x	x	270	5	60		A	Pass
2.0		x				x	x	270	5	60		A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 17, 2008

A80606-4-5.doc FR0100

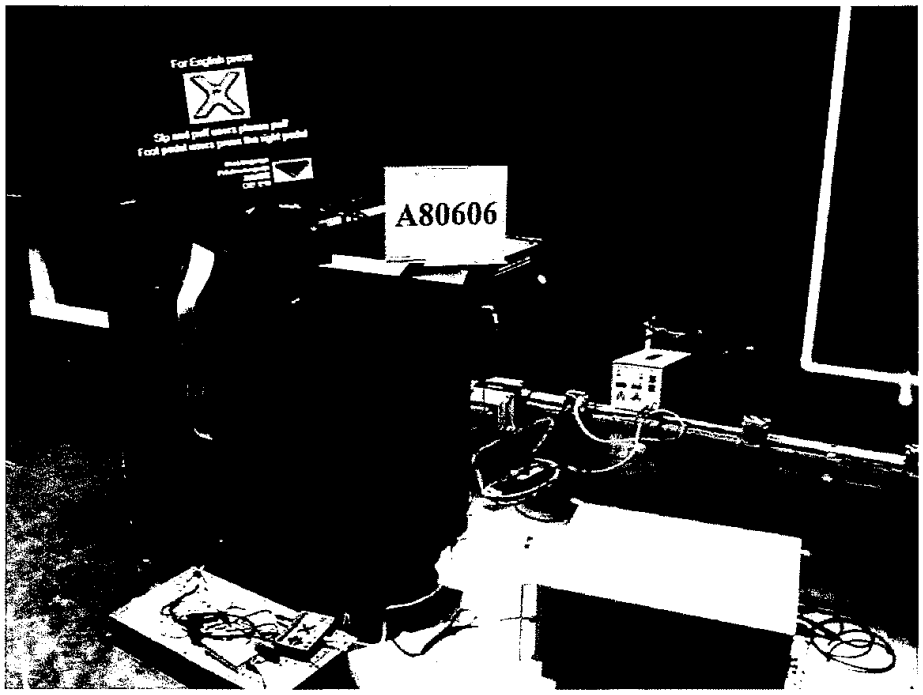


Figure D1. Surge Immunity Test Setup – AC Mains.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Surge Immunity per IEC / EN 61000-4-5

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 17, 2008

A80606-4-5.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1013	KeyTek	EMC Pro	0008347	Advanced EMC Immunity Tester	12/20/2007	12/20/2008
1184	KeyTek	CEWare32	NA	KeyTek EMCPro Control Software for EFT, Surge, H-F	NA	NA
1272	EXTECH	445715	NA	Hygro-Thermometer	01/18/2008	01/18/2009

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX E

Conducted RF Immunity Test Data

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008
Temperature:	20°C Humidity: 60%	Pressure:	841mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-6.doc FR0100

Frequency (MHz)	Modulation			Level (Vrms)	Dwell (sec)	Comments	Criteria Met	Pass / Fail
	Type	%	Freq					
0.150 – 80.0	AM	80	1 kHz	10	3	AC using M3 CDN	A	Pass
Spot Frequencies	AM	80	1 kHz	10	10	Client Test Plan Section 4.4	A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-6.doc FR0100

Figure E1. Conducted RF Immunity Test Setup.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-6.doc FR0100

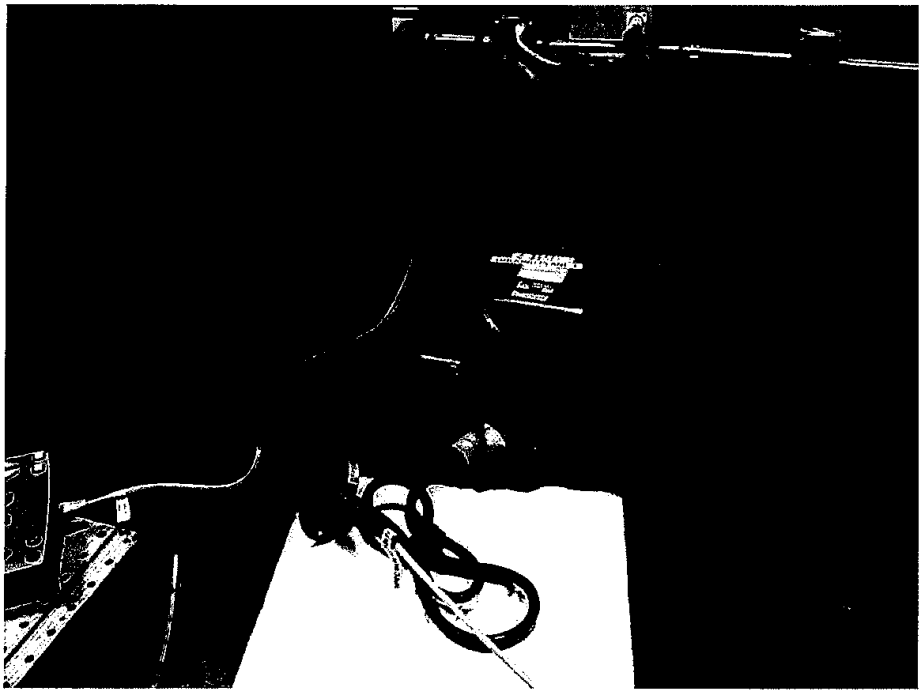


Figure E2. Conducted RF Immunity Test Setup – AC Mains.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Conducted RF Immunity per IEC / EN 61000-4-6

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-6.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1047	Hewlett Packard	8591A	2943A00554	Spectrum Analyzer, 9 kHz - 1.8 GHz w/ Tracking Gen	11/15/2007	11/15/2008
1080	Fischer Custom	F-33-1	592	Current Probe (10 kHz - 230 MHz)	08/27/2007	08/27/2008
1181	EMCI	RFS	NA	Release 02 July 2004	NA	NA
1226	EMCI	EMCI-CDN-M3-16	EMCI011	M3 CDN, 16A, 250 VAC	09/10/2007	09/10/2008
1258	Hewlett Packard	8648C	3537A01572	Signal Generator, 100kHz to 3.2GHz	05/09/2008	05/09/2009
1272	EXTECH	445715	NA	Hygro-Thermometer	01/18/2008	01/18/2009
1274	IFI	M100	L594-0108	100W Power Amplifier, 0.01 MHz to 220 MHz	NA	NA

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX F

Power Frequency H-field Test Data

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008
Temperature:	22°C Humidity: 60%	Pressure:	841mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-8.doc FR0100

Frequency (Hz) 50	Frequency (Hz) 60	Field Strength (A/m)	EUT Location	Dwell Time (sec)	Comments	Criteria Met	Pass / Fail
x		30	Ballot Marker	60		A	Pass
	x	30	Ballot Marker	60		A	Pass
x		30	Ballot Counter	60		A	Pass
	x	30	Ballot Counter	60		A	Pass
x		30	Monitor	60		A	Pass
	x	30	Monitor	60		A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-8.doc FR0100

Figure F1. Power Frequency H-field Immunity Test Setup.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Power Frequency H-field Immunity per IEC / EN 61000-4-8

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-8.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1013	KeyTek	EMC Pro	0008347	Advanced EMC Immunity Tester	12/20/2007	12/20/2008
1059	Solar	7429-1	NA	RS01 Loop	NA	NA
1272	EXTECH	445715	NA	Hygro-Thermometer	01/18/2008	01/18/2009

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX G

Voltage Dip and Interrupts Test Data

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Voltage Dips and Interrupts per IEC / EN 61000-4-11

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008
Temperature:	21°C Humidity: 59%	Pressure:	841mb
Input Voltage:	120VAC/60Hz		
Configuration of Unit:	Scanning Ballots		
Test Engineer:	Bill Norton		

A80606-4-11.doc FR0100

% Nominal	No. of Seconds	Phase Angle (deg) 0	90	180	270	Time between dropouts (sec)	Number of tests	Comments	Criteria Met	Pass / Fail
70%	0.01	x				10	3		A	Pass
70%	0.01		x			10	3		A	Pass
70%	0.01			x		10	3		A	Pass
70%	0.01				x	10	3		A	Pass
40%	0.10	x				10	3		A	Pass
40%	0.10		x			10	3		A	Pass
40%	0.10			x		10	3		A	Pass
40%	0.10				x	10	3		A	Pass
40%	1	x				10	3		A	Pass
40%	1		x			10	3		A	Pass
40%	1			x		10	3		A	Pass
40%	1				x	10	3		A	Pass
0%	5	x				10	3	EUT is on a UPS, so	A	Pass
0%	5			x		10	3	power was not interrupted.	A	Pass
138VAC Line Voltage Variations (+15%)									A	Pass
102VAC Line Voltage Variations (-15%)									A	Pass
Increase in Voltage by +7.5% = 129VAC									A	Pass
Decrease in Voltage by -12.5% = 105VAC									A	Pass

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Voltage Dips and Interrupts per IEC / EN 61000-4-11

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-11.doc FR0100

Figure G1. Voltage Dips and Interruptions Test Setup.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

Voltage Dips and Interrupts per IEC / EN 61000-4-11

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Customer Representative:	Shawn Singh	Test Area:	GP 1
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NJJBB8K1030
Standard Referenced:	SysTest Dominion Voting System Test Plan	Date:	June 16, 2008

A80606-4-11.doc FR0100

Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1013	KeyTek	EMC Pro	0008347	Advanced EMC Immunity Tester	12/20/2007	12/20/2008
1026	California Instruments	5001iX	55638	AC Power Source, 5kVA	NA	NA
1182	Tektronics	TDS1002	C043193	60 MHz Digital Oscilloscope	08/02/2007	08/02/2008
1184	KeyTek	CEWare32	NA	KeyTek EMCPro Control Software for EFT, Surge, H-F	NA	NA
1272	EXTECH	445715	NA	Hygro-Thermometer	01/18/2008	01/18/2009

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX H

Hardware Test Plan

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Table of Contents

List of Tables

1.0 Introduction

1.1 Overview

This test plan covers the Environmental and EMC (Electromagnetic Compatibility) test requirements and methods for the Dominion ImageCast Precinct Ballot Counter and Ballot Marker, hereafter known as the Equipment Under Test (EUT).

1.2 Qualifications

The EUT supplied by Dominion is representative of product produced in their volume manufacturing process.

1.3 Client

Dominion
20 Mowat Ave. Suite 100
Toronto, Ontario, Canada M6K 3EB

1.4 Company Restricted Information

This document contains confidential and restricted information and shall not be reproduced outside of SysTest Labs Inc. without written consent.

This document must be reproduced in whole unless written consent has been attained from SysTest Labs Inc.

1.5 Reference Documents

1) Election Assistance Commission 2005 Voluntary Voting System Guidelines Vol I Version 1.0
2) Election Assistance Commission 2005 Voluntary Voting System Guidelines Vol II Version 1.0

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Dominion
Ballot Counter and Ballot Marker Hardware Test Plan

2.0 Environmental Test Matrix

Table 1: Environmental tests

Applicable	Item	VVSG Reference	Comments
X	Safety	IEC 60950-1	
Non-Operating Environmental Tests			
X	Dust and Rain	NA	NYS Requirement 6209.2.E
X	Bench Handling Test	V2 4.6.2	
X	Vibration Test	V2 4.6.3	
X	Low Temperature Test	V2 4.6.4	
X	High Temperature Test	V2 4.6.5	
X	Humidity Test	V2 4.6.6	
Operating Environmental Tests			
X	Electrical Supply	V1 4.1.2.4	
X	Temperature/Power Variation	V2 4.7.1	
X	Reliability Tests	V2 4.7.3	

Dominion Ballot Counter and Ballot Marker Hardware Test Plan V 1.1 SysTest Labs Inc. Page 4 of 21

3.0 EMC Test Matrix

Table 2: EMC Tests

Applicable	Test Name	Test Name	Test Specification	VVSG Reference	Requirement	Comments
Electromagnetic Emissions Tests						
X	Radiated Electromagnetic Emissions	Radiated Electromagnetic Emissions	FCC, Part 15 ANSI C63.4	V1, 4.1.2.9 V2, 4.8	Class B	[redacted]
X	Conducted Electromagnetic Emissions	Conducted Electromagnetic Emissions	FCC, Part 15 ANSI C63.4	V1, 4.1.2.9 V2, 4.8	Class B	
Electromagnetic Immunity Tests						
X	Electrostatic Disruption	Electrostatic Disruption	IEC 61000-4-2 (1995-01)	V1, 4.1.2.8 V2, 4.8	±8kV contact, ±15kV air discharge	
X	Electromagnetic Susceptibility	Electromagnetic Susceptibility	IEC 61000-4-3 (1996)	V14.1.2.10 V2, 4.8	A field of 10 V/m modulated by a 1 kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz	
X	Electrical Fast Transient	Electrical Fast Transient	IEC 61000-4-4 (1995-01)	V1, 4.1.2.6 V2, 4.8	±2kV AC & DC external power lines ±1kV all external wires control Repetition Rate for all transient pulses will be 100 kHz	[redacted]
X	Lightning Surge	Lightning Surge	IEC 61000-4-5 (1995-02)	V1, 4.1.2.7 V2, 4.8	±2 kV AC line to line; ±2 kV AC line to earth; ±0.5 kV DC line to line >10m; ±0.5 kV DC line to earth >10m; and ±1 kV I/O sig/control >30m.	[redacted]
X	Conducted RF Immunity	Conducted RF Immunity	IEC 61000-4-6 (1996-04)	V1, 4.1.2.11 V2, 4.8	10V rms over the frequency range 150 KHz to 80 MHz with an 80% amplitude modulation with a 1 KHz sine wave AC & DC power 10V rms sig/control >3 m over the frequency range 150 KHz to 80 MHz with an 80% amplitude modulation with a 1 KHz sine wave	[redacted]
X	Magnetic Fields Immunity	Magnetic Fields Immunity	IEC 61000-4-8 (1993-06)	V14.1.2.12 V2, 4.8	30 A/m at 60 Hz	
X	Electrical Power Disturbance	Electrical Power Disturbance	IEC 61000-4-11 (1994-06)	V1, 4.1.2.5 V2, 4.8	Voltage dip of 30% of nominal @10 ms; Voltage dip of 60% of nominal @100 ms & 1 sec Voltage dip of >95% interrupt @5 sec Surges of +15% line variations of nominal line voltage Electric power increases of 7.5% and reductions of 12.5% of nominal specified power for a period of up to four hours at each level.	

4.0 Product Description

4.1 Equipment Under Test

Description include model no.	Qty	Part No.	Revision No.	Serial No.
ImageCast Precinct Ballot Counter and Ballot Marker REV 001B	1			NYJBB8K1029 (Environmental)
ImageCast Precinct Ballot Counter and Ballot Marker REV 001B	1			NYJBB8K1030 (EMC)
ImageCast Precinct Ballot Counter and Ballot Marker REV 001B	1			NYJBB8K1035 (Safety)

4.2 Power Supplies

Manufacturer	Model	Input	Output and Type

4.3 Accessories

Type	Model	Function
Audio Tactile Interface (ATI)	Imagecast	Provides accessibility to voters who are visually impaired
Audio Headphones		Provides accessibility to voters who are visually impaired
Sip/puff Switchbox	AC-0304-AV	Provides accessibility to voters with motor disabilities and limited dexterity

4.4 Oscillator Frequencies

Frequency	Description of Use
32.768 kHz	Crystal
5 MHz	Printer Controller Board
11.2896 MHz	Oscillator
16 MHz	Crystal
20 MHz	Power Board
40 MHz	LCD Controller
70 MHz	SDRAM
140 MHz	uP

4.5 Interconnecting Cables

Type	Description	Shielded?	Length	Quantity
TRS	Headphones	No	<3 m	1
RJ45	Ethernet	No	<3 m	1
Jack Plug	Sip/puff	No	<3 m	1

4.6 Software

Type	Version	Description

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Dominion
Ballot Counter and Ballot Marker Hardware Test Plan

Type	Version	Description
Firmware	1.20	ImageCast Precinct Ballot Counter REV 001

5.0 Test Plan

5.1 Environmental Test Procedures

5.1.1 Operating Environment

Equipment used for election management activities or vote counting (including both precinct and central count systems) shall be capable of operation in temperatures ranging from 50 to 95 degrees Fahrenheit.

5.1.2 Transit and Storage

Equipment used for vote casting, or for counting votes in a precinct count system, shall meet specific minimum performance standards that simulate exposure to physical shock and vibration associated with handling and transportation by surface and air common carriers, and to temperature conditions associated with delivery and storage in an uncontrolled warehouse environment.

- High and low storage temperatures ranging from -4 to +140 degrees Fahrenheit, equivalent to MIL-STD-810D, Methods 501.2 and 502.2, Procedure I-Storage;
- Bench handling equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI;
- Vibration equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier; and
- Uncontrolled humidity equivalent to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid.

5.2 Safety

All voting systems shall meet the following requirements for safety:

- All voting systems and their components shall be designed so as to eliminate hazards to personnel, or to the equipment itself;
- Defects in design and construction that can result in personal injury or equipment damage must be detected and corrected before voting systems and components are placed into service; and
- Equipment design for personnel safety shall be equal to or better than the appropriate requirements of the Occupational Safety and Health Act (OSHA), as identified in Title 29, part 1910, of the Code of Federal Regulations. UL60950 First Edition Product Safety, Information Technology Equipment is the applicable standard.

5.3 Non-Operating Environmental Tests

5.3.1 Operational Check

Normal operation shall be verified by conducting an Operational Check diagnostic that verifies that internal subsystems within the EUT are operating correctly. Prior to and following the conduct of each of the environmental hardware non-operating tests, an Operational Check is performed to determine that the operational state of the equipment is within acceptable performance limits.

The following procedures shall be followed to verify the equipment status:

Step 1: Arrange the system for normal operation.

Step 2: Turn on power, and allow the system to reach recommended operating temperature.

Step 3: Perform any servicing, and make any adjustments necessary, to achieve operational status.

Step 4: Operate the equipment in all modes, demonstrating all functions and features that would be used during election operations.

Step 5: Verify that all system functions have been correctly executed.

5.3.1.1 Failure Criteria

Upon completion of each non-operating test, the system hardware shall be subject to the Operational Check to verify continued operability. If any portion of the voting machine or precinct counter hardware fails to remain fully functional, the testing will be suspended until the failure is identified and corrected by the vendor. The system will then be subject to a retest.

5.3.2 Dust and Rain

The voting system shall be designed to protect against dust and moisture during storage and transportation. Testing shall be performed according to the procedure of MIL-STD-810F, Method 510.4, Procedure III for dust, and MIL-STD-810F, Method 506.4, Procedure III for moisture.

5.3.2.1 Applicability

These tests are intended to evaluate exposure to these elements when the system or equipment is in a non-operating configuration with the required protective cover in place.

5.3.2.2 Dust Test

5.3.2.2.1 Procedure III - Settling Dust

Procedure III is used to investigate the effects of settling dust on materiel (usually electrical) in sheltered or enclosed areas with negligible airflow (e.g., offices, laboratories, store rooms, tents) where dust may accumulate over long periods. Cement dust is used for this test at a settling rate of 6 g/m^2/day.

Step 1: Perform an operational check to verify correct operation of the equipment at the start of the test. Place the EUT in the chamber, powered off, with protective cover in place.

Step 2: With the test item in the test chamber, adjust the test section temperature to 23°C or as otherwise specified and the relative humidity to less than 30%. (Maintain less than 30% relative humidity throughout the test.)

Step 3: Following stabilization of the test item temperature, introduce the required quantity of dust into the test section for 60 seconds.

Step 4: Allow the dust to settle for 59 minutes.

Step 5: Verify the dust fallout rate and repeat steps 2 and 3 above for a total of six cycles.

Step 6: Without unnecessarily disturbing the dust deposits, perform an operational check in accordance with the approved test plan, and document results for comparison with pretest data.

Step 7: Inspect the test item for dust penetration, giving special attention to bearings, grease seals, lubricants, filters, ventilation points, etc. Document the results.

5.3.2.2.2 ANALYSIS OF RESULTS.

Determine if:

a. Dust has penetrated the test item in sufficient quantity to cause binding, clogging, seizure or blocking of moving parts, non-operation contacts or relays, or the formation of electrically conductive bridges with resulting shorts.

b. Functional performance is within the specified requirements/tolerances.

c. Protective coatings were compromised.

d. Abrasion of the test item exceeds the specified levels.

5.3.2.3 Rain Test

5.3.2.3.1 Procedure III - Drip.

Use a test setup that provides a volume of water greater than 280 $l/m^2/hr$ (7 $gal/ft^2/hr$) dripping from a dispenser with drip holes on a 20 to 25.4 mm pattern (depending on which dispenser is used) but without coalescence of the drips into a stream. Use a drip height that ensures terminal velocity of the droplets (~9 m/s). Use a dispenser with a drip area large enough to cover the entire top surface of the test item.

Step 1: Perform an operational check to verify correct operation of the equipment at the start of the test. Place the EUT in the chamber, powered off,.

Step 2: Install the test item in the test facility in its non-operational configuration with protective cover in place.

Step 3: With the test item non-operational, subject it to water falling from a specified height (no less than 1 meter (3 feet)) as measured from the upper main surface of the test item at a uniform rate for 15 minutes. Use a test setup that ensures that all of the upper surfaces get droplets on them at some time during the test.

Step 4: At the conclusion of the 15-minute exposure, remove the test item from the test facility and remove sufficient panels or covers to allow the interior to be seen.

Step 5: Visually inspect the test item for evidence of water penetration.

Step 6: Measure and document any free water inside the test item.

Step 7: Conduct an operational check of the test item and document the results.

5.3.2.3.2 ANALYSIS OF RESULTS.

Analyze any failure of a test item to meet the requirements of the materiel specifications and consider related information such as follows.

Operational Failures.

a. Degradation allowed in the performance characteristics because of rainfall exposure.

b. Necessity for special kits for special operating procedures.

c. Safety of operation.

5.3.3 Bench Handling Test

The bench handling test simulates stresses faced during maintenance and repair of voting machines and ballot counters.

5.3.3.1 Applicability

All systems and components, regardless of type, shall meet the requirements of this test. This test is equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI.

5.3.3.2 Procedure

Step 1: Place each piece of equipment on a level floor or table, as for normal operation or servicing.

Step 2: Make provision, if necessary, to restrain lateral movement of the equipment or its supports at one edge of the device. Vertical rotation about that edge shall not be restrained.

Step 3: Using that edge as a pivot, raise the opposite edge to an angle of 45 degrees, to a height of four inches above the surface, or until the point of balance has been reached, whichever occurs first.

Step 4: Release the elevated edge so that it may drop to the test surface without restraint.

Step 5: Repeat steps 3 and 4 for a total of six events.

Step 6: Repeat steps 2, 3, and 4 for the other base edges, for a total of 24 drops for each device.

5.3.4 Vibration Test

The vibration test simulates stresses faced during transport of voting machines and ballot counters between storage locations and polling places.

5.3.4.1 Applicability

All systems and components, regardless of type, shall meet the requirements of this test. This test is equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier.

5.3.4.2 Procedure

Step 1: Install the test item in its transit or combination case as prepared for transport.

Step 2: Attach instrumentation as required to measure the applied excitation.

Step 3: Mount the equipment on a vibration table with the axis of excitation along the vertical axis of the equipment.

Step 4: Apply excitation as shown in MIL-STD-810D, Method 514.3-1, "Basic transportation, common carrier, vertical axis", with low frequency excitation cutoff at 10 Hz, for a period of 30 minutes.

Step 5: Repeat steps 2 and 3 for the transverse and longitudinal axes of the equipment with the excitation profiles shown in Figures 514.3-2 and 514.3-3, respectively. (Note: The total excitation period equals 90 minutes, with 30 minutes excitation along each axis.)

Step 6: Remove the test item from its transit or combination case and verify its continued operability.

5.3.5 Low Temperature Test

The low temperature test simulates stresses faced during storage of voting machines and ballot counters.

5.3.5.1 Applicability

All systems and components, regardless of type, shall meet the requirements of this test. This test is equivalent to the procedure of MIL-STD-810D, Method 502.2, Procedure I-Storage. The minimum temperature shall be -4 degrees F.

5.3.5.2 Procedure

Step 1: Arrange the equipment as for storage. Install it in the test chamber.

Step 2: Lower the internal temperature of the chamber at any convenient rate, but not so rapidly as to cause condensation in the chamber, and in any case no more rapidly than 10 degrees F per minute, until an internal temperature of -4 degrees F has been reached.

Step 3: Allow the chamber temperature to stabilize. Maintain this temperature for a period of 4 hours after stabilization.

Step 4: Allow the internal temperature of the chamber to return to standard laboratory conditions, at a rate not exceeding 10 degrees F per minute.

Step 5: Allow the internal temperature of the equipment to stabilize at laboratory conditions before removing it from the chamber.

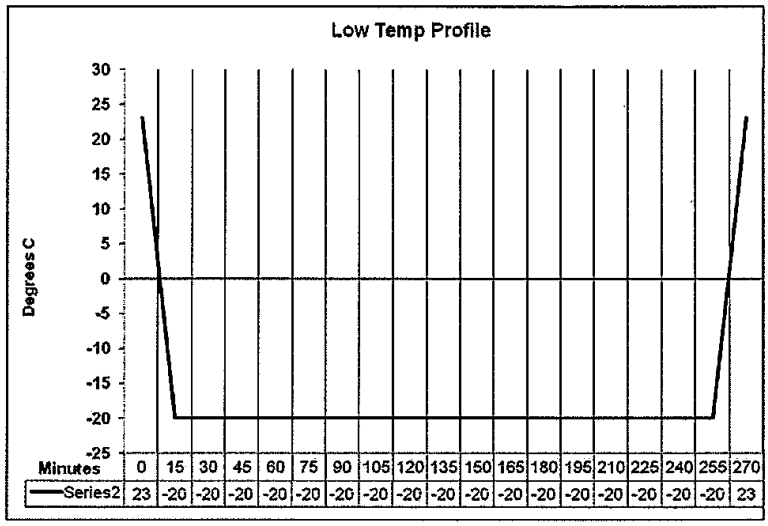
Step 6: Remove the equipment from the chamber and from its containers, and inspect the equipment for evidence of damage.

Step 7: Verify continued operability of the equipment.

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Dominion
Ballot Counter and Ballot Marker Hardware Test Plan

Figure 1 Low Temp Profile



5.3.6 High Temperature Test

The high temperature test simulates stresses faced during storage of voting machines and ballot counters.

5.3.6.1 Applicability

All systems and components, regardless of type, shall meet the requirements of this test. This test is equivalent to the procedure of MIL-STD-810D, Method 501.2, Procedure I-Storage. The maximum temperature shall be 140 degrees F.

5.3.6.2 Procedure

Step 1: Arrange the equipment as for storage. Install it in the test chamber.

Step 2: Raise the internal temperature of the chamber at any convenient rate, but in any case no more rapidly than 10 degrees F per minute, until an internal temperature of 140 degrees F has been reached.

Step 3: Allow the chamber temperature to stabilize. Maintain this temperature for a period of 4 hours after stabilization.

Step 4: Allow the internal temperature of the chamber to return to standard laboratory conditions, at a rate not exceeding 10 degrees F per minute.

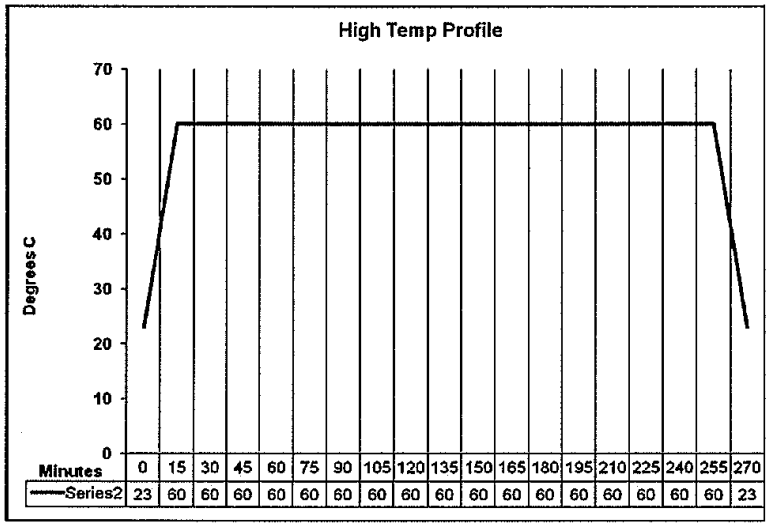
Step 5: Allow the internal temperature of the equipment to stabilize at laboratory conditions before removing it from the chamber.

Dominion Ballot Counter and Ballot Marker Hardware Test Plan V 1.1 SysTest Labs Inc. Page 13 of 21

Step 6: Remove the equipment from the chamber and from its containers, and inspect the equipment for evidence of damage.

Step 7: Verify continued operability of the equipment.

Figure 2 High Temp Profile



5.3.7 Humidity Test

The humidity test simulates stresses faced during storage of voting machines and ballot counters.

5.3.7.1 Applicability

All systems and components regardless of type shall meet the requirements of this test. This test is similar to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid. It is intended to evaluate the ability of the equipment to survive exposure to an uncontrolled temperature and humidity environment during storage. This test lasts for ten days.

5.3.7.2 Procedure

Step 1: Arrange the equipment as for storage. Install it in the test chamber.

Step 2 Adjust the chamber conditions to those given in MIL-STD-810D Table 507.2-I, for the time 0000 of the HotHumid cycle (Cycle 1).

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Step 3: Perform a 24-hour cycle with the time and temperature-humidity values specified in Figure 507.2-1, Cycle 1.

Step 4: Repeat Step 2 until 5, 24-hour cycles have been completed.

Step 5: Continue with the test commencing with the conditions specified for time = 0000 hours.

Step 6: At any convenient time in the interval between time = 120 hours and time = 124 hours, place the equipment in an operational configuration, and perform a complete operational check as defined in Subsection 4.6.1.5.

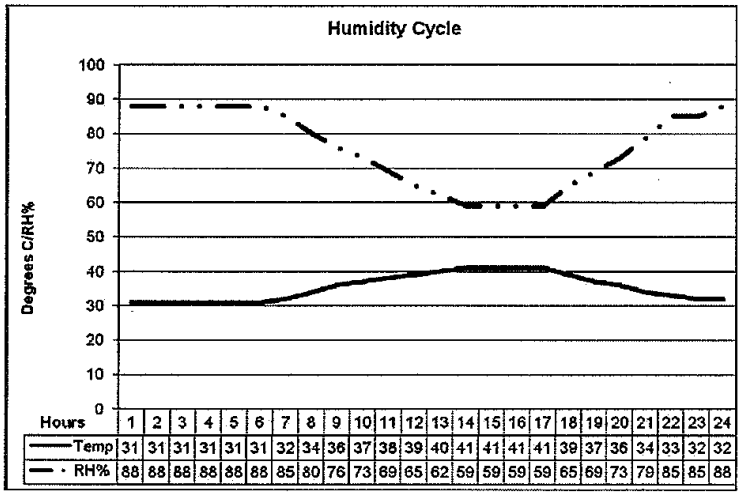
Step 7: If the equipment satisfactorily completes the status check, continue with the sixth 24-hour cycle.

Step 8: Perform 4 additional 24-hour cycles, terminating the test at time = 240 hours.

Step 9: Remove the equipment from the test chamber and inspect it for any evidence of damage.

Step 10: Verify continued operability of the equipment.

Figure 3 Humidity Profile



Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Temp	31	31	31	31	31	31	32	34	36	37	38	39	40	41	41	41	41	39	37	36	34	33	32	32
RH%	88	88	88	88	88	88	85	80	76	73	69	65	62	59	59	59	59	65	69	73	79	85	85	88

5.4 Operating Environmental Tests

This section addresses a range of tests for all voting system equipment, including equipment for both precinct count and central count systems.

5.4.1 Simulated Operation Diagnostic

A diagnostic test routine is performed to exercise and diagnose failures from internal subsystems in the EUT. The test performs various operations including writing and reading to storage devices and printing to internal printers. The diagnostic can be looped continuously and will halt if an error is detected while performing an operation.

For DRE equipment, each loop may be very short. For paper ballot scanning devices, a recirculating ballot operation is typically used where the ballot is read, reversed to the input position and then read again. The test will loop continuously until manually interrupted.

5.4.2 Electrical Supply

Components of voting systems that require an electrical supply shall meet the following standards:

- Precinct count systems shall operate with the electrical supply ordinarily found in polling places (120vac/60hz/1);
- Central count systems shall operate with the electrical supply ordinarily found in central tabulation facilities or computer room facilities (120vac/60hz/1, 208vac/60hz/3, or 240vac/60hz/2); and
- All systems shall also be capable of operating for a period of at least 2 hours on backup power, such that no voting data is lost or corrupted, nor normal operations interrupted. When backup power is exhausted the system shall retain the contents of all memories intact. The backup power capability is not required to provide lighting of the voting area.

5.4.3 Temperature and Power Variation Tests

This test is similar to the low temperature and high temperature tests of MIL-STD-810-D, Method 502.2 and Method 501.2, with test conditions that correspond to the requirements of the performance standards. This procedure tests system operation under various environmental conditions for at least 163 hours. During 48 hours of this operating time, the device shall be in a test chamber. For the remaining hours, the equipment shall be operated at room temperature. The system shall be powered for the entire period of this test; the power may be disconnected only if necessary for removal of the system from the test chamber.

Operation shall consist of ballot-counting cycles, which vary with system type. An output report need not be generated after each counting cycle. The interval between reports, however, should be no more than 4 hours to keep to a practical minimum the time between the occurrence of a failure or data error and its detection.

Test Ballots per Counting Cycle

- Precinct count systems 100 ballots/hour
- Central count systems 300 ballots/hour

The recommended pattern of votes is one chosen to facilitate visual recognition of the reported totals; this pattern shall exercise all possible voting locations. System features such as data quality tests, error logging, and audit reports shall be enabled during the test. Each operating cycle shall consist of processing the number of ballots indicated above.

Step 1: Arrange the equipment in the test chamber. Connect as required and provide for power, control, and data service through enclosure wall.

Step 2: Set the supply voltage at 117 voltage alternating current.

Step 3: Power the equipment, and perform an operational check as in Section 4.6.1.5.

Step 4: Set the chamber temperature to 50 degrees F, observing precautions against thermal shock and condensation.

Step 5: Begin 24 hour cycle.

Step 6: At T=4 hrs, lower the supply voltage to 105 vac.

Step 7: At T=8 hrs, raise the supply voltage to 129 vac.

Step 8: At T=11:30 hrs, return the supply voltage to 117 vac and return the chamber temperature to lab ambient, observing precautions against thermal shock and condensation.

Step 9: At T=12:00 hrs, raise the chamber temperature to 95 degrees Fahrenheit.

Step 10: Repeat Steps 5 through 8, with temperature at 95 degrees Fahrenheit, complete at T=24 hrs.

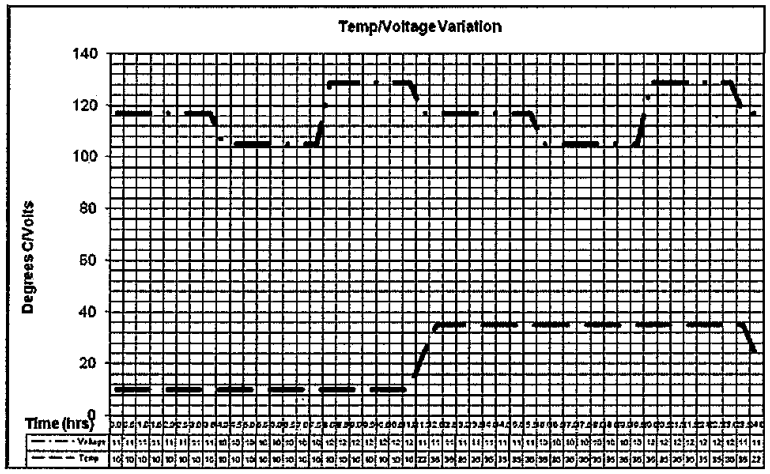
Step 11: Set the chamber temperature at 50 degrees Fahrenheit as in Step 4.

Step 12: Repeat the 24 hour cycle as in Steps 5-10, complete at T=48 hrs.

Step 13: After completing the second 24 hour cycle, disconnect power from the system and remove it from the chamber if needed.

Step 14: Reconnect the system as in Step 2, and continue testing for the remaining period of operating time.

Figure 4 Temp/Voltage Variation Profile



5.4.4 Reliability Test

The EUT is subject to reliability verification based on the provisions of Volume I, Section 4.7.3 and appendix C for the acceptable Mean Time Between Failure (MTBF). The MTBF is measured during the conduct of other system operational tests specified in this section and shall be at least 163 hours.

A failure is defined as any event which results in either:

1. Loss of one or more functions.
2. Degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds.

5.5 EMC Test Procedures

5.5.1 Operating Modes and Configurations for EMC Testing

5.5.1.1 Operating Mode

A diagnostic test routine is performed to exercise and diagnose failures from internal subsystems in the EUT. The test performs various operations including writing and reading to storage devices and printing to internal printers. The diagnostic can be looped continuously and will halt if an error is detected while performing an operation.

For DRE equipment, each loop may be very short. For paper ballot scanning devices, a recirculating ballot operation is typically used where the ballot is read, reversed to the input position and then read again. The test will loop continuously until manually interrupted.

5.5.1.2 Exercising Software

Prior to and during testing, proper operation of the EUT shall be confirmed using ~Company software.

Once testing is completed, operational check shall be performed to fully exercise the EUT and ensure that no damage has occurred as a result of the test.

5.5.2 Treatment of Test Failures

Failures of EMC tests or failures of the exercising software to perform shall be documented in the EMC test report.

5.5.3 Test Documentation

A test report shall be attained from the test lab that meets the pertinent requirements of EN45001, and ISO/IEC17025, "General Requirements of Testing and Calibration Laboratories".

5.5.4 Electromagnetic Emissions

Objective:

To verify that the electromagnetic emissions generated by the product under normal use and in the product's intended environment are below a level as specified by the Voting System Standard.

5.5.4.1 Radiated Electromagnetic Emissions

Test Method: FCC Part 15, Radio Frequency Devices

Deviations from Test Method: None

Exit Criteria: The EUT shall meet the following emissions limits:

Frequency Band (MHz)	Class B Equipment 3m Measurement Distance (dBuV/m)
30 – 88	40
88-216	43.5
216 – 960	46
960-1000	54
1000-2000	54

5.5.4.2 Conducted Electromagnetic Emissions

Test Method: FCC Part 15, Radio Frequency Devices

Deviations from Test Method: None

Exit Criteria: The EUT shall meet the following emissions limits:

Frequency Band (MHz)	Class B Equipment Quasi-Peak Measurement (dBuV)	Average Measurement (dBuV)
0.15 – 0.5	66 decreasing with the log of the frequency to 56	56 decreasing with the log of the frequency to 46
0.5 – 5.0	56	46
5.0 - 30	60	50

5.5.5 Electromagnetic Immunity

Objective: To verify that the product performs as intended when exposed to different types of electromagnetic energies that may be encountered under normal use in the product's intended environment.

5.5.5.1 Immunity Compliance Criteria

Note 1: The EUT shall be able to withstand the test without disruption of normal operation or loss of data.

Note 2: The EUT shall be able to withstand the test without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.

5.5.5.2 Electrostatic Disruption

Test Method: IEC61000-4-2, Electrostatic Disruption Test, (1995-01)

Test Levels:

Test Location	Discharge Voltage +/-(kV)
Indirect Contact: HCP	2, 4, 8
Indirect Contact: VCP	2, 4, 8
Direct Contact to Metallic Surfaces	2, 4, 8

Air Discharges to Insulated Surfaces	2, 4, 8, 15

Deviations from Test Method: None
Exit Criteria: 5.5.5.1Immunity Compliance Criteria Note 2

5.5.5.3 Electromagnetic Susceptibility

Test Method: IEC61000-4-3, Radiated, Radio-Frequency, Electromagnetic Field Immunity Test, (1996)

Test Levels:

Frequency Range (MHz)	Test Level (V/m)	Modulation / Sweep
80.0 to 1000.0	10	80% AM at 1.0kHz 1% steps with 3s dwell
Clock Frequencies	10	80% AM at 1.0kHz 1% steps with 3s dwell

Deviations from Test Method: None
Exit Criteria: 5.5.5.1Immunity Compliance Criteria Note 1

5.5.5.4 Electrical Fast Transient

Test Method: IEC61000-4-4, Electrical Fast Transient Test, (1995-01)

Test Levels:

Coupling Mode	Test Voltage +/- kV
AC & DC Line Cord	2.0
All external wires >3m	1

Deviations from Test Method: None
Exit Criteria: 5.5.5.1Immunity Compliance Criteria Note 1

5.5.5.5 Lightning Surge

Test Method: IEC61000-4-5, Lightning Surge Test, (1995-02)

Test Levels:

Coupling Mode	Test Voltage +/- kV
Differential Mode	2
Common Mode	2
Differential Mode >10m	0.5
Common Mode >10m	0.5
I/O sig/control >30m	1

Deviations from Test Method: None

Exit Criteria: 5.5.5.1 Immunity Compliance Criteria Note 1

5.5.5.6 Conducted RF Immunity

Test Method: IEC61000-4-6, Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields, (1996-04)

Test Levels:

Test Point	Frequency Range (MHz)	Test Level (Vrms)	Modulation / Sweep
AC & DC Power >3m in length	0.150 to 80.0	10	80% AM at 1.0kHz 1% steps with 3s dwell
I/O cables >3M in length	Clock Frequencies	10	80% AM at 1.0kHz 1% steps with 3s dwell

Deviations from Test Method: None

Exit Criteria: 5.5.5.1 Immunity Compliance Criteria Note 1

5.5.5.7 Magnetic Fields Immunity

Test Method: IEC61000-4-8, Power Frequency Magnetic Field Immunity Test, (1993-06)

Test Levels: 30 A/m at 60 HZ

Deviations from Test Method: None

Exit Criteria: 5.5.5.1 Immunity Compliance Criteria Note 1

5.5.5.8 Electrical Power Disturbance

Test Method: IEC61000-4-11, Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests, (1994-06)

Test Levels:

Electrical Power Disturbance
30% dip @ 10ms
60% dip @ 100 ms and 1 sec
> 95% interrupt @ 5 sec
Surges of ±15% line variations of nominal line voltage
Electric power increases of 7.5% and reductions of 12.5% of nominal specified power supply for a period of up to four hours at each power level

Deviations from Test Method: None

Exit Criteria: 5.5.5.1 Immunity Compliance Criteria Note1

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX I

EMI Test Log

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

EMI Test Log

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NYJBB8K1030
Customer Representative:	Shawn Singh		
Standard Referenced:	FCC Part 15/ SysTest Dominion Voting System Test Plan		

FR0105

Test	Test Code	Date	Event	Time (hrs)	Result	Initials
RE	6009	June 12, 2008 0800	Radiated Emissions, 30 MHz - 2 GHz 120 VAC / 60 Hz Test #1, 8 rads, 4 heights, 3 second dwell, ref level 80dBuV 10 meter spacing Baseline	1.0	---	TW
RE		0900	Test #2, 8 rads, 4 heights, 3 second dwell, ref level 80dBuV 10 meter spacing Troubleshooting mode Client added sip/puff to configuration – re started prescan	2.0	---	TW
RE		1100	Test #3, 8 rads, 4 heights, 3 second dwell, ref level 80dBuV 10 meter spacing Client added copper tape to seams near the scanner	1.0	---	TW
		1200	RE Troubleshooting	4.25	---	DL
		1615	Test #4, 8 radials, 4 heights, 3 second dwell, ref level 80dBuV 10 meter spacing Added copper tape to close up seams near scanner, decoupling caps on ss board	0.75	---	DL
RE	6009	June 13, 2008 0800	Client arrived and did some trouble shooting on the 41 MHz and 191 MHz signals.	1.0	---	TW
		0900	Test #5, 8 rads, 4 heights, 3 second dwell, ref level at 80dBuV 10 meter spacing, Client added a ferrite to the AC power cable Notes: Added copper tape to close up seams near scanner, decoupling caps on ss board + ferrite on AC cable (new baseline) Several signals are still failing	1.0	---	TW
		1000	Client added .01 caps to the motherboard, ATI interface. – no significant change at 191 MHz From audio to ground plane	1.5	---	TW
			Client added a ground strap from ss board to chassis.		---	TW
		1130	Test #6, 8 rads, 4 heights, 3 second dwell, ref level at 80dBuV 10 meter spacing, Added gasket to connect EMI shield to transport along with all the other fixes prior to this scan. At 53.5 MHz, unit is still failing by 6.69 dB	1.0	---	TW

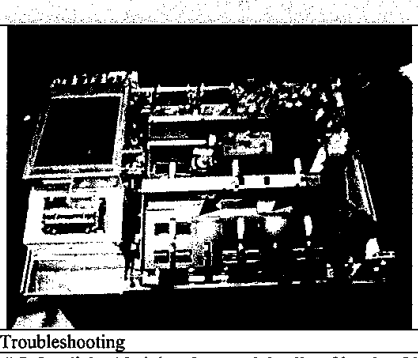
EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

EMI Test Log

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NYJBB8K1030
Customer Representative:	Shawn Singh		
Standard Referenced:	FCC Part 15/ SysTest Dominion Voting System Test Plan		

FR0105

Test	Test Code	Date	Event	Time (hrs)	Result	Initials
						
		1230	RE Troubleshooting	2.5	---	DL
		1500	Test# 7, 8 radials, 4 heights, 3 second dwell, ref level at 80dBuV 10 meter spacing Added gasket to connect EMI shield to transport, Added gasket to attach transport EMI and LCD EMI shields	2.0	---	DL
4-2	4294	June 16, 2008 0800-1130	Electrostatic Discharge +/- 2, 4, 6, 8kV Contact, +/-2, 4, 8, 15kV Air 120 VAC / 60 Hz	3.5	Pass	BN
			At all Contact Voltages at various points on all figures EUT gave a warning and incorrect ballot reading, but EUT self recovers.	---	---	BN
			Figure A2-Figure A6: No Contact Discharges.	---	---	BN
4-6	4622	1130-1315	Conducted RF Immunity 10Vrms, 0.15 - 80 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz			
			Client says all I/O Cables will be < 3m as per the Test Plan.	---	---	BN
4-4	4411	1315-11400	Electrical Fast Transient / Burst Mains: +/- 2kV, I/O: +/- 1kV 120 VAC / 60 Hz	0.75	Pass	BN
			Client says all I/O Cables will be < 3m as per the Test Plan.	---	---	BN
4-11	4191	1400-1445	Voltage Dips and Interruptions See SysTest eScan test plan 120 VAC / 60 Hz	0.75	Pass	BN
			At 0% with a 5 second drop out, EUT is on a UPS, so power was not interrupted.	---	---	BN
4-8	4831	1445-1530	Power Frequency H-Field Immunity 30A/m, 60 Hz, 3 axes 120 VAC / 60 Hz	0.75	Pass	BN
			Using Proximity Method.	---	---	BN

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

EMI Test Log

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NYJBB8K1030
Customer Representative:	Shawn Singh		
Standard Referenced:	FCC Part 15/ SysTest Dominion Voting System Test Plan		

FR0105

Test	Test Code	Date	Event	Time (hrs)	Result	Initials
4-5	4515	June 17, 2008 0800-1300	Surge Immunity Mains: +/- 2kV CM, +/- 2kV DM, (0, 90, 180, 270) 120 VAC / 60 Hz	5.0	Pass	BN
4-3	4354	June 18, 2008 0730-1130	Radiated RF Immunity 10V/m, 80 - 1000 MHz, 1% Step, 80% AM, 1kHz sine, 3s dwell 120 VAC / 60 Hz	4.0	Pass	BN
RE	6005	June 24, 2008 0800-900	Setup in the 10m Chamber Troubleshooting time on 24 June 2008 10m Chamber Engineering / Trouble-Shoot 120Vac/60Hz	1.0	---	TW
RE		0900	Test #8, 8 rads, 4 heights , 3 second dwell, ref level 80dBuV 10 meter spacing Client added a gasket to attach LCD EMI shield to the Transport EMI shield and cap on the SS board Unit fully operating	1.0	---	TW
RE		1000-1400	Unit failed and client has spent time troubleshooting.	4.0	---	TW/DL
		1400	Test #9, 8 radials, 4 heights , 3 second dwell, ref level 80dBuV 10 meter spacing Client added a gasket to attach LCD EMI shield to the Transport EMI shield and cap on the SS board, Removed paint from blanking plate, added 3 ferrites Unit fully operating	1.5	---	DL
		1530	Unit failed and client is troubleshooting	0.5	---	DL
		1600	Test #9, 8 radials, 4 heights , 3 second dwell, ref level 80dBuV 10 meter spacing Client added a gasket to attach LCD EMI shield to the Transport EMI shield and cap on the SS board, Removed paint from blanking plate, 4 ferrites on all cables coming out of ITX motherboard. Unit fully operating	1.0	Pass	DL
			Pictures of RE Mods			KJ

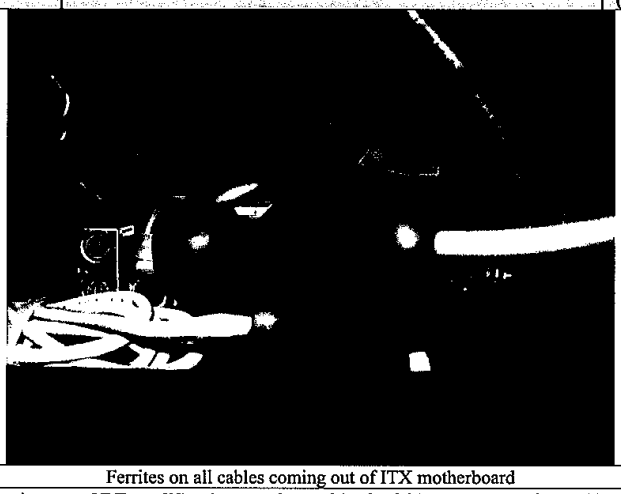
EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

EMI Test Log

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NYJBB8K1030
Customer Representative:	Shawn Singh		
Standard Referenced:	FCC Part 15/ SysTest Dominion Voting System Test Plan		

FR0105

Test	Test Code	Date	Event	Time (hrs)	Result	Initials
						
			Ferrites on all cables coming out of ITX motherboard			
			More pictures of RE modifications are located in the folder under EMC Modifications			
CE	2341	June 30, 2008 0800	Test#11: Conducted Emissions, 150 kHz - 30 MHz 120 VAC / 60 Hz	1.0	Pass	KJ
		1000	Testing complete	---	---	KJ

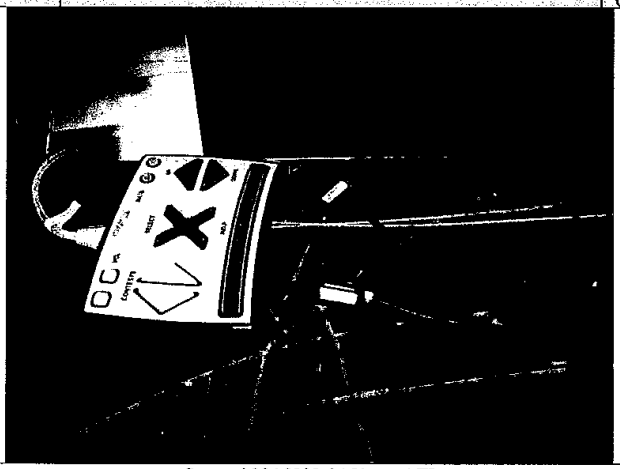
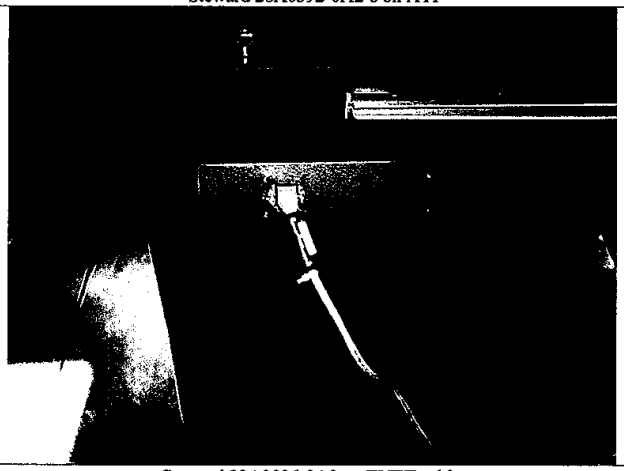
EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

emc integrity incorporated

EMI Test Log

Manufacturer:	Dominion Voting Systems	Project Number:	A80606
Model:	ImageCast Precinct Ballot Counter and Ballot Marker	S/N:	NYJBB8K1030
Customer Representative:	Shawn Singh		
Standard Referenced:	FCC Part 15/ SysTest Dominion Voting System Test Plan		

FR0105

Test	Test Code	Date	Event	Time (hrs)	Result	Initials
			 Steward 28A0392-0A2's on ATI			
			 Steward 28A2026-0A2 on ENET cable			

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

APPENDIX J

Laboratory Accreditations

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Nemko

Nemko Laboratory Authorization

Authorization: ELA 215

EMC Laboratory: **EMC Integrity, Inc.**
1736 Vista View Drive
Longmont, Colorado 80504
USA

Scope of Authorization: **All CENELEC standards [ENs] for EMC that are listed on the accompanying page, and all of the corresponding CISPR, IEC and ISO EMC standards that are listed on the accompanying page.**

Nemko has assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA -10. During the visit by the Nemko representative it was found that the Laboratory is capable of performing tests within the Scope of the Authorisation.

Accordingly, Nemko will normally accept test results from the laboratory on a partial or complete basis for certification of the products.

In order to maintain the Authorisation, the information given in the pertinent NLA-10 must be carefully followed. Nemko is to be promptly notified about any changes in the situation at the Laboratory, which may affect the basis for this Authorisation. The Authorisation may be withdrawn at any time if the conditions are no longer considered to be fulfilled.

The Authorisation is valid through December 31, 2008.

Dallas, Texas, USA.
For and on behalf of Nemko AS:

T.B. Ketterling,
Nemko ELA Co-ordinator
Region: North America

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

Nemko

Nemko Laboratory Authorization

Authorization: ELA 215

SCOPE OF AUTHORIZATION

Capability to perform a basic test implies also that any product (family) standard calling up this basic test is also within the scope if mentioned below or not:

Generic & Product Family Standards		
EN 55011 :1998+A1 :1999 +A2 :2002 CISPR 11:1997 (Modified) + A1:1999 + A2:2002 CISPR 11 Ed. 4.1	EN 55014-1:2000 + A1:2001 + A2:2002 CISPR 14-1:2000 + A1:2001 + A2:2002 CISPR 14-1 Ed. 5.0 EN 55014-2:1997 + A1:2001 CISPR 14-2:1997 + A1:2001 CISPR 14-2 Ed. 1.1	EN 55022: 1998+ A1:2000, +A2:2003 CISPR 22: 2003+ A1:2004 EN55022:2006 CISPR 22:2005 (Modified) CISPR 22 Ed. 5.2
EN 55024: 1998 +A1:2001, +A2:2003 CISPR 24: 1997 +A1:2001, +A2:2002 CISPR 24 Ed. 1.0	EN 61000-6-1 :2007 IEC 61000-6-1 Ed. 2.0 EN 61000-6-1: 2001	EN 61000-6-2:2005 IEC 61000-6-2 Ed. 2.0
EN 61000-6-3 :2007 IEC 61000-6-3 Ed. 2.0 EN 61000-6-3: 2001 + A1 :2004	IEC 61000-6-2 Ed. 2.0 EN 61000-6-2: 2005 IEC 61000-6-2: 2005 EN 61000-6-2: 2001	EN 61326:1997 +A1:1998 + A2:2001 +A3:2003 IEC 61326:1997 + A1:1998 + A2:2000 IEC 61326:2002-02
EN 60601-1-2:2001 IEC 60601-1-2:2001 EN 60601-1-2:2007 IEC 60601-1-2 Ed. 2.1	EN 55103-1:1996 EN 55103-2 :1996	EN 300 386 V.1.3.1 EN 300 386 V.1.3.3
EN 61000-3-3: 1995, +A1:2001 +A2:2005 IEC 61000-3-3: 1994, +A1:2001 +A2:2005	EN 61000-3-2: 2000 +A2 :2005 IEC 61000-3-2: 2000 (Modified) +A1:2001 +A2:2004	BLANK
Basic Standards		
EN 61000-4-2:1995, +A1:1998, +A2:2000 IEC 61000-4-2:1995, +A1:1998, +A2:2000 IEC 61000-4-2 Ed. 1.2	EN 61000-4-3:2002, +A1:2002 IEC 61000-4-3:2002, +A1:2002 EN 61000-4-3 :2006 +A1 :2006 +A2 :2006 IEC 61000-4-3 Ed. 3.0	EN 61000-4-4:1995, +A1:2002, +A2:2002 IEC 61000-4-4:1995, +A1:2000, +A2:2001 EN 61000-4-4:2004 IEC 61000-4-4 Ed. 2.0
EN 61000-4-5:1995, +A1:2001 IEC 61000-4-5:1995, +A1:2000 EN 61000-4-5 :2006 IEC 61000-4-5 Ed. 2.0	EN 61000-4-6:1996, +A1:2001 IEC 61000-4-6:1996, +A1:2000 EN 61000-4-6 : 2006 IEC 61000-4-6 Ed. 2.2	EN 61000-4-8:1994,+A1:2001 IEC 61000-4-8:1994, +A1:2001 IEC 61000-4-8 Ed. 1.1
EN 61000-4-11:2004 IEC 61000-4-11 Ed. 2.0 EN 61000-4-11:1994, +A1:2000 IEC 61000-4-11:1994, +A1:2000	BLANK	BLANK

Dallas, Texas December 7, 2006.

T.B. Kettering, Nemko ELA Co-ordinator

2(2)

NLA 3 ED3

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMC Integrity, Inc.
1736 Vista View Drive
Longmont, CO 80504
Mr. Vincent W. Greb
Phone: 303-776-7249 Fax: 303-776-7314
E-Mail: vinceg@emcintegrity.com
URL: http://www.emcintegrity.com

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS **NVLAP LAB CODE 200737-0**

NVLAP Code	*Designation / Description*
Emissions Test Methods:	
12/100063e	IEC 61000-6-3 (1996), EN 61000-6-3 (2001), A1 (2004): Electromagnetic Compatibility (EMC) - Part 6: Generic standards - Section 3: Emission standard for residential, commercial, and light-industrial environments.
12/610006h	IEC 61000-6-4 (2006-07): Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
12/CIS11f	AS/NZS CISPR 11 (2002): Industrial, scientific and medical (ISM) radio frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
12/CIS11g	IEC/CISPR 11, Ed. 4.1 (2004-06): Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurements
12/CIS11h	AS/NZS CISPR 11 (2004): Industrial, scientific and medical (ISM) radio frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
12/CIS11i	IEC/CISPR 11, Ed. 4.1 (2004-06) + A1(2004): Industrial, scientific and medical (ISM) radio frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement

2008-07-01 through 2009-06-30
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

Page 1 of 6

NVLAP-01S (REV. 2005-05-19)

[redacted]

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

NVLAP LAB CODE 200737-0

NVLAP Code	*Designation / Description*
12/CIS11j	EN 55011 (1998) + A1(1999), A2(2002): Industrial, scientific and medical (ISM) radio frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
12/CIS11k	IEC/CISPR 11 (2003), EN 55011 (1998), A2(2002): Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical Radio-Frequency Equipment
12/CIS14b1	AS/NZS CISPR 14-1 (2003): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS14x	IEC/CISPR 14-1, Ed. 4 (2003): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS22	IEC/CISPR 22 (1997) & EN 55022 (1998) + A1(2000): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993) and EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)
12/CIS22a4	IEC/CISPR 22 (1993) & EN 55022 (1994)+A1(1995), A2(1997): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/CIS22e	IEC/CISPR 22, Fourth Edition (2003-04) & EN 55022 (1998): Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
12/CIS22e1	IEC/CISPR 22, Edition 5 (2005) and EN 55022 (1998): Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

2008-07-01 through 2009-06-30
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

Page 2 of 6

NVLAP-01S (REV. 2005-05-19)

[redacted]

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

NVLAP LAB CODE 200737-0

NVLAP Code	*Designation / Description*
12/CIS22e3	IEC/CISPR 22, Edition 5 (2005) + A1(2005): Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
12/CIS22e4	EN 55022 (1998) + A1(2000) + A2(2003): Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
12/EM02d	IEC 61000-3-2, Edition 2.2 (2004-11): Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)
12/EM03b	IEC 61000-3-3, Edition 1.1(2002-03) & EN 61000-3-3, A1(2001): EMC - Part 3-3: Limits - Limitations of voltage changes, voltage fluctuations and flicker, in public low-voltage supply-systems, for equipment with rated current <=16 A per phase and not subject to conditional connections
12/EM03g	IEC 61000-3-3, Edition 1.1 (2003) +A2 (2005): EMC Part 3-3: Limits - Limitations of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connections
12/F18	FCC OST/MP-5 (1986): FCC Methods of Measurement of Radio Noise Emissions for ISM Equipment (cited in FCC Method 47 CFR Part 18 - Industrial, Scientific, and Medical Equipment)
12/FCC15b	ANSI C63.4 (2003) with FCC Method 47 CFR Part 15, Subpart B: Unintentional Radiators
12/KN22	KN22 with RRL Notice No. 2005-82 (Sept. 29, 2005): RRL Notice No. 2005-82: Technical Requirements for Electromagnetic Interference Annex 8 (KN-22), RRL Notice No. 2005-131: Conformity Assessment Procedures for Electromagnetic Interference
12/T51	AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment
12/VCCIa	VCCI: Agreement of Voluntary Control Council for Interference by Information Technology Equipment - Technical Requirements: V-3/2005.04

2008-07-01 through 2009-06-30
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

Page 3 of 6

NVLAP-01S (REV. 2005-05-19)

[redacted]

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS **NVLAP LAB CODE 200737-0**

NVLAP Code	*Designation / Description*
Immunity Test Methods:	
12/l0006i	IEC 61000-6-2, Edition 2.0 (2005-01): Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
12/l01b	IEC 61000-4-2 (2001); EN 61000-4-2 (2001), A2 (2001): Electrostatic Discharge Immunity Test
12/l01c	EN 61000-4-2 +A1(1998) +A2(2001): Electrostatic Discharge Immunity Test
12/l02b	IEC/EN 61000-4-3, Ed. 2.1 (2002), A1 (2002); EN 61000-4-3: Radiated, radio-frequency, electromagnetic field immunity test
12/l02e	EN 61000-4-3 (2002) + A1(2002) + IS1(2004): Radiated, radio-frequency, electromagnetic field immunity test
12/l02f	EN 61000-4-3 (2002) + A1(2002): Radiated, radio-frequency, electromagnetic field immunity test
12/l03c	IEC 61000-4-4, Ed. 2.0 (2004-07): Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
12/l04b	IEC 61000-4-5 (2001), A1(2000); EN 61000-4-5(2001), A1(2000): Surge Immunity Test
12/l05d	IEC 61000-4-6, Ed. 2.1 (2004); EN 61000-4-6: Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
12/l05e	EN 61000-4-6 (1996) + A1 (2001): Immunity to Conducted Disturbances, Induced by Radio Frequency Fields
12/l06b	IEC 61000-4-8 (2001), A1(2000); EN 61000-4-8 (2001),A1(2000): Power Frequency Magnetic Field Immunity Test

2008-07-01 through 2009-06-30
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

Page 4 of 6 NVLAP-01S (REV 2005-05-19)

[redacted]

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

NVLAP LAB CODE 200737-0

NVLAP Code	*Designation / Description*
12/l06e	EN 61000-4-8 (1993) + A1 (2001): Power Frequency Magnetic Field Immunity Test
12/l07e	IEC 61000-4-11, Ed. 2 (2004-03) & EN 61000-4-11: Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests
12/l07e	EN 61000-4-11 (1994), A1 (2001): Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
12/l07f	EN 61000-4-11 (2004): Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
12/KN11a	KN 61000-4-11 with RRL Notice No. 2005-130 (Dec 27, 2005): Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
12/KN24	KN24 (December 2005) with RRL Notice No. 2005-83: Information Technology Equipment - immunity charateristics - limits and methods of measurements
12/KN2a	KN 61000-4-2 with RRL Notice No. 2005-130 (Dec. 27, 2005): Electrostatic Discharge Immunity Test
12/KN3a	KN 61000-4-3 with RRL Notice No. 2005-130 (Dec. 27, 2005): Radiated, radio-frequency, electromagnetic field immunity test
12/KN4a	KN 61000-4-4 with RRL Notice No. 2005-130 (Dec. 27, 2005): Electromagnetic compatibility (EMC): Testing and measurement techniques - Electrical Fast Transient/Burst Immun
12/KN5a	KN 61000-4-5 with RRL Notice No. 2005-130 (Dec. 27, 2005): Surge Immunity Test
12/KN6a	KN 61000-4-6 with RRL Notice No. 2005-130 (Dec. 27, 2005): Electromagnetic compatibility (EMC): Testing and measurement techniques - Immunity to conducted disturbances,

2008-07-01 through 2009-06-30
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

Page 5 of 6

NVLAP-01S (REV. 2005-05-19)

[redacted]

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS — **NVLAP LAB CODE 200737-0**

NVLAP Code	*Designation / Description*
12/KN8a	KN 61000-4-8 with RRL Notice No. 2005-130 (Dec. 27, 2005): Power Frequency Magnetic Field Immunity Test

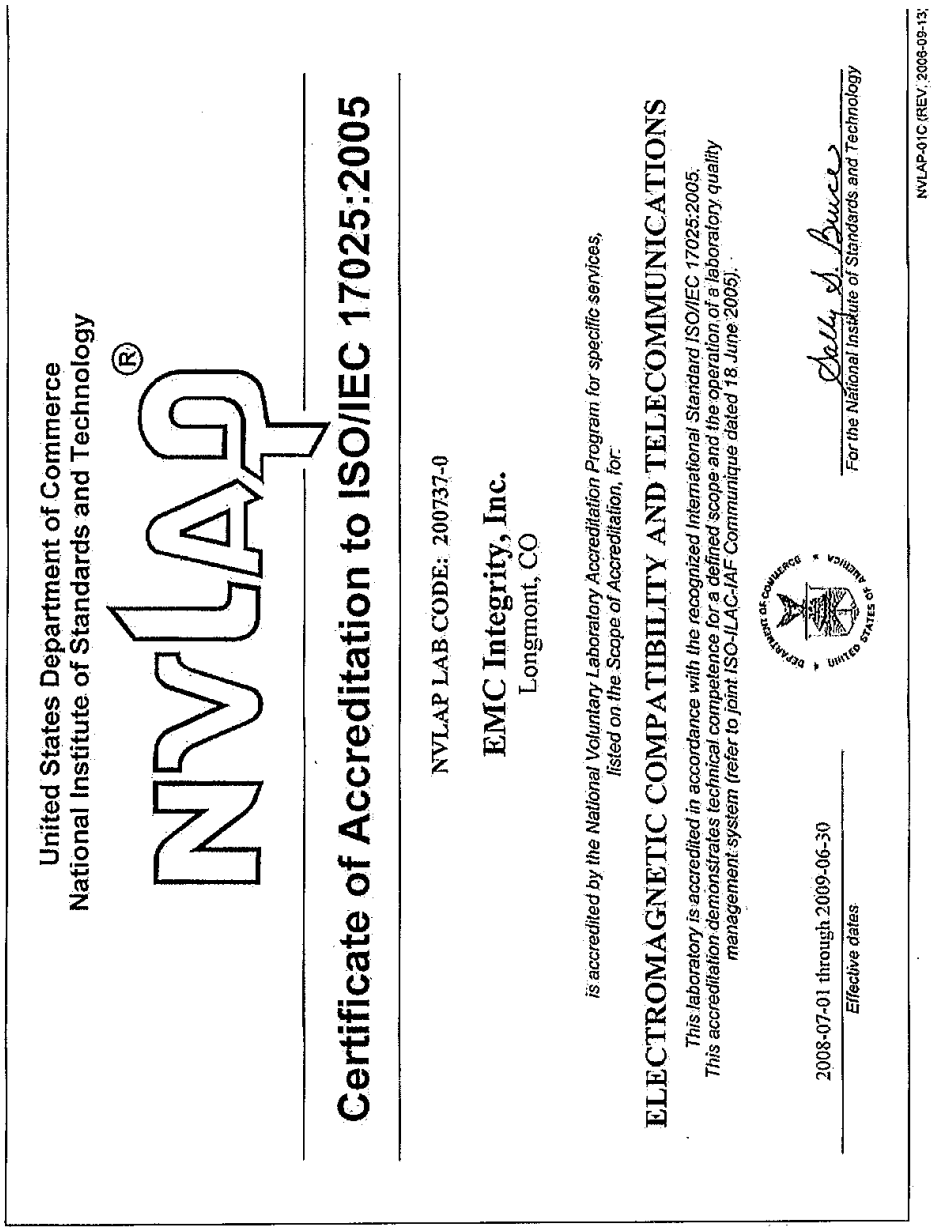
2008-07-01 through 2009-06-30
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

Page 6 of 6 — NVLAP-01S (REV. 2005-05-19)

[redacted]

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A



United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200737-0

EMC Integrity, Inc.
Longmont, CO

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2008-07-01 through 2009-06-30
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2008-09-13)

[redacted]

EMC INTEGRITY, INC.
Test Report # TRA80606, Rev. A

END OF REPORT