www.nts.com

National Technical Systems
Environmental & Dynamics Lab
1601 Dry Creek Dr. #2000
Longmont, CO 80503

Main: 303-776-7249
Fax: 303-776-7314

Date: 20 MARCH 2019

Customer:
Pro V&V, Inc.
700 Boulevard South
Huntsville, AL 35802

Purchase Order Number: 2019-002

A. <u>TEST:</u>   Environmental Hardware Testing

B. <u>TEST ITEMS:</u>   Dominion ICE
See page 4 for Test Item Identification

C. <u>SPECIFICATIONS:</u>
1. Quotation Number OP0512325-0
2. MIL-STD-810D
3. ISO 17025:2005 (NTS Quality)

D. <u>RESULTS:</u>

This is to certify that the Dominion ICE Voting System was subjected to testing according to the above specifications.

See Page 4 for Summary of Test Results. The test sample was returned to Pro V&V for post-tests and final evaluation.

Test data, an equipment list, and photographs are attached.

Greg Gagne,
Technical Writer

Bob Polverari,
Technical Reviewer

<u>REVISIONS</u>

Revision	Reason for Revision	Date
NR	Initial Release	20 March 2019

Table of Contents

TEST ITEM IDENTIFICATION

Quantity	Sample Description	Part Name	Serial Numbers
2	ICE Voting System	Dominion ICE	AAFEBIK1847
			AAFEBCN0012

SUMMARY OF TEST RESULTS

Upon completion of testing, the test sample was removed from the test fixture and subjected to a visual inspection. The Test Sample was returned to Pro V&V, Inc.

Environmental and Vibration Testing

Testing was started on 19 February 2019 and completed on 14 March 2019 by exposing two (2) test samples to testing in accordance with Quotation Number OP0512325-0 and MIL-STD-810D. The table below describes the test program. Testing was performed as indicated in the Test Log on the following page.

Test	Description	Dates
Low Temperature	MIL-810D Method 501.2 non-operating at -4F	04-05 March 2019
High Temperature	MIL-810D Method 502.2 non-operating at +140F	05-06 March 2019
Humidity	MIL-810D Method 507.2 non-operating for (10) 24-hr humidity cycles	19 February – 04 March 2019
Bench Handling	MIL-810D Method 516.3 Procedure VI. (6) 4" drops on each edge for 24 drops. Repeat for 2 sample configurations.	06 March 2019
Transportation Vibration	MIL-810D Method 514.3 Category 1 Basic Transportation Vibration per Figures 514.3-1 through 514.3-3 using suggested common carrier profiles and durations of 1 hour per axis along each of 3 axes.	07 March 2019
Temperature/Power Variation	24-hr operation with power cycled accordingly over 85 hours with NTS support provided 24-hrs daily for first 85 hours per Method 502.2 and 501.2.	11-14 March 2019

TEST LOGS

Low Temperature:

TEST	Low Temp -20c Test				MJO	PR094223

TEST Low Temp -20c Test   MJO PR094223
CUSTOMER Pro V&V Inc   P/N N/A   S/N See Below
TEST ITEM ICE Voting System & Monitor - Qty 1 Each
SPECIFICATION MIL-STD-810D   PARA

DATE	TIME	LOG ENTRIES	INITIALS
03/04/19	09:45	Start -20c high temp test	KM
03/05/19	06:30	-20c high temp temp has completed	KM
		Open chambers doors per customer and allow UUT's to set at air temperature	KM
03/05/19	10:00	Customer inspected UUT's and performed functional test	KM
		Note:All test pass or fail determinations decided by Pro V&V Inc.	
		ICE Voting System S/N - AAFEBIK1847	
		Monitor S/N - ICE-MON-001	

TEST BY Kerry Martin   **DATE** 03/05/19
PAGE 1 **OF** 1   **ENGINEER**   **GOV'T QAR** N/A

High Temperature:

TEST	High Temperature +60c Test			MJO	PR094223
CUSTOMER	Pro V&V Inc	P/N	N/A	S/N	See Below
TEST ITEM	ICE Voting System & Monitor - Qty 1 Each				
SPECIFICATION	MIL-STD-810D			PARA	

DATE	TIME	LOG ENTRIES	INITIALS
03/05/19	09:25	Start +60c high temp test	KM
	14:30	+60c high temp temp has completed	KM
03/05/19	15:00	Open chambers doors per customer and allow UUT's to set at air temperature	KM
03/06/19	09:00	Customer inspected UUT's and performed functional test	KM
		Note:All test pass or fail determinations decided by Pro V&V Inc.	
		ICE Voting System S/N - AAFEBIK1847	
		Monitor S/N - ICE-MON-001	

	TEST BY Kerry Martin	DATE	03/06/19
PAGE 1 OF 1	ENGINEER	GOV'T QAR	N/A

NTS

Humidity:

TEST	10 Day Humidity Test		MJO	PR094223
CUSTOMER	Pro V&V Inc	P/N N/A	S/N	See below
TEST ITEM	ICE Voting System & Monitor - Qty 1 Each			
SPECIFICATION	MIL-STD-810D		PARA	

DATE	TIME	LOG ENTRIES	INITIALS
02/19/19	11:45	Install UUT into chamber	KM
	11:50	Start 10 day humidity test	KM
03/04/19	06:30	Test complete & open chambers doors and allow UUT to drift back to ambient	KM
		Note after lookind at data test ran a total of 11 cycles have informed customer	KM
03/04/19		Customer inspected UUT and performed functional test	KM
		Note:All test pass or fail determinations decided by Pro V&V Inc.	
		ICE Voting System S/N - AAFEBIK1847	
		Monitor S/N - ICE-MON-001	

	TEST BY Kerry Martin	**DATE** 03/04/19
PAGE 1 **OF** 1	**ENGINEER**	**GOV'T QAR** N/A

Bench Handling:

TEST	Bench Test		MJO	PR094223
CUSTOMER	Pro V&V Inc	P/N N/A	S/N	See Below
TEST ITEM	ICE Voting System & Monitor - Qty 1 Each			
SPECIFICATION	MIL-STD-810D		PARA	

DATE	TIME	LOG ENTRIES	INITIALS
03/06/19	10:30	Start 6 drops per corner of UUT from 4 inches	KM
03/06/19	11:30	Total of 24 drops from 4 inches for UUT complete	KM
		Note:All test pass or fail determinations decided by Pro V&V Inc.	
		ICE Voting System S/N - AAFEBIK1847	
		Monitor S/N - ICE-MON-001	

	TEST BY Kerry Martin	**DATE** 03/06/19
PAGE 1 **OF** 1	**ENGINEER**	**GOV'T QAR** N/A

NTS

Transportation Vibration:

Start Date: 3-7-19	End Date: 3-7-19					MJO No: PR094223	
Customer: Pro V&V				Test Performed: Random Vibration		Test Engineer:	G. Mathews
Part Name:				Serial numbers:		Customer Witness:	
Test Specification: MIL-STD 810D Fig 514.3-1						Temp: 70° Humidity: 22%	

Date	Time	Axis	Run No.	Serial No.	Remarks	Initials
3-7-19					Set up both UUT's on shaker #ED3 for testing in the Longitudinal axis.	GM
3-7-19	1254	Longitudinal	1		Run the 0.74 gRMS random profile for 30 minutes in the Longitudinal axis.	GM
3-7-19					Set up both UUT's on shaker #HYD06 for testing in the Transverse axis.	GM
3-7-19	1418	Transverse	2		Run the 0.74 gRMS random profile for 30 minutes in the Transverse axis.	GM
3-7-19					Set up the UUT on shaker #ED3 for testing in the Vertical axis.	GM
3-7-19	1457	Vertical	3		Run the 1.04 gRMS random profile for 30 minutes in the Vertical axis.	GM

Test profiles

Vertical

| Table | Schedule | Parameters | Limits | Channels | Data | Tables | Calc | R-o-R | S-o-R | S-o-R Param | Notch |

	Frequency (Hz)	Amplitude (G²/Hz)	Slope (dB/Oct)	Tolerance (+)	Tolerance (--)	Abort (+)	Abort (--)	dB
1	10	0.015						
			>-- 0	3	3	6	9	
2	40	0.015						
			>-- -5.489	3	3	6	9	
» 3	500	0.00015						

☑ Use single Tol/Abort setting

| Insert | Delete | First | Last |

| Scale --> | | G RMS: 1.044 | in/s RMS: 2.192 | in pk-pk: 0.1328 |

Control Units: G²/Hz

Transverse

| Table | Schedule | Parameters | Limits | Channels | Data | Tables | Calc | R-o-R | S-o-R | S-o-R Param | Notch |

	Frequency (Hz)	Amplitude (G²/Hz)	Slope (dB/Oct)	Tolerance (+)	Tolerance (--)	Abort (+)	Abort (--)	dB
» 1	10	0.00013						
			>-- 6.99	3	3	6	9	
2	20	0.00065						
			>-- 0	3	3	6	9	
3	30	0.00065						
			>-- -10.97	3	3	6	9	
4	78	2e-05						
			>-- 532	3	3	6	9	
5	79	0.00019						
			>-- 0	3	3	6	9	
6	120	0.00019						
			>-- -6.211	3	3	6	9	
7	500	1e-05						

☑ Use single Tol/Abort setting

| Insert | Delete | First | Last |

| Scale --> | | G RMS: 0.2038 | in/s RMS: 0.3488 | in pk-pk: 0.01869 |

Control Units: G²/Hz

Longitudinal

	Frequency (Hz)	Amplitude (G²/Hz)		Slope (dB/Oct)	Tolerance (+)	Tolerance (--)	Abort (+)	dB (--)
» 1	10	0.0065						
			>--	0	3	3	6	9
2	20	0.0065						
			>--	-5.849	3	3	6	9
3	120	0.0002						
			>--	982.3	3	3	6	9
4	121	0.003						
			>--	0	3	3	6	9
5	200	0.003						
			>--	-11.44	3	3	6	9
6	240	0.0015						
			>--	-33.81	3	3	6	9
7	340	3e-05						
			>--	12.56	3	3	6	9
8	500	0.00015						

☑ Use single Tol/Abort setting

Insert   Delete   First   Last

Scale -->   G RMS: 0.7428   in/s RMS: 1.347   in pk-pk: 0.09105

Control Units
G²/Hz

10

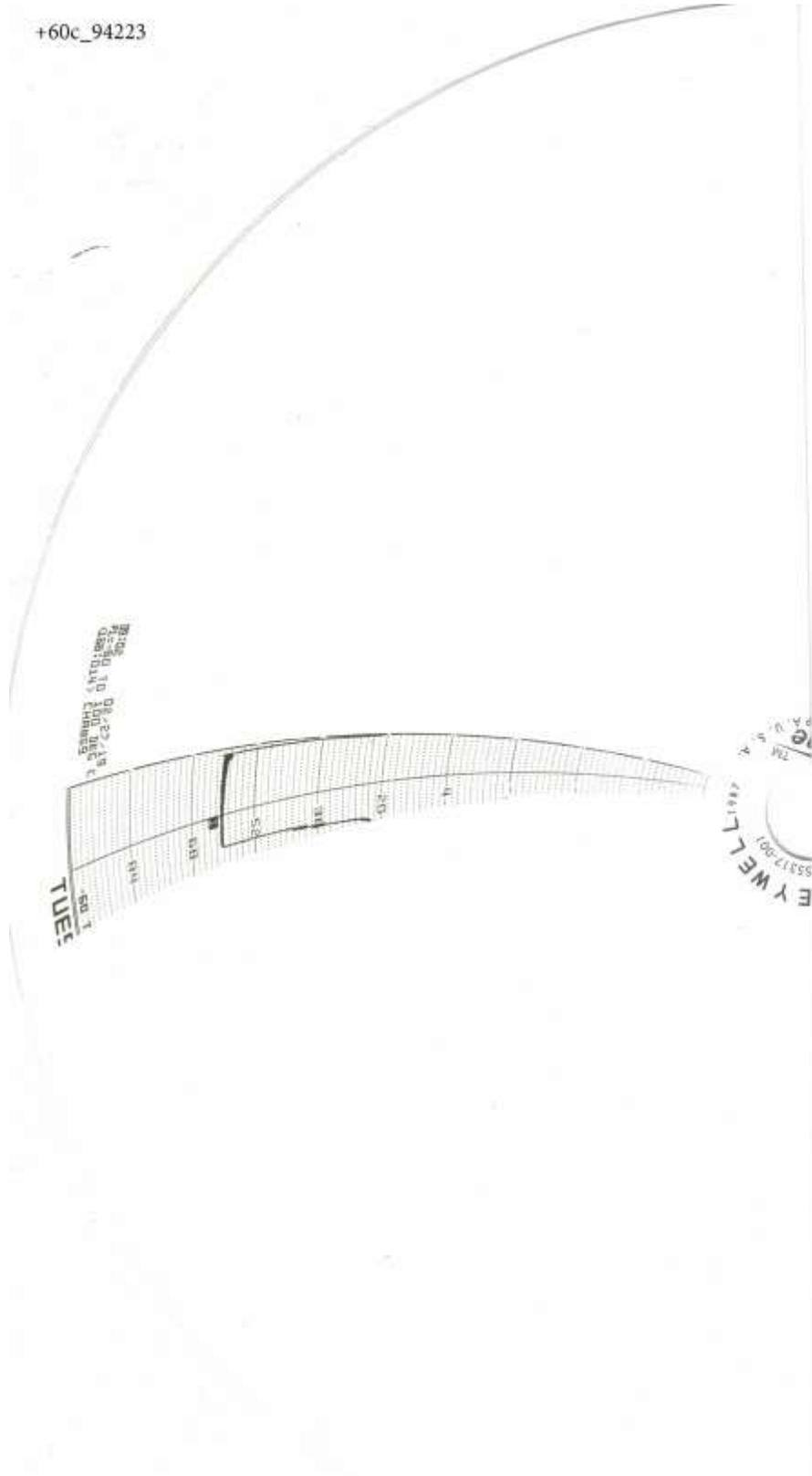### Temperature/Power Variation:

TEST	Temperature Power Variation Test		MJO	PR094223

CUSTOMER   Pro V&V   P/N   N/A   S/N   See Below

TEST ITEM   See Below

SPECIFICATION   MIL-STD-810D   PARA

DATE	TIME	LOG ENTRIES	INITIALS
03/11/19	09:00	Set VAC to 117vlts & ramp to +10c	RSP
	09:00	Start dwell at 117vlts & +10c for 4hrs	RSP
	13:00	Lower VAC to 105vlts & dwell for 4hrs	RSP
	17:00	Raise VAC to 129vlts & dwell for 4hrs	KM
	21:00	Lower VAC to 117vlts & Raise temperature to +35c & dwell for 4hrs	KM
03/12/19	01:00	Lower VAC to 105vlts & dwell for 4hrs	KM
	05:00	Raise VAC to 129vlts & dwell for 4hrs	KM
	09:00	Lower VAC to 117vlts & Lower temperature to +10c & dwell for 4hrs	RSP
	13:00	Lower VAC to 105vlts & dwell for 4hrs	RSP
	17:00	Raise VAC to 129vlts & dwell for 4hrs	KM
	21:00	Lower VAC to 117vlts & Raise temperature to +35c & dwell for 4hrs	KM
03/13/19	01:00	Lower VAC to 105vlts & dwell for 4hrs	KM
	05:00	Raise VAC to 129vlts & dwell for 4hrs	KM
	09:00	Lower VAC to 117vlts & ramp to +23c ambient	RSP
	09:00	Temp and power variation portion of test has completed	RSP
03/13/19	09:00	Test will continue to run at +23c ambient for another 37hrs	RSP
03/14/19	22:00	All Testing complete for a total of 85hrs	KM
		Note:All test pass or fail determinations decided by Pro V&V Inc.	
		ICE Voting System S/N - AAFEBIK1847	
		ICE Voting System S/N - AAFEBCN0012	
		ICE M260 - HG306013	
		ICE M260 - HG306012	
		ICE HighPro - 0078K28 - Note UUT failed 03/12/19 test will continue with remaining UUT's	
		ICE HighPro - 0080K28 - Note UUT failed 03/12/19 test will continue with remaining UUT's	

TEST BY Kerry Martin   **DATE**   03/14/19

PAGE 1 **OF** 1   **ENGINEER**   **GOV'T QAR**   N/A

TEST DATA

Low Temperature:

-20c_94223

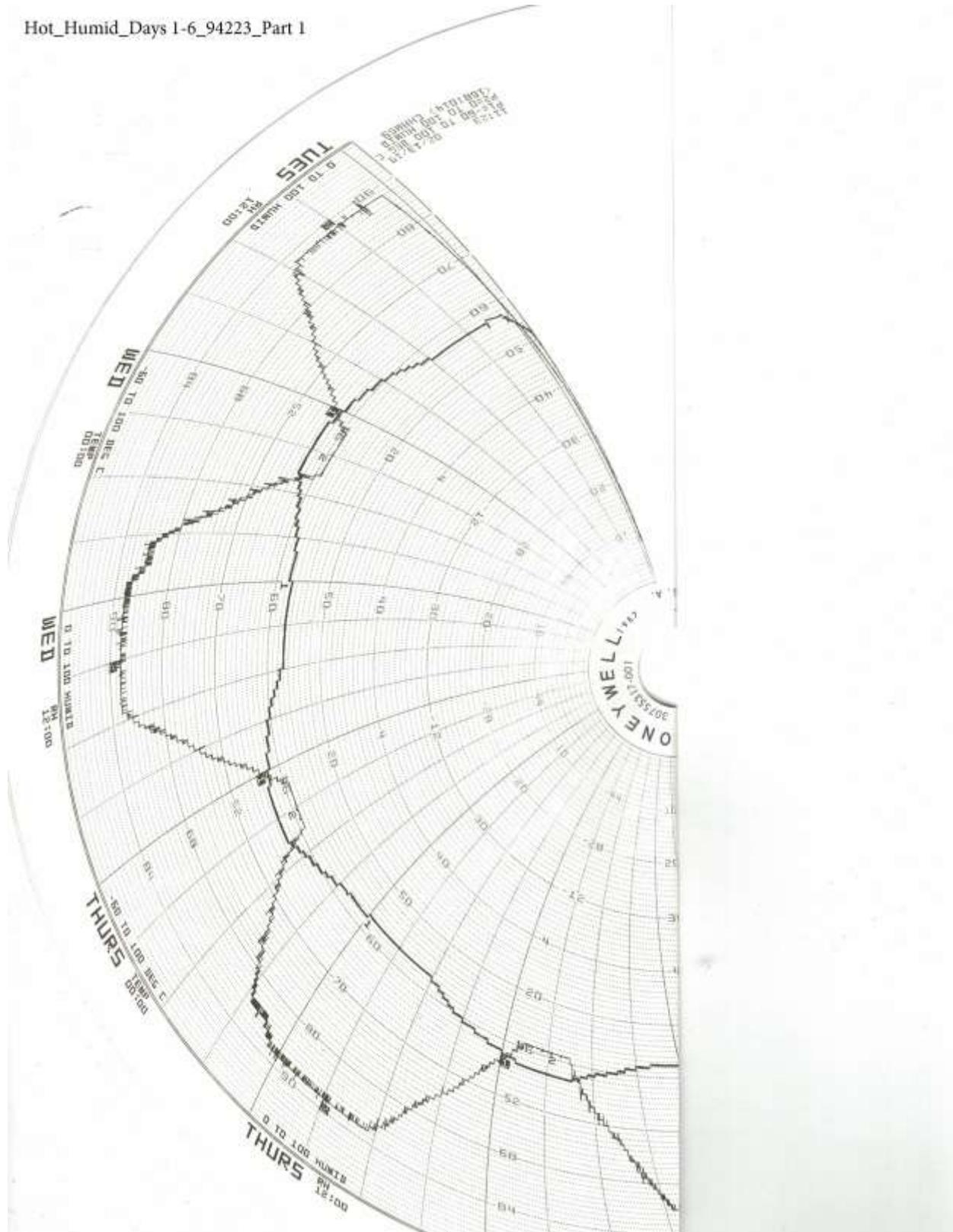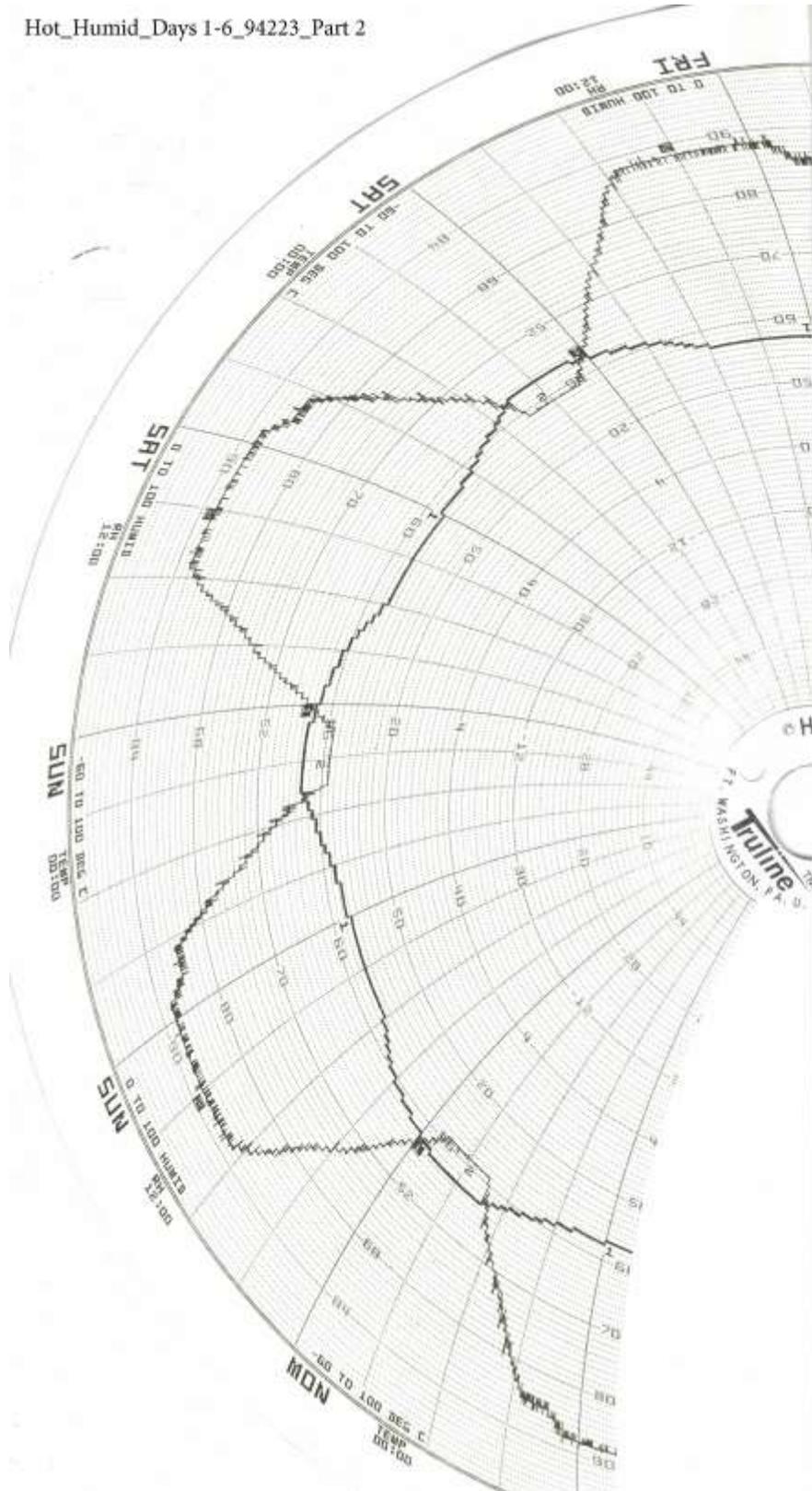*High Temperature:*

+60c_94223

Humidity:

Hot_Humid_Days 1-6_94223_Part 1

Hot_Humid_Days 1-6_94223_Part 2

Hot_Humid_Days 6-10_94223_Part 1

Hot_Humid_Days 6-10_94223_Part 2
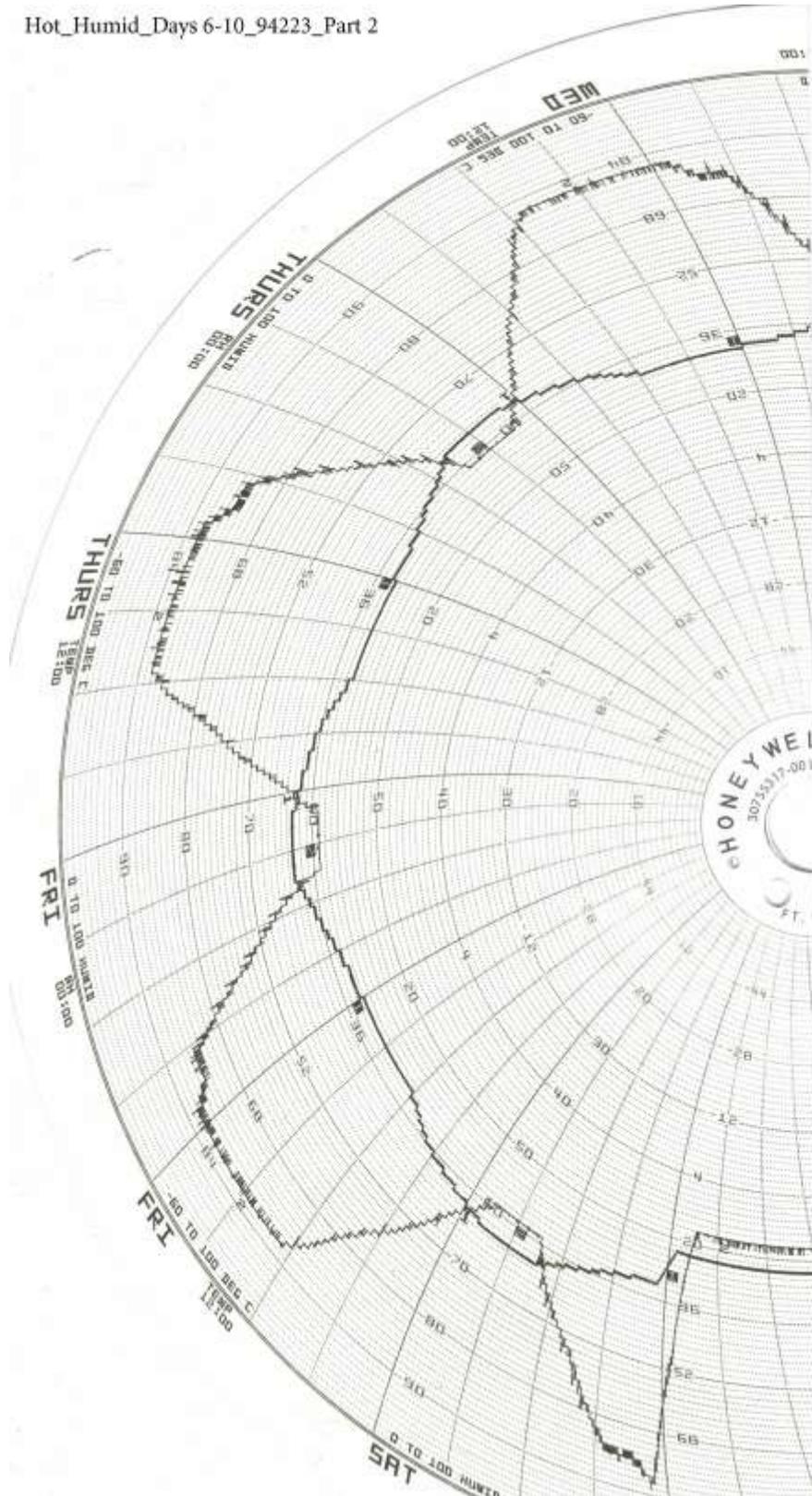
Bench Handling:

Transportation Vibration:

Control Acceleration Spectral Density

View 1

NTS Longmont, CO   Level Time: 0:30:00   Demand: 1.047 G RMS   Pro V&V

Job#: PR094591   Total Time: 0:30:10   Control: 1.05 G RMS   UUT: Dominion voting systems

Mar 07, 2019 14:57:46 Run 3   Test axis: Vertical
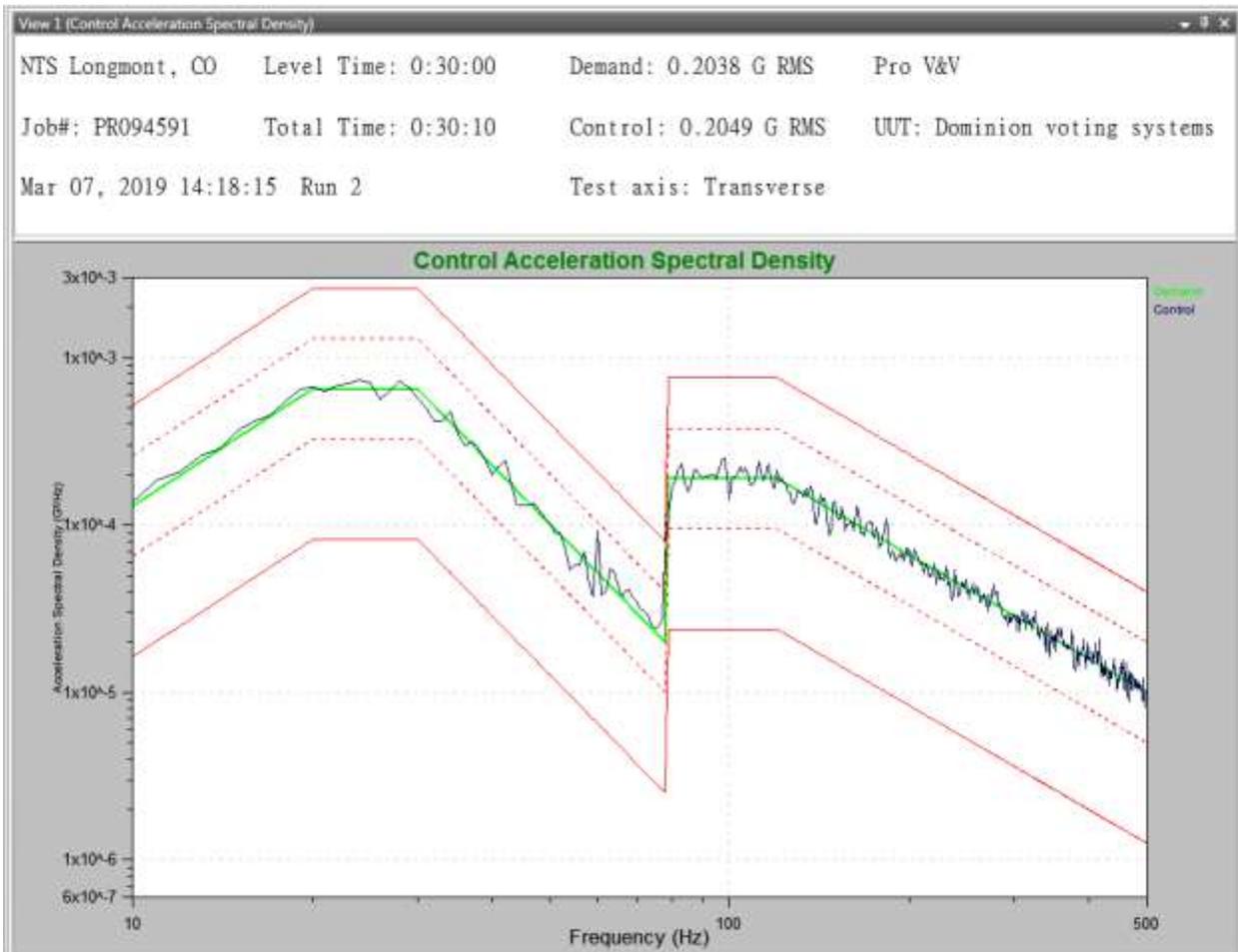
Temperature and Power Variation:

Temp_Power_Variation Part 1

Temp_Power_Variation Part 2
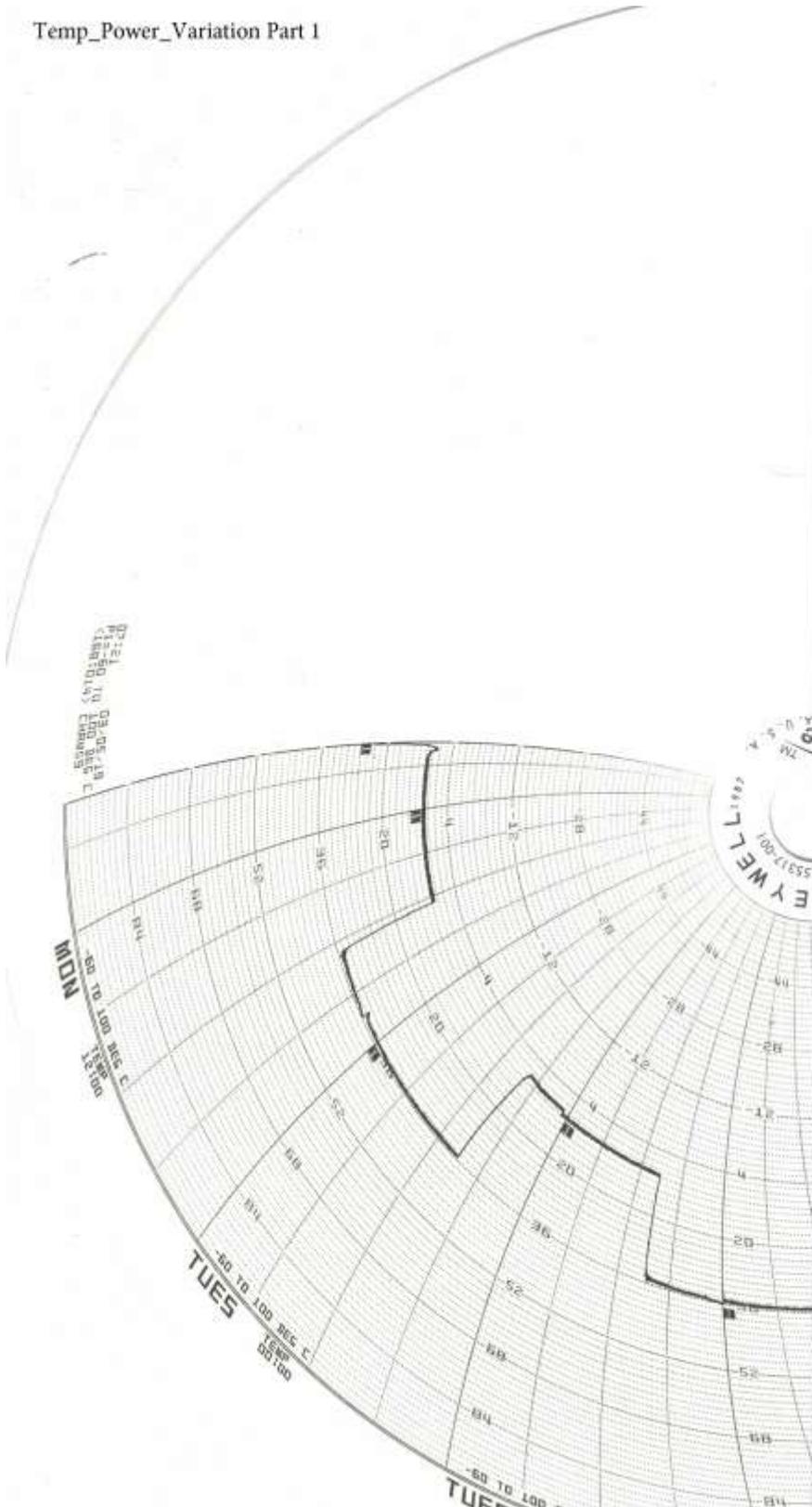
TEST SETUP

Transportation Vibration:

TEST EQUIPMENT

Low Temperature:

Test Title:	Low Temperature -20c Test					
Customer:	Pro V&V Inc		Date:	03/04/19		
Part Name:	ICE Voting System & Monitor - Qty 1 Each		MJO No.:	PR094223		
Part No.:	N/A		P.O. No.:			
Serial No.:	See below		NTS Eng.:			
Test Spec:	MIL-STD-810D		Revision:			

Equipment	Manufacture / Model	NTS I.D. #	Cal. Date	In-Service	Due Date
Chamber 59	N/A	1733	N/A	Yes	N/A
Controller	Watlow F4	1653	09/21/18	Yes	09/21/19
Chart Recorder	Honeywell	1654	09/21/18	Yes	09/21/19
ICE Voting System S/N	AAFEBIK1847				
Monitor S/N	ICE-MON-001				

Test By: Kerry Martin   Date: 03/05/19

Page 1 of 1 Engr.: _____ Govt. QAR: _____

High Temperature:

TEST	High Temperature +60c Test			MJO	PR094223
CUSTOMER	Pro V&V Inc	P/N	N/A	S/N	See Below
TEST ITEM	ICE Voting System & Monitor - Qty 1 Each				
SPECIFICATION	MIL-STD-810D			PARA	

DATE	TIME	LOG ENTRIES	INITIALS
03/05/19	09:25	Start +60c high temp test	KM
	14:30	+60c high temp temp has completed	KM
03/05/19	15:00	Open chambers doors per customer and allow UUT's to set at air temperature	KM
03/06/19	09:00	Customer inspected UUT's and performed functional test	KM
		Note:All test pass or fail determinations decided by Pro V&V Inc.	
		ICE Voting System S/N - AAFEBIK1847	
		Monitor S/N - ICE-MON-001	

TEST BY Kerry Martin   DATE 03/06/19

PAGE 1 OF 1 ENGINEER _____ GOV'T QAR N/A

NTS

Humidity:

DATE	TIME	LOG ENTRIES	INITIALS
		TEST 10 Day Humidity Test MJO PR094223	
		CUSTOMER Pro V&V Inc P/N N/A S/N See below	
		TEST ITEM ICE Voting System & Monitor - Qty 1 Each	
		SPECIFICATION MIL-STD-810D PARA	
02/19/19	11:45	Install UUT into chamber	KM
	11:50	Start 10 day humidity test	KM
03/04/19	06:30	Test complete & open chambers doors and allow UUT to drift back to ambient	KM
		Note after lookind at data test ran a total of 11 cycles have informed customer	KM
03/04/19		Customer inspected UUT and performed functional test	KM
		Note:All test pass or fail determinations decided by Pro V&V Inc.	
		ICE Voting System S/N - AAFEBIK1847	
		Monitor S/N - ICE-MON-001	

TEST BY Kerry Martin DATE 03/04/19

PAGE 1 OF 1 ENGINEER GOV'T QAR N/A

Bench Handling:

Test Title:	Bench Test				
Customer:	Pro V&V Inc		**Date:**	03/06/19	
Part Name:	ICE Voting System & Monitor - Qty 1 Each		**MJO No.:**	PR094223	
Part No.:	N/A		**P.O. No.:**		
Serial No.:	See Below		**NTS Eng.:**		
Test Spec:	MIL-STD-810D		**Revision:**		

Equipment	Manufacture / Model	NTS I.D. #	Cal. Date	In-Service	Due Date
Wooden Block	4 Inch Wooden Block	N/A	N/A	N/A	N/A
ICE Voting System S/N	AAFEBIK1847				
Monitor S/N	ICE-MON-001				

Test By: Kerry Martin Date: 03/06/19

Page 1 of 1 Engr.: Govt. QAR:

Transportation Vibration:

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
WC021574	UD	T-1000	n/a	Shaker system ED3	For reference only	
1751	Team	483 48-16	494	Shaker System HYD05	For reference only	
	Vibration Research	VR9500	95268B57	Vibration Controller	9/18/2018	9/18/2019
1671	PCB	333A12	30540	Control accelerometer	8/17/2018	8/17/2019
1673	PCB	333A12	30641	Control accelerometer	8/17/2018	8/17/2019
1869	PCB	352C34	LW256906	Control accelerometer	10/1/2018	10/1/2019
1870	PCB	352C34	LW256907	Control accelerometer	10/1/2018	10/1/2019
1766	Fluke	971	3623064	Temperature/Humidity meter	4/23/2018	4/23/2019
1858	CDI Torque Products	1002MFRMH	518704072	Torque Wrench	5/23/2018	5/23/2019

Temperature and Power Variation:

Test Title:	Temperature Power Variation Test					
Customer:	Pro V&V Inc			Date:	03/11/19	
Part Name:	See Below			MJO No.:	PR094223	
Part No.:	N/A			P.O. No.:		
Serial No.:	See below			NTS Eng.:		
Test Spec:	MIL-STD-810D			Revision:		

Equipment	Manufacture / Model	NTS I.D. #	Cal. Date	In-Service	Due Date
Chamber 59	N/A	1733	N/A	Yes	N/A
Controller	Watlow F4	1653	09/21/18	Yes	09/21/19
Chart Recorder	Honeywell	1654	09/21/18	Yes	09/21/19
ICE Voting System	S/N - AAFEBIK1847				
ICE Voting System	S/N - AAFEBCN0012				
ICE M260	S/N - HG306013				
ICE M260	S/N - HG306012				
ICE HighPro	S/N - 0078K28				
ICE HighPro	S/N - 0080K28				

Test By: Kerry Martin   Date: 03/14/19

Page 1 of 1   Engr.:   Govt. QAR:

END OF REPORT