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

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

Date: 23 AUGUST 2017

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

Purchase Order Number: 2017-004

A. TEST: Environmental Testing

B. TEST ITEMS: One (1) Clearcast
See page 2 for Test Item Identification

C. SPECIFICATIONS:
1. Volume II National Certification Testing Guidelines, 4 Hardware Testing
2. MIL-STD-810D
3. ISO 17025:2005

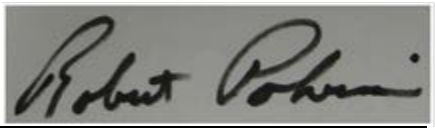
D. RESULTS:

This is to certify that the Clearcast was subjected to Environmental Testing according to the above specifications.

See Page 2 for Summary of Test Results. The Clearcast was returned to Pro V&V for post tests and final evaluation.

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

Mary Brownlee,
Preparer



Bob Polverari,
Technical Reviewer

John Radman,
Independent Reviewer

TEST ITEM IDENTIFICATION

Quantity	Sample Description	Model	Serial Number
1	Clearcast	Clearcast	00014

SUMMARY OF TEST RESULTS

Upon completion of testing, the test sample was subjected to a visual inspection. No anomalies were noted. The Test Sample was returned to Pro V&V.

10 Day Humidity Testing

Testing was started on 03 May 2017 and was completed on 17 May 2017 by subjecting one (1) Model Clearcast labeled as S/N 00014 to the 10 Day Humidity Test in accordance with the MIL-STD-810D, Method 507.2 – Natural Hot Humidity.

The test sample was placed into an environmental chamber and subjected to 10 - 24 hour Natural Hot Humid cycles. Each 24 hour cycle consisted of a test temperature at +75°F with Relative Humidity ranging between 100 and 95% constant humidity.

High/Low Temperature Testing

Testing was started on 03 May 2017 and was completed on 17 May 2017 by subjecting one (1) Model Clearcast labeled as S/N 00014 to High/Low Temperature Test in accordance with the MIL-STD-810D, Method 501.2 – Non operating.

The test sample was placed into an environmental chamber and subjected to 2 - 4 hour dwells at each temperature of +140°F and -4°F.

Bench Handling Testing

Testing was performed on 17 May 2017 by subjecting one (1) Model Clearcast labeled as S/N 00014 to the Bench Handling Test in accordance with the MIL-STD-810D, Method 516.3, Procedure VI.

The test sample was subjected to 24 – 4" Drops as follows:

1st – Six (6) Back Edge Drops

2nd – Six (6) Left Side Edge Drops

3rd – Six (6) Right Side Edge Drops

4th – Six (6) Forward Side Edge Drops

Vibration Testing

Testing was performed on 17 May 2017 by subjecting one (1) Model Clearcast labeled as S/N 00014 to the Vibration Test in accordance with the MIL-STD-810D, Method 514.3, Category 1 – Basic Transportation, Common Carrier.

The test sample was secured to an electro-dynamic shaker and exposed to vibration testing in each of the three (3) axes (X, Y and Z).

Test Sample in temperature/humidity chamber

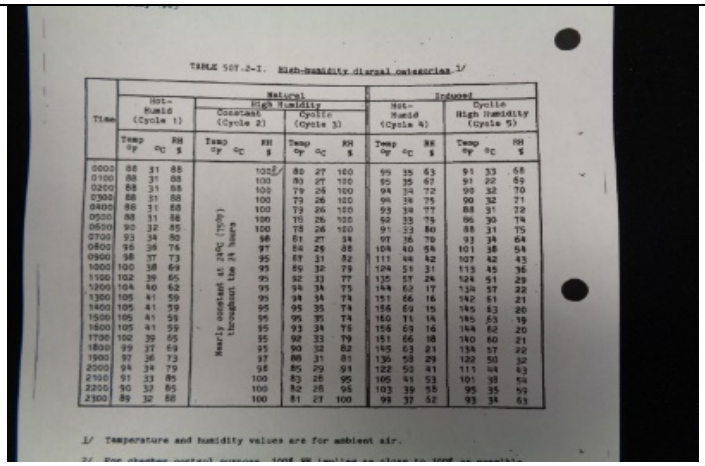
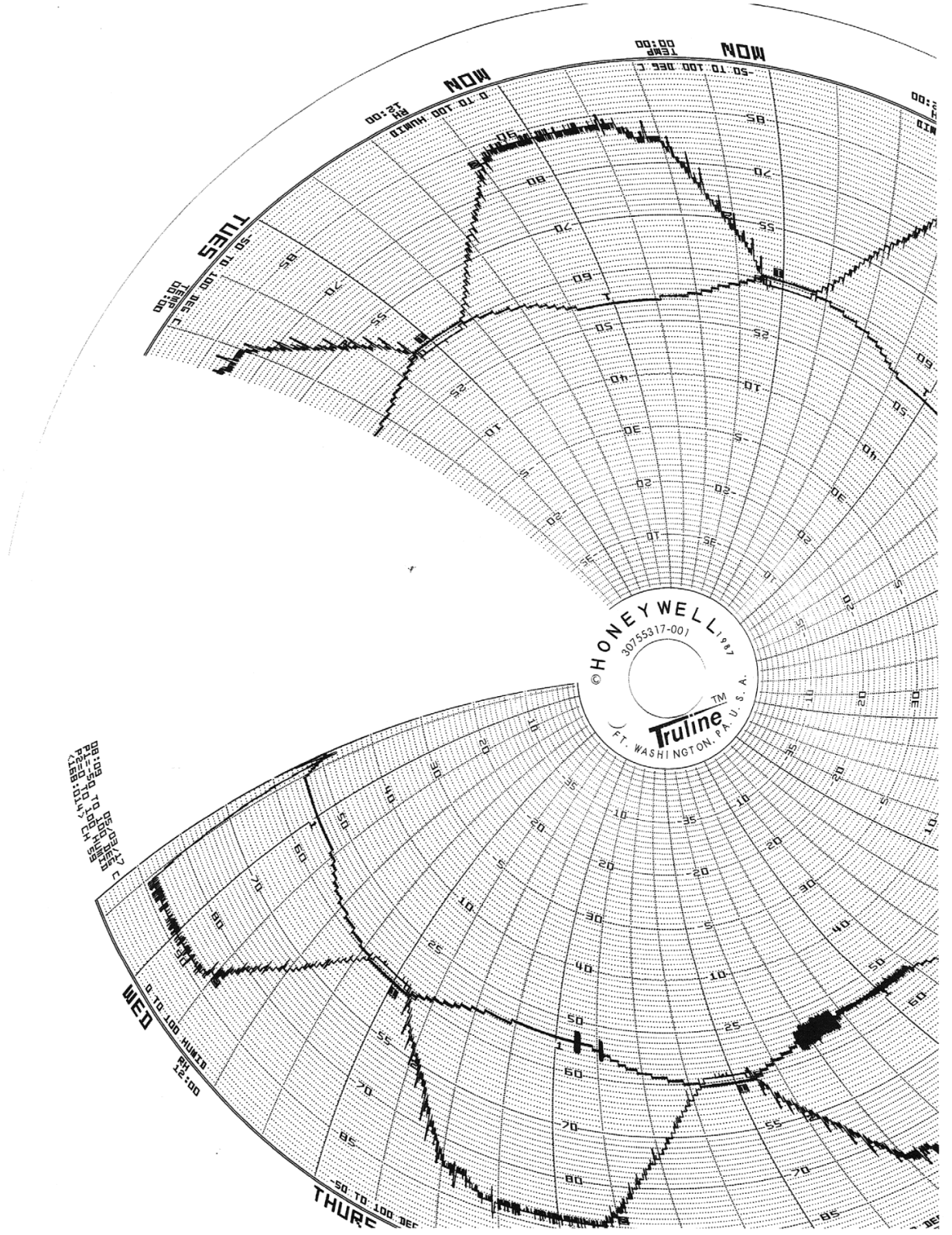
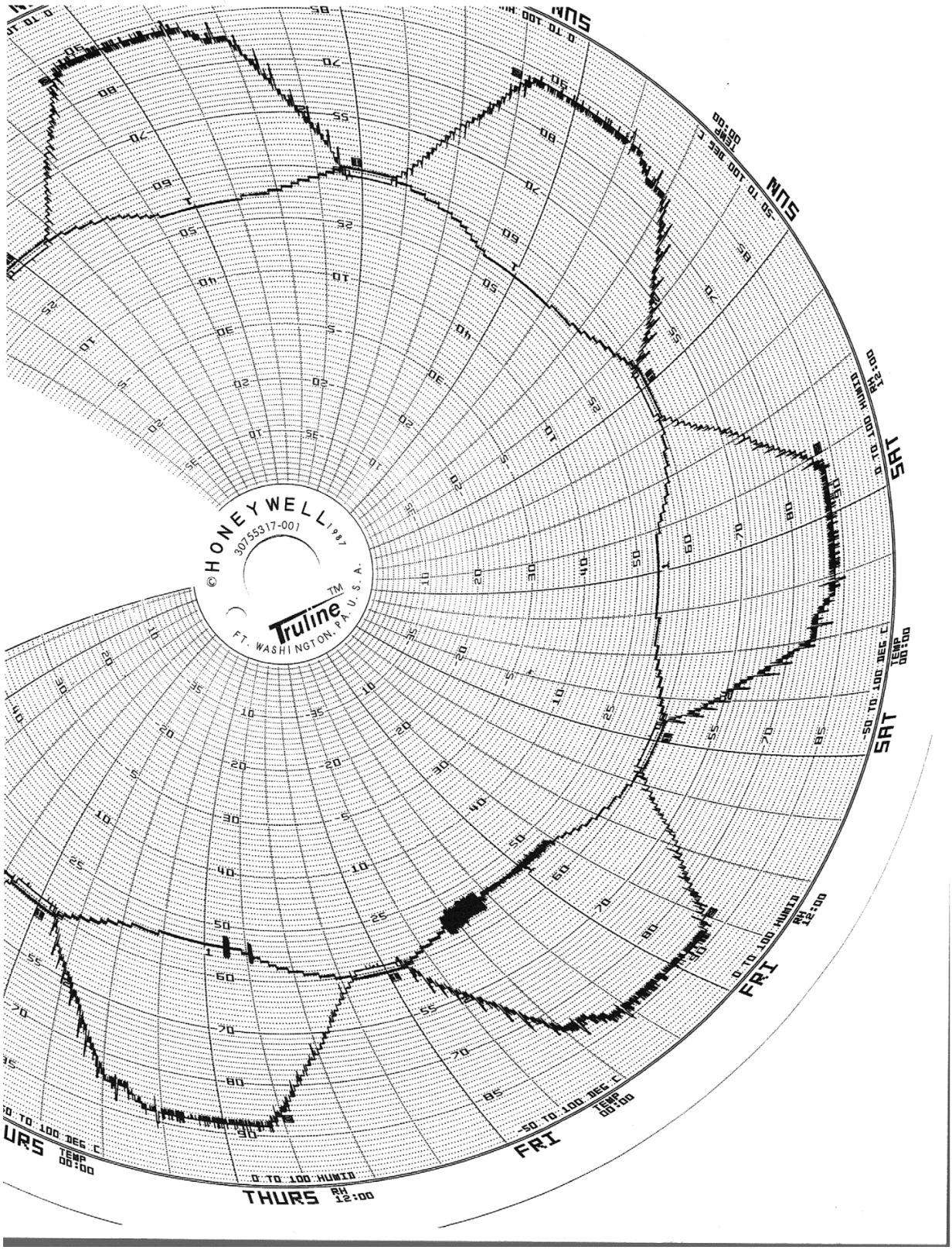

Performed Natural Hot Humidity Procedure 1 performed (10/ 24 hour cycles)

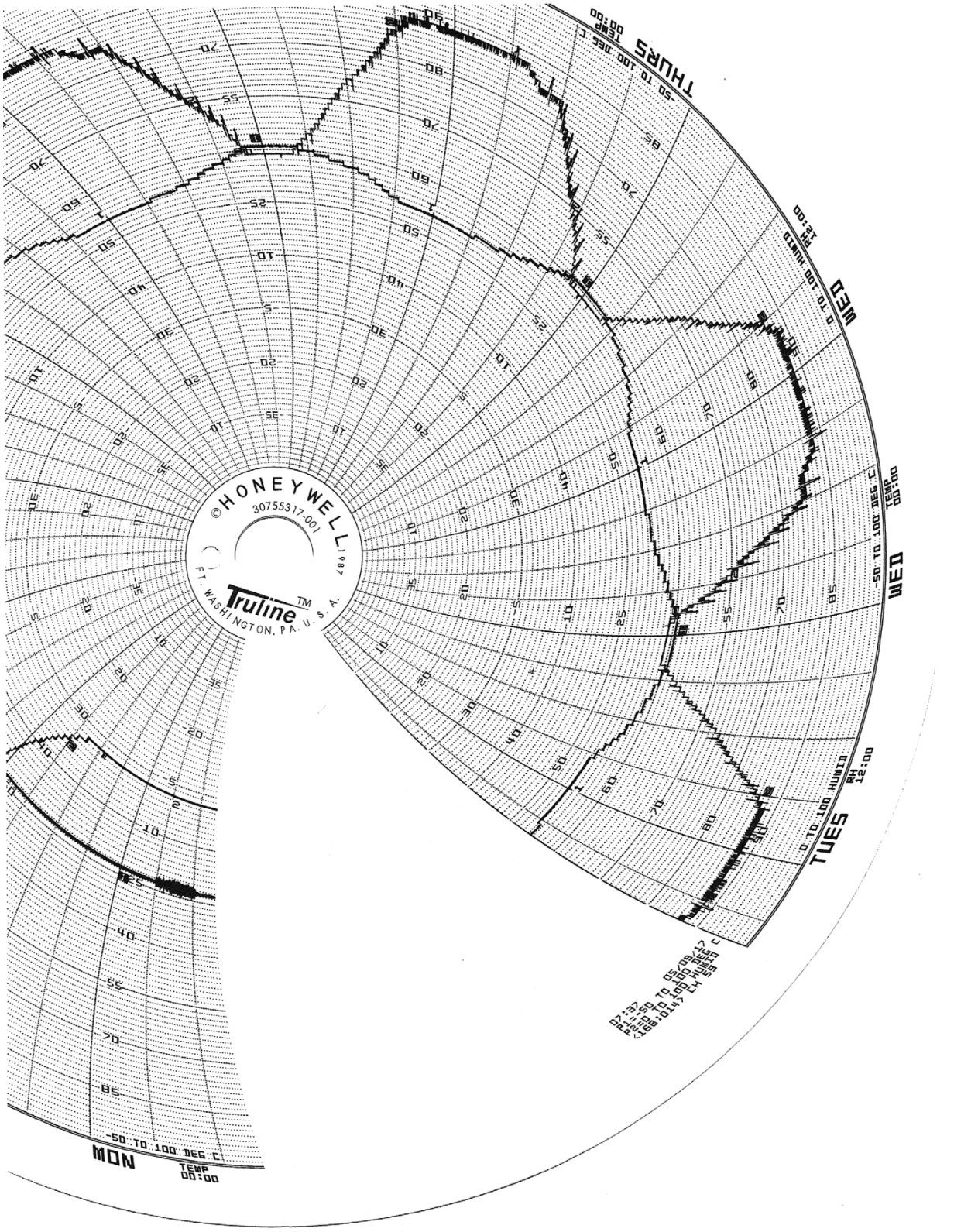
TABLE 507.2-I. High-humidity diurnal categories 1/

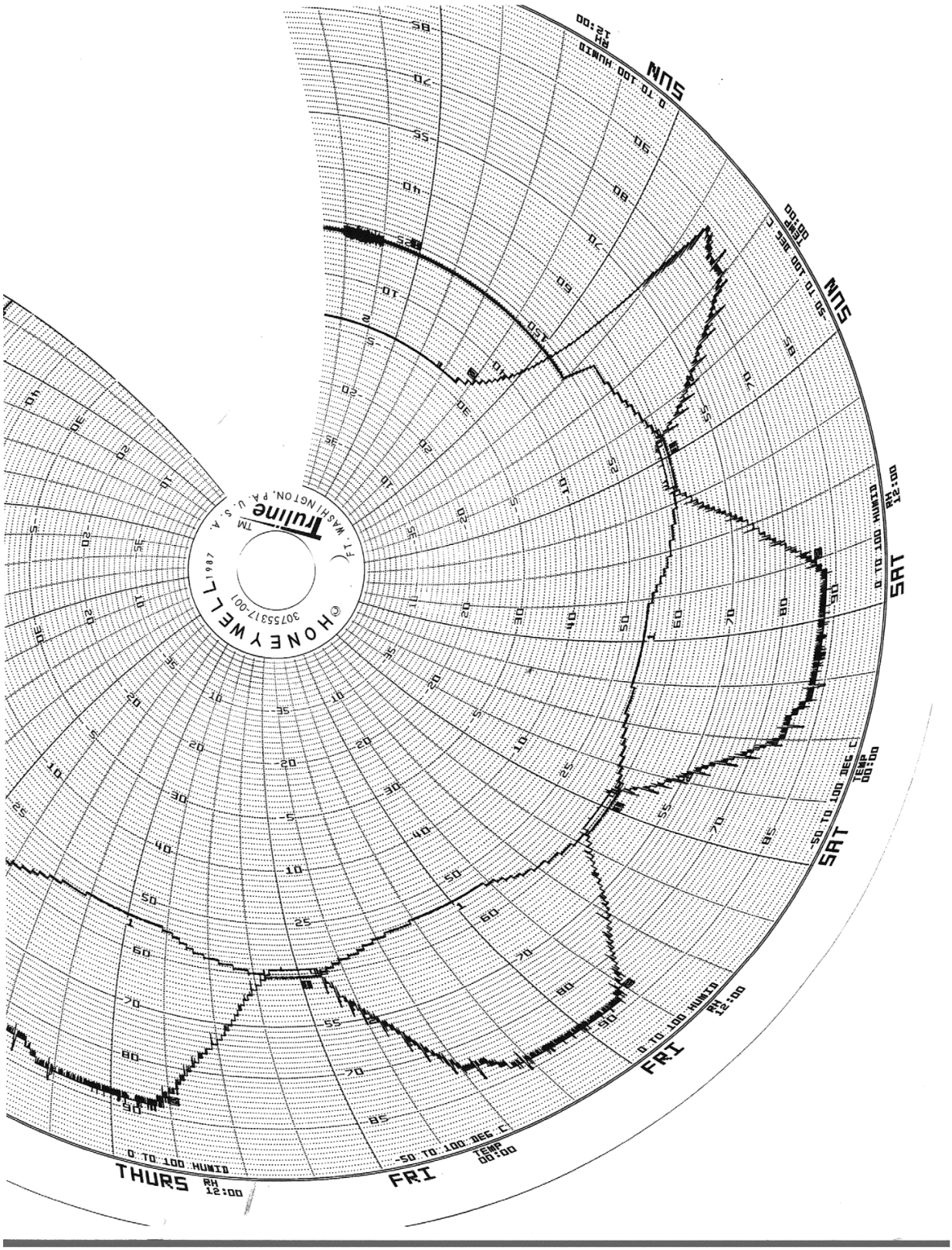
Time	Natural						Induced					
	Hot-Humid (Cycle 1)			High Humidity								
				Constant (Cycle 2)			Cyclic (Cycle 3)			Hot-Humid (Cycle 4)			Cyclic High Humidity (Cycle 5)		
	Temp °F	°C	RH %	Temp °F	°C	RH %	Temp °F	°C	RH %	Temp °F	°C	RH %	Temp °F	°C	RH %
0000	88	31	88	Nearly constant at 24°C (75°F) throughout the 24 hours		100 2/	80	27	100	95	35	63	91	33	68
0100	88	31	88			100	80	27	100	95	35	67	91	22	69
0200	88	31	88			100	79	26	100	94	34	72	90	32	70
0300	88	31	88			100	79	26	100	94	34	75	90	32	71
0400	88	31	88			100	79	26	100	93	34	77	88	31	72
0500	88	31	88			100	78	26	100	92	33	79	86	30	74
0600	90	32	85			100	78	26	100	91	33	80	88	31	75
0700	93	34	80			98	81	27	94	97	36	79	93	34	64
0800	96	36	76			97	84	29	88	104	40	54	101	38	54
0900	98	37	73			95	87	31	82	111	44	42	107	42	43
1000	100	38	69			95	89	32	78	124	51	31	115	45	36
1100	102	39	65			95	92	33	77	135	57	24	124	51	29
1200	104	40	62			95	94	34	75	144	62	17	134	57	22
1300	105	41	59			95	94	34	74	151	66	16	142	61	21
1400	105	41	59			95	95	35	74	156	69	15	145	63	20
1500	105	41	59			95	95	35	74	160	71	14	145	63	19
1600	105	41	59			95	93	34	75	156	69	16	144	62	20
1730	102	39	65			95	92	33	79	151	66	18	140	60	21
1800	99	37	69			95	90	32	82	145	63	21	134	57	22
1900	97	36	73			97	88	31	81	136	58	29	122	50	32
2000	94	34	79			98	85	29	91	122	50	41	111	44	43
2100	91	33	85			100	83	28	95	105	41	53	101	38	54
2200	90	32	85			100	82	28	96	103	39	55	95	35	59
2300	89	32	88			100	81	27	100	99	37	52	93	34	63

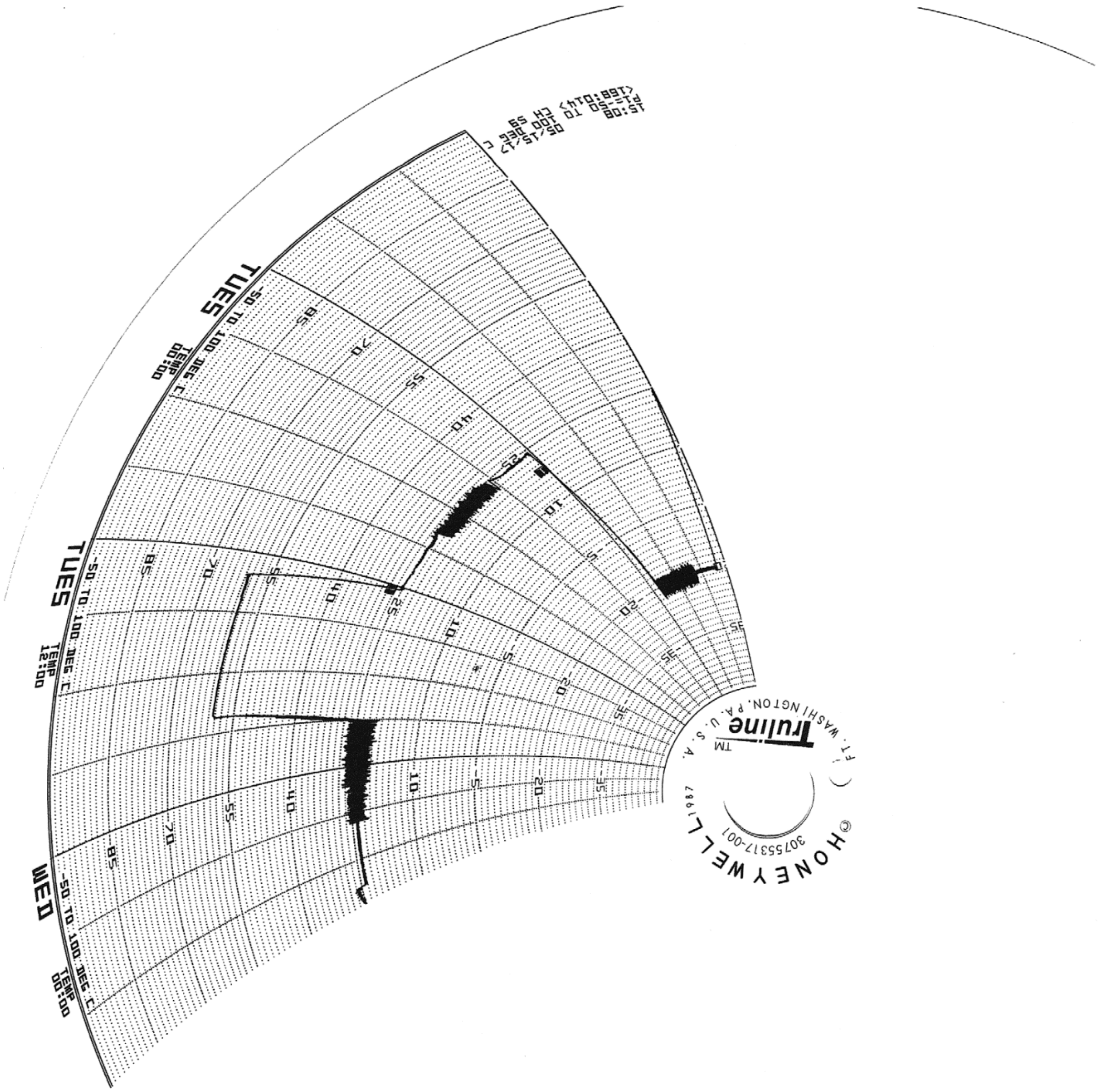
1/ Temperature and humidity values are for ambient air.


MON
TUES
WED
THURS
HONEYWELL 1987
30755317-001
Truline
FT. WASHINGTON, PA. U.S.A.

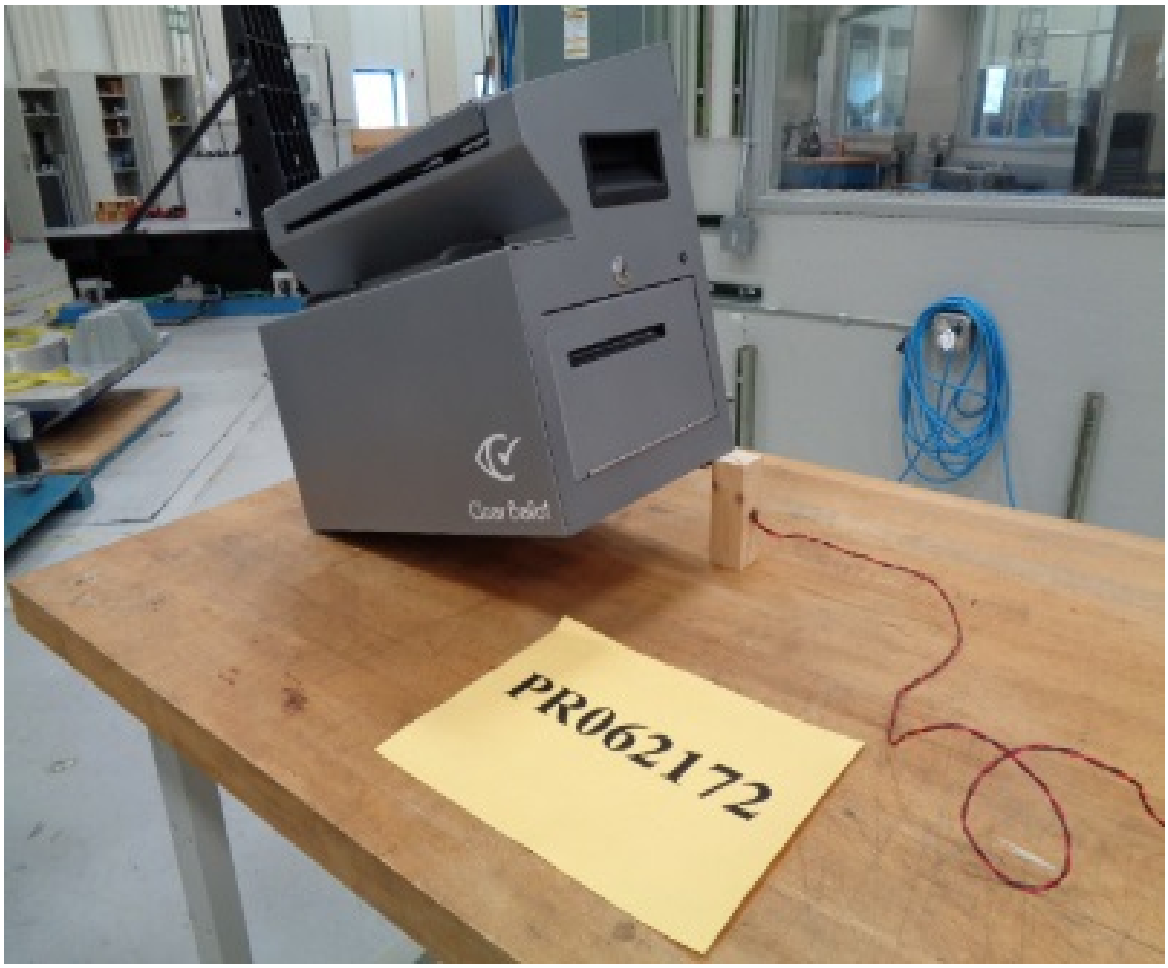

HONEYWELL 1987
30755317-001
Truline TM
FT. WASHINGTON, PA. U.S.A.
SUN
MON
TUES
WED
THURS
FRI
SAT
-50 TO 100 DEG C
TEMP
00:00
0 TO 100 HUMID
RH
12:00

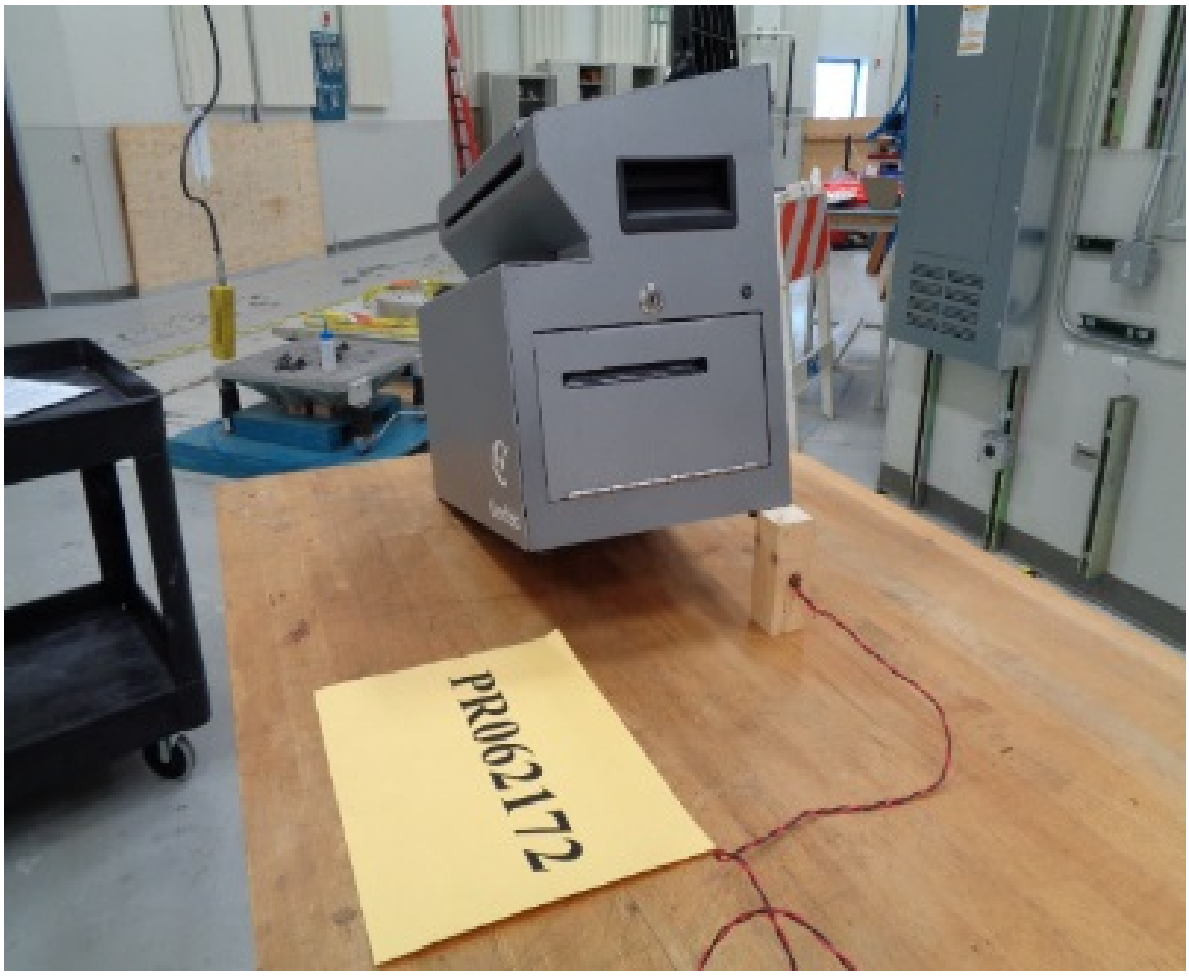

HONEYWELL
30755317-001
1987
Truline
TM
FT. WASHINGTON, PA. U.S.A.
MON
TUES
WED
THURS
-50 TO 100 DEG C
TEMP
00:00
0 TO 100 HUMID
RH
12:00

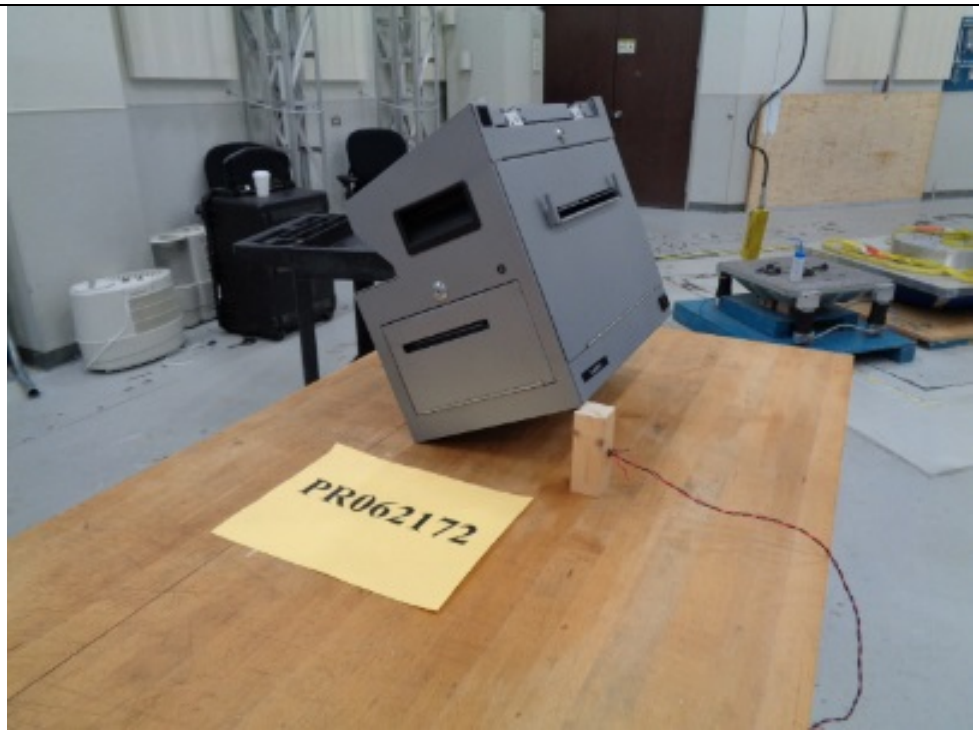

SUN
SAT
FRI
THURS
HONEYWELL
Truline
-50 TO 100 DEG C
0 TO 100 HUMID
TEMP
RH
12:00
00:00



Handling Drops

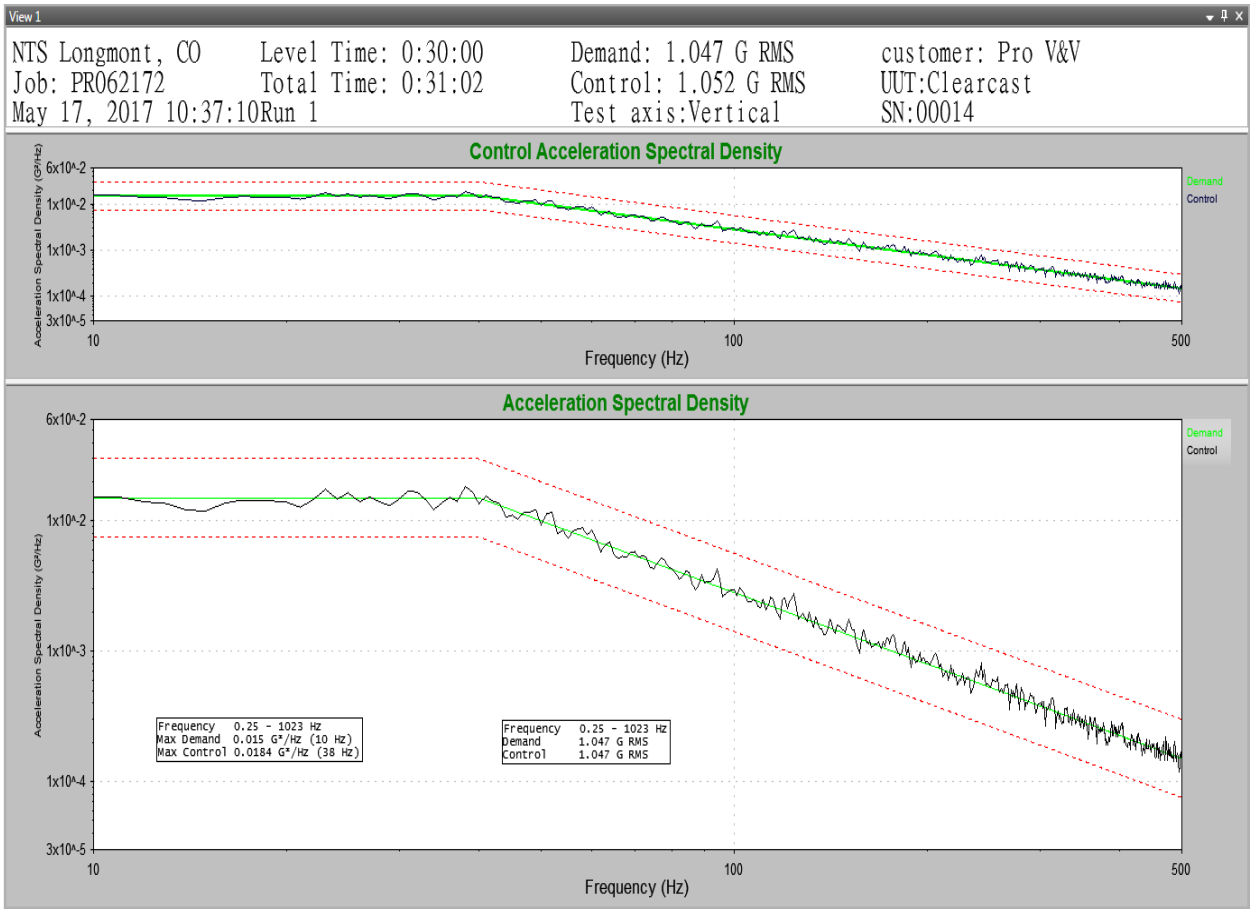


PR062172


PR062172

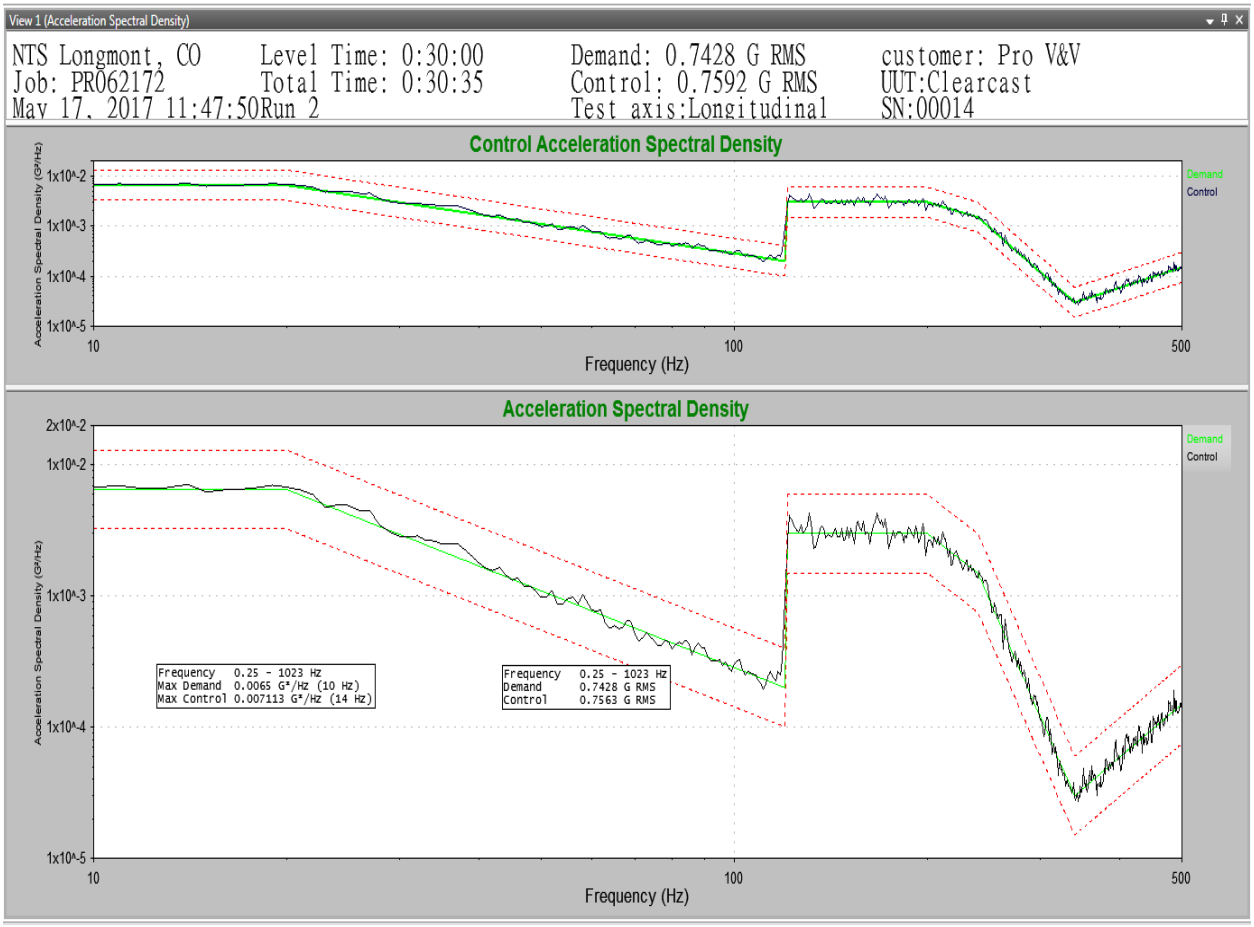


Random Vibration: MIL-STD 810D Method 514.3-1,3-2 & 3-3 Basic Transportation common carrier, in Vertical, Longitudinal & Transverse Axis

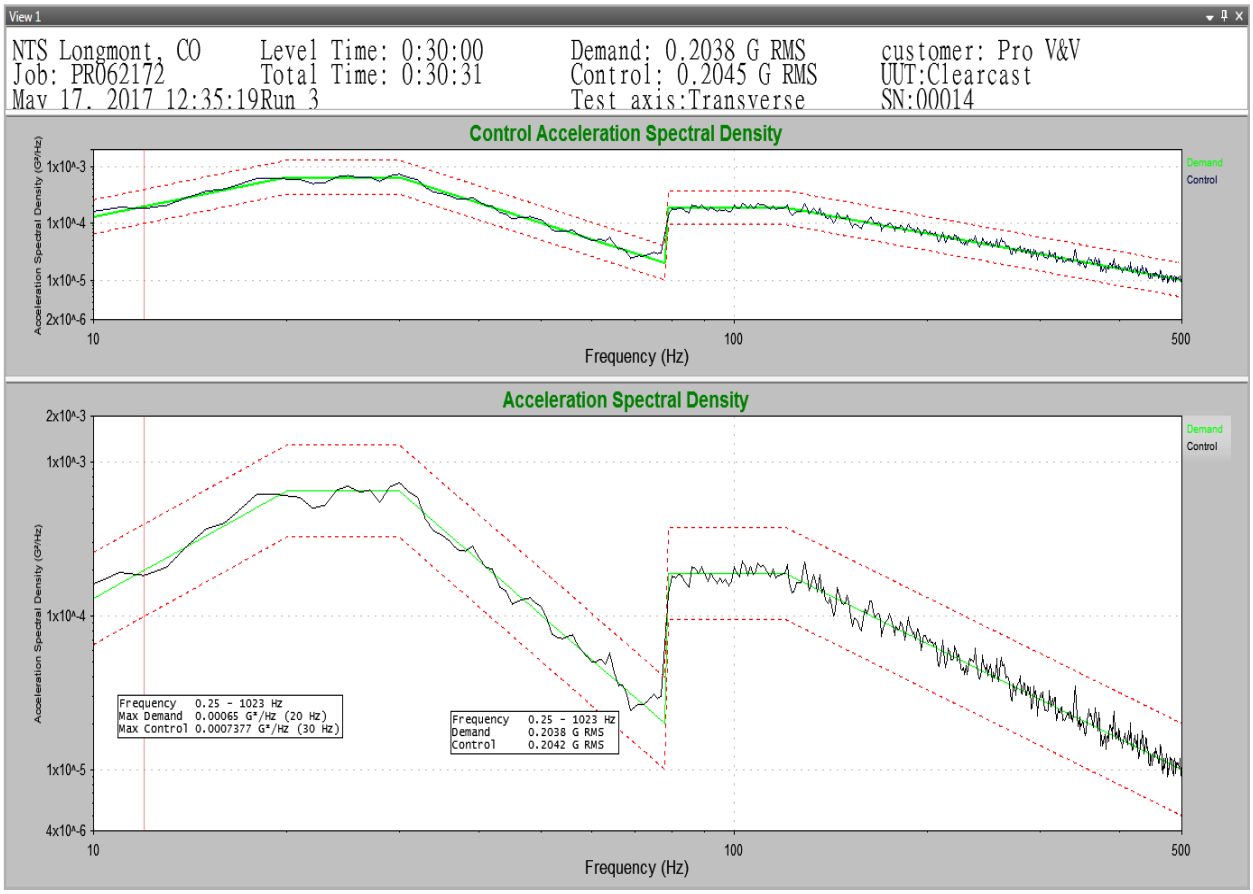
Run 1 Transportation Vertical Axis


View 1
NTS Longmont, CO
Job: PR062172
May 17, 2017 10:37:10
Run 1
Level Time: 0:30:00
Total Time: 0:31:02
Demand: 1.047 G RMS
Control: 1.052 G RMS
Test axis:Vertical
customer: Pro V&V
UUT:Clearcast
SN:00014
Control Acceleration Spectral Density
Acceleration Spectral Density (G²/Hz)
6x10^-2
1x10^-2
1x10^-3
1x10^-4
3x10^-5
10
100
500
Frequency (Hz)
Demand
Control
Acceleration Spectral Density
Frequency 0.25 - 1023 Hz
Max Demand 0.015 G²/Hz (10 Hz)
Max Control 0.0184 G²/Hz (38 Hz)
Frequency 0.25 - 1023 Hz
Demand 1.047 G RMS
Control 1.047 G RMS

Run 2 Transportation Longitudinal Axis


View 1 (Acceleration Spectral Density)
NTS Longmont, CO
Job: PR062172
May 17, 2017 11:47:50Run 2
Level Time: 0:30:00
Total Time: 0:30:35
Demand: 0.7428 G RMS
Control: 0.7592 G RMS
Test axis:Longitudinal
customer: Pro V&V
UUT:Clearcast
SN:00014
Control Acceleration Spectral Density
Acceleration Spectral Density (G²/Hz)
1x10^-2
1x10^-3
1x10^-4
1x10^-5
10
100
500
Frequency (Hz)
Demand
Control
Acceleration Spectral Density
2x10^-2
1x10^-2
1x10^-3
1x10^-4
1x10^-5
Frequency 0.25 - 1023 Hz
Max Demand 0.0065 G²/Hz (10 Hz)
Max Control 0.007113 G²/Hz (14 Hz)
Frequency 0.25 - 1023 Hz
Demand 0.7428 G RMS
Control 0.7563 G RMS

Run 3 Transportation Transverse Axis


View 1
NTS Longmont, CO
Job: PR062172
May 17, 2017 12:35:19
Level Time: 0:30:00
Total Time: 0:30:31
Run 3
Demand: 0.2038 G RMS
Control: 0.2045 G RMS
Test axis:Transverse
customer: Pro V&V
UUT:Clearcast
SN:00014
Control Acceleration Spectral Density
Acceleration Spectral Density (G²/Hz)
1x10^-3
1x10^-4
1x10^-5
2x10^-6
10
100
500
Frequency (Hz)
Demand
Control
Acceleration Spectral Density
2x10^-3
1x10^-3
1x10^-4
1x10^-5
4x10^-6
Frequency 0.25 - 1023 Hz
Max Demand 0.00065 G²/Hz (20 Hz)
Max Control 0.0007377 G²/Hz (30 Hz)
Frequency 0.25 - 1023 Hz
Demand 0.2038 G RMS
Control 0.2042 G RMS


PR062172

EQUIPMENT LIST

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1653	Watlow	F4	NA	Chamber Controller	8/15/16	8/15/17
1654	Honeywell	4500	NA	Chart Recorder	8/15/16	8/15/17
1708	Vibration Research	VR9500	9521DE50	Vibration Controller	08/22/16	08/22/17
1705	Vibration Research	VR9500	952141E2	Vibration Controller	8/22/16	8/22/16
1751	Team	483 48-16	494	Shaker System HYD05	For reference only	1751
1750	Team	80/10.5	544	Shaker System HYD06	For reference only	1750
1670	PCB	333A12	30536	Control accelerometer	8-20-16	8-20-17
1672	PCB	333A1**2**	30638	Control accelerometer	8-20-16	8-20-17

END OF REPORT