Electrical Equipment

1.0 Purpose

The purpose of this document is to provide calibration specifications for electrical and mechanical tools.

2.0 Scope

This procedure applies to Kavlico Thousand Oaks and Kavlico Tijuana Facilities.

3.0 Department Responsible for Implementation

- Calibration

4.0 Reference Documents:

- AP0411 – Aerospace Procedure for control of inspection and test equipment
- AP0422 – Aerospace Procedure for requirements for control of inspection, measuring, and test equipment (Subcontractor)
- AP0416 – Aerospace Procedure for control of quality records
- WI691 – Calibrating Kavlico Mexico Facility Equipment

5.0 Procedure:

Refer to the Table of Contents to locate the calibration specification for electrical tools.

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Electrical Equipment

ELECTRICAL EQUIPMENT

CALIBRATION SPECIFICATION FOR ENVIRONMENTAL CHAMBERS

1. **Dedicated to a Process**: Compare the setpoint temperature of UUT [unit under test] against temperature standard next to temperature sensor of UUT controller.

2. **Dedicated to a process at variable setpoints**: Calibrate at the spectrum of the process.

3. **Not Dedicated**: Calibrate on full scale basis.

4. **Controller calibration**: If controller is available for bench calibration then perform full calibration per manufacture manual.

SPECIFICATION:

[A] Manufacturer's specs

[B] Mfg. spec not available: Desired Limit ± 2° of setpoint

[C] Reference to KPS

[D] For non-dedicated Engineering: Desired Limit ± 5° of setpoint

Prepared By: *Harshad Shah* Date: 10/25/96
Harshad Shah

Approved By: Jeffrey Stanton Date: 5/17/18
Jeffrey Stanton

TOROTRON Hi Pot Tester
THP-03D-AD

DC OUTPUT	*LIMIT*	*STANDARDS EMPLOYED*
500 V	490 - 510	Digital Multimeter HP 3490A S/N 1637A 05777
1000 V	980 - 1020	High Voltage Probe Fluke 80K-40
2000 V	1960 - 2040	
3000 V	2940 - 3060	

Prepared By: *Harshad Shah* Date: 11/01/96
Harshad Shah

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Strip Chart Recorder
Honeywell
All Models with ranges between 0-1000°C K

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Applied		
50°C	± 1 div	Fluke Thermometer/Calibrator 2190A / Y2003 S/N 2021044
200°C	"	
400°C	"	
600°C	"	
800°C	"	
950°C	"	

Prepared By: *Harshad Shah* Date: 11/01/96

Approved By: Jeffrey Stanton Date: 5/17/18
Jeffrey Stanton

Channel Recorder
Omega 3
PD2053

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Applied		
Ch1, Ch2 & Ch3	± 1 div	Fluke Thermometer/ Calibrator 2190A/ Y2003 S/N 2021044
200°C	"	
400°C	"	
600°C	"	
800°C	"	
950°C	"	

Prepared By: *Harshad Shah* Date: 11/01/96

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Frequency Counter
TOPWARD
Model TFC-1202

TEST		*LIMIT*	*STANDARDS EMPLOYED*
Sensitivity Check			
Range	Input	± 100 mV	Fluke Calibrator 5100A S/N 780037
10 MHz	100 Hz	"	Signal Generator Tektronix 191 S/N 004903
	1 kHz	"	Frequency Counter HP 5328A S/N 1828A11009
	10 kHz	"	
	00 kHz	"	
	10 MHz	"	
100 MHz	50 MHz	± 500 mV	
	100 MHz	"	
Time Base 10 MHz		Adjust	

Prepared By: *Harshad Shah* Date: 11/01/96

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Jeffrey Stanton

Electrical Equipment

Thermometer
Keithley
Model 740

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Applied		
- 100°C	± 1°C	Fluke Thermometer/ Calibrator 2190A/ Y2003 S/N 2021044
-50°C	"	
-25°C	"	
0.0°C	"	
25°C	"	
50°C	"	
100°C	"	
150°C	"	
200°C	"	
400°C	"	

Prepared By: *Harshad Shah* Date: 11/05/96

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Jeffrey Stanton

Electrical Equipment

Dig. Panel Meter
WESTEN

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Meter Acc.		
Applied Volts DC		Fluke Calibrator 5100A S/N 780037
0.500	± 0.5%	
1.000		
2.000		
4.000		
6.000		
8.000		
10.000		
19.000		

Prepared By: *Harshad Shah* Date: 11/05/96

Approved By: Jeffrey Stanton Date:5/17/18
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Decade Resistors and Capacitors

Cornell-Dubliner
All Models

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Decade Resistors		
Zero Res.	Included in all Readings.	Digital Multimeter HP 3455A S/N 1622A03238
Scale readings for each decade all steps 1,2.3,4,5,6,7, 8,9 and 10.	As specified on box.	
Decade Capacitors		
Zero Capacitance	Included in all Readings.	Digital Impedance Meter ESI 252 S/N V201063252
Scale readings for each decade all steps 1,2.3,4,5,6,7, 8,9 and 10.	As specified on box.	

Prepared By: *Harshad Shah* Date:11/06/96

Approved By: Jeffrey Stanton Date: 5/17/18
Jeffrey Stanton

Counter/Timer P6000 Series
Newport

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Meter Acc.		
Applied Frequency	Nominal Display / Nominal Analog Output	Fluke Calibrator 5100A S/N 780037
50 kHz	50000 / 500 mV	Wave Generator 186 S/N 286337
60 kHz	60000 / 600 mV	Freq. Counter Keithley 775A S/N 390445
80 kHz	80000 / 800 mV	Multimeter Keithley 197 S/N 440065
100 kHz	100000 / 1000 mV	
120 kHz	120000 / 1200 mV	
	0-1M = 0 - 10 V [1mV/100 counts]	
	Sensitivity Sq. Wave input ± 50mV 2 Hz - 100 kHz	

Prepared By: *Harshad Shah* Date:11/06/96

Approved By: Jeffrey Stanton Date: 5/17/18
Jeffrey Stanton

Broadband Amplifier
Amplifier Research
Model 15A250

Amplifier Performance Test	*LIMIT*	*STANDARDS EMPLOYED*
Frequency Power Input Level		
	Gain Adjustment @ Minimum setting	Constant Amplitude Signal Generator Tektronix 191 S/N 004903
5 MHz 0.0 dB	≥ 18 dB	
50 0.0	‘’	
100 0.0	‘’	
	Gain Adjustment @ Maximum setting	Power meter HP 437B S/N 2912A01901 or equivalent.
5 MHz 0.0 dB	≥ 42 dB	
50 0.0	‘’	
100 0.0	‘’	

Prepared By: *Harshad Shah* Date: 11/05/96

Approved By: _Jeffrey Stanton_____ Date: 5/17/18
Jeffrey Stanton

FEED-THRU COVER AND AUTOMATIC STAKE TO HOUSING SYSTEM PERFORMANCE CHECK

SYSTEM Performance Test	*LIMIT*	*STANDARDS EMPLOYED*
Regulator Pressure Pressure Switch	Pressure/ Time waveform Response	Perkin-Elmer Recorder model R50 S/N 11712
70± 5 Psi 1.8kg/cm^2	25.602 psi Nominal	Chart speed @ 20 cm/min
		Sensitivity 100 mV/cm and 1V/cm
		Dig. Pressure Gauge MENSOR model 11900-401 s/n 1953
	KPS2829	Bus x-ducer MENCER model 11603-001 s/n 1448
		Analog output range 1 Psi = 100mV and 100 Psi = 500mV

Prepared By: *Harshad Shah* Date: 12/09/96

Approved By: Jeffrey Stanton Date: 5/17/18
Jeffrey Stanton

Electrical Equipment

Digital Hot Plate
PMC
Model 732A

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Set Temp		
100°C	± 10°C	Fluke Thermometer/ Calibrator 2190A/ Y2003 S/N 2021044
200°C	"	
300°C	"	

Prepared By: *Harshad Shah* Date: 1/16/97

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Jeffrey Stanton

Solder Pots with Temp. Controller
All Models

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Set Temp		
°F	± 10°F	Soldering Iron Tester Wahl Model ST2000BF S/N ST0092
Pot to GND Potential Diff.	≤ 2 mV	
Pot to GND Resistance	≤ 2 ohms	

Prepared By: *Harshad Shah* Date: 01/21/97

Approved By: Jeffrey Stanton Date: 5/17/18
Jeffrey Stanton

Electrical Equipment

Oscilloscopes
All Models

TEST Characteristics	*Performance Requirements*	*STANDARDS EMPLOYED*
Vertical Deflection System		
Deflection Factor		Tektronix Calibration Fixture 067-0502-0 S/N 003153
2 mV/div → 5 V/div Nominal		Tektronix Generator 191 S/N 004903
1-2-5 sequence	± 3% or Mfg. spec.	WAVETEK Generator 186 S/N 286337
		HP Counter Freq/Period 5328A S/N 1828A11009
Bandwidth [- 3 dB]		
5 mV/div → 5 V/div	Dc → up to 100 MHz	Fluke Calibrator 5100A S/N 780037
2 mV/div	Dc → up to 80 MHz	Freq. Counter Keithley 775A S/N 390445
Bandwidth Limit	20 MHz or Mfg. spec	
Triggering System		
Trigger Sensitivity Norm Auto	Stable Trigger @	
INT-EXT-HF & LF REJ	Mfg. specified Sens.	
Horizontal Deflection System		
0.5 Sec → 0.05 us/div Nom.		
in 1-2-5 sequence	± 3% or Mfg. spec.	
Magnified x10 Nom.	± 4% or Mfg. spec.	
X-Y Operation		
x- Axis	± 3% or Mfg. spec.	
Y- Axis	± 3% or Mfg. spec.	
Phase difference	± 3° from dc→ 150k	
Store Mode Accuracy	Same as Vert-Horizontal.	

Prepared By: *Harshad Shah* Date: 02/07/97

Approved By: Jeffrey Stanton Date: 5/17/18

PRESSURE EQUIPMENT

All Models

TEST Characteristics	*Performance Limits*	*STANDARDS EMPLOYED*
Gauge Pressure:		
Positive Reading DUT		
Increasing steps @ 20%, 40%, 60%, 80%,100%FS Decreasing steps 80%, 60%, 40%, 20% and zero.	5 → 15 Psi ≥ 0.006 Psi 15 → 100 Psi ≥ 0.02 Psi 100 → 1000 Psi ≥ 0.2 Psi 1000→3000 Psi ≥ 0.6 Psi	MENSOR PCS 400 S/N 180252 MENSOR 15500 S/N 250642
Bi-directional DUT		
Increasing steps @ -100%, -80%, -60%, -40%, -20%, zero, 20%,40%,60%,80%,100% FS	± 5 Psi @ ≥ 0.0003 Psi	Ruska 7010-704 S/N 49058
Absolute Pressure:		
Increasing @ ≤ 10%,20%,40%, 60%,80%,100% FS Decreasing steps 80%,60%,40%, 20% and ≤ 10% Fs	30 Psia ≥ 0.0033 Psi	MENSOR PCS 200 S/N 100556 Hasting Vacuum Gauge VH-3B S/N 7081

Prepared By: *Harshad Shah* Date: 02/12/97

Approved By: Jeffrey Stanton Date: 5/17/18
Jeffrey Stanton

Internal Correlation Transducers

Standards Employed:

1. Pressure calibrator Mensor PCS 200 s/n 100552
2. Pressure calibrator Mensor PCS 400 s/n 180252
3. Pressure calibrator Ruska 7010-704 s/n 49058
4. Bus Transducer Mensor 15500 s/n 250642
5. Multimeter Fluke 8860A s/n 2420053
6. Multimeter Fluke 45 s/n 5450076

Calibration Intervals: Will be developed by Programs office.

Test Conditions:

1. Output levels
2. Pressure points
3. Temperature and other test parameters will be established by Programs office.

Prepared By: *Harshad Shah* Date:03/25/97

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Chart Recorder
Simpson
Model: 2750-2

TEST	*LIMIT*	*STANDARDS EMPLOYED*
Meter Acc.		
Applied Volts DC		Fluke Calibrator 5100A S/N 780037
0.200	± 1div	
0.400		
0.600		
0.800		
1.000		

Prepared By: *Harshad Shah* Date: 04/22/97

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Electrical Equipment

Calibration Specification for Distortion Analyzer

Standards employed:
COUNTER KEITHLEY 775A S/N 390445
CALIB. FLUKE 5520A S/N 7950015

TEST		LIMIT
Meter Acc.		@ 400Hz
300v	300	± 2% fs
100	100	‘’
30	30	‘’
	20	‘’
	10	‘’
10	10	‘’
3	3	‘’
1	1	‘’
.3	.3	‘’
.1	.1	‘’
.03	.03	‘’
.01	.01	‘’
.003	.003	‘’
.001	.001	‘’
Freq. Resp.		
3V	400Hz	2.85 Ref
	50	±0.06v
	1KHz	‘’
	10	‘’
	50	‘’
.003	400 Hz	.00285
	50	± 15 uV
	1KHz	± 6 uV
	10	‘’
	50	‘’
Second Harmonic		
15 Hz		±1 dB
10 kHz		< ± 0.6
50 kHz		< -1.0
200 kHz		< -2.0
500 kHz		< -3.0
Freq. Acc.		
10 Hz		± 5 ms
1.0 kHz		± 50 Hz
100 kHz		± 5 kHz
200 kHz		± 10 kHz
400 kHz		± 40 kHz
600 kHz		± 60 kHz
Auto null mode		
25 Hz → 50 Hz		< 3dB, -0dB
500 Hz →500kHz		< 1.5dB,0dB
Main, I/P level		100% set level
HP Filter		> 40dB
RES. Noise		< 25 uV

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

Inductance Analyzer

Standards employed:
DMM HP 34401A S/N 3146A61169
COUNTER KEITHLEY 775A S/N 390445

TEST	LIMIT
FREQUENCY	
50 Hz	±[0.2%+.02Hz]
100 Hz	"
1000 Hz	"
10 kHz	"
100 kHz	"
500 kHz	"
1 MHz	"
Ac Test Signal	@ 1kHz
20 mV	± [5%+1mV]
100	"
1 V	"
Capacitance	
Nominal Value	
496.92 pf	nominal±0.5%
982.84 pf	"
5.0082 nf	"
9.9758 nf	"
51.88 nf	"
101.81 nf	"
510.43 nf	"
1.0138 uf	"
5.25 uf	"
10.62 uf	"
RESISTANCE	
10 ohms	± 0.5%
100 ohms	"
1 kohm	"
10 kohm	"
100 kohm	"
1 Mohm	"

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

VOLTMETER DIGITAL
Model: 2251
MFG: North Atlantic

Tested	Limit
Func.chk @400Hz	30° 7.0Vrms
Cal Step Seq.	check
Total	≅ 7.000 V
Fund	≅ 7.000
In Phase	≅ 6.062
Quad	≅ 3.5
Phase Angle	≅ 30°
90.00°	≅ 90°
270.00	≅ 270°
±180 Phase	≅ -90.00°
±180 Phase off	≅ 270°
Ratio R	≅ 0.5000 V
20 MV	HHHHHH
200 MV	HHHHHH
2 V	HHHHHH
20 V	≅ 3.500 V
200 V	≅ 3.50 V
300 V	≅ 3.5 V
Auto Range	check
Read Ref	≅ 7.0 V
Amp Acc. & Phase	@ 400 Hz
300V/300	± 6V, ±0.5°
200V/180	±4V, ‘’
200V/90	±4V, ‘’
20V/18	±0.4V, ‘’
20V/9	±0.4V, ‘’
20V/4.5	±0.4V, ‘’
2V/900mV	±40mV, ‘’
0.2V/180mV	±4mV, ‘’
0.02V/9mV	±0.4mV, ‘’
Wide Band	
50Hz 180mV	±4mV 0.5°
0.9 V	±40mV 0.5°
18 V	±0.4V 0.5°
90 V	±4V 0.5°°
1kHz 9 mV	±0.4mV 0.5°
180mV	±4mV 0.5°
0.9 V	±40mV 0.5°
18 V	±0.4V 0.5°
90 V	±4V 0.5°
50kHz 9 mV	±0.4mV 0.5°
180mV	±4mV 0.5°
0.9 V	±40mV 0.5°
18 V	±0.4V 0.5°
20kHz 90 V	±4V 1.0°

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

BRIDGE, VIDEO
MODEL: 2150/2160
MFG: ESI

FREQ:	LIMIT
150 k Hz	±15 Hz
100	±10 Hz
20	±2 Hz
3750 Hz	±.37 Hz
1000	±.10 Hz
248.96	±.025 Hz
33.3333 ms	±.003 ms
50.000	±.005
Range Resistor	
1-ohm nominal	.000%Rs±0.1%
10	.000%Rs±0.05%
100	‘’
1k	‘’
10k	‘’
100k	‘’
1M	.000%Rs±0.1%
Capacitors Acc.	nominal value
1 nf 100 Hz	.000%Cs±.1%≤.0004D
1.0 kHz	.000%Cs±.1%≤.00025
10	.000%Cs±.1%≤.0010
100	.000%Cs±.1%≤.0030
100 nf 100 Hz	.000%Cs±.05%≤.0004D
1.0 kHz	.000%Cs±.02%≤.00025
10	.000%Cs±.05%≤.0010
100	.000%Cs±.05%≤.0030
Test Level	
1500 mV	± 62 mV
1000	± 42mV
500	± 22 mV
200	± 10 mV
100	± 6 mV
50	± 4mV
20	± 2.8mV
10	± 2.4mV
5	± 2.2mV
100 mA	± 4.2 mA
50	± 2.2 mA
20	± 1.0 mA
10	± 0.6 mA
5	± 0.4 mA
2	± 0.1 mA
1	± 0.06mA
0.5	± 0.04mA
0.1	± 0.024mA

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

CAPACITOR, DECADE

MODEL:CS-300/301
IET
S/N: 01240233

TEST	LIMIT
100 pf/step	
0	±4%+4pf
1	‘’
2	‘’
4	‘’
6	‘’
8	‘’
9	‘’
nf/step	
1	±4%+4pf
2	‘’
4	‘’
6	‘’
8	‘’
10	‘’
20	‘’
40	‘’
60	‘’
80	‘’
100	‘’
200	‘’
400	‘’
600	‘’
800	‘’
uf/step	
1	±4%+4pf
2	‘’
4	‘’
6	‘’
8	‘’
9	‘’
10	‘’
20	‘’
40	‘’
60	‘’
80	‘’
90	‘’

MODEL: CDB-3/5
CDE
S/N: 0528

TEST	LIMIT
Scale RDG	
0.01uf/step	
0	± 3%
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
0.1uf/step	
1	± 3%
2	
3	
4	
5	
6	
7	
8	
9	
10	

Prepared By: *Jonathan Umana*
Date: 05/17/18

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Date: 5/17/18

Electrical Equipment

FLUKE Multi-Counter
MODEL: 1900A

TEST	LIMITS
Sensitivity	
Frequency Input	
5 Hz	25 mV RMS
50	‘’
500	‘’
5 kHz	‘’
50	‘’
500	‘’
5 MHz	‘’
50	‘’
Self-Check	
100 Hz	1.0000
10	1000.00
1	000.000
.1	00.0000
Period	25 mV RMS
Totalize	Op. Check
Time base	10.0000±1dig c11 ADI

Prepared By: *Jonathan Umana*
Date: 05/17/18

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Date: 5/17/18

DATA ACQ SYSTEM
MFG: HP
MODEL No. 34972A / 34970A

TEST		LIMIT
DC VOLTS:		
RNG	I/P	
100mV	+100	±0.01%
	-100	"
1.0V	1.0000	"
	-1.0000	"
10V	10.000	"
	- 10.000	"
100V	100.00	"
300V	300.00	"
TEMP:	Applied	
	300.0°	± 1.5°
	200.0°	"
	100.0°	"
	50.0°	"
	0.0°	"
	-40.0°	"
	-60.0°	"
OHMS 2W		
1K		± 110mΩ
10K		± 1.1Ω
100K		± 11Ω
1M		± 110Ω
10M		± 4.1KΩ
100M		± 810KΩ
AC VOLTS:		
100mV	1 kHz	± 100 uV
	50 kHz	± 170 uV
1V	1 kHz	± 1mV
	50 kHz	± 1.7 mV
10V	1 kHz	± 14 mV
	50 kHz	± 17 mV
100V	1 kHz	± 100 mV
300V	400Hz	± 420 mV
FREQ:		
100HZ	1V	± 0.1 Hz

Prepared By: *Jonathan Umana*
Date: 05/17/18

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Date: 5/17/18

DIGITAL DISPLAY GRAM GAGE

BEI

TEST	LIMITS
10 g	**+/- .1g**

CONDUCTIVITY METER

MFG: Omega
MODLE: DP25-TC-A

LIMITS
±.3% of reading

Prepared By: *Jonathan Umana*
Date: 05/17/18

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Date: 5/17/18

Electrical Equipment

Frequency Response Analyzer
SOLARTRON
MODEL No. 1250/1254

TEST	LIMIT
Gen. Freq	
65.000 kHz	+/- .0065
50.000	+/- .005
25.000	+/- .0025
15.000	+/- .0015
10.000	+/- .001
5.000	+/- .0005
4.000	+/- .0004
3.000	+/- .0003
2.000	+/- .0002
1.000	+/- .0001
1.2500 ms	+/- .0002
2.500	+/- .0003
10.000	+/- .0001
16.666	+/- .020
100.00	+/- .01
250.00	+/- .025
1000.0	+/- .10
5000	+/- .50
10000	+/- 1.0
Gen. Distorsion :	
60 Hz	< 1%
400 Hz	< 1%
800 Hz	< 1%
3.0 kHz	< 1%
20 kHz	< 1%

TEST	LIMIT
Gen o/p @ 400 Hz	
10.000 V	+/- .11
9.000	+/- .10
8.000	+/- .09
7.000	+/- .08
6.000	+/- .07
5.000	+/- .06
4.000	+/- .05
3.000	+/- .04
2.000	+/- .03
1.000	+/- .011
100 mV	+/- 2
10 mV	+/- 1.1
Bais o/p :	
+10	+/- .11
- 10	+/- .11
+ 1	+/- .011
- 1	+/- .011
Sq. o/p 10v	
@ 400 Hz	+/- .11v
Tri o/p 5v	
@ 400 Hz	+/- .06v

TEST		LIMIT
Analyzer Acc. 400Hz		
10.000	ch1	+/-0.02
	ch2	
	ch3	
	ch4	
8.000	ch1	+/-0.016
	ch2	
	ch3	
	ch4	
6.000	ch1	+/-0.012
	ch2	
	ch3	
	ch4	
5.000	ch1	+/-0.010
	ch2	
	ch3	
	ch4	
4.000	ch1	+/-.008
	ch2	
	ch3	
	ch4	
3.000	ch1	+/-.006
	ch2	
	ch3	
	ch4	
2.000	ch1	+/-.004
	ch2	
	ch3	
	ch4	
1.000	ch1	+/-.002
	ch2	
	ch3	
	ch4	
100.0m	ch1	+/-0.2
	ch2	
	ch3	
	ch4	

Electrical Equipment

Gain Phase Analyzer
MODEL No. 1253
S/N: 100411

TEST	LIMIT
Gen. Freq	
20.000	+/- .0025
10.000	+/- .001
9.000	+/- .0009
8.000	+/- .0008
7.000	+/- .0007
6.000	+/- .0006
5.000	+/- .0005
4.000	+/- .0004
3.000	+/- .0003
2.000	+/- .0002
1.000	+/- .0001
1.2500 ms	+/- .0002
2.500	+/- .0003
10.000	+/- .0001
16.666	+/- .020
100.00	+/- .01
250.00	+/- .025
1000.0	+/- .10
5000	+/- .50
Gen Distortion:	@ 10 v
60 Hz	< 2%
400 Hz	< 2%
800 Hz	< 2%
3.0 kHz	< 2%
20 kHz	< 2%

TEST	LIMIT
Gen o/p @ 400 Hz	
10.000 V	+/- .11
9.000	+/- .10
8.000	+/- .09
7.000	+/- .08
6.000	+/- .07
5.000	+/- .06
4.000	+/- .05
3.000	+/- .04
2.000	+/- .03
1.000	+/- .011
100 mV	+/- 2
10 mV	+/- 1.1
Bais o/p :	
+10	+/- .11
- 10	+/- .11
+ 1	+/- .011
- 1	+/- .011

TEST		LIMIT
Analyzer Acc. 400Hz		
10.000	ch1	+/-0.02
	ch2	
8.000	ch1	+/-0.016
	ch2	
6.000	ch1	+/-0.012
	ch2	
5.000	ch1	+/-0.010
	ch2	
4.000	ch1	+/-.0008
	ch2	
3.000	ch1	+/-.0006
	ch2	
2.000	ch1	+/-.0004
	ch2	
1.000	ch1	+/-.0002
	ch2	
100.0m	ch1	+/-0.2
	ch2	

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

FUNCTION GENERATOR
MFG: BK
MODEL: 4011A/ 4011

TEST	LIMIT
DIAL ACC:	
X5	
2	± 1 count
5	"
X50	
2	"
5	"
X500	
2	"
5	"
X5K	
2	"
5	"
X50K	
2	"
5	"
X500K	
2	"
5	"
X5M	
2	"
5	"
DISTORTION:	
SINE 100Hz	<= 1%
10Hz	"
1000Hz	"
MAIN O/P	
SINE OPEN	>= 20V P-P
50 Ohm	>= 10V P-P
TRI "	"
SQ "	"
ATTN 20dB	-20 dB +/- 1dB
DC OFFSET	<-10V= >10V
DUTY CYCLE	50%
SQ WAVE	
RISE TIME	≤ 20 nsec

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

FUNCTION GENERATOR

HP-Agilent
Model: 33220A/33210A/33120A

TEST	LIMIT
Freq	
sine 50Ω 3.5v 1k	1.00 ± 0.01Hz
sq50Ω 3.5v/ 1k burst	500 Hz ± 5 Hz
Func. Gain & Lin:	Hi z Sine
7vrms 1kHz	7.0 ± 0.07vrms
5.7v 1kHz	5.7 ± 0.057vrms
Tri 5.7v 100Hz	5.7 ± 0.057vrms
Ramp 100Hz	5.7 ± 0.057vrms
Sq. 10v 100Hz	10.0 ± 0.1vrms
Sq. 8.0v 100Hz	8.00 ± 0.08vrms
Dc Offset 10v	10 ± 0.20v
- 10v	-10 ± 0.20v
AC AMP Sine Hi z	
1 kHz 7.0 v	7.0 ± 0.070
5.7	5.7 ± 0.057
5.5	5.5 ± 0.055
4.4	4.4 ± 0.044
3.5	3.5 ± 0.035
2.8	2.8 ± 0.028
2.2	2.2 ± 0.022
1.7	1.7 ± 0.017
1.4	1.4 ± 0.014
1.1	1.1 ± 0.011
0.88	0.88 ± 0.0088
0.70	0.70 ± 0.0070
0.55	0.55 ± 0.0055
0.44	0.44 ± 0.0044
0.35	0.35 ± 0.0035
0.28	0.28 ± 0.0028
0.22	0.22 ± 0.0022
0.17	0.17 ± 0.0017
0.14	0.14 ± 0.0014
0.11	0.11 ± 0.0011
0.088	0.088 ± 0.00088
0.070	0.070 ± 0.0007
0.055	0.055 ± 0.00055
0.044	0.044 ± 0.00044
0.036	0.036 ± 0.00036
50Ω 3.5 v	3.5 ± 0.035
0.88	0.88 ± 0.0088
0.035	0.035 ± 0.00035
Amp flatness:	
50Ω 3.0v 1 kHz	Ref.
100 kHz	3.00 ± 0.01
500 kHz	3.00 ± 0.01
Am Depth	
1.0 kHz 1v 0%	0.5 ± 0.005
100%	0.6 ± 0.0061

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

FUNCTION GENERATOR

PROTEK
MODEL No. B-801

TEST		LIMIT
DAL ACCY:		
X1	.2	4750 - 5250 ms
	1	950 - 1050
	2	475 - 525
X10	.2	"
	1	95.0 - 105
	2	47.5 - 52.5
X100	.2	"
	1	95 - 105 Hz
	2	190 - 210
X1K	.2	"
	1	.95 - 1.05K
	2	1.90 - 2.10
X10K	.2	"
	1	9.5 - 10.5
	2	19.0 - 21.0
X100K	.2	"
	1	95 - 105
	2	190 - 210K
X1M	.2	"
	2	1840 - 2160
DISTORTION :		
SINE	100Hz	<= 2%
	10Hz	"
11/21/131000Hz		"
MAIN O/P		
SINE	OPEN	>= 20V P-P
	50 Ohm	>= 10V P-P
TRI	"	"
SQ	"	"
ATTN	20dB	-20 dB +/- 1dB
AMP RNG		< 20 mV→20V
DC OFFSET		<-10V→ >10V
SQ WAVE		
	RISETIME	< 100 nsec
	FALL TIME	"

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

FUNCTION GENERATOR

PRAGMATIC
MODEL No. 1404A

TEST	LIMIT
FREQUENCY	
SET 100HZ	±10 ppm ± 10 mHz
400Hz	"
1kHz	"
10kHz	"
40kHz	"
80kHz	"
100kHz	"
400kHz	"
800kHz	"
1MHz	"
4MHz	"
8MHz	"
10MHz	"
15MHz	"
20 MHz	"
DISTORTION	
SINE 100Hz	< 0.14%
1kHz	"
100kHz	"
AMPLITUDE	
100mVpp	±2% + 4mV
200	"
400	"
600	"
800	"
1.00V	±1% + 20mV
2.00	"
4.00	"
6.00	"
8.00	"
10.00	"
FLATNESS	
<100kHz	±2%

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

GRAM GAGE

BEI
ALL MODELS

TEST	LIMIT
APPLIED WEIGHT	
20	±1%
25	"
50	"
100	"

High Voltage Probe

Fluke
80K-40

TEST	LIMIT
Voltage	
20kV to 35kV	±1%
36kV to 40kV	±2%
Frequency	
60Hz	±5%

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

INDUCTOR STANDARD
BOURNS

TEST	LIMIT
FREQUENCY	
50 Hz	±[0.2%+.02Hz]
100 Hz	"
1000 Hz	"
10 kHz	"
100 kHz	"
500 kHz	"
1 MHz	"
Ac Test Signal	@ 1kHz
20 mV	± [2%+5mV]
100	"
1 V	"
Capacitance	
Nominal Value	
496.92 pf	nominal±0.5%
982.84 pf	"
5.0082 nf	"
9.9758 nf	"
51.88 nf	"
101.81 nf	"
510.43 nf	"
1.0138 uf	"
5.25 uf	"
10.62 uf	"
Resistance	
10 ohms	± 0.5%
100 ohms	"
1 kohm	"
10 kohm	"
100 kohm	"
1 Mohm	"
INDUCTANCE	"
Nominal Value	
46.81mH	nominal±0.5%
97.82mH	"

Prepared By: *Jonathan Umana*
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Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

LCR METER
MFG: BK
MODEL: 878A

TEST	LIMIT
FREQUENCY	
120 Hz	±0.1%
1000 Hz	"
Capacitance	
Nominal Value	@1KHZ
496.92 pf	± 1.0%+5
982.84 pf	"
5.0082 nf	± 0.7%+5
9.9758 nf	"
51.88 nf	"
101.81 nf	± 0.7%+3
510.43 nf	"
1.0138 uf	"
5.25 uf	"
10.62 uf	"
RESISTANCE	@1KHZ
100 ohms	± 0.8%+5
1 kohm	± 0.5%+3
10 kohm	"
100 kohm	"
1 Mohm	± 0.5%+5
10 Mohm	± 2.0+8
INDUCTANCE	@1KHZ
Nominal Value	
46.81mH	±1.0%+ (Lx
	/10000) %+5
97.83mH	±0.7%+ (Lx
	/10000) %+5

Prepared By: *Jonathan Umana*
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Date: 5/17/18

Electrical Equipment

MEGOHMMETER

MFG: G/R
MODEL: 1864-9700 / 1863 / 1865

MFG: ASR
MODEL: 2801D

Test Volts:		Limit
0-100V	10	9.8 - 10.2
	20	19.6 – 20.4
	40	39.2 - 40.8
	60	58.8 - 61.2
	80	78.4 - 81.6
	100	98.0 - 102.0
0-1000V		
	200	196 - 204
	400	392 - 408
	600	588 - 612
	800	784 - 816
Resistance		
20M	10V	+/- 2%rdg+1c
	50V	“
	200V	“
200M	10V	“
	50V	“
	200V	“
2G	10V	“
	50V	“
	200V	“

Prepared By: *Jonathan Umana*
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Electrical Equipment

CAPACITANCE METER

MFG: B&K
MODEL: 890

Test	Limit
500pf 0	Included in RDGS
99.53pf	±1%+10d
304.33pf	"
5nf 982pf	±1%+3d
1.9994nf	"
50nf 2.9949nf	"
30.765nf	"
500nf 101.18	"
304.76	"
5uf 1.0136uf	"
3.22uf	"
50uf 10.63	"
500uf 10.63	±2% + 3d
5000uf 10.63	±2% + 3d

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

DIGITAL IMPEDANCE METER

Quad Tech 1920

TEST	LIMIT
Frequency	
50 Hz	±[0.2%+.02Hz]
100 Hz	"
1000 Hz	"
10 kHz	"
100 kHz	"
500 kHz	"
1 MHz	"
Ac Test Signal	@ 1kHz
20 mV	± [2%+5mV]
100	"
1 V	"
Capacitance	
Nominal Value	
496.92 pf	nominal±0.5%
982.84 pf	"
5.0082 nf	"
9.9758 nf	"
51.88 nf	"
101.81 nf	"
510.43 nf	"
1.0138 uf	"
5.25 uf	"
10.62 uf	"
Resistance	
10 ohms	± 0.5%
100 ohms	"
1 kohm	"
10 kohm	"
100 kohm	"
1 Mohm	"

ESI 252

TEST	LIMIT
Cap. Check	
200pf 0	Included in rdgs
30.05(pf)	± [0.25%+(1+
99.935	0.002Gp*)
198.27	digits] **
2nf 304.33pf	± [0.25%+(1+
982.3	0.001Gp*)
1.9994nf	digits] **
20nf 2.9949nf	"
9.9758	"
200nf 30.765nf	"
59.636	"
101.18	"
2uf 304.76nf	"
1.0136uf	"
20uf 3.22uf	"
10.63	"
Frequency	1kHz ± 1%
RES:/Optional	
20 ohms 10	± [0.25%+(1+
200 100	0.001Ls*)
2k 1k	digits]
20k 10k	"
200k 100k	"
2000k 1000k	"
*Dig. counts, same range	** After correction for test lead zero RDG

SRS: 15 / 720

TEST	LIMIT
FREQ:	
100 Hz	99.99-100.01
120	119.99-120.01
1 kHz	999.90-1000.1
10	9999.0-10001.0
100	99990-100010
AMPLITUDE :	
1V 1kHz	0.98 - 1.02
100Hz	0.98 - 1.02
120Hz	0.98 - 1.02
10kHz	0.98 - 1.02
0.25V 1kHz	0.245 - 0.255
0.1V 1kHz	0.098 - 1.02
INT.BIAS	1.96 - 2.04 V
RESISTANCE	
R Rn F	
10 3 1K/S	100Hz-1kHz
25 3	0.05% SR720
25 3 10K/S	0.20% SR715
100 3 1K/S	
100 2	1kHz - 10kHz
400 2	0.10% SR720
400 2 10K/S	0.30% SR715
1.6K 2 1K/P	
1.6K 1	
6.4K 1	
6.4K 1 10K/P	
25K 1 1K/P	
25K 0 1K/P	
100K 0 "	
100K 0 10K/P	
400K 0 1K/P	
C F R	
1.0n 1k 0	100Hz - 10000Hz
10K 1	
10n 100 0	1-100pf
1k 1	0.2%SR720
10k 2	0.3%SR715
100n 100 1	1-10nf
1k 2	0.1%SR720
10k 2	0.3%SR715
1.0u 100 2	
1k 2	10n-100uf
10k 3	0.2%SR715
10u 100 2	0,05%S720
1k 3	100-1000Hz

Electrical Equipment

DIGITAL MICRO-OHMMETER

Valhalla
4300C

TEST	LIMIT
RANGE	
.1 Ohm (.1A)	±. O4%
1 Ohm (10mA)	"
10 Ohm (1mA)	"
100 Ohm (.1mA)	"
1K Ohm (.1mA)	"

DIGITAL MILLIOHMMETER

FLUKE 5520A
EXTECH 380560

TEST	LIMIT
RANGE	
ALL	±O. O2%

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

Multifunction Switch /Measure Unit
HP-Agilent
34980A

TEST		LIMIT
DC VOLTS:		± (% of reading + % of range)
RNG	I/P	
100mV	+100	0.0050 + 0.0040
	-100	"
1.0V	1.0000	0.0040 + 0.0007
	-1.0000	"
10V	10.000	0.0035 + 0.0005
	- 10.000	"
100V	100.00	0.0045 + 0.0006
300V	300.00	0.0045 + 0.0030
OHMS 2W		
100 Ohms		0.010 + 0.004
1K		0.010 + 0.001
10K		"
100K		"
1M		"
10M		0.040 + 0.001
100M		0.800 + 0.010
AC VOLTS:		
100mV	5Hz	1.00 + 0.04
100V	50Hz	0.06 + 0.04
	1 kHz	"
	10 kHz	"
	20 kHz	0.12 + 0.05
	50 kHz	0.60 + 0.08
	100 kHz	4.00 + 0.50
300V	50Hz	0.06 + 0.08
	1 kHz	"
	10 kHz	"
	20 kHz	0.12 + 0.12
	50 kHz	0.60 + 0.20
	100 kHz	4.00 + 1.25

TEST Cont.		LIMIT Cont.
FREQUENCY		
100HZ	1V	± 0.01% of reading
1 kHz		"
100 kHz		"
300 kHz		"
100HZ	10V	"
1 kHz		"
100 kHz		"
100HZ	100V	"
1 kHz		"
100 kHz		"
100HZ	300V	"
1 kHz		"
100 kHz		"

Prepared By: *Jonathan Umana*
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Approved By: Jeffrey Stanton
Date: 5/17/18

Multifunction Switch /Measure Unit Continued

TEST		LIMIT
DC VOLTS		
Range	App	
400mV	390	± 0.5%+1d
	- 390	‘’
4.0V	3.9	‘’
	- 3.9	‘’
40 V	39	‘’
	- 39	‘’
400 V	390	‘’
	- 390	‘’
1000V	900	‘’
AC VOLTS		
390mV	60Hz	± 1.2%+8d
3.9V	‘’	‘’
39V	‘’	‘’
390	400Hz	‘’
DC CURRENT		
400 uA	390	± 1.0%+1d
40 mA	39	‘’
300 mA	290	‘’
10A	1.99	±2.0%+3d
AC CURRENT		@ 60Hz
40 mA	39	±1.5%+8d
300 mA	290	‘’
10A	1.99	±2.5%+10d
RESISTANCE		
100 ohms		± 1.0%+4d
1 kohm		‘’
10 kohm		‘’
100 kohm		‘’
1 Mohm		‘’
10 Mohm		‘’
40 Mohm		± 2.0%+5d
Frequency		
	1kHz	± 0.1%+3d
	10kHz	‘’
Cap	1uf	± 5.0%+10c

Prepared By: *Jonathan Umana*
Date: 05/17/18

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Date: 5/17/18

Electrical Equipment

MULTIMETER, HANDHELD

All models

TEST		LIMIT
DC VOLTS		
Range	App	
600mV	590	± 0.09%+2c
	- 590	‘’
6.0V	5.9	‘’
	- 5.9	‘’
60 V	59	‘’
	- 39	‘’
600 V	590	‘’
1000V	900	± 0.1%+2c
AC VOLTS		@ 400Hz
600mV	590	± 1.0%+3c
6V	5.9	‘’
60V	59	‘’
600	590	‘’
1000	900	‘’
DC CURRENT		
40 mA	39	± 1.0%+3c
400 mA	390	‘’
10A	1.999	‘’
AC CURRENT		@ 60Hz
40 mA	39	±1.5%+3c
400 mA	390	‘’
RESISTANCE		
100 ohms		± 0.9%+2c
1 kohm		± 0.9%+1c
10 kohm		‘’
100 kohm		‘’
1 Mohm		‘’
10 Mohm		‘’
Counter Acc.		
100 Hz		80 mV
1kHz		‘’
Cap	1nf	± 1.2%+2c

Prepared By: *Jonathan Umana*
Date: 05/17/18

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Date: 5/17/18

Electrical Equipment

MULTIMETER, DIGITAL

ALL MFG / MODELS

TEST		LIMIT
DC VOLTS:		
RNG.	I/P	±
0.100 V	0.	3.5 uV
	0.100	0.0072mv
	-0.100	0.0072mv
1V	0	7.0 uV
	1.0	0.000032
	-1.0	0.000032
10V	0	50 uV
	5.0	0.00017
	-5.0	0.00017
	10	0.000290
	-10	0.000290
100V	0	600
	100	0.0051
	-100	0.0050
1000V	0	10 mv
	1000	0.055
	-1000	0.055
AC VOLTS &FREQ		
RNG.	I/P	±
0.100 /0.100	10Hz	0.1mv
	20kHZ	0.1mv
	50kHz	0.17mv
	100kHz	0.68mv
	300kHz	4.5mv
1 V / 1	10Hz	0.0009
	20kHZ	0.0009
	50kHz	0.0017
	100kHz	0.0068
	300kHz	0.045
10 V / 10	10Hz	0.009
	20kHZ	0.009
	50kHz	0.017
	100kHz	0.068
3V	300kHz	3.17
100 V / 100	45Hz	0.09
	20kHZ	0.09
	50kHz	0.17
	100kHz	0.68
750V /750	45Hz	0.0009kv
	1kHz	0.0009kv
	10kHz	0.0009kv
320 V	20kHZ	0.417
	50kHz	0.759
	100kHz	2.52
10 Hz	1 V	0.003 Hz
40 Hz	1 V	0.012 Hz
300kHZ	100 mV	0.03 kHz

TEST		LIMIT
4-wire Ohms		
Range	I/P	±
100	0	4.0 m Ω
	100	0.014 Ω
1k	1000	0.00011k Ω
10k	10k	0.0011k Ω
100k	100k	0.011k Ω
2-wire Ohms		±
100	0	4.0 m Ω
	100	0.014 Ω
1k	1000	0.00011k Ω
10k	10k	0.0011k Ω
100k	100k	0.011k Ω
1M	1M	0.00011MΩ
10M	10M	0.0041MΩ
100M	100M	0.81MΩ
DC Current		±
100uA	+100	0.075
	-100	0.075
1mA	+1.0	0.00055
	-1.0	0.00055
10mA	+10	0.007
	-10	0.007
100mA	+ 100	0.055
	-100	0.055
1A	+1.0	0.0007
	-1.0	0.0007
3A	+1.9	0.025
	-1.9	0.025
10A	+10	0.017
	-10	0.017
AC Current		
10mA	10Hz	0.014
	1000Hz	0.014
	5000Hz	0.014
	10000Hz	0.045
100mA	10Hz	0.14
	1000Hz	0.14
	5000Hz	0.14
	10000Hz	0.45
1A	45Hz	0.0014
	1000Hz	0.0014
	5000Hz	0.0014
	10000Hz	0.0105

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

MULTIMETER, ANALOG

MFG: MICRONTA / Triplett

TEST		LIMIT
DC VOLTS:		
RNG	I/P	
1V	00mV	±3% + F.S.
3V	3.0	"
10V	10.0	"
30V	30.0	"
100V	100.0	"
300V	300.0	"
AC VOLTS:		@ 400 Hz
3.0V	3.0	±4% F.S.
30V	30.0	"
100V	100.0	"
300V	300.0	"
RESISTANCE:		
1kohm	1k	±3 of scale length
10kohm	10k	"
100kohm	100k	"
1Mohm	1M	"
10Mohm	10M	"
DC CURRENT :		
.1mA	.1	±3% F.S.
1mA	1	"
30mA	10	"
1A	1	"

Prepared By: *Jonathan Umana*
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OHMMETER, ANALOG

ALL MODELS

TEST	LIMIT
RESISTANCE:	
10ohm 10	±3%
100ohm 100	"
1kohm 1k	"
10kohm 10k	"
100kohm 100k	"
1Mohm 1M	"
10Mohm 10M	"

OVEN

All Oven Models

TEST	LIMIT
Temperature	
100° C	± 5°C
150° C	± 5°C
200° C	± 5°C
250° C	± 5°C

Prepared By: *Jonathan Umana*
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Electrical Equipment

PAV
CLARK HESS
All Models

TEST	LIMIT
Voltage Accuracy	
@1000 Hz	
20mV / 20mV	±0.022mV
63mV / 63mV	±0.069mV
200mV/ 200mV	±0.20mV
630mV / 630mV	±0.63mV
2V / 2 V	±0.002 V
6.3V / 6.3 V	±0.0063 V
20V / 20 V	±0.020 V
63V / 63 V	±0.063 V
200V / 200 V	±0.34 V
630V / 630 V	±1.07 V
FREQUENCY RESPONSE	
@ 2V	
20 Hz	±0.002 V
2000Hz	±0.002 V
5000Hz	±0.003 V
20kHz	±0.004V
50kHz	±0.008 V
100kHZ	±0.018 V
@20 V	
20.001	±0.02 V
2000Hz	±0.02 V
5000Hz	±0.03 V
20kHz	±0.04V
50kHz	±0.08 V
100kHZ	±0.18 V

TEST			LIMIT
Phase Test vs. Frequency			
	Reference	Variable	
20Hz – 90 °	1V	1V	±0.020
20Hz – 90 °	10V	10V	±0.020
20Hz – 90 °	.1V	100V	±0.020
20Hz – 90 °	100V	.1V	±0.020
2000Hz - 90 °	1V	1V	±0.020
2000Hz - 90 °	10V	10V	±0.020
2000Hz - 90 °	.1V	100V	±0.020
2000Hz - 90 °	100V	.1V	±0.020
5000Hz - 90 °	1V	1V	±0.030
5000Hz - 90 °	10V	10V	±0.030
5000Hz - 90 °	.1V	100V	±0.030
5000Hz - 90 °	100V	.1V	±0.030
10kHz – 90 °	1V	1V	±0.040
10kHz – 90 °	10V	10V	±0.040
10kHz – 90 °	.1V	100V	±0.040
10kHz – 90 °	100V	.1V	±0.040
20kHz – 90 °	1V	1V	±0.050
20kHz – 90 °	10V	10V	±0.050
20kHz – 90 °	.1V	100V	±0.050
20kHz – 90 °	100V	.1V	±0.050

Electrical Equipment

PAV - Continued
CLARK HESS

TEST			LIMIT
Phase Test Low Amplitude Normal			
	Reference	Variable	
20kHz – 90 °	2V	200mV	±0.050
20kHz – 90 °	2V	600mV	±0.050
Low Amplitude Reverse			
	Reference	Variable	
20kHz – 90 °	200mV	2V	±0.050
20kHz – 90 °	600mV	2V	±0.050
High Amplitude			
20kHz – 90 °	Reference	Variable	
20kHz – 90 °	2V	.2V	±0.050
20kHz – 90 °	2V	.6V	±0.050
20kHz – 90 °	2V	2V	±0.050
20kHz – 90 °	2V	6V	±0.050
20kHz – 90 °	2V	20V	±0.050
20kHz – 90 °	2V	60V	±0.050
20kHz – 90 °	2V	120V	±0.050
20kHz – 90 °	2V	120V (1)	±0.050
20kHz – 90 °	.2V	2V	±0.050
20kHz – 90 °	.6V	2V	±0.050
20kHz – 90 °	2V	2V	±0.050
20kHz – 90 °	6V	2V	±0.050
20kHz – 90 °	20V	2V	±0.050
20kHz – 90 °	60V	2V	±0.050
20kHz – 90 °	100V	2V	±0.050
20kHz – 90 °	120V (2)	2V	±0.050

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

POWER SUPPLY
ALL MODELS

TEST	LIMIT
Meter Acc.: 1	
12.00	± 0.05%+10mV
24.00	"
36.00	"
48.00	"
60.00	"
Regulation	
Load	< 0.01%+ 3mV
Line	< 0.01%+ 3mV
Ripple & Noise	< 1mVrms

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

Precision LCR Meter
ALL IET MODELS

TEST	LIMIT
FREQUENCY	
50 Hz	±[0.2%+.02Hz]
100 Hz	"
1000 Hz	"
10 kHz	"
100 kHz	"
500 kHz	"
1 MHz	"
Ac Test Signal	@ 1kHz
20 mV	± [2%+5mV]
100	"
1 V	"
Capacitance	
Nominal Value	
496.92 pf	nominal±0.5%
982.84 pf	"
5.0082 nf	"
9.9758 nf	"
51.88 nf	"
101.81 nf	"
510.43 nf	"
1.0138 uf	"
5.25 uf	"
10.62 uf	"
RESISTANCE	
10 ohms	± 0.5%
100 ohms	"
1 kohm	"
10 kohm	"
100 kohm	"
1 Mohm	"
INDUCTANCE	
Nominal Value	nominal±0.5%
46.81mH	"
97.83mH	"

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

PROG. CURRENT SOURCE
Keithley – All Models

TEST	LIMIT
Range	
100mA	± 0.1% + 50µA
10mA	± 0.05% +10µA
-10mA	"
1mA	± 0.05% +1µA
100µA	± 0.05% +100nA
10µA	± 0.05% +10nA

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

RATIO TRANSFORMER

GTH RT-7

TEST	FREQ.	INPUT VOLTAGE	LIMIT
DIAL SETTING	**800 Hz**	**18 V**	**(0.001+0.001/Ratio) %**
X000000	"	"	"
9999999	"	"	"
8888888	"	"	"
7777777	"	"	"
6666666	"	"	"
5555555	"	"	"
4444444	"	"	"
3333333	"	"	"
2222222	"	"	"
1111111	"	"	"
1000000	"	"	"
2000000	"	"	"
3000000	"	"	"
4000000	"	"	"
5000000	"	"	"
6000000	"	"	"
7000000	"	"	"
8000000	"	"	"
9000000	"	"	"

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

RECORDER, CHART

MFG: Astro-Med
MODEL: DASH-8

TEST		LIMIT
DC VOLTS		
RNG	I/P	
500V	500	1.1%
	400	"
	300	"
	200	"
	100	"
	50	"
5V	5V	"
	4	"
	3	"
	2	"
	1	"
	900mV	"
	800	"
	700	"
	600	"
	500	"
	400	"
	300	"
	200	"
	100	"
	50	"
AC VOLTS		10KHz
	100mV	2%
	200	"
	300	"
	400	"
	500	"
	1V	"
	2.5	"
	50	"
	100	"
250V / 400Hz		"

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

RECORDER, TEMP, HUM
All MODELS

SPECIFIED LIMIT: ±1°C, ±3%

STANDARD CAPACITOR
ALL MFG IET MODELS

SPECIFIED LIMIT: 0.01%

VACUUM GAGE
MFG: USG

SPECIFIED LIMIT: 5.0%FS Assigned

WRIST STRAP /FOOTWEAR TESTER
MFG: UCSTAT
MODEL UC-TE502

SPECIFIED LIMIT: ± 10%

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

RESISTANCE BOARD
ALL MODELS

TEST		LIMIT
DC VOLTS		
500		± (1%+5V)
1000		"
2000		"
3000		"
4000		"
5000		"
6000		
AC VOLTS		
500		± (1%+5V)
1000		"
2000		"
3000		"
4000		"
5000		"
Resistance		
200M	50 v	± 10%+10 CTS
	250	"
	500	± 5%+10 CTS
	1000	"
2G	50 v	± 10%+10 CTS
	250	"
	500	"
	1000	"

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

RESISTOR & CAPACITANCE, DECADE

ALL MODELS

Tested		Limit
zero		
1Ω /step	1	± (1% + .025Ω)
	2	"
	4	"
	6	"
	8	"
10Ω /step	1	"
	2	"
	4	"
	6	"
	8	"
100Ω /step	1	"
	2	"
	4	"
	6	"
	8	"
1KΩ /step	1	"
	2	"
	4	"
	6	"
	8	"
10KΩ /step	1	"
	2	"
	4	"
	6	"
	8	"
100kΩ /step	1	"
	2	"
	4	"
	6	"
	8	"
1MΩ /step	1	"
	2	"
	4	"
	6	"
	8	"
100pf/step	0	± (4% + 3pf)
	1	"
	2	"
	3	"
	4	"
	5	"
	6	"
	7	"

Tested		Limit
nf/step	1	± (4% + 3pf)
	2	"
	3	"
	4	"
	5	"
	6	"
	7	"
	8	"
	9	"
	10	"
	20	"
	30	"
	40	"
	50	"
	60	"
	70	"
	80	"
	90	"
	100	"
	200	"
	300	"
	400	"
	500	"
	600	"
	700	"
	800	"
	900	"
µf/step	1	"
	2	"
	3	"
	4	"
	5	"
	6	"
	7	"
	8	"
	9	"
	10	"
	20	"
	30	"
	40	"
	50	"
	60	"
	70	"

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

SCOPEMETER
Fluke
Specification: Calibrate according to manufacture.

Calibration Information

You can ask for the model identity (version and calibration data) at any time. To display the identity, do the following:

① USER OPTIONS — Open the USER OPTIONS menu.

② F3 — Open the VERSION&CALIBRATION submenu.

The screen gives you information about the model number with software version, the calibration number with latest calibration date, and the latest battery refresh date.

③ F4 — Return to normal mode.

Recalibration must be carried out by qualified personnel only. Contact your local Fluke representative for recalibration.

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

System Source Meter
Model: Keithley - 2601

TEST		LIMITS
DC VOLTS		
Range	Input	
100 mV	100	± 0.015%+150uV
	-100	‘’
1.0 V	1.000	± 0.015%+200uV
	-1.000	‘’
6 V	6.00	± 0.015%+1mV
	- 6.00	‘’
40 V	40.00	± 0.015%+8mV
	-40.0	‘’
DC CURRENT		
100nA	100	± 0.05%+100pA
1uA	1.0	± 0.025%+300pA
10uA	10.0	± 0.025%+1.5nA
100uA	100.0	± 0.02%+25nA
1mA	1.0	± 0.02%+200nA
10mA	10.0	± 0.02%+2.5uA
100mA	100.0	± 0.02%+20uA
1A	1.0	± 0.03%+1.5mA
3A	2.9	± 0.05%+3.5uA

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

TESTER, HI-POT
ALL MODELS

TEST	LIMIT
DC VOLTS	
500	± (2%+5V)
1000	"
2000	"
3000	"
4000	"
5000	"
AC VOLTS	
500	± (2%+5V)
1000	"
2000	"
3000	"
4000	"
5000	"
Resistance	
200M 500V	± 2%+2 CTS
1000	"
2G 50V	± 8%+2 CTS
250	"
500	"
Frequency	
@60 Hz	±0.1%

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

TESTER, INSULATION
MFG: SLR

TEST	LIMIT
DC VOLTS	
500	± 125 V
1000	‘’
1500	‘’
2000	‘’
2500	‘’
AC VOLTS	
500	± 125 V
1000	‘’
1500	‘’
2000	‘’
2500	‘’
DC CURRENT	
50 uA	± 5 uA
80	‘’
500	± 50 uA
800	‘’
1 mA	± 0.25mA
AC CURRENT	
50 uA	± 5 uA
80	‘’
500	± 50 uA
800	‘’
1 mA	± 0.25mA

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

THERMOCOUPLE MODULE
MFG: Fluke
MODEL: 80TK

TEST	LIMIT
Applied °c	
-40	±2.5%+ 2°c
-20	±0.5%+ 2°c
0.0	‘’
50	‘’
100	‘’
125	‘’
150	‘’
200	‘’
300	‘’
350	‘’

SOLDER IRON TESTER
MFG: WAHL
MODEL: ST2200

TEST	LIMIT
Set Temp	
Actual	± 9°F
Pot to GND Potential Diff.	≤ 2V peak
Pot to GND Resistance	≤ 5 ohms

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

Electrical Equipment

REPAIR STATION
MFG: Weller
MODEL: WR 3M

TEST	LIMIT
#1	
Set Temp	± 17°F
400°F	‘’
600°	‘’
700°	‘’
800°	“

TACHOMETER/TOTALIZER
Calibration Manual M-20 and K-Winder winding machines
See WI362

TEST	LIMITS
Count	±0.2%
1000	“
2000	“
3000	“

THERMOMETER, DIGITAL
ALL MODELS

TEST	LIMIT
Applied	±0.1%+0.7°c
-75	“
-50	“
-25	“
0.0	“
50	“
100	“
150	“
200	“
300	“
400	“

Prepared By: *Jonathan Umana*
Date: 05/17/18

Approved By: Jeffrey Stanton
Date: 5/17/18

TACHOMETER
Calibration Semi-Automatic Rotary Welding Machine

TEST (RPM)	LIMITS
5	±0.2
7	"
9	"
10	"

Prepared By: *Andres Hernandez*
Date: 12/06/19

Approved By: Jeffrey Stanton
Date: 12/06/19