



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid to: February 8, 2013

Certificate Number: AC - 1308

I. Electromagnetic - DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source ⁵ - Fixed Points	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV 1.018 V 1 V 10 V	7.5 µV/V + 400 nV 5 µV/V + 700 nV 3.5 µV/V + 2.5 µV 3.5 µV/V + 4 µV 5 µV/V + 40 µV 6.5 µV/V + 400 µV 610 nV 600 nV 1 µV	Fluke 5720A Opt 03 Fluke 732A	OEM and GIDEP Sourced Calibration Procedures
DC Voltage - Measure ⁵ - Fixed Points	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1 050) V 1 V 10 V	2.7 µV/V + 100 nV 2.7 µV/V + 400 nV 2.7 µV/V + 4 µV 4 µV/V + 40 µV 4 µV/V + 500 µV 750 nV 4.6 µV	Fluke 8508A Opt 01 Fluke 732A with 8508A Opt 01	
DC Current - Source ⁵	Up to 220 µA 220 µA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 3) A (3 to 11) A (11 to 20.5) A	40 µA/A + 6 nA 35 µA/A + 7 nA 35 µA/A + 40 nA 45 µA/A + 700 nA 80 µA/A + 12 µA 380 µA/A + 40 µA 360 µA/A + 480 µA 1 mA/A + 750 µA	Fluke 5720A Opt 03 Fluke 5520A Fluke 5725A Fluke 5520A	
DC Current - Measure ⁵	(10 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	20 µA/A + 800 pA 20 µA/A + 5 nA 20 µA/A + 50 nA 35 µA/A + 500 nA 105 µA/A + 10 µA	HP 3458A Opt 002	



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Resistance - Source ⁵	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	95 μΩ 181 μΩ 230 μΩ 437 μΩ 1 mΩ 1.9 mΩ 8.5 mΩ 16.2 mΩ 85 mΩ 162 mΩ 1.1 Ω 2.09 Ω 20 Ω 39.9 Ω 400 Ω 893 Ω 10 kΩ	Fluke 5720A Opt 03	
Resistance - Measure ⁵	Up to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	18 μΩ/ Ω + 50 μΩ 13 μΩ/ Ω + 500 μΩ 11 μΩ/ Ω + 500 μΩ 11 μΩ/ Ω + 5 mΩ 11 μΩ/ Ω + 50 mΩ 15 μΩ/ Ω + 2 Ω 53 μΩ/ Ω + 100 Ω 503 μΩ/ Ω + 1 kΩ 5 mΩ/ Ω + 10 kΩ	HP 3458A Opt 002	OEM and GIDEP Sourced Calibration Procedures
Capacitance - Source ⁵	190 pF to 1.1 nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 110) nF (110 to 330) nF 330 nF to 1.1 μF (1.1 to 3.3) μF (3.3 to 11) μF (11 to 33) μF (33 to 110) μF (110 to 330) μF 330 μF to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	5 mF/F + 10 pF 5 mF/F + 10 pF 2.5 mF/F + 10 pF 2.5 mF/F + 100 pF 2.5 mF/F + 300 pF 2.5 mF/F + 1 nF 2.5 mF/F + 3 nF 2.5 mF/F + 10 nF 4 mF/F + 30 nF 4.5 mF/F + 100 nF 4.5 mF/F + 300 nF 4.5 mF/F + 1 μF 4.5 mF/F + 3 μF 4.5 mF/F + 10 μF 7.5 mF/F + 30 μF 11 mF/F + 100 μF	Fluke 5520A	



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AC Voltage - Source ⁵	Up to 2.2 mV			
	(10 to 20) Hz	240 $\mu\text{V/V} + 4 \mu\text{V}$		
	(20 to 40) Hz	90 $\mu\text{V/V} + 4 \mu\text{V}$		
	40 Hz to 20 kHz	80 $\mu\text{V/V} + 4 \mu\text{V}$		
	(20 to 50) kHz	200 $\mu\text{V/V} + 4 \mu\text{V}$		
	(50 to 100) kHz	500 $\mu\text{V/V} + 5 \mu\text{V}$		
	(100 to 300) kHz	1.05 mV/V + 10 μV		
	(300 to 500) kHz	1.4 mV/V + 20 μV		
	500 kHz to 1 MHz	2.7 mV/V + 20 μV		
	(2.2 to 22) mV			
	(10 to 20) Hz	240 $\mu\text{V/V} + 4 \mu\text{V}$		
	(20 to 40) Hz	90 $\mu\text{V/V} + 4 \mu\text{V}$		
40 Hz to 20 kHz	80 $\mu\text{V/V} + 4 \mu\text{V}$			
(20 to 50) kHz	200 $\mu\text{V/V} + 4 \mu\text{V}$			
(50 to 100) kHz	500 $\mu\text{V/V} + 5 \mu\text{V}$			
(100 to 300) kHz	1.05 mV/V + 10 μV			
(300 to 500) kHz	1.4 mV/V + 20 μV			
500 kHz to 1 MHz	2.7 mV/V + 20 μV			
(22 to 220) mV				
(10 to 20) Hz	240 $\mu\text{V/V} + 12 \mu\text{V}$			
(20 to 40) Hz	90 $\mu\text{V/V} + 7 \mu\text{V}$			
40 Hz to 20 kHz	80 $\mu\text{V/V} + 7 \mu\text{V}$			
(20 to 50) kHz	200 $\mu\text{V/V} + 7 \mu\text{V}$			
(50 to 100) kHz	460 $\mu\text{V/V} + 17 \mu\text{V}$			
(100 to 300) kHz	900 $\mu\text{V/V} + 20 \mu\text{V}$			
(300 to 500) kHz	1.4 mV/V + 25 μV			
500 kHz to 1 MHz	2.7 mV/V + 45 μV			
220 mV to 2.2 V				
(10 to 20) Hz	240 $\mu\text{V/V} + 40 \mu\text{V}$			
(20 to 40) Hz	90 $\mu\text{V/V} + 15 \mu\text{V}$			
40 Hz to 20 kHz	45 $\mu\text{V/V} + 8 \mu\text{V}$			
(20 to 50) kHz	75 $\mu\text{V/V} + 10 \mu\text{V}$			
(50 to 100) kHz	110 $\mu\text{V/V} + 30 \mu\text{V}$			
(100 to 300) kHz	420 $\mu\text{V/V} + 80 \mu\text{V}$			
(300 to 500) kHz	1 mV/V + 200 μV			
500 kHz to 1 MHz	1.7 mV/V + 300 μV			
(2.2 to 22) V				
(10 to 20) Hz	240 $\mu\text{V/V} + 400 \mu\text{V}$			
(20 to 40) Hz	90 $\mu\text{V/V} + 150 \mu\text{V}$			
40 Hz to 20 kHz	45 $\mu\text{V/V} + 50 \mu\text{V}$			
(20 to 50) kHz	75 $\mu\text{V/V} + 100 \mu\text{V}$			
(50 to 100) kHz	100 $\mu\text{V/V} + 200 \mu\text{V}$			
(100 to 300) kHz	275 $\mu\text{V/V} + 600 \mu\text{V}$			
(300 to 500) kHz	1 mV/V + 2 mV			
500 kHz to 1 MHz	1.5 mV/V + 3.2 mV			
			Fluke 5720A Opt 03	OEM and GIDEP Sourced Calibration Procedures

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AC Voltage - Source ⁵ (cont.)	(22 to 220) V (10 to 20) Hz (20 to 40) Hz	240 $\mu\text{V/V} + 4 \text{ mV}$ 90 $\mu\text{V/V} + 1.5 \text{ mV}$	Fluke 5720A Opt 03	OEM and GIDEP Sourced Calibration Procedures

	40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (220 to 250) V (15 to 50) Hz 50 Hz to 1 kHz 250 V to 1.1 kV 50 Hz to 1 kHz	52 $\mu\text{V/V} + 600 \mu\text{V}$ 80 $\mu\text{V/V} + 1 \text{ mV}$ 150 $\mu\text{V/V} + 2.5 \text{ mV}$ 900 $\mu\text{V/V} + 16 \text{ mV}$ 4.4 $\text{mV/V} + 40 \text{ mV}$ 8 $\text{mV/V} + 80 \text{ mV}$ 300 $\mu\text{V/V} + 16 \text{ mV}$ 70 $\mu\text{V/V} + 3.5 \text{ mV}$ 70 $\mu\text{V/V} + 3.5 \text{ mV}$		
AC Voltage - Measure ⁵	(1 to 10) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (10 to 100) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz 100 mV to 1 V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	302 $\mu\text{V/V} + 3 \mu\text{V}$ 202 $\mu\text{V/V} + 1.1 \mu\text{V}$ 302 $\mu\text{V/V} + 1.1 \mu\text{V}$ 1 $\text{mV/V} + 1.1 \mu\text{V}$ 5 $\text{mV/V} + 1.1 \mu\text{V}$ 40 $\text{mV/V} + 2 \mu\text{V}$ 12 $\text{mV/V} + 5 \mu\text{V}$ 70 $\text{mV/V} + 7 \mu\text{V}$ 200 $\text{mV/V} + 8 \mu\text{V}$ 72 $\mu\text{V/V} + 4 \mu\text{V}$ 72 $\mu\text{V/V} + 2 \mu\text{V}$ 142 $\mu\text{V/V} + 2 \mu\text{V}$ 302 $\mu\text{V/V} + 2 \mu\text{V}$ 802 $\mu\text{V/V} + 2 \mu\text{V}$ 3 $\text{mV/V} + 10 \mu\text{V}$ 10 $\text{mV/V} + 10 \mu\text{V}$ 15 $\text{mV/V} + 10 \mu\text{V}$ 40 $\text{mV/V} + 70 \mu\text{V}$ 40 $\text{mV/V} + 80 \mu\text{V}$ 150 $\text{mV/V} + 100 \mu\text{V}$ 72 $\mu\text{V/V} + 40 \mu\text{V}$ 72 $\mu\text{V/V} + 20 \mu\text{V}$ 142 $\mu\text{V/V} + 20 \mu\text{V}$ 302 $\mu\text{V/V} + 20 \mu\text{V}$ 802 $\mu\text{V/V} + 20 \mu\text{V}$ 3 $\text{mV/V} + 100 \mu\text{V}$ 1 $\text{mV/V} + 100 \mu\text{V}$ 15 $\text{mV/V} + 100 \mu\text{V}$ 40 $\text{mV/V} + 700 \mu\text{V}$ 40 $\text{mV/V} + 800 \mu\text{V}$ 150 $\text{mV/V} + 1 \text{ mV}$	HP 3458A Opt 002	

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AC Voltage - Measure ⁵ (cont.)	(1 to 10) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz (2 to 4) MHz (4 to 8) MHz (8 to 10) MHz (10 to 100) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz 100 V to 1 kV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	72 $\mu\text{V/V} + 400 \mu\text{V}$ 72 $\mu\text{V/V} + 200 \mu\text{V}$ 142 $\mu\text{V/V} + 200 \mu\text{V}$ 302 $\mu\text{V/V} + 200 \mu\text{V}$ 802 $\mu\text{V/V} + 200 \mu\text{V}$ 3 mV/V + 1 mV 10 mV/V + 1 mV 15 mV/V + 1 mV 40 mV/V + 7 mV 40 mV/V + 8 mV 150 mV/V + 10 mV 202 $\mu\text{V/V} + 4 \text{ mV}$ 202 $\mu\text{V/V} + 2 \text{ mV}$ 202 $\mu\text{V/V} + 2 \text{ mV}$ 352 $\mu\text{V/V} + 2 \text{ mV}$ 1.2 mV/V + 2 mV 4 mV/V + 10 mV 15 mV/V + 10 mV 402 $\mu\text{V/V} + 40 \text{ mV}$ 402 $\mu\text{V/V} + 20 \text{ mV}$ 602 $\mu\text{V/V} + 20 \text{ mV}$ 1.2 mV/V + 20 mV 3 mV/V + 20 mV	HP 3458A Opt 002	OEM and GIDEP Sourced Calibration Procedures
AC Voltage Flatness - Measure Up to 3 V	(10 to 100) Hz 100 Hz to 100 kHz 100 kHz to 1 MHz (1 to 10) MHz (10 to 30) MHz (30 to 50) MHz (50 to 70) MHz (70 to 80) MHz (80 to 100) MHz	1 mV/V 50 $\mu\text{V/V}$ 870 $\mu\text{V/V}$ 800 $\mu\text{V/V}$ 1.67 mV/V 4.13 mV/V 6.2 mV/V 7.01 mV/V 8.4 mV/V	By comparison to Thermal Voltage Converters with HP 3458A Opt 002	
AC Current - Source ⁵	(9 to 220) μA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz 220 μA to 2.2 mA (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	250 $\mu\text{A/A} + 16 \text{ nA}$ 160 $\mu\text{A/A} + 10 \text{ nA}$ 120 $\mu\text{A/A} + 8 \text{ nA}$ 280 $\mu\text{A/A} + 12 \text{ nA}$ 1.1 mA/A + 65 nA 250 $\mu\text{A/A} + 40 \text{ nA}$ 160 $\mu\text{A/A} + 35 \text{ nA}$ 120 $\mu\text{A/A} + 35 \text{ nA}$ 200 $\mu\text{A/A} + 110 \text{ nA}$ 1.1 mA/A + 650 nA	Fluke 5720A	

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PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Capacitance - Measure ⁵ @ 1 kHz	Up to 10 pF (10 to 100) pF 100 pF to 100 nF 100 nF to 10 μF (10 to 100) μF 100 μF to 1 mF	232 μF/F 231 μF/F 238 μF/F 239 mF/F 243 mF/F 256 mF/F	Genrad 1689M Digibridge	OEM and GIDEP Sourced Calibration Procedures
Inductance - Source ⁵ Fixed Points @ 1kHz	100 μH 1 mH 100 mH 10 H	290 nH 1.2 μH 120 μH 120 mH	Genrad 1482-B Genrad 1482-E Genrad 1482-L Genrad 1482-T	
Inductance - Measure ⁵ @ 1 kHz	Up to 100 uH 100 uH to 10 H	233 μH/H 240 μH/H	Genrad 1689M Digibridge	
Electrical Simulation of Thermocouple Indicators ⁵				
Type B	(600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	0.44 °C 0.34 °C 0.3 °C 0.33 °C	Fluke 5520A/SC 1100	
Type C	(0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C	0.3 °C 0.26 °C 0.31 °C 0.5 °C 0.84 °C		
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.5 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C		
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C		
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C	0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.4 °C		

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Electrical Simulation of Thermocouple Indicators ⁵ (cont.)				
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.37 °C 0.26 °C 0.17 °C		
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C	0.4 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C		
Type R	(0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1 000 to 1 767) °C	0.57 °C 0.35 °C 0.33 °C 0.4 °C		
Type S	(0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C	Fluke 5520A/SC 1100	OEM and GIDEP Sourced Calibration Procedures
Type S	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C		
Type U	(-200 to 0) °C (0 to 600) °C	0.56 °C 0.27 °C		
Electrical Simulation of RTDs ⁵ Pt 385 (100 Ω)	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C 0.23 °C		
Pt 3926 (100 Ω)	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C		

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Electrical Simulation of RTDs ⁵ (cont.)				
Pt 3916 (100 Ω)	(-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.25 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.09 °C 0.1 °C 0.23 °C		
Pt 385 (200 Ω)	(-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.04 °C 0.05 °C 0.12 °C 0.13 °C 0.14 °C 0.16 °C	Fluke 5520A/SC 1100	OEM and GIDEP Sourced Calibration Procedures
Pt 385 (500 Ω)	(-200 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.04 °C 0.05 °C 0.06 °C 0.08 °C 0.09 °C 0.11 °C		
Pt 385 (1 kΩ)	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C	0.03 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.23 °C		
PtNi 385 (120 Ω)	(-80 to 100) °C (100 to 260) °C	0.08 °C 0.14 °C		

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Oscilloscopes⁵				
Amplitude DC Signal into 50 Ω Load into 1 MΩ Load	(-6.6 to 6.6) V (-130 to 130) V	2.5 mV/V + 40 μV 500 μV/V + 40 μV	Fluke 5520A/SC 1100	OEM and GIDEP Sourced Calibration Procedures
Amplitude - Square Wave 50 Ω Load	±1 mV to ±6.6 Vp-p 10 Hz to 10 kHz	2.5 mV/V + 40 μV		
1 MΩ Load	±1 mV to ±130 Vp-p 10 Hz to 1 kHz (1 to 10) kHz	1 mV/V + 40 μV 2.5 mV/V + 40 μV		
Leveled Sine Wave Relative to 50 kHz [5 mV to 5.5 V] p-p	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	35 mV/V + 300 μV 40 mV/V + 300 μV 60 mV/V + 300 μV 70 mV/V + 300 μV		
Time Marker into 50 Ω Load	5 s to 50 ms 20 ms to 1 ns	(25 + 1 000t) μs/s 2.5 μs/s		
Edge Specs into 50 Ω Load Rise Time 50 Ω load Range (p-p)	≤ 350 ps 5 mV to 2.5 V	(0 /-100) ps 20 mV/V + 200 μV		
Wave Generator - Source Amplitude (10 Hz to 10 kHz) Square, Sine, Triangle into 1 MΩ Square, Sine, Triangle into 50 Ω	1.8 mV to 55 V p-p 1.8 mV to 2.5 V p-p	30 mV/V + 100 μV 30 mV/V + 100 μV		

II. Electromagnetic - RF / Microwave

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Source ⁵ 50 Ω load	1 dB 1 Hz to 100 kHz 100 kHz to 20 MHz (2 to 8) dB 1 Hz to 100 kHz 100 kHz to 10 MHz (2 to 4) dB 100 kHz to 10 MHz (10 to 20) MHz (5 to 8) dB 100 kHz to 10 MHz (10 to 20) MHz (+10 to -110) dBm (10 to 50) MHz 50 MHz to 2.6 GHz (2.6 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	0.1 dB 0.4 dB 0.2 dB 0.5 dB 0.5 dB 0.8 dB 0.5 dB 0.8 dB 0.91 dB 0.61 dB 0.48 dB 0.74 dB 0.93 dB	HP 3325A Synthesized Signal Generator HP 8340B w/ 8902A, 11722A, 11792A and 11793A	OEM and GIDEP Sourced Calibration Procedures
RF Power - Measure ⁵ 50 Ω load	(+10 to -20) dBm 10 MHz to 2.6 GHz (2.6 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz (+10 to +20) dBm 10 MHz to 18 GHz (18 to 26.5) GHz (-20 to -70) dBm 10 MHz to 6 GHz (6 to 15) GHz (15 to 18) GHz (-30 to +20) dBm 100 kHz to 4.2 GHz	0.07 dBm 0.1 dBm 0.12 dBm 0.13 dBm 0.08 dBm 0.12 dBm 0.1 dBm 0.1 dBm 0.11 dBm 0.07 dBm	HP 8902A w/ 11793A, 11722A, and 11792A HP 438A w/ 8481A HP 438A w/ 8485A HP 438A w/ 8481B HP 438A w/ 8482A	
Power Reference ⁵ (50 MHz)	1 mW	0.015 dB (3.4 μW)	HP 478-H76 Thermistor Mount	
Phase Modulation - Measure ⁵ Carrier Frequency: 150 kHz to 10 MHz 10 MHz to 26.5 GHz	200 Hz to 10 kHz 200 Hz to 20 kHz	5 % 4 %	HP 8902A w/ 11722A HP 8902A w/ 11793A	
Amplitude Modulation ⁵ - Source Rate: 50 Hz to 10 kHz Depths: 5 % to 99 %	100 MHz to 1.28 GHz	2.3 %	HP 8902A w/ 8662A	

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Amplitude Modulation - Measure ⁶ Rate: 20 Hz to 10 kHz, to 99% 50 Hz to 10 kHz, (5 to 99) % 20 Hz to 10 kHz, to 99% 50 Hz to 10 kHz, (5 to 99) %	150 kHz to 10 MHz 150 kHz to 10 MHz 10 MHz to 1.3 GHz 10 MHz to 1.3 GHz	3.5 % 2.3 % 3.5 % 1.2 %	HP 8902A w/ 11722A HP 8902A w/ 11793A	OEM and GIDEP Sourced Calibration Procedures
Frequency Modulation - Source ⁵ Modulation Rate: 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz 10 MHz to 1.3 GHz 10 MHz to 1.3 GHz	2.4 % 1.3 % 5.8 %	HP 8902A w/ 8662A	
Frequency Modulation - Measure ⁵ Modulation Rate: 20 Hz to 10 kHz 50 Hz to 100 kHz 20 Hz to 200 kHz	250 kHz to 10 MHz 10 MHz to 1.3 GHz 10 MHz to 1.3 GHz	2.4 % 1.3 % 5.8 %	HP 8902A	
Insertion Loss ⁵ (0 to 110) dB	2.5 MHz to 26.5 GHz	0.13 dB	HP 8902A w/ 11793A, 11722A, and 11792A	

III. Time & Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Measure	10 MHz	2.3 parts in 10 ⁻¹²	Datum 9390-6000	OEM and GIDEP Sourced Calibration Procedures
*Frequency - Measure	DC to 500 MHz (0.5 to 26.5) GHz	1.2 parts in 10 ⁻¹⁰ 1.2 parts in 10 ⁻¹⁰	HP 5345A EIP 548A	

IV. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature - Source	(-80 to 110) °C (-40 to 150) °C (-20 to 150) °C (40 to 300) °C (180 to 550) °C	0.013 °C 0.017 °C 0.023 °C 0.023 °C 0.031 °C	Hart 5699, 1590 SPRT and the following baths: Hart 7080 Hart 7341 Hart 7321 Hart 6020 Hart 6050H	OEM and GIDEP Sourced Calibration Procedures
Temperature - Measure ⁵	(-190 to 231) °C (231 to 420) °C	0.009 °C 0.018 °C	Hart 5699 SPRT with Hart 1590 Super Thermometer	
Infrared Non-Contact Temperature - Source ⁵	Up to 150 °C (150 to 550) °C	2 °C 2.7 °C	Isotech R550 Blackbody Source	
Relative Humidity ⁵	(0 to 70) % RH (70 to 100) % RH	1.35 % RH 2.56 % RH	Vaisala HMI 41 with HMP 46 probe	

V. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Force ⁵	(55 to 1 124) lbf (1 124 to 11 240) lbf (11 240 to 67 422) lbf (67 422 to 134 885) lbf	0.018 % + 0.05 lb 0.011 % + 0.2 lb 0.01 % + 0.67 lb 0.008 % + 3.5 lb 0.02 % + 2.7 lb	United Force Stand with Load Cells	OEM and GIDEP Sourced Calibration Procedures
Torque Wrenches ⁵	(5 to 100) in-oz 100 in-oz to 4000 ft-lb	0.6 % 0.32 %	CDI and AKO Torque Systems	
Torque Transducers and Calibrators ⁵	1 in-oz to 250 in-lb (250 to 1000) in-lb 1000 in-lb to 500 ft-lb (500 to 4000) ft-lb	0.027 % 0.025 % 0.019 % 0.007 %	Class F weights w/ Torque Arms	
Mass ⁵	Up to 30 g (30 to 180) g (180 to 1200) g (1.2 to 12) kg	0.04 mg 0.18 mg 1.84 mg 153 mg	Class 1 Weights and Electronic Scales	
Scales and Balances ⁵	Up to 200 g (200 to 500) g 500 g to 5 kg (5 to 12) kg Up to 300 lb (300 to 500) lb (500 to 2000) lb	0.34 mg 2.6 mg 32.9 mg 238 mg 0.033 lb 0.39 lb 0.52 lb	Class 1 Weights Class F Weights	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure ⁵	Up to 19 psia (-14.5 to 0) psi (0 to 2 500) psi (2 500 to 10 000) psi	0.009 % 0.009 % 0.009 % 1 %	Ruska 7250xi XP2I Digital Gauge with hand pump	OEM and GIDEP Sourced Calibration Procedures

VI. Dimensional

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
*Gage Blocks	Up to 4 in (4 to 20) in	(6.4 + 1.3 L) μin (5.5 + 1.4 L) μin	Comparator with Grade 1 Gage Blocks Grade 2 Gage Blocks	ASME Sourced Calibration Procedures
*Single Axis Dimensional Gaging – External ⁵	Up to 4 in (4 to 10) in (10 to 80) in	(2.5 + 2.2 L) μin (4.2 + 2.4 L) μin (0.2 + 2.6L) μin	Pratt & Whitney Labmaster Pratt & Whitney Supermicrometer	OEM and GIDEP Sourced Calibration Procedures
*Single Axis Dimensional Gaging – Internal ⁵	Up to 4 in (4 to 10) in (10 to 14) in	(2.5 + 2.2 L) μin (4.2 + 2.4 L) μin (0.2 + 2.6L) μin	Pratt & Whitney Labmaster Pratt & Whitney Supermicrometer	
*Thread Pitch – External ⁵	Up to 10 in	(4.4 + 2L) μin	Pratt & Whitney Labmaster with Thread Wires	
Calipers – Inside and Outside ⁵	Up to 4 in (4 to 80) in	(115 + 1 L) μin (547 + 3.4 L) μin	Grade 1 and Grade 2 Gage Blocks	
Micrometers – Inside, outside, and Depth ⁵	Up to 4 in (4 to 80) in	(57 + 2 L) μin (73 + 6.8 L) μin		
Height Gages ⁵	Up to 24 in	(49 + 5.7 L) μin		
Indicators ⁵	Up to 4 in	(55 + 2 L) μin		

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Surface Plates Flatness Repeatability	(8x12 to 120x120) in (8x12 to 120x120) in	16.5 µin 20 µin	M-F Leveling System	OEM and GIDEP Sourced Calibration Procedures

Notes:

1. Calibration and Measurement Capabilities (CMC) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$.
2. This laboratory's offers calibration services in its laboratory and on-site at customer-designated locations. Since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
3. Capabilities denoted with an asterisk (*) are available in the laboratory only (not available for on-site calibration). This scope also applies to the satellite site at 1420 75th St. S.W., Suite A, Everett, WA 98203, Contact: Tom Cosgrove. Phone: 425-355-3700.
4. These parameters have been verified and authorized for accredited calibration at the Everett satellite site.
5. CMC expressed as % are % of reading unless otherwise noted.
6. CMC listed for Electromagnetic - DC/Low Frequency and RF/Microwave do not include possible contributions to uncertainty from a "best available" unit under test.
7. Electromagnetic - RF/Microwave CMC do not include possible contributions to uncertainty caused by mismatch.
8. The use of (L) signifies an expression of Length in inches.
9. The use of (t) signifies an expression of Time in seconds.
10. This scope is part of and must be included with the Certificate of Accreditation No. AC-1308.

Keith Greenway

Vice President

