SOUTHWEST RESEARCH INSTITUTE®

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Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-4834

ACCREDITED
Calibration Laboratory
Certificate #0972-01

Certificate of Calibration

Cost Center / Customer: DIV20 / DON BANNON
Mail Stop: B51
Manufacturer/Model: KEITHLEY / 6517A
Description: ELECTROMETER
Serial Number: 0735984
Asset Number: 007670
Procedure: KEITHLEY 6517 - 20 JAN 11

Work Order: 303099180
Date Issued: 24-Jan-2011
Date Calibrated: 24-Jan-2011
*** Date Due :** 24-Jan-2012
**** Results:** FOUND-LEFT
Temperature: 74.0 °F
Humidity: 40 %RH
Barometer: N/A

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 2005, ANSI/NCSL Z540-1-1994 and relevant requirements of the ISO 9000-2000 standard. This certificate shall not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. This certificate shall not be used to claim product endorsement by Southwest Research Institute, American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government. Results of this calibration relate only to the instrument described above at the time of calibration and does not imply any long term stability of the instrument.

*Determined by the customer, does not imply the instrument will remain within tolerance as any number of factors may cause an out-of-tolerance condition before this date. **Data type found in this certificate or attached measurement report must be interpreted as: Found-left - adjustment and/or repair was not performed, As-found - data is before unit is adjusted and/or repaired, As-left - data is after adjusted and/or repaired was performed. The customer has sole responsibility for determination of in-/out-of-tolerance or compliance/noncompliance.

Measurement uncertainty calculated in accordance with the method described in the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM), for a confidence level of approximately 95 percent using a coverage factor of $k=2$.

Remarks: Coulombs, 2 pA, 20 pA and 200 pA, 2T and 20 T Ohm not calibrated.

Standards Used

Asset #	Manufacturer	Model	Description	Cal Date	Due Date
000182	FLUKE	5700A/EP	MULT-FUNCTION CALIBRATOR	3-Nov-2010	3-Feb-2011
000201	FLUKE	5725A	MULT-FUNCTION CALIBRATOR AMPLIFIE	3-Nov-2010	3-Nov-2011
001505	HEWLETT-PACKARD	3458A/OPT 002	MULTIMETER	5-Feb-2010	5-Feb-2011
004164	FLUKE	5500A/SC	CALIBRATOR	12-Oct-2010	12-Oct-2011
009779	ESI	SR1050-1M	RESISTANCE TRANSFER STANDARD	13-May-2010	13-May-2011
009829	ESI	SR1050-10M	RESISTANCE TRANSFER STANDARD	13-May-2010	13-May-2011
017448	IET	SRL-100M	STANDARD RESISTOR	15-Nov-2010	15-May-2011

Walt Hill
Laboratory Manager

Bob Trollinger
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303099180	Mfr:	KEITHLEY	Technician:	blt
Asset No:	007670	Model:	6517A	Type Data:	Found-left
Serial No:	0735984	Type:	ELECTROMETER	Cal Date:	24-Jan-11
Remarks: Coulombs, 2 pA, 20 pA and 200 pA, 2TW and 20TW not calibrated.					

Function/Range	Test Point	TI Reading	Difference	± Limits	± Uncertainty	Result	% Limit
DCV	Volts	Volts	Volts	Volts	Volts		
2 Volt	1.90000	1.89998	-0.00002	0.00052	0.000015	Pass	4%
20 Volt	7.0000	6.9996	-0.0004	0.0021	0.00013	Pass	19%
	14.0000	13.9991	-0.0009	0.0038	0.00014	Pass	24%
	19.0000	18.9988	-0.0012	0.0051	0.00062	Pass	24%
	-19.0000	-18.9987	0.0013	0.0051	0.00062	Pass	25%
200 Volt	190.000	189.975	-0.025	0.117	0.013	Pass	21%
DC Amps	nAmps	nAmps	nAmps	nAmps	nAmps		
2 nA	1.90000	1.8975	-0.002500	0.00410	0.00023	Pass	61%
20 nA	19.0000	19.0065	0.0065	0.0385	0.0024	Pass	17%
200 nA	190.000	189.910	-0.090	0.385	0.025	Pass	23%
	µAmps	µAmps	µAmps	µAmps	µAmps		
2 µA	1.90000	1.90057	0.00057	0.00330	0.00023	Pass	17%
20 µA	19.0000	19.0001	0.0001	0.0300	0.0023	Pass	0%
200 µA	190.000	189.985	-0.015	0.300	0.023	Pass	5%
	mAmps	mAmps	mAmps	mAmps	mAmps		
2 mA	1.90000	1.90031	0.00031	0.00330	0.000076	Pass	9%
20 mA	19.0000	18.9981	-0.0019	0.0300	0.00014	Pass	6%
Resistance	MOhm	MOhm	MOhm	MOhm	MOhm		
2 MOhm	1.00000	1.00003	0.00003	0.00126	0.000060	Pass	2%
20 MOhm	10.0000	9.9996	-0.0004	0.0126	0.00060	Pass	3%
200 MOhm	100.000	99.950	-0.050	0.151	0.010	Pass	33%
Voltage Source	Volts	Volts	Volts	Volts	Volts		
	25.0000	24.9974	-0.0026	0.0475	0.00030	Pass	5%
	-25.0000	-24.9978	0.0022	0.0475	0.00030	Pass	5%
	50.000	49.998	-0.002	0.085	0.0052	Pass	2%
	75.0000	74.9971	-0.0029	0.1225	0.00074	Pass	2%
	100.00	100.00	0.00	0.16	0.013	Pass	0%
	1000.0	999.9	-0.1	1.6	0.13	Pass	6%
Temperature Type K	°C	°C	°C	°C	°C		
	-25	-24.5	0.5	2.4	0.24	Pass	21%
	0	0.6	0.6	1.5	0.24	Pass	40%
	50	50.4	0.4	1.7	0.24	Pass	24%
	100	100.3	0.3	1.8	0.24	Pass	17%
	150	150.3	0.3	2.0	0.34	Pass	15%

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Measurement Report

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Serial No:	0735984	Type:	ELECTROMETER	Cal Date:	24-Jan-11

Function/Range	Test Point	TI Reading	Difference	± Limits	± Uncertainty	Result	% Limit
Humidity	VDC	%	%	%	%		
0 VDC	0	0	0	1	1.3	Pass	0%
0.25 VDC	25	25	0	1	1.3	Pass	0%
0.5 VDC	50	50	0	1	1.3	Pass	0%
0.75 VDC	75	75	0	1	1.3	Pass	0%
1 VDC	100	100	0	1	1.3	Pass	0%

END OF REPORT