

SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS, 78228-0510 • TEL (210) 522-5215 • FAX (210) 522-3692

To: Don Barron, Div 20

From: Walt Hill, Manager
Institute Calibration Laboratory

Date: Sep. 16, 2008

Subject: Out-of-tolerance Notice

The purpose of this notice is to alert you of a condition, which may have caused erroneous measurements affecting safety or the quality of products or services your organization provides. The attached as-found readings are provided for your evaluation to determine if the instrument listed below had an impact and if further action is required.

Your review/evaluation should be conducted in accordance with your organizational quality policy and procedural requirements. Please contact the Institute Calibration Laboratory if you have questions at 5215.

Manufacturer: Keithley **Model:** 6517A

Description: Electrometer **Serial Number:** 0735984

Asset Number: 007670 **User ID Number:**

Last Calibration: Sep 19, 2007

Date Received for Service: Sep. 03, 2008 **Work Order Number:** 303083291

Service Requested: Scheduled calibration

Remarks: Temperature and humidity inoperative, Volts out of tol. See Measurement Report.

OUT OF TOLERANCE

OUT OF TOLERANCE

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303083291	Mfr:	KEITHLEY	Technician:	blt
Asset No:	007670	Model:	6517A	Cal Date:	16-Sep-08
Serial No:	0735984	Type:	ELECTROMETER		
Remarks: Requires repair. Temp and Humidity inoperative. Coulombs, 2 pA, 20 pA and 200 pA, 2TΩ and 20TΩ not calibrated.					

Function/Range	Test Point	TI Reading	Difference	+/-Test Limits	+/-Uncertainty	Found
DCV	Volts	Volts	Volts	Volts	Volts	Result
2 Volt	1.90000	1.89911	-0.00089	0.00052	0.000013	Fail
20 Volt	7.0000	9.9980	2.9980	0.0021	0.000067	Fail
	14.0000	13.9959	-0.0041	0.0038	0.00009	Fail
	19.0000	18.9945	-0.0055	0.0051	0.00011	Fail
	-19.0000	-18.9945	0.0055	0.0051	0.00011	Fail
200 Volt	190.000	189.916	-0.084	0.117	0.0059	Pass
DC Amps	nAmps	nAmps	nAmps	nAmps	nAmps	
2 nA	1.90000	1.9005	0.000500	0.00410	0.00017	Pass
20 nA	19.0000	19.0228	0.0228	0.0385	0.0017	Pass
200 nA	190.000	190.148	0.148	0.385	0.021	Pass
	uAmps	uAmps	uAmps	uAmps	uAmps	
2 uA	1.90000	1.89956	-0.00044	0.00330	0.00011	Pass
20 uA	19.0000	19.0133	0.0133	0.0300	0.0011	Pass
200 uA	190.000	190.122	0.122	0.300	0.030	Pass
	mAmps	mAmps	mAmps	mAmps	mAmps	
2 mA	1.90000	1.89955	-0.00045	0.00330	0.000002	Pass
20 mA	19.0000	19.0061	0.0061	0.0300	0.00019	Pass
Resistance	MOhm	MOhm	MOhm	MOhm	MOhm	
2 MOhm	1.00000	1.00068	0.00068	0.00126	0.000050	Pass
20 MOhm	10.0000	10.0090	0.0090	0.0126	0.00050	Pass
200 MOhm	100.000	100.170	0.170	0.151	0.010	Fail
Voltage Source	Volts	Volts	Volts	Volts	Volts	
	25.0000	24.9816	-0.0184	0.0475	0.00024	Pass
	-25.0000	-24.9850	0.0150	0.0475	0.00024	Pass
	50.0000	49.966	-0.034	0.085	0.00043	Pass
	75.0000	74.9519	-0.0481	0.1225	0.00063	Pass
	100.00	99.94	-0.06	0.16	0.0010	Pass
	1000.0	999.9	-0.1	1.6	0.010	Pass
Temperature Type K	°C	°C	°C	°C	°C	
	-25	172.0	197.0	2.4	0.22	Fail
	0	172.0	172.0	1.5	0.22	Fail
	50	172.0	122.0	1.7	0.22	Fail
	100	172.0	72.0	1.8	0.22	Fail
	150	172.0	22.0	2.0	0.32	Fail

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Measurement Report

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Serial No:	0735984	Type:	ELECTROMETER		

Function/Range	Test Point	TI Reading	Difference	+/-Test Limits	+/-Uncertainty	Found
Humidity	VDC	%	%	%	%	Result
0 VDC	0	0	0	1	0.58	Pass
0.25 VDC	25	0	-25	1	0.58	Fail
0.5 VDC	50	0	-50	1	0.58	Fail
0.75 VDC	75	0	-75	1	0.58	Fail
1 VDC	100	0	-100	1	0.58	Fail

END OF REPORT



SOUTHWEST RESEARCH INSTITUTE®

6220 Culebra Road, P.O. Drawer 28510
Institute Quality Systems
Institute Calibration Laboratory
Phone: 210-522-5215 Fax 210-522-4834



Calibration Laboratory
Certificate #0972-01

Certificate of Calibration

Cost Center: DIV20

Mail Stop: B51

Customer: DON BANNON

Manufacturer/Model: KEITHLEY / 6517A

Description: ELECTROMETER

Serial Number: 0735984

Asset Number: 007670

Procedure: KEITHLEY 6517 - 19 SEP 07

Work Order: 303083291

Date Issued: 31-Oct-2008

Date Calibrated: 31-Oct-2008

***Date Due :** 31-Oct-2009

****Results:** AS-LEFT

Temperature: 70°F

Humidity: 47 %

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. **Found/Left = adjustment and/or repair was not required, As Left = adjusted and/or repaired was required. The customer has sole responsibility for determination of in-/out-of-tolerance or compliance/noncompliance. See Remarks or attached Measurement Report with the same Work Order number for data.

Reported uncertainty calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM) and represents an expanded uncertainty with a coverage factor of k=2 to approximate a 95% confidence level.

Remarks Limited Cal - Coulombs, 2 pA, 20 pA and 200 pA, 2T and 20 T Ohm not calibrated.

Standards Used

<u>Asset #</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
000182	FLUKE	5700A/EP	CALIBRATOR	4-Aug-2008	4-Nov-2008
000201	FLUKE	5725A	AMPLIFIER	4-Aug-2008	4-Nov-2008
001505	HEWLETT-PACKARD	3458A/OPT 002	MULTIMETER	8-May-2008	8-May-2009
006413	FLUKE	5520A/SC1100	MULTI-PRODUCT CALIBRATOR	9-Sep-2008	9-Sep-2009
009779	ESI	SR1050-1M	DECADE RESISTOR	25-Apr-2008	25-Apr-2009
009829	ESI	SR1050-10M	DECADE RESISTOR	27-Feb-2008	27-Feb-2009

Reviewed By: (✓) srk () mar () wgh

Calibrated By: Thomas Wallace

Laboratory Quality Manager

Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303083291	Mfr:	KEITHLEY	Technician:	tew
Asset No:	007670	Model:	6517A	Cal Date:	31-Oct-08
Serial No:	0735984	Type:	ELECTROMETER		
Remarks:					
Coulombs, 2 pA, 20 pA and 200 pA, 2TΩ and 20TΩ not calibrated.					

Function/Range	Test Point	TI Reading	Difference	+/-Test Limits	+/-Uncertainty	As Left
						Result
DCV	Volts	Volts	Volts	Volts	Volts	
2 Volt	1.90000	1.89950	-0.00050	0.00052	0.000013	Pass
20 Volt	7.0000	6.9999	-0.0001	0.0021	0.000067	Pass
	14.0000	13.9997	-0.0003	0.0038	0.00009	Pass
	19.0000	18.9997	-0.0003	0.0051	0.00011	Pass
	-19.0000	-18.9996	0.0004	0.0051	0.00011	Pass
200 Volt	190.000	189.990	-0.010	0.117	0.0059	Pass
DC Amps	nAmps	nAmps	nAmps	nAmps	nAmps	
2 nA	1.90000	1.8970	-0.003000	0.00410	0.00017	Pass
20 nA	19.0000	19.0050	0.0050	0.0385	0.0017	Pass
200 nA	190.000	190.072	0.072	0.385	0.021	Pass
	uAmps	uAmps	uAmps	uAmps	uAmps	
2 uA	1.90000	1.89960	-0.00040	0.00330	0.00011	Pass
20 uA	19.0000	19.0070	0.0070	0.0300	0.0011	Pass
200 uA	190.000	190.064	0.064	0.300	0.030	Pass
	mAmps	mAmps	mAmps	mAmps	mAmps	
2 mA	1.90000	1.90002	0.00002	0.00330	0.000002	Pass
20 mA	19.0000	19.0069	0.0069	0.0300	0.00019	Pass
Resistance	MOhm	MOhm	MOhm	MOhm	MOhm	
2 MOhm	1.00000	0.99995	-0.00005	0.00126	0.000050	Pass
20 MOhm	10.0000	9.9997	-0.0003	0.0126	0.00050	Pass
200 MOhm	100.000	100.017	0.017	0.151	0.010	Pass
Voltage Source	Volts	Volts	Volts	Volts	Volts	
	25.0000	25.0015	0.0015	0.0475	0.00024	Pass
	-25.0000	-25.0003	-0.0003	0.0475	0.00024	Pass
	50.0000	50.005	0.005	0.085	0.00043	Pass
	75.0000	75.0070	0.0070	0.1225	0.00063	Pass
	100.00	100.01	0.01	0.16	0.0010	Pass
	1000.0	1000.1	0.1	1.6	0.010	Pass
Temperature Type K	°C	°C	°C	°C	°C	
	-25	-25.4	-0.4	2.4	0.22	Pass
	0	-0.4	-0.4	1.5	0.22	Pass
	50	49.5	-0.5	1.7	0.22	Pass
	100	99.3	-0.7	1.8	0.22	Pass
	150	149.5	-0.5	2.0	0.32	Pass

Southwest Research Institute
 Calibration Laboratory
 Measurement Report

Work Order:	303083291	Mfr:	KEITHLEY	Technician:	tew
Asset No:	007670	Model:	6517A	Cal Date:	31-Oct-08
Serial No:	0735984	Type:	ELECTROMETER		

Function/Range	Test Point	TI Reading	Difference	+/-Test Limits	+/-Uncertainty	As Left
Humidity	VDC	%	%	%	%	Result
0 VDC	0	0	0	1	0.58	Pass
0.25 VDC	25	25	0	1	0.58	Pass
0.5 VDC	50	50	0	1	0.58	Pass
0.75 VDC	75	75	0	1	0.58	Pass
1 VDC	100	100	0	1	0.58	Pass

END OF REPORT