

**SOUTHWEST RESEARCH INSTITUTE
CALIBRATION LABORATORY
MEMORANDUM**

August 15, 2005

To: DON BANNON DIV20 B57

From: Institute Calibration Laboratory

Subject: Status of Calibration Supplier

Manufacturer/Model: KEITHLEY 6517A

Description: ELECTROMETER

Serial Number: 0735984

Asset Number: 007670

Work Order Number: 303065069

Date Calibrated: August 11, 2005

Supplier: ROTHE DEVELOPMENT, SAN ANTONIO TX - AUDIT - 648-3

Remarks: ROTHE CERT # 30280:1123771369

- Supplier is on the Approved Suppliers List (ASL).
- Supplier is not on the Approved Suppliers List.
- Calibration is ISO 17025 accredited.
- Calibration is not ISO 17025 accredited.
- There is no known supplier to meet ISO 17025 accreditation at this time.

Please contact the Institute Calibration Laboratory, extension 5215, if you have any questions about the condition of this equipment or calibration documentation. Please do not remove or damage any of the calibration seals.

Attachment(s) 4



CERT. NUMBER: 30280:1123771369

Rothe Development, Inc.

METROLOGY SERVICES DIVISION

4614 SINCLAIR RD., SAN ANTONIO, TEXAS 78222 PH:210-648-3131

CERTIFICATE OF CALIBRATION

ISSUED TO: Southwest Research Institute (30)
6220 Culebra
San Antonio, TX 78284

MFG: Keithley
MODEL: 6517A
NOMEN: ELECTOMETER /HI RES
S/N: 0735984
CUST. ID: 7670

CAL DATE: 8/11/05
DUE DATE:

CONTROL NO: 103 - 30280

TECHNICIAN: 4

SPECIFICATIONS: MFG

PROCEDURE: MFG

WORK ORDER: 002045830

CUSTOMER P.O.: 01571R/ST433850/1.20.00755.000

RECEIVED CONDITION: IN TOLERANCE

RETURNED CONDITION: IN TOLERANCE

COMMENTS: SEE DATASHEET FOR TUR'S.

ATTACHMENTS: CALIBRATION DATA 3 SHEETS

CALIBRATION PERFORMED AT: RDMSD

CALIBRATION INTERVAL: 0

TEMPERATURE: 72.0°F

RELATIVE HUMIDITY: 39%

DATE RECEIVED: 7/21/05

All calibrations performed at Rothe Development, Inc. Metrology Services Division meet the requirements of ANSI/NCSL Z540-1-1994, ANSI/ISO/IEC 17025, ISO/IEC GUIDE 25, and ISO 10012-1, and are traceable to the National Institute of Standards and Technology. The collective uncertainty of the measurement(s) does not exceed 25% (TUR ≥ 4:1) of the instrument specification(s) unless noted in the COMMENTS section.

TR#	MFG	MODEL	SERIAL NO.	DUE DATE
20	FLUKE	5700A/EP	4605002	8/23/2005
258	FLUKE	5725A	6585002	8/23/2005
75	JRL	NMN	75	2/28/2006
100	FLUKE	5500A	6320016	10/21/2005
30	HP	3458A	2823A01926	10/26/2005



APPROVED BY: Antes J. Toranzo

CMS

QCO

DATE: 8/11/05

RDMSD 1001
11/03

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ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA: KEITHLEY MODEL 6517A ELECTROMETER

CUSTOMER: SWRI
 WO NUMBER: 002045830
 SERIAL: 0735984
 CUST ID: 7670

DATE: 11 Aug 05
 TECH: *John Plummer*
 INST NO: 30280

CALIBRATION DATA TAKEN

INCOMING ✓
 OUTGOING ✓

CONDITION OF EQUIPMENT

IN TOLERANCE ✓
 OUT OF TOLERANCE _____

DC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
2 V	+1.9 V	1.89949	<u>1.89994</u>	1.90052
	-1.9 V	1.89949	<u>1.89995</u>	1.90052
20 V	+19 V	18.9950	<u>18.9979</u>	19.0050
	-19 V	18.9950	<u>18.9979</u>	19.0050
200 V	+190 V	189.883	<u>189.963</u>	190.117
	-190 V	189.883	<u>189.963</u>	190.117

DC CURRENT ACCURACY

RANGE	INPUT	MIN	READING	MAX
20 pA	19 pA	18.8070	<u>19.0109</u>	19.1930
200 pA	190 pA	188.095	<u>190.140</u>	191.905
2 nA	1.9 nA	1.89590	<u>1.90033</u>	1.90410
20 nA	19 nA	18.9615	<u>19.0019</u>	19.0385
200 nA	190 nA	189.615	<u>190.030</u>	190.385
2 uA	1.9 uA	1.89800	<u>1.90006</u>	1.90200
20 uA	19 uA	18.9805	<u>19.0004</u>	19.0195
200 uA	190 uA	189.805	<u>189.997</u>	190.195
2 mA	1.9 mA	1.89800	<u>1.89959</u>	1.90200
20 mA	19 mA	18.9805	<u>18.9969</u>	19.0195

COULOMBS ACCURACY

RANGE	INPUT	MIN	READING	MAX
2 nC	1.9 nC	1.89235	<u>1.89345</u>	1.90765
20 nC	19 nC	18.9235	<u>18.9422</u>	19.0765
200 nC	190 nC	189.235	<u>189.305</u>	190.765
2 uC	1.9 uC	1.89235	<u>1.90375</u>	1.90765

RESISTANCE ACCURACY

RANGE	INPUT	READING TOLERANCES		READING	TUR
		>1.00000	<.999999		
2 MΩ	<u>1.00000 M</u>	±126 C	±1260 C	<u>1.00039</u>	
20 MΩ	<u>10.0003 M</u>	±126 C	±1260 C	<u>10.0044</u>	3.60
200 MΩ	<u>100.228 M</u>	±151 C	±1510 C	<u>100.292</u>	
2 GΩ	<u>.995866 G</u>	±226 C	±2260 C	<u>.996164</u>	
20 GΩ	<u>9.97780 G</u>	±226 C	±2260 C	<u>9.97361</u>	3.23
200 GΩ	<u>98.8561 G</u>	±351 C	±3510 C	<u>98.8179</u>	3.51
2 TΩ	<u>.994922 T</u>	±351 C	±3510 C	<u>.995312</u>	1.76

VOLTAGE SOURCE ACCURACY

SOURCE RANGE	OUTPUT	MIN	READING	MAX
±100 V	0.000 V	-0.01	<u>0.00</u>	0.01
	+25.000 V	24.9525	<u>24.9887</u>	25.0475
	+50.000 V	49.915	<u>49.9794</u>	50.085
	+75.000 V	74.8775	<u>74.9719</u>	75.1225
	+100.000 V	99.840	<u>99.9627</u>	100.160
	-25.000 V	24.9525	<u>24.9903</u>	25.0475
	-50.000 V	49.915	<u>49.9805</u>	50.085
	-75.000 V	74.8775	<u>74.9719</u>	75.1225
	-100.000 V	99.840	<u>99.9621</u>	100.160
	±1000 V	+250.00 V	249.525	<u>249.898</u>
+500.00 V		499.150	<u>499.871</u>	500.850
+750.00 V		748.775	<u>749.824</u>	751.225
+1000.00 V		998.40	<u>999.774</u>	1001.60
-250.00 V		249.525	<u>249.980</u>	250.475
-500.00 V		499.150	<u>499.938</u>	500.850
-750.00 V		748.775	<u>749.886</u>	751.225
-1000.00 V		998.40	<u>999.840</u>	1001.60

INST NO: 30280

DOC. DATE: 6/4/2002

INCOMING
 OUTGOING

TEMPERATURE AND HUMIDITY TURN ON = MENU / GENERAL / A/D CONTROLS /
DATE-STAMP / ^ OR v

TEMPERATURE ACCURACY

TEMP	MIN	READING	MAX
-25° C	-23.4	<u>24.1</u>	-26.6
0° C	-1.5	<u>0.8</u>	+1.5
50° C	48.3	<u>50.6</u>	51.7
100° C	98.2	<u>100.6</u>	101.8
150° C	148.0	<u>150.4</u>	152.0

HUMIDITY ACCURACY

VOLTAGE INPUT	MIN	READING	MAX
0.000 V	0	<u>0</u>	1 %
0.250 V	24	<u>25</u>	26
0.500 V	49	<u>50</u>	51
0.750 V	74	<u>75</u>	76
1.000 V	99	<u>100</u>	101

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DOC.DATE: 6/4/2002

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INCOMING
 OUTGOING