



# 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

**Submitted By:** DIV20

**Address:** B51

**Contact:** DON BANNON

**Manufacturer / Model:** KEITHLEY / 614

**Description:** ELECTROMETER

**Serial No:** 0704936

**Asset No:** 007089

**Procedure:** KEITHLEY 614 - 10 MAY 06

**Work Order:** 303080484

**Date Issued:** May 1, 2008

**Calibration Date:** May 1, 2008

**\*Calibration Due:** May 1, 2009

**Calibration Location:** Bldg. 64

**Environment:** Temp. 72.0°F Hum. 45 %RH

**\*\*Data Type:** FOUND-LEFT

**DivID/Location:** 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. \*\*Found/Left = adjustment and/or repair was not required, As Left = adjusted and/or repaired was required. The client 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.

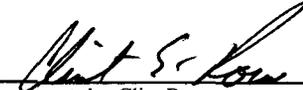
Reported uncertainty calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM) and represents an expanded uncertainty with a coverage factor of k=2 to approximate a 95% confidence level.

**Remarks:** nC Not Cal'd

### Standards Used

| Asset No. | Serial No. | Manufacturer  | Model     | Description     | Cal Due    |
|-----------|------------|---------------|-----------|-----------------|------------|
| 000101    | 86052      | BIDDLE        | 72-6346-1 | DECADE RESISTOR | May 20, 08 |
| 000182    | 5200003    | FLUKE         | 5700A/EP  | CALIBRATOR      | May 21, 08 |
| 000108    | 7993       | GENERAL RADIO | 1433G     | DECADE RESISTOR | Apr 01, 09 |

Reviewed by:  ( ) srk ( ) mar ( ) wgh

  
Measurements by: Clint Rowe  
Metrology Technician

Southwest Research Institute  
Calibration Laboratory  
Measurement Report

|             |           |       |              |            |           |
|-------------|-----------|-------|--------------|------------|-----------|
| Work Order: | 303080484 | Mfr.  | KEITHLEY     | Technician | CER       |
| Asset No.   | 007089    | Model | 614          | Cal Date.  | 01-May-08 |
| Serial No.  | 0704936   | Type. | Electrometer |            |           |

Remarks:

nC not calibrated per customer.

| Function/Range | Test Point | TI Reading | Difference | +/-Test Limits | +/-Uncertainty | Found/Left |
|----------------|------------|------------|------------|----------------|----------------|------------|
| Zero           | mVolts     | mVolts     | mVolts     | mVolts         | mVolts         | Results    |
|                | 0.00000    | 0.00000    | 0.00000    | 0.00001        | 0.0000012      | Pass       |
| DCV            | Volts      | Volts      | Volts      | Volts          | Volts          |            |
| 0.2 V          | 0.19000    | 0.18998    | -0.00002   | 0.00017        | 0.000022       | Pass       |
|                | -0.19000   | -0.18997   | 0.00003    | 0.00017        | 0.000022       | Pass       |
| 2 Volt         | 1.9000     | 1.8999     | -0.0001    | 0.0016         | 0.00012        | Pass       |
|                | -1.9000    | -1.8998    | 0.0002     | 0.0016         | 0.00012        | Pass       |
| 20 Volt        | 19.000     | 18.996     | -0.004     | 0.016          | 0.0012         | Pass       |
|                | -19.000    | -18.996    | 0.004      | 0.016          | 0.0012         | Pass       |
| DC Amps        | uAmps      | uAmps      | uAmps      | uAmps          | uAmps          |            |
| 200 uAmp       | 190.0      | 189.9      | -0.1       | 0.7            | 0.120          | Pass       |
|                | nAmps      | nAmps      | nAmps      | nAmps          | nAmps          |            |
| 200 nAmp       | 190.0      | 190.1      | 0.1        | 1.0            | 0.12           | Pass       |
|                | pAmps      | pAmps      | pAmps      | pAmps          | pAmps          |            |
| 2000 pAmp      | 1900       | 1899       | -1         | 29             | 1.2            | Pass       |
| Resistance     | kOhm       | kOhm       | kOhm       | kOhm           | kOhm           |            |
| 20 kOhm        | 19.00      | 18.99      | -0.01      | 0.11           | 0.012          | Pass       |
| 200 kOhm       | 190.0      | 189.7      | -0.3       | 1.1            | 0.12           | Pass       |
|                | MOhm       | MOhm       | MOhm       | MOhm           | MOhm           |            |
| 20 MOhm        | 10.00      | 9.98       | -0.02      | 0.10           | 0.012          | Pass       |
|                | GOhm       | GOhm       | GOhm       | GOhm           | GOhm           |            |
| 20 GOhm        | 10.00      | 10.01      | 0.01       | 0.02           | 0.014          | Pass       |

END OF REPORT