

NOTICE

Cost Center: DIV20

Mail Stop: B51

Customer: DON BANNON

Manufacturer/Model: KEITHLEY / 614

Description: ELECTROMETER

Serial Number: 0704934

Asset Number: 007088

Supplier or Calibration Procedure: KEITHLEY 614 - 21 MAR 09

Work Order: 303090168

The above instrument was received for service on September 15, 2009 and found not to meet calibration procedure specifications, or as specified by the cost center. As-found readings are provided in the attached measurement report, or as noted in remarks below, for your review to determine if the instrument is out of tolerance for project requirements and processing in accordance with your cost center quality policy.

Please call extension 5215 if you have any questions or need additional information.

Remarks: 2000 pA O.O.T.

NOTICE

Explanation of Measurement Report Results

“When statements of compliance (Pass/Fail) are made, the uncertainty of measurement shall be taken into account”. Reference ISO/IEC 17025:2005, 5.10.4.2

This explanation is provided to you because the instrument submitted for calibration has one or more of the following results.

Result

Pass – measured value or test is within the \pm limit, in tolerance, with a confidence level of 95 percent.

_____ Pass? – measured value is *within* the \pm limit, but by a margin less than half of the uncertainty interval and has a confidence level of less than 95 percent of being in tolerance. Adjustment is made and the measurement is repeated. If adjustment or repair is not possible or fails to improve the results, then the customer must determine in or out of tolerance.

_____ Fail? – measured value is *outside* the \pm limit, but by a margin less than half of the uncertainty interval and is reported as out of tolerance but it is not possible to state this with a 95 percent confidence level. Adjustment is made and the measurement is repeated. If adjustment or repair is not possible or fails to improve the results, then the customer must determine if out of tolerance action is necessary.

✓ _____ Fail – measured value is *outside* the \pm limits with a 95 percent confidence level. Adjustment is made and the measurement is repeated for As-left data. If adjustment or repair is not possible or fails to improve the results, then the customer must determine if the measured value is in compliance for the intended use.

%Limit

_____ Adjustment is made, if possible, when the As-found measured value is equal to or greater than 70 percent of the \pm limit. If adjustment is not possible or did not lower the As-left reading below 70 percent, the customer shall determine if the instrument is suitable for their requirements.

Type Data

Found-left All measurements were in tolerance and no adjustments or repairs were preformed.

As-found One or more measurements were other than Pass or exceeded 70 percent of the \pm limit and adjustment or repairs were performed.

As-left Results of measurements after adjustment or repair.

Uncertainty

Best estimate of the dispersion of the measured value that could be contributed by the; standard, environment, repeatability of the measurement process, characterizes of the instrument being calibrated (i.e. resolution) etc.

Please call extension 5215 for questions or additional information.

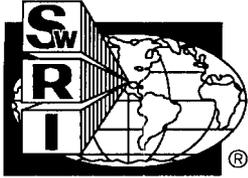
Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303090168	Mfr.	KEITHLEY	Technician	blt
Asset No.	007088	Model	614	Type Data:	As-found
Serial No.	0704934	Type.	Electrometer	Cal Date.	21-Sep-09

Remarks: nC not calibrated per customer.

Function/Range	Test Point	TI Reading	Difference	+/-Test Limits	+/-Uncertainty	Result	%Limit
Zero	Volts	Volts	Volts	Volts	Volts		
0.2 V	0.19000	0.19006	0.00006	0.00017	0.000010	Pass	35%
	-0.19000	-0.18996	0.00004	0.00017	0.000010	Pass	24%
2 Volt	1.9000	1.9001	0.0001	0.0016	0.00010	Pass	6%
	-1.9000	-1.9000	0.0000	0.0016	0.00010	Pass	0%
20 Volt	19.000	19.002	0.002	0.016	0.0010	Pass	12%
	-19.000	-19.001	-0.001	0.016	0.0010	Pass	6%
DC Amps	uAmps	uAmps	uAmps	uAmps	uAmps		
200 uAmp	190.0	190.1	0.1	0.7	0.055	Pass	14%
	nAmps	nAmps	nAmps	nAmps	nAmps		
200 nAmp	190.0	190.3	0.3	1.0	0.055	Pass	30%
	pAmps	pAmps	pAmps	pAmps	pAmps		
2000 pAmp	1900	1945	45	29	0.50	Fail	155%
Resistance	kohm	kohm	kohm	kohm	kohm		
20 kohm	19.00	18.98	-0.02	0.11	0.0058	Pass	18%
200 kohm	190.0	189.8	-0.2	1.1	0.058	Pass	18%
	Mohm	Mohm	Mohm	Mohm	Mohm		
20 Mohm	10.00	9.98	-0.02	0.10	0.0058	Pass	20%
	Gohm	Gohm	Gohm	Gohm	Gohm		
20 Gohm	10.00	10.00	0.00	0.04	0.0058	Pass	0%

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

Certificate of Calibration

Cost Center: DIV20

Mail Stop: B51

Customer: DON BANNON

Manufacturer/Model: KEITHLEY / 614

Description: ELECTROMETER

Serial Number: 0704934

Asset Number: 007088

Procedure: KEITHLEY 614 - 21 MAR 09

Work Order: 303090168

Date Issued: 23-Sep-2009

Date Calibrated: 23-Sep-2009

*** Date Due :** 23-Sep-2010

**** Results:** AS-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 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: nC not calibrated.

Standards Used

<u>Asset #</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
000101	BIDDLE	72-6346-1	DECADE RESISTOR	24-Aug-2009	24-Aug-2010
000182	FLUKE	5700A/EP	CALIBRATOR	4-Aug-2009	4-Nov-2009
000201	FLUKE	5725A	AMPLIFIER	4-Aug-2009	4-Nov-2009
009829	ESI	SR1050-10M	RESISTANCE TRANSFER STANDARD	14-May-2009	14-May-2010

Walt Hill
Laboratory Manager

Bob Trollinger
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303090168	Mfr.	KEITHLEY	Technician	blt
Asset No.	007088	Model	614	Type Data:	As-left
Serial No.	0704934	Type.	Electrometer	Cal Date.	23-Sep-09
Remarks: nC not calibrated per customer. Adjusted 2000 pA					

Function/Range	Test Point	TI Reading	Difference	+/-Test Limits	+/-Uncertainty	Result	%Limit
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	-0.19000	-0.18998	0.00002	0.00017	0.000010	Pass	12%
2 Volt	1.9000	1.9001	0.0001	0.0016	0.00010	Pass	6%
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20 Volt	19.000	19.000	0.000	0.016	0.0010	Pass	0%
	-19.000	-19.000	0.000	0.016	0.0010	Pass	0%
DC Amps	uAmps	uAmps	uAmps	uAmps	uAmps		
200 uAmp	190.0	190.1	0.1	0.7	0.055	Pass	14%
	nAmps	nAmps	nAmps	nAmps	nAmps		
200 nAmp	190.0	190.4	0.4	1.0	0.055	Pass	40%
	pAmps	pAmps	pAmps	pAmps	pAmps		
2000 pAmp	1900	1914	14	29	0.50	Pass	48%
Resistance	kohm	kohm	kohm	kohm	kohm		
20 kohm	19.00	18.98	-0.02	0.11	0.0058	Pass	18%
200 kohm	190.0	189.8	-0.2	1.1	0.058	Pass	18%
	Mohm	Mohm	Mohm	Mohm	Mohm		
20 Mohm	10.00	9.98	-0.02	0.10	0.0058	Pass	20%
	Gohm	Gohm	Gohm	Gohm	Gohm		
20 Gohm	10.00	10.00	0.00	0.04	0.0058	Pass	0%

END OF REPORT