



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: HEWLETT-PACKARD / 34970A

Description: DATA ACQUISITION/SWITCH UNIT

Serial Number: US37018965

Asset Number: 012733

Procedure: AGILENT 34970A - 21 MAR 06

Work Order: 303086375

Date Issued: 2-Mar-2009

Date Calibrated: 2-Mar-2009

***Date Due :** 2-Mar-2010

****Results:** FOUND-LEFT

Temperature: 74°F

Humidity: 40 %

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/NC SL 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:

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	3-Feb-2009	3-May-2009
000201	FLUKE	5725A	AMPLIFIER	3-Feb-2009	3-May-2009

Reviewed By: () srk (/) mar () wgh

Laboratory Quality Manager

m\A2LA OCT_08.rpt

Calibrated By: Bob Trollinger

Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	30386375	Mfr:	HP	Technician:	blt
Asset No:	012733	Model:	34970A	Type Data:	Found-left
Serial No:	US37018965	Type:	Data Acquisition Switch	Cal Date:	2-Mar-09
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Result	%Limit
DC I	mA	mA	mA	mA	mA		
10 mA	0.00000	0.00022	0.00022	0.0020	0.000064	Pass	11%
100 mA	0.0000	0.0003	0.0003	0.0050	0.00015	Pass	6%
	A	A	A	A	A		
1 A	0.000000	0.000003	0.000003	0.00010	0.0000027	Pass	3%
DC V	mV	mV	mV	mV	mV		
100 mV	0.0000	0.0005	0.0005	0.0040	0.00038	Pass	13%
	V	V	V	V	V		
1 V	0.000000	0.000001	0.000001	0.0000070	0.00000086	Pass	14%
10 V	0.00000	0.00001	0.00001	0.000050	0.0000058	Pass	20%
100 V	0.0000	0.0001	0.0001	0.00060	0.000058	Pass	17%
300 V	0.000	0.001	0.001	0.0090	0.00058	Pass	11%
Ω 4 Wire	Ω	Ω	Ω	Ω	Ω		
100 Ω	0.0000	0.0003	0.0003	0.0040	0.00034	Pass	8%
	kΩ	kΩ	kΩ	kΩ	kΩ		
1 kΩ	0.00	0.000000	0.000000	0.000010	0.00000058	Pass	0%
10 kΩ	0.0	0.00000	0.00000	0.00010	0.0000058	Pass	0%
100 kΩ	0	0.0000	0.0000	0.0010	0.000058	Pass	0%
	MΩ	MΩ	MΩ	MΩ	MΩ		
1 MΩ	0	0.000001	0.000001	0.000010	0.00000058	Pass	10%
10 MΩ	0	0.00001	0.00001	0.00010	0.0000058	Pass	10%
100 MΩ	0	0.0000	0.0000	0.010	0.000058	Pass	0%
Gain Verification DCV	mV	mV	mV	mV	mV		
100 mV	100.0000	99.9980	-0.0020	0.0090	0.00078	Pass	22%
	V	V	V	V	V		
1 V	1.000000	1.000002	0.000002	0.000047	0.000035	Pass	4%
10 V	10.00000	10.00002	0.00002	0.00040	0.000031	Pass	5%
100 V	100.0000	100.0003	0.0003	0.0051	0.00032	Pass	6%
300 V	300.000	300.000	0.000	0.023	0.0018	Pass	0%
4 Wire Ω	Ω	Ω	Ω	Ω	Ω		
100 Ω	100.00136	100.0000	-0.0014	0.014	0.0010	Pass	10%
	kΩ	kΩ	kΩ	kΩ	kΩ		
1 kΩ	0.9999318	0.999935	0.000003	0.00011	0.0000075	Pass	3%

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Measurement Report

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Asset No:	012733	Model:	34970A	Type Data:	Found-left
Serial No:	US37018965	Type:	Data Acquisition Switch	Cal Date:	2-Mar-09

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Result	%Limit
4 Wire Ω (cont.)	M Ω	M Ω	M Ω	M Ω	M Ω		
10 k Ω	9.999277	9.99935	0.00007	0.0011	0.000075	Pass	7%
100 k Ω	99.99390	99.9949	0.0010	0.011	0.00090	Pass	9%
	M Ω	M Ω	M Ω	M Ω	M Ω		
1 M Ω	0.9998825	0.999898	0.000015	0.00011	0.000015	Pass	14%
10 M Ω	9.998906	9.99887	-0.00004	0.0014	0.00032	Pass	3%
100 M Ω	99.98555	99.9578	-0.0277	0.81	0.012	Pass	3%
DC I	mA	mA	mA	mA	mA		
10 mA	10.00000	9.99987	-0.00013	0.0070	0.00028	Pass	2%
100 mA	100.0000	99.9997	-0.0003	0.055	0.0037	Pass	1%
	A	A	A	A	A		
1 A	1.0000	1.000168	0.0002	0.0011	0.000090	Pass	15%
AC V	mV	mV	mV	mV	mV		
100 mV @ 1 kHz	100.0000	99.9966	-0.0034	0.10	0.015	Pass	3%
100 mV @ 50 kHz	100.0000	99.9966	-0.0034	0.17	0.025	Pass	2%
AC V	V	V	V	V	V		
1 V @ 1 kHz	1.000000	0.999941	-0.000059	0.0010	0.000048	Pass	6%
1 V @ 50 kHz	1.000000	1.000121	0.000121	0.0017	0.000080	Pass	7%
10 V @ 1 kHz	10.00000	9.99953	-0.00047	0.014	0.00045	Pass	3%
10 V @ 50 kHz	10.00000	10.00119	0.00119	0.017	0.0018	Pass	7%
10 V @ 10 Hz	10.00000	9.99858	-0.00142	0.014	0.0017	Pass	10%
	mV	mV	mV	mV	mV		
10 mV @ 1 kHz	10.00000	9.99917	-0.0008	0.046	0.0048	Pass	2%
	V	V	V	V	V		
100 V @ 1 kHz	100.0000	99.9919	-0.0081	0.10	0.0053	Pass	8%
100 V @ 50 kHz	100.0000	99.9855	-0.0145	0.17	0.0085	Pass	9%
300 V @ 1 kHz	300.000	299.988	-0.012	0.42	0.028	Pass	3%
300 V @ 50 kHz	200.000	200.030	0.030	0.60	0.083	Pass	5%
AC I	mA	mA	mA	mA	mA		
10 mA @ 1 kHz	10.00000	9.99751	-0.00249	0.014	0.0015	Pass	18%
100 mA @ 1 kHz	100.0000	99.9939	-0.0061	0.60	0.012	Pass	1%
	A	A	A	A	A		
1A @ 1 kHz	0.010000	0.009996	-0.000004	0.00051	0.0000057	Pass	1%
AC I	A	A	A	A	A		
1A @ 1 kHz	1.000000	1.000210	0.000210	0.0014	0.00018	Pass	15%

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Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Result	%Limit
Frequency	Hz	Hz	Hz	Hz	Hz		
1 V @ 100 kHz	100.0000	99.99702	-0.00298	0.01	0.00028	Pass	30%

END OF REPORT