

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: B57

Contact: DON BANNON

Manufacturer / Model: FLUKE / 87 III

Description: MULTIMETER

Serial No: 73980497

Asset No: 007646

Procedure: FLUKE 83,85,87 - 11 OCT 07

Work Order: 303078509

Date Issued: Jan 22, 2008

Calibration Date: Jan 22, 2008

***Calibration Due:** Jan 22, 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.

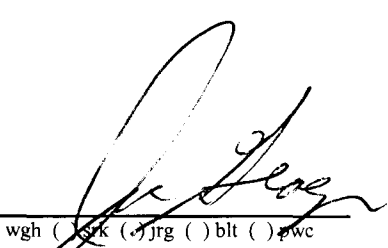
*Determined by the customer, does not imply the instrument will remain within tolerance as any number of factors may cause an out-of-tolerance condition before this date. **Found/Left = adjustment and/or repair was not required, As Left = adjusted and/or repaired was required. The client has sole responsibility for determination of in-/out-of-tolerance or compliance/noncompliance. See Remarks or attached Measurement Report with the same Work Order number for data.

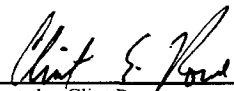
Reported uncertainty calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM) and represents an expanded uncertainty with a coverage factor of k=2 to approximate a 95% confidence level.

Remarks: None

Standards Used

Asset No.	Serial No.	Manufacturer	Model	Description	Cal Due
006413	7085202	FLUKE	5520A/SC1100	MULTI-PRODUCT CALIBRATOR	Aug 11, 08

Reviewed by: 
() wgh () sk () jrg () blt () pwc
Metrology Technician
m:\a2la1.rpt Rev date August 15, 2005


Measurements by: Clint Rowe
Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303078509	Mfr:	FLUKE	Technician:	CER
Asset No:	007646	Model:	87 III	Cal Date:	22-Jan-08
Serial No:	73980497	Type:	MULTIMETER		
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
Switch Test	Display	Display	Display	Display	N/A	Result
ACV	0	0	0	12	N/A	Pass
DCV	-32	-32	0	12	N/A	Pass
Mv/DC	-64	-64	0	12	N/A	Pass
OHMS	-96	-96	0	12	N/A	Pass
DIODE	-128	-128	0	12	N/A	Pass
mA/A	-160	-160	0	12	N/A	Pass
uA	-192	-192	0	12	N/A	Pass
ACV 400mVolts	mVolts	mVolts	mVolts	mVolts	mVolts	
60 Hz	350.0	348.7	-1.3	2.9	0.14	Pass
1 kHz	350.0	348.7	-1.3	3.9	0.14	Pass
5 kHz	350.0	347.2	-2.8	7.4	0.14	Pass
20 kHz	350.0	353.2	3.2	9.0	0.17	Pass
AC Volts	Volts	Volts	Volts	Volts	Volts	
4 V at 60 Hz	3.500	3.489	-0.011	0.027	0.0014	Pass
1 kHz	3.500	3.486	-0.014	0.039	0.0014	Pass
5 kHz	3.500	3.470	-0.030	0.074	0.0014	Pass
20 kHz	3.500	3.473	-0.027	0.090	0.0022	Pass
40 V at 60 Hz	35.00	34.89	-0.11	0.27	0.019	Pass
1 kHz	35.00	34.98	-0.02	0.39	0.019	Pass
5 kHz	35.00	35.09	0.09	0.74	0.019	Pass
20 kHz	35.00	35.02	0.02	0.90	0.11	Pass
400 V at 60 Hz	350.0	348.8	-1.2	2.7	0.16	Pass
1 kHz	350.0	349.5	-0.5	3.9	0.16	Pass
2.5 kHz	350.0	349.4	-0.6	7.4	0.16	Pass
4000 V at 60 Hz	900	903	3	8	1.2	Pass
1 kHz	900	903	3	13	1.2	Pass
Frequency	kHz	kHz	kHz	kHz	kHz	
150 mVolt	19.000	18.999	-0.001	0.002	0.0012	Pass
	190.00	189.99	-0.01	0.02	0.012	Pass
Sensitivity	Hz	Hz	Hz	Hz	Hz	
4 VAC with 300mV	1000.0	999.9	-0.1	0.2	0.12	Pass
4 VDC with 1.7V	1000.0	999.9	-0.1	0.2	0.12	Pass
4 VDC with 1 V	0.0	0.0	0.0	0.2	0.12	Pass
40 VDC with 6 V	1000.0	999.9	-0.1	0.2	0.12	Pass
40 VDC with 2 V	0.0	0.0	0.0	0.2	0.12	Pass

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303078509	Mfr:	FLUKE	Technician:	CER
Asset No:	007646	Model:	87 III	Cal Date:	22-Jan-08
Serial No:	73980497	Type:	MULTIMETER		

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
DC Volts	Volts	Volts	Volts	Volts	Volts	Result
4 Volts	3.500	3.499	-0.001	0.003	0.0012	Pass
40 Volts	35.00	34.99	-0.01	0.03	0.012	Pass
	-35.00	-34.98	0.02	0.03	0.012	Pass
400 Volt	350.0	349.9	-0.1	0.3	0.12	Pass
4000 Volt	1000	1000	0	2	1.2	Pass
IMS Min-Max	Volts	Volts	Volts	Volts	Volts	
	2.828	2.808	-0.020	0.123	0.0012	Pass
	-2.828	-2.844	0.044	0.123	0.0012	Pass
DC mV	mVolts	mVolts	mVolts	mVolts	mVolts	
	350.0	349.9	-0.1	0.5	0.12	Pass
Ohm	Ohms	Ohms	Ohms	Ohms	Ohms	
400	190.0	190.0	0.0	0.6	0.12	Pass
	kOhms	kOhms	kOhms	kOhms	kOhms	
40.00k	19.00	19.00	0.00	0.05	0.012	Pass
	MOhms	MOhms	MOhms	MOhms	MOhms	
4M	1.900	1.900	0.000	0.012	0.0012	Pass
40M	19.00	19.02	0.02	0.22	0.014	Pass
	nS	nS	nS	nS	nS	
100M	10.00	9.96	-0.04	0.20	0.062	Pass
Capacitance	uF	uF	uF	uF	uF	
	1.00	0.98	-0.02	0.05	0.012	Pass
	0.470	0.468	-0.002	0.008	0.0016	Pass
	0.0470	0.0471	0.0001	0.0008	0.00012	Pass
	nF	nF	nF	nF	nF	
	4.70	4.74	0.04	0.08	0.032	Pass
Diode	Volts	Volts	Volts	Volts	Volts	
	3.000	2.978	-0.022	0.061	0.0012	Pass
DC mAmps	mAmps	mAmps	mAmps	mAmps	mAmps	
	35.00	35.00	0.00	0.11	0.013	Pass
	350.0	349.8	-0.2	0.9	0.12	Pass
AC Amps	mAmps	mAmps	mAmps	mAmps	mAmps	
60 Hz	35.00	34.91	-0.09	0.37	0.041	Pass
1 kHz	35.00	34.97	-0.03	0.37	0.041	Pass
60 Hz	350.0	349.2	-0.8	3.7	0.34	Pass
1 kHz	350.0	349.8	-0.2	3.7	0.34	Pass

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303078509	Mfr:	FLUKE	Technician:	CER
Asset No:	007646	Model:	87 III	Cal Date:	22-Jan-08
Serial No:	73980497	Type:	MULTIMETER		

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
DC uAmp	uAmp	uAmp	uAmp	uAmp	uAmp	Result
	350.0	350.3	0.3	1.1	0.14	Pass
	3500	3500	0	9	1.3	Pass
AC uAmp	uAmp	uAmp	uAmp	uAmp	uAmp	
60 Hz	350.0	349.2	-0.8	3.7	1.0	Pass
1 kHz	350.0	349.9	-0.1	3.7	1.0	Pass
60 Hz	3500	3494	-6	37	2.7	Pass
1 kHz	3500	3500	0	37	2.7	Pass
DC Amps	mAmps	mAmps	mAmps	mAmps	mAmps	
	3500	3498	-2	11	2.7	Pass
	Amps	Amps	Amps	Amps	Amps	
	10.00	9.99	-0.01	0.04	0.013	Pass
AC Amp	mAmps	mAmp	mAmp	mAmp	mAmp	
60 Hz	3500	3489	-11	37	4.2	Pass
1 kHz	3500	3498	-2	37	4.2	Pass
AC Amp	Amp	Amp	Amp	Amp	Amp	
60 Hz	10.00	10.02	0.02	0.12	0.017	Pass
1 kHz	10.00	10.04	0.04	0.12	0.017	Pass

END OF REPORT