

# SOUTHWEST RESEARCH INSTITUTE

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Division 05 – Instrument Repair and Calibration Laboratory

## Calibration Record

ITEM FLUKE DIGITAL MULTIMETER  
MODEL 850A S/N 5005078 SWRI NO. \_\_\_\_\_  
PLUG-INS, ETC. NONE  
TOLERANCE See mfg spec's

### STANDARDS

Standard No.	MFGR Model	Description	S/N	Cal. Due	Cal. Rec. No.
<u>FLUKE</u>	<u>5100B</u>	<u>Calibration</u>	<u>2730017</u>	<u>18 Oct 90</u>	<u>5348</u>
<u>FLUKE</u>	<u>8506A</u>	<u>DMM</u>	<u>4180021</u>	<u>13 Apr 91</u>	<u>5354</u>
<u>GR</u>	<u>1433G</u>	<u>Decade Resistor</u>	<u>7953</u>	<u>26 Sep 90</u>	<u>4779</u>

ENVIRONMENT: Temperature 72° Humidity 48%  
Location Room A11, Bldg 68, SWRT

### PROCEDURE

☒ Essentially as outlined in MFGRS Service Manual \_\_\_\_\_  
☐ \_\_\_\_\_

### CONCLUSION

☒ Item within tolerance \_\_\_\_\_  
☐ Item out of tolerance \_\_\_\_\_  
☐ Item ADJ/repared to tolerance \_\_\_\_\_  
☐ \_\_\_\_\_

Calibration was in accord with requirements of MIL-STD-45662A, MIL-Q-9858A, and MIL-I-45208A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

SIGNED [Signature]

DATE 23 May 90

RECORD NUMBER: 0005470 NEXT CALIBRATION DUE: 22 MAY 91

UNIT UNDER TEST: FLUKE : Model 8050A DMM  
 SERIAL NUMBER: 5005078  
 UUT CODE: DIV 20 N SRIDHAR

RESULT: Pass  
 ADJUSTMENTS PERFORMED: 0  
 TEST STATUS: TERMINATED  
 OPERATOR:  
 ELAPSED TIME: 59 Minutes  
 DATE: 29-May-90

29 Nov 90

TEST	RANGE	UUT INDICATED	SYSTEM ACTUAL	MODIFIER	ERROR (%TOL)
1	DC LINEAR VOLTAGE TEST				
1	200	190mV	189.984		20
1	200	190mV	189.984		20
2	200	-190mV	-190.006		7
3	2	1.9V	1.90024		30
3	2	1.9V	1.90048		60
4	2	-1.9V	-1.90026		32
5	20	19V	18.9976		30
6	200	190V	190.008		10
7	1000	1000V	1000		0
8	AC LINEAR VOLTAGE TESTS				
8	Result Of Operator Evaluation				PASS
9	200	190mV	201.3	100H	>500
9	200	190mV	189.9	100H	10
10	200	190mV	189.9	10KH	10
11	200	190mV	192.7	50KH	28
12	2	.1V	0.0997	100H	20
13	2	1.9V	1.898	100H	19
14	2	1.9V	1.899	10KH	10
15	2	1.9V	1.926	50KH	27
16	20	19V	19	100H	0
17	20	19V	19.01	10KH	10
18	20	19V	19.08	50KH	8
19	200	190V	189.9	100H	10
23	dB VOLTAGE TEST				
23	UUT READ <-75dB?				
23	Result Of Operator Evaluation				PASS
24	A	-37.78D	-37.82	100H	8
25	A	-17.78D	-17.8	10KH	1
26	A	2.22D	2.1	100H	8
27	DISPLAY LAST ABOUT 3 SECONDS?				
27	Result Of Operator Evaluation				PASS
28	CURRENT TEST				
28	200	190uA	189.9		17
29	2	1.9mA	1.901		17
30	20	19mA	18.985		25

31	200	190mA	189.85		25
32	2000	1900mA	1898		34
33	20	19mA	18.98	100H	10
34					
34	RESISTANCE/CONDUCTANCE TEST				
34	Result Of Operator Evaluation				PASS
34	Result Of Operator Evaluation				PASS
35	200	100.24Z	100		171
35	200	100.02Z	100	— used 1032 DECIDE	14
36	2	0.9998KZ	1		17
37	20	10.0014KZ	10		20
38	200	100KZ	100		0
39	2000	1001.4KZ	1000		50
40	20	10.004MZ	10		14
41	2	1.0001mY	1		7
42	200	99.93nY	100		10
43	U5 JUMPER SELECTION PROCEDURE				

END

Division 05 - Instrument Repair and Calibration Laboratory

CERTIFICATE OF CALIBRATION

ISSUED TO: DIV 20 Center for Nuclear Waste Reg Analysis  
 MFR/MODEL FLUKE 18050A  
 ITEM DESCRIPTION DIGITAL MULTIMETER  
 MODEL 18050A S/N 5005078 SWRI NO. \_\_\_\_\_  
 PLUG-INS, ETC. NONE

TOLERANCE see mfg specs

STANDARDS

Standard No.	MFR Model	Description	S/N	Cal. Due	Cal. Rec. No.
FLUKE	5700A	Calibration	5200003	28 JAN 92	07412

ENVIRONMENT: Temperature 70° Humidity 46%  
 Location Room 411, Bldg 68, SWRI

PROCEDURE

☒ Essentially as outlined in MFRS Service Manual \_\_\_\_\_  
☐ \_\_\_\_\_

CONCLUSION

☒ Item within tolerance \_\_\_\_\_  
☐ Item out of tolerance \_\_\_\_\_  
☐ Item ADJ/repared to tolerance \_\_\_\_\_  
☐ \_\_\_\_\_

Calibration was in accord with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

SIGNED [Signature]  
 DATE 26 Jul 91

RECORD NUMBER: 0008037 NEXT CALIBRATION DUE: 25 JUL 92

S O U T H W E S T   R E S E A R C H   I N S T I T U T E

Department of Quality Assurance  
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B168 NARASI SRIDHAR

Device No: 1434

Manufacturer: JOHN FLUKE

Model: 8050A

Nomenclature: DIGITAL MULTIMETER

Serial Number: 5005078

SwRI No:

Remarks

Accuracy: MFGR SPECS

Procedure: MFGR

ENVIRONMENT

Temperature: 72   Humidity: 48   Location: RA11 B68 SWRI

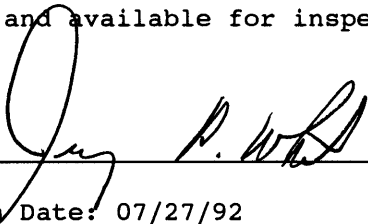
CONCLUSION

Tolerance/Remarks: Received in tolerance, no adjustments made

calibrated, in tolerance.

Calibration was in accord with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

Signed



\_\_\_\_\_

Calibration Date: 07/27/92

Record Number: 00009461

Next Calibration Due: 07/27/93

S O U T H W E S T     R E S E A R C H     I N S T I T U T E

Department of Quality Assurance  
Calibration Laboratory

Device Serial No: 5005078

Calibration Date: 07/27/92

STANDARDS

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Standard No:	108	Manufacturer:	GEN RAD	Model:	1433G
Nomenclature:	DECADE RESISTOR				
Serial No:	7993	Cal.Due:	10/21/92	Cal.Rec.No:	00008478
Standard No:	114	Manufacturer:	HEWLETT-PACKARD	Model:	3325A
Nomenclature:	SYNTHESIZER/FUNCTION GENERATOR				
Serial No:	1748A17121	Cal.Due:	01/02/93	Cal.Rec.No:	00008734
Standard No:	132	Manufacturer:	JOHN FLUKE	Model:	5100B
Nomenclature:	CALIBRATOR				
Serial No:	2730017	Cal.Due:	09/30/92	Cal.Rec.No:	00009040

S O U T H W E S T   R E S E A R C H   I N S T I T U T E

Department of Quality Assurance  
Calibration Laboratory

CERTIFICATE OF CALIBRATION

Issued to: DIV20 B57 NARASI SRIDHAR

Device No: 1434

Manufacturer: JOHN FLUKE

Model: 8050A

Nomenclature: DIGITAL MULTIMETER

Serial Number: 5005078

SwRI No:

Cal interval 12 Mo.

Remarks

Accuracy: MFGR SPECS

Procedure: MFGR

ENVIRONMENT

Temperature: 70

Humidity: 49

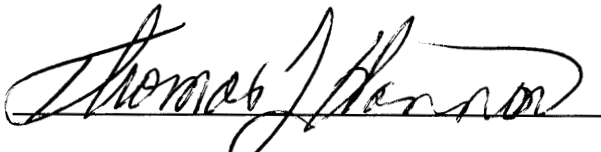
Location: ROOM A11 B68 SWRI

CONCLUSION

Tolerance/Remarks: Received in tolerance, no adjustments made

Calibration was in accord with requirements of MIL-STD-45662A. Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.

Signed



Calibration Date: 07/28/93

Cal interval: 12 Months

Record Number: 00011851

Next Calibration Due: 07/28/94

S O U T H W E S T   R E S E A R C H   I N S T I T U T E

Department of Quality Assurance  
Calibration Laboratory

Device Serial No: 5005078

Calibration Date: 07/28/93

STANDARDS

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Standard No: 182   Manufacturer: JOHN FLUKE

Model: 5700A

Nomenclature: CALIBRATOR

Serial No: 5200003

Cal.Due: 10/22/93

Cal.Rec.No: 00011820



**SOUTHWEST RESEARCH INSTITUTE**

**Department of Quality Assurance  
Calibration Laboratory**

**CERTIFICATE OF CALIBRATION  
08/23/94**

Issued to: NARASI SRIDHAR DIV20,B57  
Manufacturer: FLUKE  
Nomenclature: DIGITAL MULTIMETER  
Serial Number: 5005078

Asset Number: 001434  
Model Number: 8050A  
SwRI Capital Number: UNKWN

**ENVIRONMENTAL CONDITIONS**

Temperature: 72.0F

Relative Humidity: 36 %

**CALIBRATION INFORMATION**

Location: CAL1  
Procedure Number:  
Remarks: RECEIVED IN TOLERANCE. CAL'D MFG. SPECS.

Technician: 10004  
Accuracy: MFGR SPECS  
Received IN Tolerance

**Calibration was in accordance with requirements of MIL-STD-45662A.  
Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.**

**STANDARDS USED FOR CERTIFICATION**

Asset #	Serial #	Mfg	Model #	Nomenclature	Cal Date	Int.	Cal Due
000182	5200003	FLUKE	5700A	CALIBRATOR	06/17/94	3	09/17/94
000201	5195014	FLUKE	5725A	AMPLIFIER	06/17/94	3	09/17/94

Certified by : Walt Lin

Work Order: 14859

Calibration Date: 08/16/94  
Interval: 12 months  
Next Calibration Due: 08/16/95

**SOUTHWEST RESEARCH INSTITUTE**  
**Department of Quality Assurance**  
**Calibration Laboratory**

**CERTIFICATE OF CALIBRATION**  
**09/18/95**

Issued to: DARRELL DUNN      DIV20      ,B57  
Manufacturer: FLUKE  
Nomenclature: DIGITAL MULTIMETER  
Serial Number: 5005078  
Notes:

Asset Number: 001434  
Model Number: 8050A  
SwRI/Div. I.D. #: UNKWN

**ENVIRONMENTAL CONDITIONS**

Temperature: 72.0F

Relative Humidity: 35%

**CALIBRATION INFORMATION**

Procedure Number: MFGR  
Remarks: REPLACED BATTERY PACK

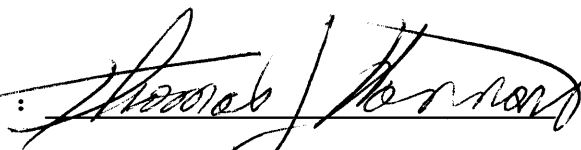
Accuracy: MFGR SPECS  
Received IN Tolerance

**Calibration was in accordance with requirements of MIL-STD-45662A.**  
**Measurements are traceable to the National Institute of Standards and Technology. Inspection and test data are on file and available for inspection.**

**STANDARDS USED FOR CERTIFICATION**

Asset #	Serial #	Mfg	Model #	Nomenclature	Cal Date	Int.	Cal Due
000182	5200003	FLUKE	5700A	CALIBRATOR	09/11/95	3	12/11/95

Certified by :



Certificate#: 18255

Calibration Date: 09/18/95  
Interval: 12 months  
Next Calibration Due: 09/18/96



Southwest Research Institute  
6220 Culebra Road  
San Antonio, TX 78238  
Department of Quality Assurance  
Calibration Laboratory

## Certificate of Calibration

5 November 1996

Issued to: DARRELL DUNN                      DIV20                      B57  
Manufacturer/Model: FLUKE 8050A  
Description: DIGITAL MULTIMETER  
Serial Number: 5005078  
Asset Number: 001434

### Environmental Conditions

Temperature: 79.0 Deg. F

Humidity: 38%

### Calibration Information

Calibration was in accordance with requirements of MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Measurements are traceable to the National Institute of Standards and Technology (NIST). This report may not be reproduced except in full without written approval of the originator. Inspection and test data are on file and available for inspection.

Calibration Date: 5 Nov 96

Calibration Procedure: MET/CAL 5500A/CAL VER REV. 1.2

Interval: 12 months


Accuracy: MFGR SPECS

Next Calibration Due: 5 Nov 97

Received: In Tolerance

Remarks:

Certificate # 23179

Signed: 

LAST PAGE OF REPORT  
Total Pages Printed: 1



Southwest Research Institute  
6220 Culebra Road  
San Antonio, TX 78238  
Department of Quality Assurance  
Calibration Laboratory

## Certificate of Calibration

3 December 1997

Issued to: DARRELL DUNN                      DIV20                      B57  
Manufacturer/Model: FLUKE 8050A  
Description: DIGITAL MULTIMETER  
Serial Number: 5005078  
Asset Number: 001434

### Environmental Conditions

Temperature: 73.00      Deg. F                      Humidity: 35      % RH

### Calibration Information

Calibration was in accordance with requirements of MIL-STD-45662A and ANSI/NC SL Z540-1-1994. Measurements are traceable to the National Institute of Standards and Technology (NIST). This report may not be reproduced except in full without written approval of the originator. Inspection and test data are on file and available for inspection.

The uncertainty of the calibration was sufficient to determine that the instrument met the manufacturer's specifications.

Calibration Date: 28 Nov 97                      Calibration Procedure: MFG

Interval: 12 months                      Uncertainty: MFG SPECS

Next Calibration Due: 28 Nov 98                      Received: In Tolerance

Remarks: CALIBRATED BY ROTHE DEV., SAN ANTONIO, TX.  
ROTHE CERT. #50528.

### Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
VENDOR					

Signed: 

Title: Cal Lab Metrologist

LAST PAGE OF REPORT  
Total Pages Printed: 1

Certificate # 27655



Southwest Research Institute  
6220 Culebra Road  
San Antonio, TX 78238  
(210) 522-5215  
Department of Quality Assurance  
Calibration Laboratory

Accredited  
  
Certificate #  
0972-01

## Certificate of Calibration

19 January 1999

**Issued to:** DARRELL DUNN DIV20 B57  
**Manufacturer/Model:** FLUKE 8050A  
**Description:** DIGITAL MULTIMETER  
**Serial Number:** 5005078  
**Asset Number:** 001434

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. Standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request. This certificate is not to be reproduced, except in full, without the written approval of the Southwest Research Institute Department of Quality Assurance Calibration Laboratory.

This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results of this calibration certificate were determined in accordance with the terms of accreditation unless stated otherwise below.

The uncertainty of the calibration was sufficient to determine that the item met the manufacturer's published specifications unless stated otherwise below.

**Ambient Conditions:** Temperature: 74. Degrees Fahrenheit Humidity: 40 % RH

**Calibration Date:** 19 Jan 99

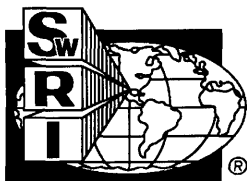
**Calibration Procedure:** FLUKE 8050A: (1 YEAR) CAL VER /5700

**Condition as Received:** IN TOLERANCE

**Condition as Released:** IN TOLERANCE

**Remarks:**

  
Vince Morales / Technician



# SOUTHWEST RESEARCH INSTITUTE™

6220 Culebra Road, P.O. Drawer 28510  
Institute Quality Systems  
Institute Calibration Laboratory  
Phone: 210-522-5215 Fax 210-522-3692

## Certificate of Calibration

**Submitted By:** DIV20

**Address:** B57

**Contact:** DARRELL DUNN

**Manufacturer Model:** FLUKE 8050A

**Description:** MULTIMETER

**Serial No:** 5005078

**Asset No:** 001434

**Procedure:** MULTIMETERS, DEC/02

**Work Order:** 444053859

**Date Issued:** May 21, 2003

**Calibration Date:** May 21, 2003

**\*\*Calibration Due:** May 21, 2004

**Calibration Location:** Bldg. 64

**Environment:** Temp. 72.0°F Hum. 42 %RH

**\*As Found:** IN TOLERANCE

**\*As Left:** IN TOLERANCE

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, 1999 and ANSI/NC SL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of  $k=2$  to approximate a 95% confidence level. The calibration process provides a Test Uncertainty Ratio (TUR) of less than or equal to 25% (4:1) of the test limit unless otherwise stated in remarks or an attachment.

\*The client has sole responsibility for determination of in/out of tolerance or compliance/noncompliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.

\*\*Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

**Remarks:** None

### Standards Used

Asset	Manufacturer	Model	Description	Cal Due
006413	FLUKE	5520A/SC1100	MULTI-PRODUCT CALIBRATOR	Jan 17, 04

Approved by: Walt Hill  
Metrology Group Leader  
m:\Nona21a1.rpt Rev date 15, August 02

Measurements by: Tom Hannon  
Metrology Technician

Southwest Research Institute  
Calibration Laboratory  
Calibration Report

Work Order:	444053859	Mfr.	FLUKE	Technician	thomas Hanno
Asset No.	001434	Model	8050A		
Serial No.	5005078	Type.	VOLTMETER	Cal Date.	21-May-03

Remarks:

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
DCV 200 mVolt	mVolts	mVolts	mVolts	mVolts	mVolts	Result
	190.00	190.04	0.04	0.08	0.01	Pass
	-190.00	-190.03	-0.03	0.08	0.01	Pass
DCV 2 Volt	Volts	Volts	Volts	Volts	Volts	
	1.9000	1.9001	0.0001	0.0008	0.0001	Pass
	-1.9000	-1.9001	-0.0001	0.0008	0.0001	Pass
DCV 20 Volt	19.000	19.005	0.005	0.008	0.001	Pass
DCV 200 Volt	190.00	190.01	0.01	0.08	0.01	Pass
DCV 1000 Volt	1000.0	1000.1	0.1	0.5	0.1	Pass
ACV 2 Volt	Volts	Volts	Volts	Volts	Volts	
SHORT	0.000	0.001	0.001	0.004	0.000	Pass
ACV 200 m Volts	mVolts	mVolts	mVolts	mVolts	mVolts	
100 Hz	190.00	189.99	-0.01	1.05	0.05	Pass
10 kHz	190.00	189.92	-0.08	1.05	0.05	Pass
50 kHz	190.00	187.27	-2.73	9.80	0.05	Pass
ACV 2 Volts	Volts	Volts	Volts	Volts	Volts	
100 Hz	0.1000	0.1000	0.0000	0.0015	0.0001	Pass
100 Hz	1.9000	1.9002	0.0002	0.0105	0.0003	Pass
10 kHz	1.9000	1.8997	-0.0003	0.0105	0.0003	Pass
50 kHz	1.9000	1.8760	-0.0240	0.0980	0.0019	Pass
ACV 20 Volts	Volts	Volts	Volts	Volts	Volts	
100 Hz	19.000	19.000	0.000	0.105	0.003	Pass
10 kHz	19.000	19.002	0.002	0.105	0.003	Pass
50 kHz	19.000	18.909	-0.091	0.980	0.025	Pass
ACV 200 Volts	Volts	Volts	Volts	Volts	Volts	
100 Hz	190.00	190.02	0.02	1.05	0.06	Pass
10 kHz	100.00	100.04	0.04	0.60	0.06	Pass
ACV 750 Volts	Volts	Volts	Volts	Volts	Volts	
100 Hz	750.0	750.2	0.2	4.8	0.3	Pass
1 kHz	750.0	749.5	-0.5	4.8	0.3	Pass

Southwest Research Institute  
Calibration Laboratory  
Calibration Report

Work Order:	444053859	Mfr.	FLUKE	Technician	Thomas Hannon
Asset No.	001434	Model	8050A		
Serial No.	5005078	Type.	VOLTMETER	Cal Date.	21-May-03

Function/Range	Test Point	TI Reading	Difference	Test Limits+/-	Uncertainty	Found/Left
200 mV dB Volts	Freq	dB	dB	dB	mV	Result
Short	0.00	-101.00	<-75 dB			Pass
10 mV @100 Hz	-37.78	-37.77	0.01	0.50	0.0012	Pass
10 mV @10 kHz	-37.78	-37.77	0.01	0.50	0.0012	Pass
1 V @100 Hz	2.22	2.23	0.01	0.15	0.0012	Pass
DC Amp	Amp	Amp	Amp	Amp	Amp	
200 uAmp	190.00	190.08	0.08	0.59	0.03	Pass
2 mAmp	1.9000	1.8988	-0.0012	0.0059	0.0003	Pass
20 mAmp	19.000	19.012	0.012	0.059	0.003	Pass
200 mAmp	190.00	190.18	0.18	0.59	0.03	Pass
2000 mAmp	1900.0	1902.1	2.1	5.9	1.0	Pass
AC mAmp	mAmp	mAmp	mAmp	mAmp	mAmp	
20 mA @100 Hz	19.000	19.003	0.003	0.200	0.030	Pass
Ohm	Ohms	Ohms	Ohms	Ohms	Ohms	
200	0.00	0.02	0.02	0.04	0.00	Pass
	100.00	99.97	-0.03	0.14	0.01	Pass
	kOhms	kOhms	kOhms	kOhms	kOhms	
2 k	1.0000	0.9992	-0.0008	0.0012	0.0001	Pass
20 k	10.000	10.000	0.000	0.007	0.001	Pass
200 k	100.00	99.9800	-0.02	0.07	0.01	Pass
2000 k	1000.00	1000.1000	0.10	2.80	0.12	Pass
	MOhms	MOhms	MOhms	MOhms	MOhms	
20 M	10.000	10.0030	0.003	0.028	0.01	Pass
	nS	nS	nS	nS	nS	
2 mS@ 1 kOhm	1.0000	1.0007	0.0007	0.0015	0.0001	Pass
200nS@ 10MOhm	100.00	99.9800	-0.02	0.70	0.01	Pass

END OF REPORT





# SOUTHWEST RESEARCH INSTITUTE™

6220 Culebra Road, P.O. Drawer 28510  
Institute Quality Systems  
Institute Calibration Laboratory  
Phone: 210-522-5215 Fax 210-522-3692



Certificate #

0972-01

## Certificate of Calibration

**Submitted By:** DIV20

**Address:** B57

**Contact:** DARRELL DUNN

**Manufacturer Model:** FLUKE 8050A

**Description:** MULTIMETER

**Serial No:** 5005078

**Asset No:** 001434

**Procedure:** MULTIMETERS, JAN/03

**Work Order:** 444059298

**Date Issued:** Jun 7, 2004

**Calibration Date:** Jun 7, 2004

**\*\*Calibration Due:** Jun 7, 2005

**Calibration Location:** Bldg. 64

**Environment:** Temp. 73.0°F Hum. 40 %RH

**\*As Found:** IN TOLERANCE

**\*As Left:** IN TOLERANCE

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, 1999 and ANSI/NCSL Z540-1-1994 which are equivalent to relevant requirements of the ISO 9000-1994 series of standards. This certificate may not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. The results of this calibration relate only to the individual instrument described above. This certificate shall not be used to claim product endorsement by the American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government.

Uncertainty evaluation includes the item under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor of  $k=2$  to approximate a 95% confidence level. See Remarks or attached Calibration Report with the same Work Order number for calibration data.

\*The client has sole responsibility for determination of in/out of tolerance or compliance/noncompliance. An in/out of tolerance opinion is provided for your convenience based only on the Test Instrument (TI) reading(s) and limits as reported. The reported uncertainty relates only to the results at the time of calibration and does not imply any short or long term stability of the TI.

\*\*Calibration interval is determined by the client and does not assure the instrument will remain within tolerance until this date. Any number of factors may cause the instrument to be out of tolerance before the next calibration date.

**Remarks:** None

### Standards Used

Asset	Manufacturer	Model	Description	Cal Due
006413	FLUKE	5520A/SC1100	MULTI-PRODUCT CALIBRATOR	Feb 19, 05

Approved by: Walt Hill  
Metrology Group Leader  
m\al21a1.rpt Rev date 11, May 04

Measurements by: Scott Kester  
Metrology Technician

Southwest Research Institute  
Calibration Laboratory  
Measurement Report

Work Order:	444059298	Mfr.	FLUKE	Technician	SRK
Asset No.	001434	Model	8050A		
Serial No.	5005078	Type.	VOLTMETER	Cal Date.	07-Jun-04
Remarks:					

Function/Range	Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left	
DCV 200 mVolt	mVolts	mVolts	mVolts	mVolts	mVolts	Result	
	190.00	190.05	0.05	0.08	0.013	Pass	
	-190.00	-190.03	-0.03	0.08	0.013	Pass	
DCV 2 Volt	Volts	Volts	Volts	Volts	Volts		
	1.9000	1.9001	0.0001	0.0008	0.00012	Pass	
	-1.9000	-1.9000	0.0000	0.0008	0.00012	Pass	
DCV 20 Volt	19.000	19.005	0.005	0.008	0.0012	Pass	
DCV 200 Volt	190.00	190.01	0.01	0.08	0.012	Pass	
DCV 1000 Volt	1000.0	1000.1	0.1	0.5	0.12	Pass	
ACV 200 mVolts	mVolts	mVolts	mVolts	mVolts	mVolts		
100 Hz	190.00	190.04	0.04	1.05	0.040	Pass	
10 kHz	190.00	189.90	-0.10	1.05	0.040	Pass	
50 kHz	190.00	186.03	-3.97	9.80	0.090	Pass	
ACV 2 Volt	Volts	Volts	Volts	Volts	Volts		
SHORT INPUT	0.000	0.000	0.000	0.004	0.0012	Pass	
100 Hz	0.1000	0.0999	-0.0001	0.0015	0.00012	Pass	
100 Hz	1.9000	1.9008	0.0008	0.0105	0.00031	Pass	
10 kHz	1.9000	1.8995	-0.0005	0.0105	0.00031	Pass	
50 kHz	1.9000	1.8619	-0.0381	0.0980	0.00073	Pass	
20 ACV	100 Hz	19.000	19.010	0.010	0.105	0.0023	Pass
	10 kHz	19.000	18.947	-0.053	0.105	0.0023	Pass
	50 kHz	19.000	18.694	-0.306	0.980	0.0085	Pass
200 ACV	100 Hz	190.00	190.08	0.08	1.05	0.053	Pass
	10 kHz	100.00	99.71	-0.29	0.60	0.032	Pass
ACV 750	100 Hz	750.0	750.4	0.4	4.8	0.30	Pass
	1 kHz	750.0	749.5	-0.5	4.8	0.30	Pass
200 mV dB Volts	dB	dB	dB	dB	dB		
Short	0.00	0.02	<-75 dB			Pass	
10 mV @100 Hz	-37.78	-37.77	0.01	0.50	-94	Pass	
10 mV @10 kHz	-37.78	-37.77	0.01	0.50	-94	Pass	
1 V @100 Hz	2.22	2.23	0.01	0.15	-36.2	Pass	
DC Amp	uAmp	uAmp	uAmp	uAmp	uAmp		
200 uAmp	190.00	190.08	0.08	0.59	0.029	Pass	
	mAmp	mAmp	mAmp	mAmp	mAmp		
2 mAmp	1.9000	1.8988	-0.0012	0.0059	0.00028	Pass	
20 mAmp	19.000	19.012	0.012	0.059	0.0027	Pass	
200 mAmp	190.00	190.18	0.18	0.59	0.027	Pass	
2000 mAmp	1900.0	1902.1	2.1	5.9	0.89	Pass	

Southwest Research Institute  
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Measurement Report

Work Order:	444059298	Mfr.	FLUKE	Technician	SRK
Asset No.	001434	Model	8050A		
Serial No.	5005078	Type.	VOLTMETER	Cal Date.	07-Jun-04

Function/Range		Test Point	TI Reading	Difference	+/-Limit	+/-Uncertainty	Found/Left
AC mAmp		mAmp	mAmp	mAmp	mAmp	mAmp	Result
20 mA	100 Hz	19.000	19.011	0.011	0.200	0.032	Pass
Ohm		Ohms	Ohms	Ohms	Ohms	Ohms	
200		0.00	0.02	0.02	0.04	0.012	Pass
		100.00	99.98	-0.02	0.14	0.013	Pass
		kOhms	kOhms	kOhms	kOhms	kOhms	
2 k		1.0000	0.9992	-0.0008	0.0012	0.00012	Pass
20 k		10.000	10.000	0.000	0.007	0.0012	Pass
200 k		100.00	99.9800	-0.02	0.07	0.012	Pass
2000 k		1000.00	1000.1000	0.10	2.80	0.13	Pass
		MOhms	MOhms	MOhms	MOhms	MOhms	
20 M		10.000	10.002	0.002	0.028	0.0020	Pass
		nS	nS	nS	nS	nS	
2 mS	1 kOhm	1.0000	1.0007	0.0007	0.0015	0.00012	Pass
200nS	10MOhm	100.00	99.9600	-0.04	0.70	0.0012	Pass

END OF REPORT