

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory • 522-5215

WORK ORDER

CERTIFICATE # 23179 ASSET # 001434 DATE 10/31/96

ITEM DATA:

Manufacturer FLUKE Model 85A
Description DMM Serial # 6005078
Accessories _____

ACTION REQUESTED Cal

CUSTODIAN _____

Turned in by: [Signature] Phone _____

CHARGE # 20 Date Required _____

INSTRUMENT USED ON: NUCLEAR DOD NASA GLP SPPE
 OTHER _____

COPY OF CALIBRATION CERTIFICATE Yes No

CONDITION RECEIVED: _____ Out of tolerance, repaired to specifications
_____ In tolerance, minor adjustments/repairs made
 In tolerance, no adjustments/repairs
_____ Out of tolerance, adjusted to specifications
_____ Received into system, introduced or reactivated
_____ Calibration interval
_____ Reliability code

ACTION TAKEN: (Calibration/Repair/Parts) Replaced 2A, 250V fuse

CAL ENVIRONMENT:
Temperature 79°F Humidity 38%RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure MET/CAL 8050A/5500A/CAL VER Rev 1.2
Date 5 NOV 96 Accuracy MFG
Cal Interval 12 Time to complete: _____
Next Cal due 5 NOV 97 Cal _____ Repair _____
Standards used (Asset#) 4164

DATE COMPLETED 5 NOV 96
DATE PICKED UP 11/14/96 PICKED UP BY [Signature]

23179

Southwest Research Institute (Calibration Lab) MET/CAL RESULTS

ASSET NUMBER: 001434
UNIT UNDER TEST: Fluke 8050A: (1 year) CAL VER /5500
SERIAL NUMBER: 5005078
RESULT: PASS
TEST STATUS: COMPLETED
OPERATOR: Vince Morales
DATE: 05-Nov-96
TEMPERATURE: 78
RELATIVE HUMIDITY: 40
WORK ORDER NUMBER: 23179
TEST TYPE: f

TRACEABILITY INFORMATION

Fluke	5500A	004164	06-Feb-97
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TEST COMMENTS...

Southwest Research Institute (Calibration Lab) 05-Nov-96

CALIBRATION DATA RECORD

MODEL NUMBER: 8050A

WORK ORDER : 23179

SERIAL NUMBER: 5005078

PARAMETER	TEST RESULT	ACCEPTANCE LIMITS	
		LOW	HIGH
DISPLAY TEST			
overrange indicator			
1 Result of Operator Evaluation	PASS		
00.00			
2 Result of Operator Evaluation	PASS		
.0000			
3 Result of Operator Evaluation	PASS		
0.000			
4 Result of Operator Evaluation	PASS		
00.00			
5 Result of Operator Evaluation	PASS		
000.0			
6 Result of Operator Evaluation	PASS		
0.000			
7 Result of Operator Evaluation	PASS		
....			
8 Result of Operator Evaluation	PASS		
all segments of the digits illuminated			
9 Result of Operator Evaluation	PASS		
display segments			
10 Result of Operator Evaluation	PASS		
high voltage indicator (HV) on			
11 Result of Operator Evaluation	PASS		
high voltage indicator (HV) off			
12 Result of Operator Evaluation	PASS		

PARAMETER	TEST RESULT	ACCEPTANCE LIMITS	
		LOW	HIGH
negative sign (-)			
13 Result of Operator Evaluation	PASS		
(dB) and (rel) indicators on			
14 Result of Operator Evaluation	PASS		
DC VOLTAGE			
200mV Range			
15 190.00mV	190.07	189.92	190.08
16 -190.00mV	-190.06	-190.08	-189.92
2V Range			
17 1.9000V	1.9002	1.8992	1.9008
18 -1.9000V	-1.9001	-1.9008	-1.8992
20V Range			
19 19.000V	19.007	18.992	19.008
200V Range			
20 190.00V	190.02	189.92	190.08
1000V Range			
21 1000.0V	1000.1	999.5	1000.5
AC VOLTAGE			
200mV Range			
22 190.00mV @ 100Hz	190.05	188.95	191.05
23 190.00mV @ 10kHz	189.99	188.95	191.05
24 190.00mV @ 50kHz	187.27	180.20	199.80
2V Range			
25 0V	0	0	0
26 0.1000V @ 100Hz	0.1000	0.0985	0.1015
27 1.9000V @ 100Hz	1.9009	1.8895	1.9105
28 1.9000V @ 10kHz	1.9005	1.8895	1.9105
29 1.9000V @ 50kHz	1.8755	1.8020	1.9980

Southwest Research Institute (Calibration Lab) 05-Nov-96

CALIBRATION DATA RECORD

MODEL NUMBER: 8050A

WORK ORDER : 23179

SERIAL NUMBER: 5005078

PARAMETER	TEST RESULT	ACCEPTANCE LIMITS	
		LOW	HIGH
20V Range			
30 19.000V @ 100Hz	19.004	18.895	19.105
31 19.000V @ 10kHz	18.968	18.895	19.105
32 19.000V @ 50kHz	18.840	18.020	19.980
200V Range			
33 190.00V @ 100Hz	190.09	188.95	191.05
34 100.00V @ 10kHz	99.79	99.40	100.60
750V Range			
35 750.0V @ 100Hz	750.6	745.2	754.8
36 750.0V @ 1kHz	749.6	745.2	754.8
dB VOLTAGE TESTS			
UUT reading below -75dBm			
37 Result of Operator Evaluation	PASS		
38 -37.78dBm @ 100Hz	-37.76	-38.28	-37.28
39 -37.78dBm @ 10kHz	-37.77	-38.28	-37.28
40 2.22dBm @ 100Hz	2.22	2.07	2.37
RESISTANCE			
20 MOhm Range			
41 10.00MZ	10.00	9.97	10.03
2000 kOhm Range			
42 1000.0kZ	1000.4	997.2	1002.8
200 kOhm Range			
43 100.00kZ	99.99	99.93	100.07
200nS Range			
44 100.0nS	100.0	99.3	100.7
20 kOhm Range			
45 10.000kZ	10.002	9.993	10.007
2 kOhm Range			

Southwest Research Institute (Calibration Lab) 05-Nov-96

CALIBRATION DATA RECORD

MODEL NUMBER: 8050A

WORK ORDER : 23179

SERIAL NUMBER: 5005078

PARAMETER	TEST RESULT	ACCEPTANCE LOW	LIMITS HIGH
46 1.0000kZ	0.9994	0.9930	1.0080
200 Ohm Range			
47 0.00Z	0.02	0.00	0.04
48 100.00Z	99.98	99.10	100.90
2mS Range			
49 1.0000mS	1.0006	0.9985	1.0015
DC CURRENT			
200uA Range			
DC CURRENT			
50 Replaced fuse.			
200uA Range			
200uA Range			
50 190.00uA	190.14	189.41	190.59
2mA Range			
2mA Range			
51 1.9000mA	1.8994	1.8941	1.9059
20mA Range			
52 19.000mA	19.017	18.941	19.059
200mA Range			
53 190.00mA	190.23	189.41	190.59
2000mA Range			
54 1900.0mA	1902.6	1894.1	1905.9
AC CURRENT			
20mA Range			

Southwest Research Institute (Calibration Lab) 05-Nov-96

CALIBRATION DATA RECORD

MODEL NUMBER: 8050A

WORK ORDER : 23179

SERIAL NUMBER: 5005078

PARAMETER	TEST RESULT	ACCEPTANCE LIMITS	
		LOW	HIGH
55 19.000mA @ 100Hz	19.008	18.800	19.200

SOUTHWEST RESEARCH INSTITUTE

Department of Quality Assurance

Calibration Laboratory • 522-5215

WORK ORDER

CERTIFICATE # 27655 ASSET # 001434 DATE 20 Apr 97

ITEM DATA:

Manufacturer Fluke Model 803A

Description Dimmer Serial # 5055028

Accessories _____

ACTION REQUESTED Cal

CUSTODIAN Div 20, David Dunn

Turned in by: _____ Phone 6020

CHARGE # 18-NOR-511 Date Required _____

INSTRUMENT USED ON: DOD/NASA NUCLEAR GLP SPPE ISO
 OTHER _____

COPY OF CALIBRATION CERTIFICATE Yes No

NEW WORK Yes No If yes, an evaluation shall be made to verify capabilities.

By _____ Date _____

- CONDITION RECEIVED:
- _____ (F) Out of tolerance, repaired to specifications
 - _____ (G) In tolerance, minor adjustments/repairs made
 - _____ (J) In tolerance, no adjustments/repairs
 - _____ (K) Out of tolerance, adjusted to specifications
 - _____ (S) Received into system, introduced or reactivated

ACTION TAKEN: (Calibration/Repair/Parts) Rocke Dev st# 31670 yes

Motors Dev adjusted to road better

cal cycle O.V. med!

CAL ENVIRONMENT:
Temperature 73 °F Humidity 35 %RH

CALIBRATED/REPAIRED:

By David Dunn Sam Adams, TX Cal Procedure MTG

Date 4/28/97 Accuracy MTG

Cal Interval 12 mos Reliability Code: 7

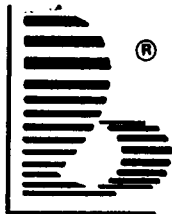
Next Cal due 4/28/98 Cal Time _____ Repair Time _____

Standards used (Asset#) Vendor

DATE COMPLETED 25 Dec 97

DATE PICKED UP 12/4/97 PICKED UP BY [Signature]

27655



CERT. NUMBER: 50528

ROTHE DEVELOPMENT, INC.
METROLOGY SERVICES DIVISION

4614 SINCLAIR RD., SAN ANTONIO, TEXAS 78222 PH:210-648-3131

CERTIFICATE OF CALIBRATION

ISSUED TO: Southwest Research Institute
6220 Culebra, Bldg. 64/Division 30
San Antonio, TX 78284
522-5460

(30) MFG: Fluke
MODEL: 8050A
NOMEN: DMM
S/N: 5005078
CUST. ID:

CAL DATE: 11/28/1997
DUE DATE: 11/28/1998

CONTROL NO.: 103 - 25272

TECHNICIAN: 6

SPECIFICATIONS: MFG

PROCEDURE: MFG

WORK ORDER: 62664

CUSTOMER P.O.: 02127/ST311670/20-1402571

RECEIVED CONDITION: IN TOLERANCE

RETURNED CONDITION: IN TOLERANCE

CALIBRATION PERFORMED AT: RDMSD

CALIBRATION INTERVAL: 12mos.

TEMPERATURE: 73 °F

RELATIVE HUMIDITY: 35 %

DATE RECEIVED: 11/25/1997

COMMENTS:

ATTACHMENTS: CALIBRATION DATA

All Calibrations performed at Rothe Development, Inc. Metrology Services Division meet the requirements of ANSI/NCSL Z540-1-1994, ISO/IEC GUIDE 25, and ISO 10012-1, and are traceable to the National Institute of Standards and Technology. The collective uncertainty of the measurement(s) does not exceed 25% (TUR_>4:1) of the instrument specification(s) unless noted in the COMMENTS section.

TR#	MFG	MODEL	SERIAL NO.	DUE DATE
100	Fluke	5500A	6320016	07/11/1998

APPROVED BY: *Peter J. Stammen*

CMS

QCO

DATE: 11/30/1997

RDMSD 1001
08/97

This certificate may not be reproduced, except in full, without written approval of Rothe Development, Inc. Metrology Services Division.

ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA: FLUKE 8050A DIGITAL MULTIMETER

CUSTOMER: Southwest Research Inst.
 WO NUMBER: 62664
 SERIAL: 5005078
 CUST ID: _____

DATE: Nov 28, 97
 TECH: RM
 INST NO: 25272

CALIBRATION DATA TAKEN

INCOMING ✓
 OUTGOING _____

CONDITION OF EQUIPMENT

IN TOLERANCE ✓
 OUT OF TOLERANCE _____

DC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 mV	+190.0 mV	+189.92	<u>190.07</u>	+190.08
	-190.0 mV	-189.92	<u>-190.06</u>	-190.08
2 V	+1.9 V	+1.8992	<u>1.9000</u>	+1.9008
	-1.9 V	-1.8992	<u>-1.9000</u>	-1.9008
20 V	+19 V	+18.992	<u>19.007</u>	+19.008
200 V	+190 V	+189.92	<u>190.00</u>	+190.08
1000 V	+1000 V	+999.5	<u>1000.0</u>	+1000.5

AC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
2 V	SHORT			
200 mV	190.0 mV 100 Hz	188.95	<u>.0005</u>	<.0040
	190.0 mV 10 KHz	188.95	<u>190.09</u>	191.05
	190.0 mV 50 KHz	188.95	<u>190.03</u>	191.05
2 V	100.0 mV 100 Hz	180.20	<u>187.49</u>	199.80
	1.9 V 100 Hz	.0985	<u>.1002</u>	.1015
	1.9 V 10 KHz	1.8895	<u>1.9011</u>	1.9105
20 V	1.9 V 50 KHz	1.8895	<u>1.9006</u>	1.9105
	19 V 100 Hz	1.8020	<u>1.8780</u>	1.9980
	19 V 10 KHz	18.895	<u>19.009</u>	19.105
	19 V 50 KHz	18.895	<u>18.976</u>	19.105
			18.020	<u>18.866</u>

200 V	190 V	100 Hz	188.95	<u>190.12</u>	191.05
	100 V	10 KHz	99.40	<u>99.79</u>	100.60
750 V	750 V	100 Hz	745.2	<u>750.6</u>	754.8
	750 V	1 KHz	745.2	<u>749.8</u>	754.8

dB VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 mV	SHORT	> -75	<u>-99</u>	
	10 mV 100 Hz	-37.28	<u>-37.76</u>	-38.28
	10 mV 10 KHz	-37.28	<u>-37.77</u>	-38.28
	1.0 V 100 Hz	+2.07	<u>02.22</u>	+2.37

DC CURRENT ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 uA	190 uA	189.41	<u>190.11</u>	190.59
2 mA	1.9 mA	1.8941	<u>1.8992</u>	1.9059
20 mA	19 mA	18.941	<u>19.014</u>	19.059
200 mA	190 mA	189.41	<u>190.19</u>	190.59
2000 mA	1.9 A	1894.1	<u>1902.2</u>	1905.9

RESISTANCE ACCURACY

RANGE	ACTUAL INPUT	TOLERANCE	READING
200 Ω	SHORT	<00.04 C	<u>00.01</u>
	(1) <u>100.00 Ω</u>	±14 C	<u>99.97</u>
2 KΩ	<u>1.0000 K</u>	±12 C	<u>9999</u>
20 KΩ	<u>10.000</u>	±7 C	<u>10.002</u>
200 KΩ	<u>100.00</u>	±7 C	<u>99.98</u>
2000 KΩ	<u>1000.0</u>	±28 C	<u>1000.2</u>
20 MΩ	<u>10.000 M</u>	±28 C	<u>10.002</u>
2 mS	<u>1.0000 K</u>	±15 C	<u>1.0005</u>
200 nS	<u>10.000 M</u>	±70 C	<u>99.96</u>

ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA: FLUKE 8050A DIGITAL MULTIMETER

CUSTOMER: Southwest Research Inst.
 WO NUMBER: 62664
 SERIAL: 5005078
 CUST ID: _____

DATE: Nov 25, 97
 TECH: ZZ
 INST NO: 25272

CALIBRATION DATA TAKEN

INCOMING _____
 OUTGOING ✓

CONDITION OF EQUIPMENT

IN TOLERANCE ✓
 OUT OF TOLERANCE _____

DC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 mV	+190.0 mV	+189.92	<u>190.00</u>	+190.08
	-190.0 mV	-189.92	<u>-189.98</u>	-190.08
2 V	+1.9 V	+1.8992	<u>1.9000</u>	+1.9008
	-1.9 V	-1.8992	<u>-1.9000</u>	-1.9008
20 V	+19 V	+18.992	<u>19.000</u>	+19.008
200 V	+190 V	+189.92	<u>190.00</u>	+190.08
1000 V	+1000 V	+999.5	<u>1000.1</u>	+1000.5

AC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
2 V	SHORT		<u>.0001</u>	<.0040
200 mV	190.0 mV 100 Hz	188.95	<u>189.93</u>	191.05
	190.0 mV 10 KHz	188.95	<u>189.87</u>	191.05
	190.0 mV 50 KHz	180.20	<u>187.39</u>	199.80
2 V	100.0 mV 100 Hz	.0985	<u>.0996</u>	.1015
	1.9 V 100 Hz	1.8895	<u>1.8996</u>	1.9105
	1.9 V 10 KHz	1.8895	<u>1.8993</u>	1.9105
20 V	1.9 V 50 KHz	1.8020	<u>1.8769</u>	1.9980
	19 V 100 Hz	18.895	<u>18.993</u>	19.105
	19 V 10 KHz	18.895	<u>19.003</u>	19.105
	19 V 50 KHz	18.020	<u>18.933</u>	19.980

200 V	190 V	100 Hz	188.95	<u>189.77</u>	191.05
	100 V	10 KHz	99.40	<u>100.02</u>	100.60
750 V	750 V	100 Hz	745.2	<u>750.0</u>	754.8
	750 V	1 KHz	745.2	<u>749.1</u>	754.8

dB VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 mV	SHORT	> -75	<u>-102</u>	
	10 mV 100 Hz	-37.28	<u>-37.77</u>	-38.28
	10 mV 10 KHz	-37.28	<u>-37.77</u>	-38.28
	1.0 V 100 Hz	+2.07	<u>02.22</u>	+2.37

DC CURRENT ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 uA	190 uA	189.41	<u>190.04</u>	190.59
2 mA	1.9 mA	1.8941	<u>1.8984</u>	1.9059
20 mA	19 mA	18.941	<u>19.007</u>	19.059
200 mA	190 mA	189.41	<u>190.13</u>	190.59
2000 mA	1.9 A	1894.1	<u>1901.6</u>	1905.9

RESISTANCE ACCURACY

RANGE	ACTUAL INPUT	TOLERANCE	READING
200 Ω	SHORT	<00.04 C	<u>00.01</u>
	(1) <u>100.00 Ω</u>	±14 C	<u>99.93</u>
2 KΩ	<u>1.0000 K</u>	±12 C	<u>9994</u>
20 KΩ	<u>10.000</u>	±7 C	<u>9999</u>
200 KΩ	<u>100.00</u>	±7 C	<u>99.99</u>
2000 KΩ	<u>1000.0</u>	±28 C	<u>1000.0</u>
20 MΩ	<u>10.000 M</u>	±28 C	<u>10.003</u>
2 mS	<u>1.0000 K</u>	±15 C	<u>1.0006</u>
200 nS	<u>10.000 M</u>	±70 C	<u>99.96</u>

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory • 522-5215

WORK ORDER

CERTIFICATE # 32910 ASSET # ~~004~~ 20434 DATE 12 JAN 99

ITEM DATA:

Manufacturer Fluke Model 8050A
Description DMM Serial # 5005078
Accessories _____

ACTION REQUESTED CM

CUSTODIAN Dr. 20, Darrill [Signature]

Turned in by: _____ Phone 6096

CHARGE # 20-1408-571 Date Required _____

INSTRUMENT USED ON: (DOD/NASA) (NUCLEAR) (GLP) (SPPE) (ISO)
 OTHER _____

COPY OF CALIBRATION CERTIFICATE (Yes) (No)

NEW WORK Yes No If yes, an evaluation shall be made to verify capabilities.

By [Signature] Date 01-12-99

Work involves proprietary/confidential information or equipment (Yes) (No)

- CONDITION RECEIVED:
- _____ (F) Out of tolerance, repaired to specifications
 - _____ (G) In tolerance, minor adjustments/repairs made
 - (J) In tolerance, no adjustments/repairs
 - _____ (K) Out of tolerance, adjusted to specifications
 - _____ (S) Received into system, introduced or reactivated

ACTION TAKEN: (Calibration/Repair/Parts) _____

CAL ENVIRONMENT:
Temperature 74 °F Humidity 40 %RH

CALIBRATED/REPAIRED:
By [Signature] Cal Procedure MET/CR 5705A/CR UCR Rev
Date 19 JAN 99 Accuracy MFG
Cal Interval 12 Reliability Code: 8
Next Cal due 19 JAN 00 Cal Time 1.5 Repair Time _____
Standards used (Asset#) 182

DATE COMPLETED 19 JAN 99
DATE PICKED UP 2/2/99 PICKED UP BY [Signature]

32910

WORK ORDER 37934

Date Received 2/24/00

Asset No. 001434 Manufacturer FLUKE Model 8050A
Description DIGITAL MULTIMETER Serial Number 5005078
Accessory Received/Required NONE
Div/CC ID NONE Accessory to Asset No. N/A Accuracy MFG SPECS
Div/CC DIV20 Location B57 Custodian DARRELL DUNN Tel. 6090
Charge/Project No. 20.00751.006 Proprietary/Confidential N Date Required ROUTINE
Work Requested CALIBRATION
Receiving Inspection O.K.
Delivered By DARRELL DUNN Tel. 6090

WORK HISTORY

Date	Start Time	Stop Time	Notes

PARTS

Part Name	Part Number	Cost	Failure Description

WORK SUMMARY

Failure Description _____
Repair Action _____
Cal Procedure Cl-251 Temp 72 F Hum 40 %
Tech V. Morales Cal Hrs. 2.5 Repair Hrs. _____ Part Cost _____
Action Taken Calibration
Standards Used 4164
Date Cal GMAR 00 Int. 12 Mo. Date Due GMAR 01 Reliability Code 9
Date Picked Up 3/22/2000 Picked Up By [Signature]

37934

CALIBRATION CHECK FORM

Date Calibrated 6 MAR 00 Work Order 37934 Cal By U Morales

Procedure No./Date: CL-251, SEP 99 Unit Under Test: DIGITAL MULTIMETER

Mfg FLUKE Model: 8050A SN 5005078 AN 1434

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4-25	DISPLAY TEST						Pass
	SELECT 200 AND KOhm	OPEN	OPEN (1) PASS/FAIL		Pass		
	200 Ohm	0.00Ohm	00.00	PASS/FAIL	Pass		
	2K Ohm	0.00Ohm	.0000	PASS/FAIL	Pass		
	20K Ohm	0.00Ohm	0.000	PASS/FAIL	Pass		
	200K Ohm	0.00Ohm	00.00	PASS/FAIL	Pass		
	2000K Ohm	0.00 Ohm	000.0	PASS/FAIL	Pass		
	20M Ohm	0.00 Ohm	0.000	PASS/FAIL	Pass		
	SELECT DCV, 20MOHM	0.00 Ohm	PASS/FAIL	Pass		
	SELECT DCV, 200V	188.88V	ALL SEGMENTS ON		Pass		
			AND HV ANNUNCIATOR ON?		Pass		
			PASS/FAIL		Pass		
		-39V	HV ANNUNCIATOR OFF		Pass		
			AND - SIGN ON?		Pass		
			PASS/FAIL		Pass		
	SELECT DB AND REL		ARE ANNUNCIATOR ON		Pass		
			PASS/FAIL		Pass		
4-27	LINEAR VOLTAGE						
	TESTS						
	200mV	190.00mV	189.92	190.08mV	190.03mV		
		-190.00mV	-189.92	-190.08mV	-190.02mV		
	2V	1.9000V	1.8992	1.9008V	1.9001V		
		-1.9000V	-1.8992	-1.9008V	-1.9001V		
	20V	19.000V	-18.992	19.008V	19.003V		
	200V	190.00V	189.92	190.08V	190.01V	✓	

CALIBRATION CHECK FORM

Date Calibrated 6 MAR 00 Work Order 37934 Cal By V. Morales

Procedure No./Date: CL-251, SEP 99 Unit Under Test: DIGITAL MULTIMETER

Mfg FLUKE Model: 8050A SN 5005078 AN 1434

STEP	FUNCTION OR RANGE CONTD	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4-27	LINEAR VOLTAGE						
	TESTS						
	1000V	1000.0V	999.5	1000.5V	1000.1V		Pass ↓
	2V	0.00V	<.0040V		0.0000V		
	AC VOLTAGE TESTS						
	200mV	190mV, 100h	188.95	191.05mV	189.96mV		
		190mV, 10kh	188.95	191.05mV	189.91mV		
		190mV, 50kh	180.20	199.80mV	187.45mV		
	2V	100mV, 100h	985	1015mV	1899.99mV		
		1.9V, 100h	1.8895	1.9105V	1.9006V		
		1.9V, 10kh	1.8895	1.9105V	1.9000V		
		1.9V, 10kh	1.8020	1.9980V	1.9000V		
	20V	19V, 100hz	18.895	19.105V	18.999V		
		19V, 10kh	18.895	19.105V	19.012V		
		19V, 50kh	18.020	19.980V	18.950V		
	200V	190V, 100hz	188.95	191.05V	190.01V		
		100V, 10kh	99.40	100.60V	100.08V		
	750V	750V, 100hz	745.2	754.8V	750.1V		
		750V, 1khz	745.2	754.8V	749.2V		
4-29	DB VOLTAGE TEST						
	AC DB, 200mV	0.00V	BELOW -75 DB		Pass		Pass ↓
		10mV, 100hz	-37.28	-38.28db	-37.77db		
		10mV, 10khz	-37.28	-38.28db	-37.77db		

CALIBRATION CHECK FORM

Date Calibrated 6 MAR 99 Work Order 37934 Cal By UMorales

Procedure No./Date: CL-251, SEP 99 Unit Under Test: DIGITAL MULTIMETER

Mfg FLUKE Model: 8050A SN 5008078 AN 1434

STEP	FUNCTION OR RANGE CONTD	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN	MAX	AS FOUND	RELEASED	
4-29	DB VOLTAGE TESTS	1.0V, 100hz	2.07	2.37db	2.23db		PASS ↓
4-31	DC CURRENT TEST						
	200uA	190.00uA	189.41	190.59uA	190.07uA		
	2mA	1.9000mA	1.8941	1.9059mA	1.8987mA		
	20mA	19.000mA	18.941	19.059mA	19.011mA		
	200mA	190.00mA	189.41	190.59mA	190.17mA		
	2000ma	1900mA	1894.1	1905.9mA	1902.0mA		
4-33	RESISTANCE/CONDUCT						
	200 OHM	0.00OHMS	00.00	00.04OHMS	00.02Ω		
		100.00OHM	99.88	00.14OHMS	99.97Ω		
	2KOHM	1000KOHM	.9988	1.0012KOHM	0.9993 KΩ		
	20KOHM	10000KOHM	9.993	10.007KOHM	10.000 KΩ		
	200KOHM	100KOHM	99.93	100.07KOHM	99.99 KΩ		
	2000KOHM	1MOHM	997.2	10.028MOHM	1000.1 KΩ		
	2mS	1000OHMS	.9985	1.0015KOHM	1.0006 KΩ		
	200nS	10MOHM	99.30	100.70nS	100.03 nS		



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



Certificate #
0972-01

Certificate of Calibration

7 March 2000

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. The results of this calibration relate only to the individual item as described above. 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 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: 72.0 Degrees Fahrenheit Humidity: 40 % RH

Calibration Date: 6 Mar 00 **Calibration Procedure:** CL-251, SEP 99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist

Certificate # 37934

m:\a2la.rpt Rev date 14 Dec 99

Measurements performed by:

Vince Morales, Technician

Page 1 of 1

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Processed by RCRUZ at 2:38:38PM on 4/26/01

1 00000 00000 00000 00000 00000 00000 00000

Work Order 444043361

Arrived 4/26/01

Asset No. 001434 Manufacturer FLUKE

Model 8050A

Instrument Type/Class MULTIMETER

Serial No. 5005078

Accessory No. Calibration Procedure CL-251.9/99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel. 6090

Charge/Project No. 20.00751.006

Delivered By / Telephone DARRELL DUNN

IN4CAL

Special Instructions _____

WORK NOTES

Date	Hours	Remarks/Notes
<u>April 27, 2001</u>		<u>Calibrate</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

REPAIR PARTS

Date	Hours	Part Name	Part Number	Failure Description	Cost
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

WORK SUMMARY

Failure Description None

Repair Action None

Calibration Procedure Fluke 8050A 55201 YR Sep 99 Temp 72 F Hum. 40 %

Tech Alan Harty Totals Cal Hours 1.0 Repair Hours _____ Parts Cost _____

Standards Used 6413

Date Picked Up 5/2/01

Picked Up By Dunn

43361

Calibration Results

SwRI Calibration Laboratory

UUT: FLUKE 8050A
 MULTIMETER
 Serial No: 5005078
 Asset No. 001434

Result: **PASS**
 Performed on: 4/27/01 at 10:19:34
 Performed by: Thomas Hannon
 Environment: Temp. 72.0°F Humid. 40 %
 Condition F/L: FOUND-LEFT
 Procedure Completed: YES

Notes:

Standards Used

Asset	Mfg	Model	Description	Cal. Date	Due Date
006413	FLUKE	5520A	MULTI-PRODUCT CALIBRATOR	10-Nov-00	10-Nov-01

Test Data

TEST#	STD PARAMETER	TRUE VALUE	----- READING	UNIT UNDER TEST TOLERANCE	----- UUT ERROR	ERROR in (% of Tol)	NOTIFY TUR	USER
DISPLAY TEST								
	overrange indicator						PASS	
	Result of Operator Evaluation						PASS	
	00.00							
	Result of Operator Evaluation						PASS	
	.0000							
	Result of Operator Evaluation						PASS	
	0.000							
	Result of Operator Evaluation						PASS	
	00.00							
	Result of Operator Evaluation						PASS	
	000.0							
	Result of Operator Evaluation						PASS	
	0.000							
	Result of Operator Evaluation						PASS	
							
	Result of Operator Evaluation						PASS	
	all segments of the digits illuminated							
	Result of Operator Evaluation						PASS	
	display segments							
	Result of Operator Evaluation						PASS	
	high voltage indicator (HV) on							
	Result of Operator Evaluation						PASS	
	high voltage indicator (HV) off							
	Result of Operator Evaluation						PASS	
	negative sign (-)							
	Result of Operator Evaluation						PASS	
	(dB) and (rel) indicators on							
	Result of Operator Evaluation						PASS	
DC VOLTAGE								
200mV Range								
15	190.00mV		190.02	80uV	20uV	25		
16	-190.00mV		-190.01	80uV	-10uV	12		
2V Range								
17	1.9000V		1.9001	800uV	100uV	12		
18	-1.9000V		-1.9000	800uV	0V	0		

TEST#	STD	TRUE	UNIT UNDER TEST		ERROR in	NOTIFY		
	PARAMETER	VALUE	READING	TOLERANCE	UUT ERROR		(% of Tol)	TUR
20V Range								
19	19.000V		19.003	8mV	3mV	38		
200V Range								
20	190.00V		190.00	80mV	0V	0		
1000V Range								
21	1000.0V		1000.1	500mV	100mV	20		
AC VOLTAGE								
200mV Range								
22	190.00mV @ 100Hz		190.04	1.05mV	40uV	4		
23	190.00mV @ 10kHz		189.96	1.05mV	-40uV	4		
24	190.00mV @ 50kHz		187.25	9.8mV	-2.75mV	28		
2V Range								
25	0.0000V		0.0005	4mV	500uV	13		
26	0.1000V @ 100Hz		0.1001	1.5mV	100uV	7		
27	1.9000V @ 100Hz		1.9007	10.5mV	700uV	7		
28	1.9000V @ 10kHz		1.9000	10.5mV	0V	0		
29	1.9000V @ 50kHz		1.8759	98mV	-24.1mV	25		
20V Range								
30	19.000V @ 100Hz		19.004	105mV	4mV	4		
31	19.000V @ 10kHz		19.006	105mV	6mV	6		
32	19.000V @ 50kHz		18.909	980mV	-91mV	9		
200V Range								
33	190.00V @ 100Hz		190.06	1.05V	60mV	6		
34	100.00V @ 10kHz		99.99	600mV	-10mV	2		
750V Range								
35	750.0V @ 100Hz		750.3	4.8V	300mV	6		
36	750.0V @ 1kHz		749.4	4.8V	-600mV	13		
dB VOLTAGE TESTS								
UUT reading below -75dBm								
Result of Operator Evaluation						PASS		
38	-37.78dBm @ 100Hz		-37.76	171.636uV	20mdBm	13		
39	-37.78dBm @ 100Hz		-37.76	171.636uV	20mdBm	13		
40	2.22dBm @ 100Hz		2.23	17.1438mV	10mdBm	7		
RESISTANCE								
20 MOhm Range								
41	10.00 MOhm		10.00	28 kOhm	2 kOhm	7		
2000 kOhm Range								
42	1000.0 kOhm		1000.1	2.8 kOhm	100 Ohm	4		
200 kOhm Range								
43	100.00 kOhm		99.97	70 Ohm	-30 Ohm	43		
200nS Range								
44	100.00nS		99.95	700pS	-50pS	7		
20 kOhm Range								
45	10.000 kOhm		9.998	7 Ohm	-2 Ohm	29		
2 kOhm Range								
46	1.0000 kOhm		0.9992	1.2 Ohm	-800 mOhm	67		
200 Ohm Range								
47	0.00 Ohm		0.02	40 mOhm	20 mOhm	50		
48	100.00 Ohm		99.94	140 mOhm	-60 mOhm	43		
2mS Range								
49	1.0000mS		1.0007	1.5uS	700nS	47		
DC CURRENT								
200uA Range								
50	190.00uA		190.06	590nA	60nA	10		
2mA Range								
51	1.9000mA		1.8987	5.9uA	-1.3uA	22		
20mA Range								
52	19.000mA		19.010	59uA	10uA	17		
200mA Range								
53	190.00mA		190.15	590uA	150uA	25		
2000mA Range								
54	1900.0mA		1901.5	5.9mA	1.5mA	25		

TEST#	STD PARAMETER	TRUE VALUE	UNIT UNDER TEST READING	TOLERANCE	UUT ERROR	ERROR in (% of Tol)	NOTIFY TUR USER
AC CURRENT							
20mA Range							
55	19.000mA @ 100Hz		19.009	200uA	9uA		5

End of Test Data



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



Certificate #
0972-01

Certificate of Calibration

27 April 2001

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: FLUKE 8050A
Description: MULTIMETER
Serial Number: 5005078
Asset Number: 001434
Work Order Number: 444043361

This certifies the above item was calibrated in compliance with MIL-STD-45662A and ANSI/NCSL Z540-1-1994. The results of this calibration relate only to the individual item as described above. 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 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: 72.0 Degrees Fahrenheit Humidity: 40 % RH

Calibration Date: 27 Apr 01 **Calibration Procedure:** FLUKE 8050A 5520 1YR SEP 99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:

Tom Hannon, Technician

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by RCRUZ,5/14/02 10:27:16AM

||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||

Arrived 5/14/02

Work Order **444048537**

Asset No. 001434 Manufacturer FLUKE

Model 8050A

Equipment Type MULTIMETER

Serial No. 5005078

Accessory No.

Interval 12 M

Calibration Procedure CL-251, 9/99

Location B57

Div/Client DIV20

Custodian DARRELL DUNN

Mail Stop B57

Tel 6090

IN LINE

Special Instructions _____

Notify before adjustments or repairs. () Provide data with certificate (✓) Certificate Typ _____

Charge/Project No. 00751.006 1.20

Requester / Telephone DARRELL DUNN X6090

This information is correct for the work requested.

WORK NOTES

Date Hours Remarks/Notes

20 MAY 02 -

Date	Hours	Part Name	Part Number	Failure Description	Cost
------	-------	-----------	-------------	---------------------	------

WORK SUMMARY

Failure Description _____

Repair Action _____

Tech ADP Cal Hrs. 1 Repair Hrs _____ Parts Cost _____ Temp 72F Hum. 42 %

Standards Used 6413

Date Picked Up 6/6/2002

Picked Up By Darrell Dunn

48537

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

Found/Left

Work Order:	444048537	Mfr.	FLUKE	Technician	Tplanas
Asset No.	1434	Model	8050A	Procedure	CL-251 Sep 99
Serial No.	5005078	Type.	DIGITAL VOLTMETER	Cal Date.	20 May, 02

Remarks: (1) The Difference is equal to TI reading - Test Point reading.
 (2) If no value is listed the uncertainty is >4/1
 The results can be Pass, Fail, or if blank "not determinable". If "not determinable" it is up to the end user to determine if results meet their needs.

Range/Function	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results	
DCV 200 mVolt	mVolts	mVolts	mVolts	mVolts	mVolts	Results	
	190.00	190.05	0.05	0.08	0.01	Pass	
	-190.00	-190.03	-0.03	0.08	0.01	Pass	
DCV 2 Volt	Volts	Volts	Volts	Volts	Volts	Results	
	1.9000	1.9003	0.0003	0.0008	0.0001	Pass	
	-1.9000	-1.9003	-0.0003	0.0008	0.0001	Pass	
DCV 20 Volt	Volts	Volts	Volts	Volts	Volts	Results	
	19.000	19.006	0.006	0.008	0.001	Pass	
DCV 200 Volt	Volts	Volts	Volts	Volts	Volts	Results	
	190.00	190.03	0.03	0.08	0.01	Pass	
DCV 1000 Volt	Volts	Volts	Volts	Volts	Volts	Results	
	1000.0	1000.2	0.2	0.5	0.1	Pass	
ACV 2 Volt SHORT	Volts	Volts	Volts	Volts	Volts	Results	
	0.000	0.000	0.000	0.004	0.000	Pass	
ACV 200 m Volts	m Volts	m Volts	m Volts	m Volts	m Volts	Results	
	100 Hz	190.00	189.94	-0.06	1.05	0.05	Pass
	10 kHz	190.00	189.89	-0.11	1.05	0.05	Pass
	50 kHz	190.00	187.18	-2.82	9.80	0.05	Pass
ACV 2 Volts	Volts	Volts	Volts	Volts	Volts	Results	
	100 Hz	0.100	0.100	-0.001	0.002	0.000	Pass
	100 Hz	1.900	1.900	0.000	0.011	0.000	Pass
	10 kHz	1.900	1.900	0.000	0.011	0.000	Pass
	50 kHz	1.900	1.874	-0.026	0.098	0.002	Pass
ACV 20 Volts	Volts	Volts	Volts	Volts	Volts	Results	
	100 Hz	19.00	18.99	-0.01	0.11	0.00	Pass
	10 kHz	19.00	19.00	0.00	0.11	0.00	Pass
	50 kHz	19.00	18.91	-0.09	0.98	0.02	Pass

Southwest Research Institute
Calibration laboratory
Calibration Sheet.

Found/Left

Work Order:	444048537	Mfr.	FLUKE	Technician	Tplanas
Asset No.	1434	Model	8050A	Procedure	CL-251 Sep 99
Serial No.	5005078	Type.	DIGITAL VOLTMETER	Cal Date.	20 May, 02

Range/Function	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
ACV 200 Volts	Volts	Volts	Volts	Volts	Volts	
100 Hz	190.0	190.0	0.0	1.1	0.1	Pass
10 kHz	100.0	100.0	0.0	0.6	0.1	Pass

Range/Function	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
ACV 750 Volts	Volts	Volts	Volts	Volts	Volts	
100 Hz	750.0	749.7	-0.3	4.8	0.3	Pass
1 kHz	750.0	749.0	-1.0	4.8	0.3	Pass

Range/Function	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
200 mV dB Volts	Freq	dB	dB	Low	High	Results Pass/Fail
Short	0.00	-87.00	<-75 dB	0.00	-38.28	Pass
10 mV @100 Hz	100.00	-37.77		-37.28	-38.28	Pass
10 mV @10 kHz	10.00	-37.77		-37.28	-38.28	Pass
1 V @100 Hz	100.00	2.22		2.07	2.37	Pass

Range/Function	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
DC Amp	Amp	Amp	Amp	Amp	Amp	Results
200 uAmp	190.00	190.09	0.09	0.59	0.03	Pass
2 mAmp	1.9000	1.8988	-0.0012	0.0059	0.0003	Pass
20 mAmp	19.000	19.013	0.013	0.059	0.003	Pass
200 mAmp	190.00	190.19	0.19	0.59	0.03	Pass
2000 mAmp	1900.0	1902.2	2.2	5.9	1.0	Pass

Range/Function	Test Point	TI Reading	Difference (1)	Test Limits+/-	Uncertainty (2)	Results
Ohm	Ohms	Ohms	Ohms	Ohms	Ohms	Results
200	0.00	0.02	0.02	0.04	0.00	Pass
	100.00	99.98	-0.02	0.14	0.01	Pass
2 k	1.0000	0.9993	-0.0007	0.0012	0.0001	Pass
20 k	10.000	10.000	0.000	0.007	0.001	Pass
200 k	100.00	99.9900	-0.01	0.07	0.01	Pass
2000 k	1000.00	1000.1000	0.10	2.80	0.12	Pass
20 M	10.00	10.0030	0.00	0.20	0.01	Pass
2 mS@ 1 kOhm	1.0000	1.0007	0.0007	0.2000	0.0001	Pass
200nS@ 10MOhm	10.00	99.9500	-0.05	0.20	0.01	Pass



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

Certificate of Calibration

20 May 2002

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: FLUKE 8050A
Description: MULTIMETER
Serial Number: 5005078
Asset Number: 001434
Work Order Number: 444048537

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.

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: 72.0 Degrees Fahrenheit Humidity: 42 % RH


Calibration Date: 20 May 02 **Calibration Procedure:** CL-251, 9/99

Condition as Received: IN TOLERANCE

Condition as Returned: IN TOLERANCE

Remarks:

Approved by:


Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Measurements performed by:


Tony Plasas, Technician