

SOUTHWEST RESEARCH INSTITUTE

POST OFFICE DRAWER 28510 • 6220 CULEBRA ROAD • SAN ANTONIO, TEXAS, USA 78284 • (512) 684-5111 • TELEX 76-7357

Division 05 – Instrument Repair and Calibration Laboratory

Calibration Record

ITEM FLUKE DIGITAL MULTIMETER
MODEL 850A S/N 5005110 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>5100A</u>	<u>Calibrator</u>	<u>2730017</u>	<u>18 Oct 90</u>	<u>5349</u>
<u>FLUKE</u>	<u>850A</u>	<u>DMM</u>	<u>4180021</u>	<u>13 APR 91</u>	<u>5354</u>
<u>GR</u>	<u>1433E</u>	<u>Decade Resistor</u>	<u>7993</u>	<u>26 Sept 90</u>	<u>4779</u>

ENVIRONMENT: Temperature 72° Humidity 78%
Location Room A11, Bldg 68, SWRI

PROCEDURE

Essentially as outlined in MFGRS Service Manual _____

CONCLUSION

Item within tolerance _____
 Item out of tolerance _____
 Item ADJ/repaired 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 Jay H. White

DATE 30 MAY 90

RECORD NUMBER: 0005471 NEXT CALIBRATION DUE: 30 MAY 91

```

=====
UNIT UNDER TEST:      FLUKE : Model 8050A DMM
SERIAL NUMBER:        5005110
UUT CODE:             DIV 20 N SRIDHAR
  
```

```

RESULT:               Pass
ADJUSTMENTS PERFORMED: 0
TEST STATUS:          COMPLETED
OPERATOR:
ELAPSED TIME:         35 Minutes
DATE:                 30-May-90
=====
  
```

TEST	RANGE	UUT INDICATED	SYSTEM ACTUAL	MODIFIER	ERROR (%TOL)
1	DC LINEAR VOLTAGE TEST				
1	200	190mV	189.992		10
2	200	-190mV	-189.988		15
3	2	1.9V	1.90032		40
4	2	-1.9V	-1.89984		20
5	20	19V	19		0
6	200	190V	190.008		10
7	1000	1000V	1000.04		8
8	AC LINEAR VOLTAGE TESTS				
8	Result Of Operator Evaluation				PASS
9	200	190mV	190.2	100H	19
10	200	190mV	190.3	10KH	29
11	200	190mV	193.6	50KH	37
12	2	.1V	0.1012	100H	80
13	2	1.9V	1.903	100H	29
14	2	1.9V	1.903	10KH	29
15	2	1.9V	1.936	50KH	37
16	20	19V	19.03	100H	29
17	20	19V	19.01	10KH	10
18	20	19V	19.18	50KH	18
19	200	190V	190.2	100H	19
23	dB VOLTAGE TEST				
23	UUT READ <-75dB?				
23	Result Of Operator Evaluation				PASS
24	A	-37.780	-37.78	100H	0
25	A	-17.780	-17.7	10KH	5
26	A	2.220	2.3	100H	5
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	1.9		0
30	20	19mA	19.005		8
31	200	190mA	189.9		17
32	2000	1900mA	1898		34
33	20	19mA	19.04	100H	20
34					

34	RESISTANCE/CONDUCTANCE TEST			
34	Result Of Operator Evaluation			
35	200	100Z	100	0
36	2	0.9999KZ	1	8
37	20	10.0007KZ	10	10
38	200	100.007KZ	100	10
39	2000	1000.2KZ	1000	7
40	20	10.004MZ	10	14
41	2	1.0002mY	1	13
42	200	99.93nY	100	10

END

used 1433E DECADE

**Division 05 - Instrument Repair and Calibration Laboratory
CERTIFICATE OF CALIBRATION**

ISSUED TO: DIV 20, Center for Nuclear Waste Reg Analysis
 MFGR/MODEL FLUKE / 8050A
 ITEM DESCRIPTION DIGITAL MULTIMETER
 MODEL 8050A S/N 5005110 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>5700A</u>	<u>Calibration</u>	<u>5200003</u>	<u>21 JAN 92</u>	<u>074 P3</u>

ENVIRONMENT: Temperature 70° Humidity 46%
 Location Room A11, Bldg 68, SW KE

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. 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 22 JUL 91

RECORD NUMBER: 0068038 NEXT CALIBRATION DUE: 26 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: 1435

Manufacturer: JOHN FLUKE

Model: 8050A

Nomenclature: DIGITAL MULTIMETER

Serial Number: 5005110

SwRI No:

Remarks

Accuracy: MFGR SPECS

Procedure: MFGR

ENVIRONMENT

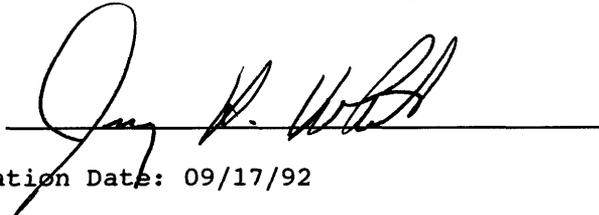
Temperature: 72 Humidity: 48 Location: ROOM A11 B68, SWRI

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: 09/17/92

Record Number: 00009829

Next Calibration Due: 09/17/93

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: 5005110

Calibration Date: 09/17/92

STANDARDS

Standard No: 182 Manufacturer: JOHN FLUKE

Model: 5700A

Nomenclature: CALIBRATOR

Serial No: 5200003

Cal.Due: 01/24/93

Cal.Rec.No: 00009507

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: 5005110

Calibration Date: 10/07/93

STANDARDS

Standard No: 182 Manufacturer: JOHN FLUKE

Model: 5700A

Nomenclature: CALIBRATOR

Serial No: 5200003

Cal.Due: 10/22/93

Cal.Rec.No: 00011820

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: 1435

Manufacturer: JOHN FLUKE

Model: 8050A

Nomenclature: DIGITAL MULTIMETER

Serial Number: 5005110

SwRI No:

Cal interval 12 Mo.

Remarks

Accuracy: MFGR SPECS

Procedure: MFGR

ENVIRONMENT

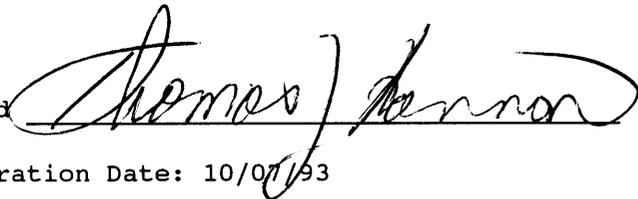
Temperature: 70 Humidity: 46 Location: ROOM A11 B68 SWRI

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: 10/07/93

Cal interval: 12 Months

Record Number: 00012405

Next Calibration Due: 10/07/94

SOUTHWEST RESEARCH INSTITUTE

**Department of Quality Assurance
Calibration Laboratory**

**CERTIFICATE OF CALIBRATION
02/09/95**

Issued to: DARRELL DUNN DIV20 ,B57
Manufacturer: FLUKE
Nomenclature: DIGITAL MULTIMETER
Serial Number: 5005110

Asset Number: 001435
Model Number: 8050A

SwRI Capital Number: UNKWN

ENVIRONMENTAL CONDITIONS

Temperature: 74.0F

Relative Humidity: 40 %

CALIBRATION INFORMATION

Location: CAL1
Procedure Number: MFGR SERVICE MAN
Remarks:

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 Tech-
nology. 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	12/14/94	3	03/14/95
000201	5195014	FLUKE	5725A	AMPLIFIER	12/14/94	3	03/14/95

Certified by :



Certificate#: 16294

Calibration Date: 02/09/95
Interval: 12 months
Next Calibration Due: 02/09/96



Rothe Development Inc.

Metrology Services Division

4614 SINCLAIR RD., SAN ANTONIO, TEXAS 78222 210-648-3131 FAX 210-648-4091

Certificate of Calibration

41980

CAL DATE: 01/31/96

DUE DATE: 01/31/97

ISSUED TO: Southwest Research Institute (30)
6220 Dulebra, Bldg. 64/Division 30
San Antonio, TX 78234
684-5111 * 2702

MFG Fluke

MODEL 9050A

SERIAL # 5005110

TYPE DMH

CONTROL: 103 - 21872
TECHNICIAN #: 4
SPECIFICATIONS: MFG
PROCEDURE: MFG
WORK ORDER #: 51989
CUSTOMER PO #: 03602/ST278262/20-0754

RECEIVED IN-SPECS
OUT-OF-SPECS

All Calibration measurements performed at ROTHE DEVELOPMENT INC. METROLOGY SERVICES meet the requirements of MIL-STD-45662A, and are traceable to the National Institute of Standards and Technology through Primary NIST Calibration or Secondary Calibration performed by other Metrological facilities. Ambient conditions: Temperature 74°F, Relative Humidity 31%.

Test Report Number and Calibration Standards Used

Ref #	Model #	Mfgr	Serial #	Description	Cal Date	Int	Cal Due
TR 20	5700A	FLUKE	4605002	CALIBRATOR	12/04/95	3	03/04/96

----- Test Report Numbers -----
 DCV FLUKE CERT# DH70
 ACV FLUKE CERT# DF00
 OHM NIST TEST# 253975
 TEMP NIST TEST# 253806
 Hz WWVB Transmission

INSPECTED BY Peter J. Hammer
COMMENTS:

ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA: FLUKE 8050A DIGITAL MULTIMETER

CUSTOMER: SWRI
 WO NUMBER: 51989
 SERIAL: 5005110
 CUST ID: _____

DATE: 31 Jan 96
 TECH: PJS
 INST NO: 21872

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>190.04</u>	+190.08
	-190.0 mV	-189.92	<u>190.04</u>	-190.08
2 V	+1.9 V	+1.8992	<u>1.9003</u>	+1.9008
	-1.9 V	-1.8992	<u>1.9003</u>	-1.9008
20 V	+19 V	+18.992	<u>19.003</u>	+19.008
200 V	+190 V	+189.92	<u>190.02</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>.0003</u>	<.0040
200 mV	190.0 mV 100 HZ	188.95	<u>189.69</u>	191.05
	190.0 mV 10 KHZ	188.95	<u>189.62</u>	191.05
	190.0 mV 50 KHZ	180.20	<u>186.83</u>	199.80
2 V	100.0 mV 100 HZ	.0985	<u>.0982</u>	.1015 *
	1.9 V 100 HZ	1.8895	<u>1.8980</u>	1.9105
	1.9 V 10 KHZ	1.8895	<u>1.8973</u>	1.9105
20 V	1.9 V 50 KHZ	1.8020	<u>1.8696</u>	1.9980
	19 V 100 HZ	18.895	<u>18.971</u>	19.105
	19 V 10 KHZ	18.895	<u>18.928</u>	19.105
	19 V 50 KHZ	18.020	<u>18.804</u>	19.980

200 V	190 V	100 HZ	188.95	<u>189.79</u>	191.05
	100 V	10 KHZ	99.40	<u>99.55</u>	100.60
750 V	750 V	100 HZ	745.2	<u>748.5</u>	754.8
	750 V	1 KHZ	745.2	<u>747.3</u>	754.8

dB VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 mV	SHORT	> -75	<u>-106</u>	
	10 mV 100 HZ	-37.28	<u>-37.79</u>	-38.28
	10 mV 10 KHZ	-37.28	<u>-37.79</u>	-38.28
	1.0 V 100 HZ	+2.07	<u>+2.21</u>	+2.37

DC CURRENT ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 uA	190 uA	189.41	<u>190.08</u>	190.59
2 mA	1.9 mA	1.8941	<u>1.9004</u>	1.9059
20 mA	19 mA	18.941	<u>19.002</u>	19.059
200 mA	190 mA	189.41	<u>190.15</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>100.01 Ω</u>	±14 C	<u>99.95</u>
2 KΩ	<u>1.0000 K</u>	±12 C	<u>1.9994</u>
20 KΩ	<u>10.000 K</u>	±7 C	<u>10.000</u>
200 KΩ	<u>100.00 K</u>	±7 C	<u>99.99</u>
2000 KΩ	<u>1.0001 M</u>	±28 C	<u>1000.0</u>
20 MΩ	<u>10.001 M</u>	±28 C	<u>10.002</u>
2 mS	<u>1.0000 K</u>	±15 C	<u>1.0006</u>
200 nS	<u>10.001 M</u>	±70 C	<u>99.97</u>

ROTHER DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA: FLUKE 8050A DIGITAL MULTIMETER

CUSTOMER: SWRT
 WO NUMBER: 51989
 SERIAL: 5005110
 CUST ID: _____

DATE: 31 Jan 96
 TECH: PJS
 INST NO: 21872

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>190.00</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>189.99</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		<u>.0018</u>	<.0040
200 mV	190.0 mV 100 HZ	188.95	<u>189.86</u>	191.05
	190.0 mV 10 KHZ	188.95	<u>189.80</u>	191.05
	190.0 mV 50 KHZ	180.20	<u>187.02</u>	199.80
2 V	100.0 mV 100 HZ	.0985	<u>.0998</u>	.1015
	1.9 V 100 HZ	1.8895	<u>1.8996</u>	1.9105
	1.9 V 10 KHZ	1.8895	<u>1.8989</u>	1.9105
20 V	1.9 V 50 KHZ	1.8020	<u>1.8712</u>	1.9980
	19 V 100 HZ	18.895	<u>18.986</u>	19.105
	19 V 10 KHZ	18.895	<u>18.997</u>	19.105
	19 V 50 KHZ	18.020	<u>18.920</u>	19.980

200 V	190 V	100 HZ	188.95	<u>189.96</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>748.8</u>	754.8

dB VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 mV	SHORT	> -75	<u>-93</u>	
	10 mV 100 HZ	-37.28	<u>-37.77</u>	-38.28
	10 mV 10 KHZ	-37.28	<u>-37.78</u>	-38.28
	1.0 V 100 HZ	+2.07	<u>+2.22</u>	+2.37

DC CURRENT ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 uA	190 uA	189.41	<u>190.03</u>	190.59
2 mA	1.9 mA	1.8941	<u>1.8998</u>	1.9059
20 mA	19 mA	18.941	<u>18.997</u>	19.059
200 mA	190 mA	189.41	<u>190.10</u>	190.59
2000 mA	1.9 A	1894.1	<u>1901.7</u>	1905.9

RESISTANCE ACCURACY

RANGE	ACTUAL INPUT	TOLERANCE	READING
200 Ω	SHORT	<00.04 C	<u>00.01</u>
	(1) <u>100.01 Ω</u>	±14 C	<u>99.95</u>
2 KΩ	<u>1.0000 K</u>	±12 C	<u>.9994</u>
20 KΩ	<u>10.000 K</u>	±7 C	<u>9.999</u>
200 KΩ	<u>100.00 K</u>	±7 C	<u>99.99</u>
2000 KΩ	<u>1.0001 M</u>	±28 C	<u>1000.0</u>
20 MΩ	<u>10.001 M</u>	±28 C	<u>10.002</u>
2 mS	<u>1.0000 K</u>	±15 C	<u>1.0006</u>
200 nS	<u>10.001 M</u>	±70 C	<u>99.97</u>

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory

CERTIFICATE OF CALIBRATION
02/05/96

Issued to: DARRELL DUNN DIV20 ,B57
Manufacturer/Model: FLUKE/8050A
Nomenclature: DIGITAL MULTIMETER
Serial Number: 5005110
Asset Number: 001435
Notes:

ENVIRONMENTAL CONDITIONS

Temperature: 74.0F

Relative Humidity: 31%

CALIBRATION INFORMATION

Procedure Number: MFGR SERVICE MAN
Remarks: ADJUSTED TO SPEC., CAL BY ROTHE DEV.,
SAN ANTONIO, TX. CERT# 41980

Accuracy: MFGR SPECS
Received OUT Tolerance

**Calibration was in accordance with requirements of MIL-STD-45662A.
Measurements are traceable to the National Institute of Standards and Tech-
nology. 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
---------	----------	-----	---------	--------------	----------	--------------

VENDOR

Certified by : _____

Calibration Date: 01/31/96
Interval: 12 months
Next Calibration Due: 01/31/97

Certificate#: 20020

SOUTHWEST RESEARCH INSTITUTE
Department of Quality Assurance
Calibration Laboratory

OUT OF TOLERANCE NOTICE

02/05/96

The following asset was found to be out of tolerance when submitted for calibration. Please be aware measurements made with this may be inaccurate.

INSTRUMENT INFORMATION

Issued to: DARRELL DUNN DIV20 B57 Asset Number: 001435
Manufacturer: FLUKE Model Number: 8050A
Nomenclature: DIGITAL MULTIMETER
Serial Number: 5005110 SwRI Capital Number: UNKWN
Accuracy: MFGR SPECS Calibration Interval: 12 months

DEVIATION

Out of Tolerance Date: 01/31/96 Last Valid Calibration Date: 02/09/95

REMARKS

RECEIVED OUT OF TOLERANCE. ADJUSTED TO SPECIFICATION.

AC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
2 V	SHORT 100.0 mV 100HZ	.0985	.0982	.1015

ADJUSTED
READ: .0998

Signed 

Checked by 

OUT OF TOLERANCE



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

Certificate of Calibration

16 June 1999

Issued to: DARRELL DUNN DIV20 B57
Manufacturer/Model: FLUKE 8050A
Description: DIGITAL MULTIMETER
Serial Number: 5005110
Asset Number: 001435

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: 75.0 Degrees Fahrenheit Humidity: 42 % RH

Calibration Date: 16 Jun 99 **Calibration Procedure:** FLUKE 8050A:(1 YEAR)CAL VER /5700

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor or Walt Hill, Metrologist

Certificate # 34811

m:\nona21a.rpt Rev date 13 Apr 99

Measurements performed by:

Vince Morales, Technician

Page 1 of 1