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

WORK ORDER

CERTIFICATE # 27654 ASSET # 001435 DATE 20 Nov. 97

ITEM DATA:

Manufacturer Fluke Model 8050A

Description DMM Serial # 5005110

Accessories

ACTION REQUESTED Cal

CUSTODIAN DMM, David Dunn

Turned in by: Phone 000

CHARGE # 20-1662-571 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 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) Radio Dev St# 31670 11/21
BT indicator on when received. Battery would not charge. Replaced battery pack

CAL ENVIRONMENT:
Temperature 72 °F Humidity 34 %RH

CALIBRATED/REPAIRED:
By Radio Dev. San Antonio, TX Cal Procedure MSG
Date 12/2/97 Accuracy MSG
Cal Interval 12 mos Reliability Code:
Next Cal due 12/2/98 Cal Time Repair Time
Standards used (Asset#) Various

DATE COMPLETED 04 Dec. 97
DATE PICKED UP 12/4/97 PICKED UP BY

SwRI Form QA-174-0

CERT. NUMBER: 50533

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: 5005110
CUST. ID:

CAL DATE: 12/02/1997
DUE DATE: 12/02/1998

CONTROL NO.: 103 - 21872
TECHNICIAN: 4
SPECIFICATIONS: MFG
PROCEDURE: MFG
WORK ORDER: 62631
CUSTOMER P.O.: 02127/ST311670/20-1402571
RECEIVED CONDITION: OUT OF TOLERANCE
RETURNED CONDITION: IN TOLERANCE

CALIBRATION PERFORMED AT: RDMSD
CALIBRATION INTERVAL: 12mos.
TEMPERATURE: 72 °F
RELATIVE HUMIDITY: 34 %

DATE RECEIVED: 11/24/1997

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
20	FLUKE	5700A	4605002	12/09/1997
258	Fluke	5725A	6585002	12/09/1997

APPROVED BY: _____ [X] CMS [ ] QCO DATE: 12/03/1997

ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA: FLUKE 8050A DIGITAL MULTIMETER

CUSTOMER: SWRI
WO NUMBER: 62631
SERIAL: 5005110
CUST ID:

DATE: 2 Dec 97
TECH: PJS
INST NO: 21872

CALIBRATION DATA TAKEN

INCOMING ✓
OUTGOING

CONDITION OF EQUIPMENT

IN TOLERANCE
OUT OF TOLERANCE ✓ *

* BT operation only

DC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 mV	+190.0 mV	189.92	190.01	190.08
	-190.0 mV	189.92	190.00	190.08
2 V	+1.9 V	1.8992	1.9000	1.9008
	-1.9 V	1.8992	1.9001	1.9008
20 V	+19 V	18.992	19.000	19.008
200 V	+190 V	189.92	190.00	190.08
1000 V	+1000 V	999.5	1000.0	1000.5

AC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
2 V	SHORT		.0017	<.0040
200 mV	190.0 mV 100 Hz	188.95	189.83	191.05
	190.0 mV 10 KHz	188.95	189.73	191.05
	190.0 mV 50 KHz	180.20	186.61	199.80
2 V	100.0 mV 100 Hz	.0985	.0997	.1015
	1.9 V 100 Hz	1.8895	1.8994	1.9105
	1.9 V 10 KHz	1.8895	1.8983	1.9105
	1.9 V 50 KHz	1.8020	1.8674	1.9980
20 V	19 V 100 Hz	18.895	18.987	19.105
	19 V 10 KHz	18.895	18.997	19.105
	19 V 50 KHz	18.020	18.891	19.980

200 V	190 V	100 Hz	188.95	189.95	191.05
	100 V	10 KHz	99.40	99.93	100.60
750 V	750 V	100 Hz	745.2	749.8	754.8
	750 V	1 KHz	745.2	748.9	754.8

dB VOLTAGE ACCURACY

RANGE	INPUT		MIN	READING	MAX
200 mV	SHORT		> -75	~~-35~~ -93	
	10 mV	100 Hz	-37.28	-37.78	-38.28
	10 mV	10 KHz	-37.28	-37.78	-38.28
	1.0 V	100 Hz	+2.07	+ 2.22	+2.37

DC CURRENT ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 uA	190 uA	189.41	190.03	190.59
2 mA	1.9 mA	1.8941	1.9000	1.9059
20 mA	19 mA	18.941	18.999	19.059
200 mA	190 mA	189.41	190.12	190.59
2000 mA	1.9 A	1894.1	1901.8	1905.9

RESISTANCE ACCURACY

RANGE		ACTUAL INPUT	TOLERANCE	READING
200 Ω		SHORT	<00.04 C	00.01
	(1)	100.01 Ω	±14 C	99.94
2 KΩ		1.0000 K	±12 C	.9993
20 KΩ		10.000 K	±7 C	9.998
200 KΩ		100.00 K	±7 C	99.98
2000 KΩ		1.0001 M	±28 C	999.9
20 MΩ		10.001 M	±28 C	10.002
2 mS		1.0000 K	±15 C	1.0003
200 nS		10.001 M	±70 C	99.97

✓ INCOMING
OUTGOING

ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA: FLUKE 8050A DIGITAL MULTIMETER

CUSTOMER: SwRI
WO NUMBER: 62631
SERIAL: 5005110
CUST ID:

DATE: 2 Dec 97
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	190.00	190.08
	-190.0 mV	189.92	189.99	190.08
2 V	+1.9 V	1.8992	1.9000	1.9008
	-1.9 V	1.8992	1.9000	1.9008
20 V	+19 V	18.992	18.999	19.008
200 V	+190 V	189.92	190.00	190.08
1000 V	+1000 V	999.5	1000.0	1000.5

AC VOLTAGE ACCURACY

RANGE	INPUT	MIN	READING	MAX
2 V	SHORT		.0017	<.0040
200 mV	190.0 mV 100 Hz	188.95	189.83	191.05
	190.0 mV 10 KHz	188.95	189.75	191.05
	190.0 mV 50 KHz	180.20	186.64	199.80
2 V	100.0 mV 100 Hz	.0985	.0998	.1015
	1.9 V 100 Hz	1.8895	1.8992	1.9105
	1.9 V 10 KHz	1.8895	1.8986	1.9105
	1.9 V 50 KHz	1.8020	1.8676	1.9980
20 V	19 V 100 Hz	18.895	18.984	19.105
	19 V 10 KHz	18.895	19.015	19.105
	19 V 50 KHz	18.020	18.926	19.980

200 V	190 V	100 Hz	188.95	189.95	191.05
	100 V	10 KHz	99.40	100.03	100.60
750 V	750 V	100 Hz	745.2	749.9	754.8
	750 V	1 KHz	745.2	748.8	754.8

dB VOLTAGE ACCURACY

RANGE	INPUT		MIN	READING	MAX
200 mV	SHORT		> -75	-93	
	10 mV	100 Hz	-37.28	-37.78	-38.28
	10 mV	10 KHz	-37.28	-37.78	-38.28
	1.0 V	100 Hz	+2.07	+2.22	+2.37

DC CURRENT ACCURACY

RANGE	INPUT	MIN	READING	MAX
200 uA	190 uA	189.41	190.02	190.59
2 mA	1.9 mA	1.8941	1.8998	1.9059
20 mA	19 mA	18.941	18.998	19.059
200 mA	190 mA	189.41	190.11	190.59
2000 mA	1.9 A	1894.1	1901.7	1905.9

RESISTANCE ACCURACY

RANGE		ACTUAL INPUT	TOLERANCE	READING
200 Ω		SHORT	<00.04 C	00.01
	(1)	100.01 Ω	±14 C	99.94
2 KΩ		1.0000 KΩ	±12 C	.9993
20 KΩ		10.000 KΩ	±7 C	9.999
200 KΩ		100.00 KΩ	±7 C	99.98
2000 KΩ		1.0001 MΩ	±28 C	1000.0
20 MΩ		10.001 MΩ	±28 C	10.002
2 mS		1.0000 KΩ	±15 C	1.0004
200 nS		10.001 MΩ	±70 C	99.97

___ INCOMING
✓ OUTGOING

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

Certificate of Calibration

4 December 1997

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

Environmental Conditions

Temperature: 72 Deg. F **Humidity:** 34 % RH

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.

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

Calibration Date: 2 Dec 97 **Calibration Procedure:** MFG

Interval: 12 months **Received:** Out of Tolerance

Next Calibration Due: 2 Dec 98

Remarks: CALIBRATED BY ROTHE DEV., SAN ANTONIO, TX.
ROTHE CERT. #50533.

Out of Tolerance Data

The unit was found to be in an Out of Tolerance condition as indicated below. An evaluation should be made by the user to determine any adverse impact that may have occurred.

BT INDICATOR ON WHEN RECEIVED - BATTERIES WOULD NOT CHARGE.
REPLACED BATTERY PACKS; TOOK DATA. NO ADJUSTMENTS NEEDED.

Signed:
Title:

Checked By:
Title:

LAST PAGE OF REPORT
Total Pages Printed: 1

OUT OF TOLERANCE

Certificate # 27654

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

WORK ORDER

CERTIFICATE # 34811 ASSET # 001435 DATE 07 June 99

ITEM DATA:

Manufacturer Fluke Model 8050A

Description Digital Multimeter Serial # 5005110

Accessories

ACTION REQUESTED cal

CUSTODIAN Div. 20, Darrell Dunn

Turned in by: Phone 6090

CHARGE # 20-0H 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 J. J. L. Date 07 June 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

34811

ACTION TAKEN: (Calibration/Repair/Parts)

CAL ENVIRONMENT:
Temperature 75 °F Humidity 42 %RH

CALIBRATED/REPAIRED:
By VMorales Cal Procedure MET/CAL 5700A/CAL VER REV 1.1
Date 16 June 99 Accuracy Mfs
Cal Interval 12 Reliability Code: 1
Next Cal due 16 June 00 Cal Time 1.5 Repair Time
Standards used (Asset#) 7198

DATE COMPLETED 16 June 99
DATE PICKED UP 6/22/99 PICKED UP BY

SwRI Form QA-174-0

WORK ORDER 39975

Date Received 7/31/00

Asset No. 001435 **Manufacturer** FLUKE **Model** 8050A
Description DIGITAL MULTIMETER **Serial Number** 5005110
Accessory Received/Required TEST LEADS
Div/CC ID NONE **Accessory to Asset No.** N/A
Div/CC DIV20 **Location** B57 **Custodian** DARRELL DUNN **Tel.** 6090
Charge/Project No. 20.00751.006 **Proprietary/Confidental** **Date Required** ROUTINE
Work Requested CALIBRATION
Receiving Inspection OK
Delivered By DARRELL DUNN **Tel.** 6090

WORK HISTORY

Date	Start Time	Stop Time	Notes
			Check fuse.

PARTS

Part Name	Part Number	Cost	Failure Description

39975

WORK SUMMARY

Failure Description _____

Repair Action _____

Cal Procedure CL-251, 9/99 Fluke 8050A 5520 1yr SEP 99 **Temp** 74 **F** **Hum** 40 **%**

Tech Vincent Morales **Cal Hrs.** 1.0 **Repair Hrs.** _____ **Part Cost** _____

Action Taken Calibrated

Standards Used 6413

Date Cal 09 Aug 2000 **Int.** 0 **Mo. Date Due** Not on Recall **Reliability Code** 3

Date Picked Up 8/10/2000 **Picked Up By** Darrell Dunn

workreq.rpt Rev 30 Jan 00

Calibration Results

SwRI Calibration Laboratory

UUT: FLUKE 8050A
DIGITAL MULTIMETER
Serial No: 5005110
Asset No. 001435

Result: **PASS**
Performed on: 8/9/00 at 09:41:10
Performed by: Mark Anthony Romero
Environment: Temp. 74.0°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	14-Oct-99	14-Oct-00

Test Data

TEST#	STD PARAMETER	TRUE VALUE	UNIT UNDER TEST READING	TOLERANCE	UUT ERROR	ERROR in (% of Tol)	NOTIFY TUR	NOTIFY USER
DISPLAY TEST								
overrange indicator								
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		190.00	80uV	0V	0		
16	-190.00mV		-190.00	80uV	0V	0		
2V Range								
17	1.9000V		1.9000	800uV	0V	0		
18	-1.9000V		-1.9000	800uV	0V	0		

TEST#	STD PARAMETER	TRUE VALUE	UNIT UNDER TEST READING	TOLERANCE	UUT ERROR	ERROR in (% of Tol)	NOTIFY TUR	NOTIFY USER
20V Range								
19	19.000V		19.000	8mV	0V	0		
200V Range								
20	190.00V		190.00	80mV	0V	0		
1000V Range								
21	1000.0V		1000.0	500mV	0V	0		
AC VOLTAGE								
200mV Range								
22	190.00mV @ 100Hz		189.83	1.05mV	-170uV	16		
23	190.00mV @ 10kHz		189.76	1.05mV	-240uV	23		
24	190.00mV @ 50kHz		186.91	9.8mV	-3.09mV	32		
2V Range								
25	0.0000V		0.0018	4mV	1.8mV	45		
26	0.1000V @ 100Hz		0.0994	1.5mV	-600uV	40		
27	1.9000V @ 100Hz		1.8989	10.5mV	-1.1mV	10		
28	1.9000V @ 10kHz		1.8980	10.5mV	-2mV	19		
29	1.9000V @ 50kHz		1.8701	98mV	-29.9mV	31		
20V Range								
30	19.000V @ 100Hz		18.980	105mV	-20mV	19		
31	19.000V @ 10kHz		18.998	105mV	-2mV	2		
32	19.000V @ 50kHz		18.924	980mV	-76mV	8		
200V Range								
33	190.00V @ 100Hz		189.88	1.05V	-120mV	11		
34	100.00V @ 10kHz		99.89	600mV	-110mV	18		
750V Range								
35	750.0V @ 100Hz		749.2	4.8V	-800mV	17		
36	750.0V @ 1kHz		748.1	4.8V	-1.9V	40		
dB VOLTAGE TESTS								
UUT reading below -75dBm								
Result of Operator Evaluation						PASS		
~~UUT reading below -75dBm~~								
~~dB VOLTAGE TESTS~~								
~~UUT reading below -75dBm~~								
~~dB VOLTAGE TESTS~~								
~~UUT reading below -75dBm~~								
~~Result of Operator Evaluation~~						~~PASS~~		
~~38~~	~~-37.78dBm @ 100Hz~~		~~-40.00~~	~~134.93uV~~	~~-2.22dBm~~	~~>500~~		*
38	-37.78dBm @ 100Hz		-37.78	174.224uV	0dBm	0		
39	-37.78dBm @ 100Hz		-37.78	174.224uV	0dBm	0		
40	2.22dBm @ 100Hz		2.22	17.4224mV	0dBm	0		
RESISTANCE								
20 MOhm Range								
41	10.00 MOhm		10.00	28 kOhm	0 Ohm	0		
2000 kOhm Range								
42	1000.0 kOhm		999.9	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		99.99	700pS	-10pS	1		
20 kOhm Range								
45	10.000 kOhm		9.998	7 Ohm	-2 Ohm	29		
2 kOhm Range								
46	1.0000 kOhm		0.9993	1.2 Ohm	-700 mOhm	58		
200 Ohm Range								
47	0.00 Ohm		0.01	40 mOhm	10 mOhm	25		
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		190.01	590nA	10nA	2		
2mA Range								

TEST#	STD PARAMETER	TRUE VALUE	UNIT UNDER TEST READING	TOLERANCE	UUT ERROR	ERROR in (% of Tol)	NOTIFY TUR	NOTIFY USER
51	1.9000mA		1.8997	5.9uA	-300nA	5		
20mA Range								
52	19.000mA		18.998	59uA	-2uA	3		
200mA Range								
53	190.00mA		190.11	590uA	110uA	19		
2000mA Range								
54	1900.0mA		1901.6	5.9mA	1.6mA	27		
AC CURRENT								
20mA Range								
55	19.000mA @ 100Hz		18.973	200uA	-27uA	14		

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

9 August 2000

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. 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: 74.0 Degrees Fahrenheit Humidity: 40 % RH

Calibration Date: 9 Aug 00 **Calibration Procedure:** FLUKE 8050A 5520 1YR SEP 99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist

Measurements performed by:

Vince Morales, Technician

Certificate # 39975