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

Certificate of Calibration

8 November 1996

Issued to: SITAKANTA MOHANTY DIV20 B189
Manufacturer/Model: FLUKE 87
Description: TRUE RMS MULTIMETER
Serial Number: 61880517
Asset Number: 003674

Environmental Conditions

Temperature: 73.0 Deg. F **Humidity:** 32%

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: 7 Nov 96 **Calibration Procedure:** MET/CAL 5700A/CAL VER. REV. 2.4

Interval: 12 months **Accuracy:** MFG

Next Calibration Due: 7 Nov 97 **Received:** In Tolerance

Remarks:

Certificate # 23202 **Signed:** Vincent Morales

LAST PAGE OF REPORT
Total Pages Printed: 1

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

WORK ORDER

CERTIFICATE # 23202 ASSET # 3674 DATE 4 Nov 96

ITEM DATA:

Manufacturer JOHN FLUKE Model 87

Description ~~[illegible]~~ TRUE RMS Multimeter Serial # 61850517

Accessories _____

ACTION REQUESTED Rubber Protective Case
Scheduled CoL.

CUSTODIAN ~~Ron Green~~ DIV. 20, Standards Mfg.

Turned in by: Melissa Phone 2012

CHARGE # 20-0N6 90 Date Required ASAP

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) Calibrated. 4/04/96 MKE

Replaced 9V battery 11/7/96

CAL ENVIRONMENT:
Temperature _____ °F Humidity _____ %RH

CALIBRATED/REPAIRED:
By _____
Date _____
Cal Interval _____
Next Cal due _____
Cal Procedure MET/CAL 5700A/CAL VER RE 2.4
Accuracy MFG
Time to complete:
Cal _____ Repair _____
Standards used (Asset#) _____

DATE COMPLETED _____
DATE PICKED UP _____ PICKED UP BY Melissa E. Hill

SwRI Form QA-169-2

23202

Southwest Research Institute (Calibration Lab) MET/CAL RESULTS

ASSET NUMBER:	003674
UNIT UNDER TEST:	Fluke 87: (1 year) CAL VER
SERIAL NUMBER:	61880517
RESULT:	Y
TEST STATUS:	COMPLETED
OPERATOR:	Vince Morales
DATE:	07-Nov-96
TEMPERATURE:	76
RELATIVE HUMIDITY:	32
WORK ORDER NUMBER:	23202
TEST TYPE:	f

TRACEABILITY INFORMATION

Fluke	5700A	000182	13-Nov-96
Fluke	5725A	000201	13-Nov-96
Gen Rad	1413	003121	12-jul-97

TEST COMMENTS...

Southwest Research Institute (Calibration Lab) 07-Nov-96
CALIBRATION DATA RECORD WORK ORDER : 23202
MODEL NUMBER: 87 SERIAL NUMBER: 61880517

	PARAMETER	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH
1	DISPLAY TEST			
1	Result of Operator Evaluation	PASS		
	ROTARY SWITCH TESTS			
	VAC			
2	0display	0	-12	12
	VDC			
3	-32display	-35	-44	-20
	mVDC			
4	-64display	-70	-76	-52
	Ohms			
5	-96display	-102	-108	-84
	Diode			
6	-128display	-131	-140	-116
	mA/A			
7	-160display	-162	-172	-148
	uA			
8	-192display	-192	-204	-180
	AC VOLTAGE TESTS			
	400mV Range			
9	350.0mV @ 60Hz	349.2	347.1	352.9
10	350.0mV @ 1kHz	349.3	346.1	353.9
11	350.0mV @ 5kHz	347.5	342.6	357.4
12	350.0mV @ 20kHz	347.8	341.0	359.0
	4V Range			
13	3.500V @ 60Hz	3.490	3.473	3.527
14	3.500V @ 1kHz	3.489	3.461	3.539
15	3.500V @ 5kHz	3.470	3.426	3.574
16	3.500V @ 20kHz	3.460	3.410	3.590

Southwest Research Institute (Calibration Lab) 07-Nov-96
CALIBRATION DATA RECORD WORK ORDER : 23202
MODEL NUMBER: 87 SERIAL NUMBER: 61880517

	PARAMETER	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH
36	1000.0Hz @ 6.0V	999.9	999.8	1000.2
	displaying all zeros			
37	Result of Operator Evaluation	PASS		
	DC VOLTAGE TESTS			
	4V Range			
38	3.500V	3.500	3.495	3.505
	40V Range			
39	35.00V	35.00	34.95	35.05
40	-35.00V	-34.99	-35.05	-34.95
	400V Range			
41	350.0V	350.0	349.5	350.5
	1000V Range			
42	1000V	1000	998	1002
	1ms MIN/MAX TESTS			
43	2.828VP	2.820	2.783	2.873
44	-2.828VP	-2.816	-2.873	-2.783
	DC MILLIVOLT TEST			
	400mV Range			
45	350.0mV	349.9	349.5	350.5
	RESISTANCE TESTS			
	400 Ohm Range			
46	190.0Z	190.1	189.5	190.5
	40 kOhm Range			
47	19.00kZ	19.00	18.95	19.05
	4 MOhm Range			

Southwest Research Institute (Calibration Lab) 07-Nov-96
CALIBRATION DATA RECORD WORK ORDER : 23202
MODEL NUMBER: 87 SERIAL NUMBER: 61880517

PARAMETER	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH
48 1.900MZ	1.901	1.895	1.905
40 MOhm Range			
49 19.00MZ	19.02	18.78	19.22
CONDUCTANCE TEST			
40nS Range			
50 10.00nS	9.98	9.80	10.20
DIODE TEST			
51 3.000V	2.994	2.939	3.061
CAPACITANCE TESTS			
5.00uF Range			
52-1 1.00uF	0.99	0.96	1.04
0.500uF Range			
52-2 0.470uF	0.470	0.462	0.478
0.0500uF Range			
52-3 0.0470uF	0.0475	0.0462	0.0478
5.00nF Range			
52-4 4.70nF	4.73	4.30	5.10
DC MILLIAMP TESTS			
40mA Range			
53 35.00mA	35.00	34.91	35.09
400mA Range			
54 350.0mA	349.8	349.1	350.9
AC MILLIAMP TESTS			
40mA Range			

Southwest Research Institute (Calibration Lab) 07-Nov-96
CALIBRATION DATA RECORD WORK ORDER : 23202
MODEL NUMBER: 87 SERIAL NUMBER: 61880517

	PARAMETER	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH
	40V Range			
17	35.00V @ 60Hz	34.90	34.73	35.27
18	35.00V @ 1kHz	34.99	34.61	35.39
19	35.00V @ 5kHz	35.06	34.26	35.74
20	35.00V @ 20kHz	34.88	34.10	35.90
	400V Range			
21	350.0V @ 60Hz	349.0	347.3	352.7
22	350.0V @ 1kHz	349.7	346.1	353.9
23	350.0V @ 5kHz	350.2	342.6	357.4
24	100.0V @ 20kHz	102.4	96.0	104.0
25	200.0V @ 20kHz	204.7	194.0	206.0
26	300.0V @ 20kHz	306.7	292.0	308.0
27	350.0V @ 20kHz	357.7	341.0	359.0
	1000V Range			
28	900V @ 60Hz	902	892	908
29	900V @ 1kHz	902	887	913
30	900V @ 5kHz	905	878	922
	FREQUENCY TESTS			
	19.999kHz Range			
31	19.000kHz @ 150mV	18.999	18.998	19.002
	199.99kHz Range			
32	190.00kHz @ 150mV	189.98	189.98	190.02
	FREQUENCY SENSITIVITY AND TRIGGER LEVEL			
	4V AC Range			
33	1000.0Hz @ 300mV	999.9	999.8	1000.2
	4V DC Range			
34	1000.0Hz @ 1.7V	999.9	999.8	1000.2
	displaying all zeros			
35	Result of Operator Evaluation	PASS		
	40V DC Range			

Southwest Research Institute (Calibration Lab) 07-Nov-96
CALIBRATION DATA RECORD WORK ORDER : 23202
MODEL NUMBER: 87 SERIAL NUMBER: 61880517

	PARAMETER	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH
55	35.00mA @ 60Hz	34.95	34.63	35.37
56	35.00mA @ 1kHz	35.01	34.63	35.37
	400mA Range			
57	350.0mA @ 60Hz	349.4	346.3	353.7
58	350.0mA @ 1kHz	349.9	346.3	353.7
	DC MICROAMP TESTS			
	400A Range			
59	350.0uA	349.9	349.0	351.0
	4000A Range			
60	3500uA	3497	3491	3509
	AC MICROAMP TESTS			
	400A Range			
61	350.0uA @ 60Hz	349.3	346.3	353.7
62	350.0uA @ 1kHz	349.9	346.3	353.7
	4000A Range			
63	3500uA @ 60Hz	3492	3463	3537
64	3500uA @ 1kHz	3497	3463	3537
	DC AMP TESTS			
	4000mA Range			
	10A Range			
66	10.00A	10.00	9.96	10.04
	AC AMP TESTS			
	4000mA Range			
67	3500mA @ 60Hz	3495	3463	3537
68	3500mA @ 1kHz	3502	3463	3537

Southwest Research Institute (Calibration Lab) 07-Nov-96
CALIBRATION DATA RECORD WORK ORDER : 23202
MODEL NUMBER: 87 SERIAL NUMBER: 61880517

	PARAMETER	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH
	10A Range			
69	10.00A @ 60Hz	10.03	9.88	10.12
70	10.00A @ 1kHz	10.04	9.88	10.12

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

WORK ORDER

CERTIFICATE # 27259 ASSET # 003674 DATE 14 OCT. 97

ITEM DATA:

Manufacturer Fluke Model 87

Description True RMS Multimeter Serial # 67890517

Accessories Case

ACTION REQUESTED Cal

CUSTODIAN Div. 20, Rothman Sitakanta Mohanty

Turned in by: Melissa Hill Phone 2012

CHARGE # 20-04 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

27259

ACTION TAKEN: (Calibration/Repair/Parts) Replaced 9V battery + checked fuses.

CAL ENVIRONMENT:
Temperature 75 °F Humidity 40 %RH

CALIBRATED/REPAIRED:
By VMenchaca Cal Procedure Met/Cal 5700A/Cal Ver Rev 1.8
Date 24 Oct 97 Accuracy MFS
Cal Interval 12 Reliability Code:
Next Cal due 24 Oct 98 Cal Time Repair Time
Standards used (Asset#) 182, 3121, 114, 201

DATE COMPLETED 24 Oct 97
DATE PICKED UP 11/3/97 PICKED UP BY Melissa Hill

SwRI Form QA-174-0

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

Certificate of Calibration

24 October 1997

Issued to: SITAKANTA MOHANTY DIV20 B189
Manufacturer/Model: FLUKE 87
Description: TRUE RMS MULTIMETER
Serial Number: 61880517
Asset Number: 003674

Environmental Conditions

Temperature: 75.00 Deg. F **Humidity:** 40 % 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: 24 Oct 97 **Calibration Procedure:** FLUKE 87: (1 YEAR) CAL VER. REV. 1.5

Interval: 12 months

Next Calibration Due: 24 Oct 98 **Received:** In Tolerance

Remarks:

Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
000182	FLUKE	5700A	CALIBRATOR	5200003	3 Jan 98
000114	HEWLETT-PA	3325A	SYNTHESIZER/FUNCTION GENE	1748A17121	14 Feb 98
000201	FLUKE	5725A	AMPLIFIER	5195014	3 Jan 98
003121	GENERAL RA	1413	PRECISION DECADE CAPACITO	330	14 Jul 98

Certificate # 27259

Certificate of Calibration

24 October 1997

Issued to: SITAKANTA MOHANTY DIV20 B189
Manufacturer/Model: FLUKE 87
Description: TRUE RMS MULTIMETER
Serial Number: 61880517
Asset Number: 003674

Signed: [signature]

Title: Cal. Tech.

LAST PAGE OF REPORT
Total Pages Printed: 6

Certificate # 27259

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

ACCREDITED
Certificate #
0972-01

Certificate of Calibration

21 October 1998

Issued to: SITAKANTA MOHANTY DIV20 B189
Manufacturer/Model: FLUKE 87
Description: TRUE RMS MULTIMETER
Serial Number: 61880517
Asset Number: 003674

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.

This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this calibration certificate have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report. The uncertainty of the calibration was sufficient to determine that the instrument met the manufacturer's specifications.

Temperature: 74.0 Deg. F
Humidity: 40 % RH
Calibration Date: 21 Oct 98
Calibration Procedure: FLUKE 87: (1 YEAR) CAL VER
Interval: 12 months
Received: IN TOLERANCE
Next Calibration Due: 21 Oct 99
Remarks:

Standards Used

Asset	MFR	Model	Description	Serial No.	Due Cal
000182	FLUKE	5700A	CALIBRATOR	5200003	2 Jul 99
000201	FLUKE	5725A	AMPLIFIER	5195014	2 Jul 99
000114	HEWLETT-PACKARD	3325A	SYNTHESIZER/FUNCTION GENERAT	1748A17121	19 Feb 99
003121	GENERAL RADIO	1413	PRECISION DECADE CAPACITOR	330	21 Jul 99

Certificate # 27259

Certificate of Calibration

21 October 1998

Issued to: SITAKANTA MOHANTY DIV20 B189
Manufacturer/Model: FLUKE 87
Description: TRUE RMS MULTIMETER
Serial Number: 61880517
Asset Number: 003674

Signed:

Title: Cal-Tech

LAST PAGE OF REPORT
Total Pages Printed: 6

Certificate # 27259

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

WORK ORDER

WORK ORDER # 37229 ASSET # 003674 DATE 21 Dec. 99

ITEM DATA:

Manufacturer Fluke Model 87

Description True RMS Multimeter Serial # 61880517

Accessories Holster

ACTION REQUESTED Cal

CUSTODIAN Div. 20, Ron Green

Turned in by: Dwayne Halbordier Phone 2012

CHARGE # 20-04 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 MMC Date 12.21.99

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

CONDITION RECEIVED:
- ___ Out of tolerance
- ✓ In tolerance
- ___ Damaged (Contact customer)
- ___ Contact ___ Date ___
- ___ Received into system, introduced or reactivated

ACTION TAKEN: (Calibration/Repair/Parts)

CAL ENVIRONMENT:

Temperature 70 °F Humidity 38 %RH

CALIBRATED/REPAIRED:

By JMoebes Cal Procedure Fluke 87 5720A 14R Sep95

Date 4JAN00 Accuracy MS

Cal Interval 12 Reliability Code 5

Next Cal Due 4JAN01 Cal Time 1.5 Repair Time

Standards used (Asset #) 182, 209, 3121, 114

DATE COMPLETED 4JAN00

DATE PICKED UP 01/10/99 PICKED UP BY Dwayne Halbordier

SwRI Form QA-174-0

37229

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

4 January 2000

Issued to:	RON GREEN DIV20 B57
Manufacturer/Model:	FLUKE 87
Description:	TRUE RMS MULTIMETER
Serial Number:	61880517
Asset Number:	003674

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: 70.0 Degrees Fahrenheit Humidity: 38 % RH

Calibration Date: 4 Jan 00 **Calibration Procedure:** FLUKE 87 5720A 1YR SEP 99

Condition as Received: IN TOLERANCE

Condition as Released: IN TOLERANCE

Remarks:

Approved by:

Jim Patterson, Supervisor, or Walt Hill, Metrologist
Certificate # 37229

Measurements performed by:

Vince Morales, Technician

m:\a2la.rpt Rev date 14 Dec 99

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Processed by RCRUZ at 10:57:31AM on 1/3/01

Work Order 444041915 Arrived 1/3/01

Asset No. 003674 Manufacturer FLUKE Model 87

Instrument Type/Class MULTIMETER Serial No. 61880517

Accessory No. Calibration Procedure CL-165, 8/99 Location B57

Div/Client DIV20 Custodian RON GREEN Mail Stop B57 Tel. 5305

Charge/Project No. 20.00751.006 Delivered By / Telephone MELISSA HILL X2636

IN4CAL Special Instructions

WORK NOTES

Swift Cal-Lab By: vm
CAL: 01/04/00 DUE: 01/04/01
AN: 003674 SN: 61880517

Date	Hours	Remarks/Notes

REPAIR PARTS

Date	Hours	Part Name	Part Number	Failure Description	Cost
		Fuse	BBS-1 600V 1A	blown	
		battery	9V		

WORK SUMMARY

Failure Description

Repair Action

Calibration Procedure Fluke 87 5720A 1yr Sep 99 Temp 72 F Hum. 38 %

Tech Mark Anthony Lomeli Totals Cal Hours 1.5 Repair Hours Parts Cost

Standards Used 182, 201, 114, 3121

Date Picked Up 1-8-01 Picked Up By

Calibration Results

SwRI Calibration Laboratory

UUT: FLUKE 87
TRUE RMS MULTIMETER
Serial No: 61880517
Asset No. 003674

Result: **PASS**
Performed on: 1/4/01 at 13:17:15
Performed by: Mark Anthony Romero
Environment: Temp. 72.0°F Humid. 38 %
Condition F/L: FOUND-LEFT
Procedure Completed: YES

Notes:

Standards Used

Asset	Mfg	Model	Description	Cal. Date	Due Date
000182	FLUKE	5700A/EP	CALIBRATOR	11-Oct-00	11-Jan-01
000201	FLUKE	5725A	AMPLIFIER	10-Aug-99	10-Aug-01
000114	HEWLETT-PACKAR	3325A	SYNTHESIZER/FUNCTION GENERATOR	20-Sep-00	20-Sep-01
003121	GENERAL RADIO	1413	PRECISION DECADE CAPACITOR	15-Aug-00	15-Aug-01

Test Data

	STD	TRUE	UNIT UNDER TEST			ERROR in	NOTIFY
TEST#	PARAMETER	VALUE	READING	TOLERANCE	UUT ERROR	(% of Tol)	TUR USER
DISPLAY TEST							
Result of Operator Evaluation						PASS	
ROTARY SWITCH TESTS							
VAC							
2	0display		0		0display	0	
VDC							
3	-32display		-32		0display	0	
mVDC							
4	-64display		-64		0display	0	
Ohms							
5	-96display		-96		0display	0	
Diode							
6	-128display		-128		0display	0	
mA/A							
7	-160display		-160		0display	0	
uA							
8	-192display		-192		0display	0	
AC VOLTAGE TESTS							
400mV Range							
9	350.0mV @ 60Hz		349.1	2.9mV	-900uV	31	
10	350.0mV @ 5kHz		348.8	3.9mV	-1.2mV	31	
11	350.0mV @ 20kHz		350.3	7.4mV	300uV	4	
4V Range							
12	3.500V @ 60Hz		3.491	27mV	-9mV	33	
13	3.500V @ 5kHz		3.485	39mV	-15mV	38	
14	3.500V @ 20kHz		3.487	74mV	-13mV	18	
40V Range							
15	35.00V @ 60Hz		34.91	270mV	-90mV	33	
16	35.00V @ 5kHz		35.21	390mV	210mV	54	
17	35.00V @ 20kHz		35.17	740mV	170mV	23	

TEST#	PARAMETER	STD VALUE	TRUE VALUE	UNIT UNDER TEST READING	TOLERANCE	UUT ERROR	ERROR in (% of Tol)	TUR	NOTIFY USER
400V Range									
18	350.0V @ 60Hz			349.1	2.7V	-900mV	33		
19	350.0V @ 5kHz			348.9	3.9V	-1.1V	28		
20	100.0V @ 20kHz			99.2	2.4V	-800mV	33		
21	200.0V @ 20kHz			199.1	4.4V	-900mV	20		
22	300.0V @ 20kHz			298.5	6.4V	-1.5V	23		
23	350.0V @ 20kHz			348.2	7.4V	-1.8V	24		
1000V Range									
24	900V @ 60Hz			903	9V	3V	33		
25	900V @ 5kHz			901	14V	1V	7		
FREQUENCY TESTS									
19.999kHz Range									
26	19.000kHz			19.000	.002kHz	0kHz	0		
199.99kHz Range									
27	190.00kHz			190.00	.02kHz	0kHz	0		
FREQUENCY SENSITIVITY AND TRIGGER LEVEL									
4V AC Range									
28	1000.0Hz @ 300mV			999.9	30Hz	-100mHz	0		
4V DC Range									
29	1000.0Hz @ 1.7V			999.9	30Hz	-100mHz	0		
displaying all zeros									
Result of Operator Evaluation							PASS		
40V DC Range									
31	1000.0Hz @ 6.0V			999.9	30Hz	-100mHz	0		
displaying all zeros									
Result of Operator Evaluation							PASS		
DC VOLTAGE TESTS									
4V Range									
33	3.500V			3.500	5mV	0V	0		
40V Range									
34	35.00V			35.00	50mV	0V	0		
35	-35.00V			-35.00	50mV	0V	0		
400V Range									
36	350.0V			350.0	500mV	0V	0		
1000V Range									
37	1000V			1000	2V	0V	0		
1ms MIN/MAX TESTS									
38	2.828VP			2.808	.045VP	-0.02VP	44		
39	-2.828VP			-2.808	.045VP	0.02VP	44		
DC MILLIVOLT TEST									
400mV Range									
40	350.0mV			350.1	500uV	100uV	20		
RESISTANCE TESTS									
400 Ohm Range									
41	190.0 Ohm		189.99	190.1	500 mOhm	105.58 mOhm	21		
40 kOhm Range									
42	19.00 kOhm		18.999	19.01	50 Ohm	11.388 Ohm	23		
4 MOhm Range									
43	1.900 MOhm		1.8999	1.901	5 kOhm	1.0552 kOhm	21		
40 MOhm Range									
44	19.00 MOhm		18.998	19.02	220 kOhm	21.649 kOhm	10		
CONDUCTANCE TEST									
40nS Range									
45	10.00nS		10.002	10.00	200pS	-1.66228pS	1		
DIODE TEST									
46	3.000V			2.993	61mV	-7mV	11		
CAPACITANCE TESTS									
5.00uF Range									
47-1	1.00uF			0.99	.0399uF	-0.01uF	25		
0.500uF Range									
47-2	0.470uF			0.470	.0077uF	0uF	0		
0.0500uF Range									

TEST#	STD PARAMETER	TRUE VALUE	UNIT UNDER TEST READING	TOLERANCE	UUT ERROR	ERROR in (% of Tol) . TUR	NOTIFY ,USER
47-3	0.0470uF		0.0474	774E-6uF	0.0004uF	52	
5.00nF Range							
47-4	4.70nF		4.74	.3974nF	0.04nF	10	
DC MILLIAMP TESTS							
40mA Range							
48	35.00mA		35.03	90uA	30uA	33	
400mA Range							
49	350.0mA		350.2	900uA	200uA	22	
AC MILLIAMP TESTS							
40mA Range							
50	35.00mA @ 60Hz		34.98	370uA	-20uA	5	
51	35.00mA @ 1kHz		35.03	370uA	30uA	8	
400mA Range							
52	350.0mA @ 60Hz		349.8	3.7mA	-200uA	5	
53	350.0mA @ 1kHz		350.2	3.7mA	200uA	5	
DC MICROAMP TESTS							
400uA Range							
54	350.0uA		350.2	900nA	200nA	22	
4000A Range							
55	3500uA		3500	9uA	0A	0	
AC MICROAMP TESTS							
400A Range							
56	350.0uA @ 60Hz		349.5	3.7uA	-500nA	14	
57	350.0uA @ 1kHz		350.0	3.7uA	0A	0	
4000A Range							
58	3500uA @ 60Hz		3496	37uA	-4uA	11	
59	3500uA @ 1kHz		3500	37uA	0A	0	
DC AMP TESTS							
4000mA Range							
60	3500mA		3499	9mA	-1mA	11	
10A Range							
61	10.00A		10.00	40mA	0A	0	
AC AMP TESTS							
4000mA Range							
62	3500mA @ 60Hz		3495	37mA	-5mA	14	
63	3500mA @ 1kHz		3502	37mA	2mA	5	
10A Range							
64	10.00A @ 60Hz		10.04	120mA	40mA	33	
65	10.00A @ 1kHz		10.07	120mA	70mA	58	

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

4 January 2001

Issued to:	RON GREEN DIV20 B57
Manufacturer/Model:	FLUKE 87
Description:	TRUE RMS MULTIMETER
Serial Number:	61880517
Asset Number:	003674

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: 38 % RH

Calibration Date: 4 Jan 01 **Calibration Procedure:** FLUKE 87 5720A 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:

Mark Romero, Technician

Certificate # 444041915

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by RCRUZ,3/7/02 10:17:21AM

Arrived 3/7/02 Work Order **444047568**

Asset No. 003674 Manufacturer FLUKE Model 87

Equipment Type MULTIMETER Serial No. 61880517 Accessory No.

Interval 12 M Calibration Procedure FLUKE 87 5720A 1YR SEP 99 Location B57

Div/Client DIV20 Custodian RON GREEN Mail Stop T1 Tel 5305

QUEUE Special Instructions _____

Notify before adjustments or repairs. ( ) Provide data with certificate ( ) Certificate Typ_____

Charge/Project No. 01402.661 1.20 Requester / Telephone MELISSA HILL

This information is correct for the work requested. _____

WORK NOTES

Date	Hours	Remarks/Notes
3/11	1	Cal

Date	Hours	Part Name	Part Number	Failure Description	Cost

WORK SUMMARY

Failure Description _____

Repair Action _____

Tech _____ Cal Hrs. 1 Repair Hrs ___ Parts Cost _____ Temp ____ F Hum. ____ %

Standards Used 003641 3

Date Picked Up 4/1/02 Picked Up By Melissa Hill

M:\TRAVELER10.RPTRev 19 Oct 2001

47568

CALIBRATION CHECK FORM

Date Calibrated March 11, 2002 Work Order 444047568 Cal By BLT

Procedure No./Date: CL-165, AUG 99 Unit Under Test: DIGITAL MULTIMETER

Mfg FLUKE Model: 87 SN 61880517 AN 003674

STEP	FUNCTION OR RANGE	APPLIED	TOLERANCE		MEASURED VALUES		P/F
			MIN - MAX		AS FOUND	RELEASED	
3-15	DISPLAY TEST		()PASS/()FAIL		PASS		
3-16	ROTARY SWITCH TEST						
	ACV	0	-12	+12	0		
	DCV	-32	-20	-43	-32		
	mV/DC	-64	-52	-76	-64		
	OHMS	-96	-84	-108	-96		
	DIODE	-128	-116	-140	-128		
	mA/A	-160	-148	-172	-160		
	uA	-192	-180	-204	-192		
3-17	AC VOLTAGE TESTS						
		350mV @60Hz	347.2	352.9mV	349.0		
		350mV @5kHz	346.1	353.9mV	348.4		
		350mV @20kh	342.6	357.4mV	350.1		
		3.5V @60Hz	3.474	3.527V	3.490		
		3.5V @5kHz	3.461	3.539V	3.481		
		3.5V @20kh	3.426	3.574V	3.483		
		35V @60Hz	34.74	35.27V	34.90		
		35V @5kHz	34.61	35.39V	35.23		
		350V @60Hz	347.4	352.7V	349.0		
		350V@5kh	346.1	353.9V	348.8		
		100V @20kHz	97.6	102.4V	99.0		
		200V @20kHz	195.6	204.4V	198.9		
		300V	293.6	306.4V	298.2		

CALIBRATION CHECK FORM

		@20kHz				

Date Calibrated March 11, 2002 Work Order 444047568 Cal By BLT

Procedure No./Date: CL-165, AUG 99 Unit Under Test: DIGITAL MULTIMETER

Mfg FLUKE Model: 87 SN 61880517 AN 003674

STEP	FUNCTION OR RANGE CONT'D	APPLIED	TOLERANCE MIN - MAX	MEASURED VALUES AS FOUND	MEASURED VALUES RELEASED	P/F
	AC VOLTAGE					
		1KV @60HZ	991 1009V	1003		
		1KV @5kHz	986 1014V	1000		
	FREQUENCY TEST	150mV @19kh	18.998 19.002V	18.999		
		150mV @190k	189.98 190.02V	189.99		
	FREQUENCY SENSITIVIYT					
		300mV @1kh	970 1030V	99.99		
		1.7V @1kHz	970 1030V	999.9		
		1V @1kHz	00.0	0		
		6V @1kHz	970 1030V	999.9		
		2V @1kHz	00.0	0		
	DC VOLTAGE					
		3.5V	3.495 3.505V	3.501		
		35.0V	34.95 35.05V	35.00		
		-35.0V	-34.95 -35.05V	-35.00		
		350V	349.5 350.5V	350.1		
		1000V	998 1002V	1000		
	1MS MIN-MAX					
		2V @60HZ	2.783 2.873V	2.820		
		2V @60HZ	-2.783 -2.873V	-2.816		

CALIBRATION CHECK FORM

Date Calibrated March 11, 2002 Work Order 444047568 Cal By BLT

Procedure No./Date: CL-165, AUG 99 Unit Under Test: DIGITAL MULTIMETER

Mfg FLUKE Model: 87 SN 61880517 AN 003674

STEP	FUNCTION OR RANGE CONT'D	APPLIED	TOLERANCE MIN - MAX		MEASURED VALUES AS FOUND	MEASURED VALUES RELEASED	P/F
	RESISTANCE						
		190Ω	189.5	190.5Ω	190.2		
		19.00KΩ	18.95	19.05KΩ	19.01		
		1.9MΩ	1.895	1.905MΩ	1.900		
		19MΩ	18.78	19.22MΩ	19.02		
		100MΩ	9.80	10.20MΩ	9.97		
	CAPACITANCE TEST						
		1.0uF	.97	1.03uF	.99		
		.470uF	.463	.477uF	.469		
		.0470uF	.0463	.0477uF	.0472		
		4.7nF	4.63	4.77nF	4.68		
	DC CURRENT						
		35mA	34.91	35.09mA	35.04		
		350mA	349.1	350.9mA	350.2		
	AC CURRENT						
		35mA @60Hz	34.63	35.37mA	34.97		
		35mA @1kHz	34.63	353.7mA	35.03		
		350mA @60Hz	346.3	353.7mA	349.7		
		350mA @1kHz	346.3	353.7mA	350.2		

CALIBRATION CHECK FORM

Date Calibrated March 11, 2002 Work Order 444047568 Cal By BLT

Procedure No./Date: CL-165, AUG 99 Unit Under Test: DIGITAL MULTIMETER

Mfg FLUKE Model: 87 SN 61880517 AN 003674

STEP	FUNCTION OR RANGE CONT'D	APPLIED	TOLERANCE MIN - MAX	MEASURED VALUES AS FOUND	MEASURED VALUES RELEASED	P/F
	DC UA TESTS					
		350uA	349.1 350.9uA	350.2		
		3500uA	3491 3509uA	3500		
	AC UA TESTS					
		350uA @60Hz	346.3 353.7uA	349.5		
		350uA @1kHz	346.3 353.7uA	350.0		
		3500uA @60Hz	3463 3537uA	3495		
		3500uA @1kh	3463 3537uA	3500		
	DC AMP TESTS					
		3500mA	3491 3509mA	3500		
		10A	9.96 10.04A	10.00		
	AC AMP TEST					
		3500mA @60h	3463 3537mA	3494		
		3500mA @1kh	3463 3537mA	3504		
		10A @60Hz	9.88 10.12A	10.04		
		10A @1kh	9.88 10.12A	10.07		

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

Certificate of Calibration

11 March 2002

Issued to:	RON GREEN DIV20 T1
Manufacturer/Model:	FLUKE 87
Description:	MULTIMETER
Serial Number:	61880517
Asset Number:	003674
Work Order Number:	444047568

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: 11 Mar 02 **Calibration Procedure:** FLUKE 87 5720A 1YR SEP 99

Condition as Received: IN TOLERANCE

Condition as Returned: IN TOLERANCE

Remarks:

Approved by:

Walt Hill, Supervisor
Institute Calibration Laboratory

Measurements performed by:

Bob Trollinger, Technician