Section 4
Maintenance

WARNING

THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

4-1. INTRODUCTION

4-2. This section contains the maintenance information for your 8050A Digital Multimeter. This information is divided into service information, general maintenance, a group of performance tests, a calibration adjustment procedure, and troubleshooting. The performance tests are recommended as an acceptance check when the instrument is first received and should be completed as necessary to verify that your 8050A is operating within the specification limits listed in Section 1. A calibration cycle of 1-year is recommended to maintain the specifications given in Section 1 of this manual. The test equipment required for both the performance test and the calibration adjustment procedure is listed in Table 4-1. If the recommended test equipment is not available, instruments having equivalent specifications may be used.

4-3. SERVICE INFORMATION

4-4. Your 8050A is warranted for a period of 1-year upon delivery to the original purchaser. Conditions of the warranty are given on the last page of this manual.

4-5. Malfunctions that occur within the limits of the warranty will be corrected at no charge. Simply mail the instrument postpaid to your nearest authorized Fluke Technical Service Center. Shipping information and a complete list of service centers are provided in Section 5 of this manual. Dated proof-of-purchase will be required for all in-warranty repairs.

4-6. Factory authorized service centers are also available for calibration and/or repair of instruments that are beyond their warranty period. Contact your nearest authorized Fluke Technical Service Center for a cost quote. Ship your 8050A and your remittance using the instructions given in Section 1 of this manual.

4-7. GENERAL INFORMATION

4-8. Access Information

NOTE

To avoid contaminating the pcb with oil from the fingers, handle the pcb by its edges or wear gloves. If the pcb does become contaminated, refer to the cleaning procedure given later in this section.

4-9. CALIBRATION ACCESS

4-10. Use the following procedure to gain access to the calibration adjustments of your 8050A:

1. Set the POWER switch to the OFF position and remove the power cord plug from the receptacle in the rear of the instrument.

Table 4-1. Recommended Calibration

INSTRUMENT TYPE	REQUIRED CHARACTERISTICS	RECOMMENDED MODEL
Calibrator	DC Voltage 0 to 1000V ±.006% AC Voltage 100 Hz 0 to 750V ±.06% 200 Hz 0 to 2V ±.06% 1 kHz 0 to 750V ±.06% 10 kHz 0 to 100V ±.06% 20 kHz 0 to 100V ±.1% 50 kHz 0 to 20V ±.5% DC Current 0 to 2000 mA ±.035% AC Current 19 mA, 100 Hz ±.1% Resistance 100Ω, 1 kΩ ±.01% 10 kΩ, 100 kΩ ±.005% 1 MΩ, 10 MΩ ±.05%	John Fluke Model 5100B
Calibration Leads	24" Shielded cable with a double banana plug at both ends	Pomona 2BC-24

2. Remove the phillips screw from the rear of your 8050A.

3. Grasp the front panel and slide the instrument out of the case.

4. Turn the instrument upside-down as viewed from the front panel.

5. All adjustments necessary to complete the calibration procedure are now accessible.

6. For reassembly, reverse the procedure (be careful to align the grooves in the sides of the front panel with the guides located inside the case and to bend the flexible interconnect inwards and out of the way).

4-11. MAIN PCB ACCESS (DISPLAY PCB REMOVAL)

4-12. Use the following procedure to gain access to all the components and test points on the Main PCB assembly for troubleshooting and repairing.

1. Complete the calibration access procedure.

2. Remove the Display (smaller) PCB Assembly using the following procedure:

CAUTION

To prevent instrument damage due to accidental shorting between the two boards, disconnect one of the wires from the right rear battery pins on the -01 Option (if installed).

a. Remove the screw from the rear center of the Display PCB.

b. Remove the two screws that hold the Display PCB in place. One of these screws is located near the center rear of the front panel, the other is near the power switch. Do not confuse these two screws with the two screws that hold the LCD bracket in place.

c. Slide the Display PCB toward the rear of the instrument and upwards until the assembly is free. Pushing inwards with your right thumb against the plastic display frame will facilitate this operation.

d. Carefully lay the Display PCB to one side.

e. Remove the two screws which fasten the top (component side) shield and lift the shield away from the Main PCB.

f. The instrument is still fully functional in this configuration and all test points and components are accessible. The bottom shield will come off by removing its hold-down screw.

NOTE

High frequency ac on the 20V range and above will not be in calibration with one or both of the shields removed. Insure that the input divider, U-1, is perpendicular to the Main PCB when the top AC shield is replaced.

3. Remove the front panel using the following procedure:

a. The V kΩ .S input line and the COMMON input line are attached to the front panel by a snap connector. Unplug these lines.

b. On the front panel, insert a coin or your fingernail into the slot on the mA terminal and turn the mA terminal 1/4 turn counterclockwise. Remove the fuse and the fuse holder.

c. Slide the fuse spring forward to the edge of the slide panel.

d. Pull the wire up through the slot in the fuse holder barrel.

e. Pull the spring and the fuse contact up through the hole in the fuse holder barrel.

f. Reinstall the fuse and fuse holder.

g. Turn the instrument component-side-down.

h. Remove the three screws that connect the Main PCB and the Front Panel Assembly. The screws are located at the front of the instrument, right, center, and left sides.

i. Carefully pull the front panel free of the switches.

4. To install the Main PCB, reverse this procedure, being careful to install the pcbs and the shields in their respective guides. Insure that the input divider, U-1, is perpendicular to the Main PCB when the top ac shield is replaced.

4-13. DISPLAY ACCESS

4-14. Use the following procedure to remove or replace the LCD:

1. Complete the Main PCB access procedure through step 2d.

2. Both the Main and Display PCBs should now be flat on your workbench, component-side-up.

3. Tilt the Display PCB towards the Main PCB, and remove the two screws connecting the Display PCB and the plastic display assembly.

4. Place your fingernail under the grey tabs on the display frame and lift them free of the screwposts on the display mounting bracket.

5. Rotate the display frame forward until the two hooks on the bottom of the display frame release the display mounting bracket.

6. The LCD may now be lifted free from the display mounting bracket. Handle the LCD by the side edges to avoid contaminating the conducting edge.

7. A two-inch length of flat, flexible material may fall out. This is the zebra strip. The zebra strip is an elastomeric strip of alternate areas of conductive and non-conductive material. When the screws are tightened to hold down the display assembly, this zebra strip provides electrical contact between the pads on the LCD and the land pattern on the Display PCB. The zebra strip is located in a channel on the display mounting bracket.

8. For reassembly, reverse this procedure, being sure that the zebra strip is properly placed between the display and Display PCB.

4-15. Changing Input Power Configuration

4-16. The standard instrument has one of three transformers; 100V, 120V, or 220/240V ac, 47-440 Hz. The transformer must be changed to accommodate a different line voltage. The -01 Battery Option has one transformer, 47-440 Hz. Match the transformer to the line voltage by soldering the white line power wire in the appropriate hole.

4-17. Fuse Replacement

4-18. Your 8050A has two fuses (the -01 Option has three). (See Section 6 for the third fuse, F3, with the -01 Option).

4-19. To gain access to the 2A, 250 V fuse, insert a coin in the slot on the mA terminal, push inwards and rotate the terminal counterclockwise. The terminal will pop out after about 1/4 turn. The terminal and the fuse may now be pulled out of the DMM. To replace the fuse, logically reverse the procedure.

4-20. To gain access to the 3A, 600 V backup fuse, complete the CALIBRATION ACCESS procedure. The 3A fuse is located to the rear of the 20 M ohm switch. To reassemble, logically reverse the CALIBRATION ACCESS procedure.

4-21. Cleaning

CAUTION

Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These solutions will react with the plastic materials used in the instrument.

CAUTION

Do not get the Liquid Crystal Display wet. Remove the display assembly before washing the pcb and do not install the display assembly until the pcb has been fully dried.

4-22. Clean the front panel and case with a mild solution of detergent and water. Clean dust from the circuit board with clean, dry, low pressure air (20 psi or less). Contaminants can be removed from the pcb using demineralized water and a soft brush (remove the display assembly before washing the Main PCB and avoid getting excess amounts of water on the switches). Dry with clean, dry, low pressure air and then bake at 50 to 60°C (122 to 140°F) for 24 hours.

4-23. PERFORMANCE TESTS

4-24. The performance tests are used to compare the performance of your 8050A to the specifications listed in Section 1 of this manual. If the instrument fails any portion of the performance tests, calibration and/or repair is indicated. Throughout the tests, your 8050A will be referred to as the UUT (Unit Under Test).

NOTE

Allow the UUT to warmup a minimum of 5 minutes and conduct the tests at an ambient temperature of 23 ±5° C (73 ±9° F).

4-25. Display Test

4-26. Complete the following procedure to verify proper operation of the display annunciators and each segment of each digit in the display:

1. Select kΩ, 200Ω range with an open circuit input.

2. Verify that the overrange indication (1) is displayed.

3. Short the input, select each range listed in Table 4-2, and verify that the decimal point is positioned as indicated.

4. Select DC V, 20 MΩ range, and verify that all four decimal points are displayed.

5. Select DC V, 200V range.

6. Connect the DMM Calibrator to the UUT HI to the V kΩ S terminal and LO to the COMMON terminal.

7. Apply +188.88V dc and adjust the calibrator until the UUT displays +188.88 exactly.

8. Verify that all segments of each digit are present in the display and that the HV annunciator has appeared in the middle-right-side of the display (UUT input is over 40V).

9. Program the DMM Calibrator for a UUT input of -39V dc.

10. Verify that the HV annunciator disappears from the display and that the polarity indication changes to a - (minus) sign.

11. Select dB first, then set RELATIVE to ON and verify that the dB and REL annunciators are displayed.

Table 4-2. Display Test

SELECT RANGE	DISPLAY
200Ω	00.00*
2 kΩ	.0000*
20 kΩ	0.000
200 kΩ	00.00
2000 kΩ	000.0
20 MΩ	0.000

*The least significant digit(s) may change by several digits from zero, depending on your test lead resistance.

4-27. Linear Voltage Test

4-28. Use the following procedure to verify the proper operation of both the AC and DC V functions:

1. Select DC V, 200 mV range.

2. Connect the DMM Calibrator to the UUT: HI to the V kΩ S terminal and LO to the COMMON terminal.

3. For each step of Table 4-3, set the AC/DC switch to the indicated position, select the listed range, program the calibrator for the corresponding input to the UUT, and verify that the UUT display value lies within the indicated limits.

4-29. dB Voltage Test

4-30. The linear voltage test must be completed before starting this test. The linear voltage test verifies the measurement accuracy of your 8050A. Use the following procedure to verify the dB operation of the UUT:

1. Select AC dB, 200 mV range.

2. Connect the DMM Calibrator to the UUT: HI to the V / kΩ / S terminal and LO to the COMMON terminal.

3. For each step in Table 4-4, set the UUT controls to the positions listed, program the calibrator for the corresponding input to the UUT, and verify that the UUT display is within the indicated limits.

Table 4-3. Linear Voltage Test

STEP	UUT SWITCH POSITIONS		UUT INPUT		DISPLAY READING
	AC/DC	RANGE	LEVEL	FREQUENCY	
1	DC	200 mV	+190 mV dc		+189.92 to +190.08
2			−190 mV dc		−189.92 to −190.08
3		2V	+1.9V dc		+1.8992 to +1.9008
4			−1.9V dc		−1.8992 to −1.9008
5		20V	+19V dc		+18.992 to +19.008
6		200V	+190V dc		+189.92 to +190.08
7		1000V	+1000V dc		+999.5 to +1000.5
8	AC	2V	Short		<.0040
9		200 mV	190 mV ac rms	100 Hz	188.95 to 191.05
10				10 kHz	188.95 to 191.05
11				50 kHz	180.20 to 199.80
12		2V	100 mV ac rms	100 Hz	985 to 1015
13			1.9V ac rms	100 Hz	1.8895 to 1.9105
14				10 kHz	1.8895 to 1.9105
15				50 kHz	1.8020 to 1.9980
16		20V	19V ac rms	100 Hz	18.895 to 19.105
17				10 kHz	18.895 to 19.105
18				50 kHz	18.020 to 19.980
19		200V	190V ac rms	100 Hz	188.95 to 191.05
20			100V ac rms	10 kHz	99.40 to 100.60
21		750V	750V ac rms	100 Hz	745.2 to 754.8
22				1 kHz	745.2 to 754.8

Table 4-4. dB Voltage Test (600Ω Reference Impedance)

STEP	SELECT RANGE	INPUT		DISPLAY READING
		LEVEL	FREQUENCY	
1	200 mV dB	Short Circuit		Below -75 dB
2		10.00 mV ac rms	100 Hz	-37.28 to -38.28
3		10.00 mV ac rms	10 kHz	-37.28 to -38.28
4		1.0000V ac rms	100 Hz	+02.07 to +02.37

4. Set the REF Z switch to the IN position and verify that the UUT display is 600 for 3 seconds, then the stored reference impedances appear in sequence at a rate of about one per second.

4-31. Current Test

4-32. Use the following procedure to verify proper operation of both the AC and DC mA measurement functions:

1. Select DC mA, 200 μA range.

2. Connect the DMM Calibrator to the UUT: HI to the mA terminal and LO to the COMMON terminal.

3. For each step in Table 4-5, select the listed range, program the calibrator for the corresponding UUT input, and verify that the UUT display value lies within the indicated limits.

4. Set the AC/DC switch to the AC position and select the 20 mA range.

5. Program the calibrator for a UUT input of 19.000 mA rms at a frequency of 100 Hz.

6. Verify that the UUT display value lies between 18.800 and 19.200.

4-33. Resistance/Conductance Test

4-34. Use the following procedure to verify the accuracy of both the kΩ and S measurement functions:

1. Select kΩ, 200Ω range.

2. Connect the UUT to the calibrator: V/kΩ/S terminal to HI and COMMON terminal to LO.

3. For each step in Table 4-6, select the listed range, program the calibrator for the corresponding UUT input, and verify that the UUT display is within the indicated limits.

Table 4-5. Direct Current Test

STEP	SELECT RANGE	INPUT	DISPLAY READING
1	200 μA	190 μA	189.41 to 190.59
2	2 mA	1.9 mA	1.8941 to 1.9059
3	20 mA	19 mA	18.941 to 19.059
4	200 mA	190 mA	189.41 to 190.59
5	2000 mA	1900 mA	1894.1 to 1905.9

Table 4-6. Resistance/Conductance Test

STEP	SELECT RANGE	INPUT	DISPLAY READING
1	200Ω	Short	00.00 to 00.04
2	200Ω	100Ω	99.88 to 100.14
3	2 kΩ	1 kΩ	.9988 to 1.0012
4	20 kΩ	10 kΩ	9.993 to 10.007
5	200 kΩ	100 kΩ	99.93 to 100.07
6	2000 kΩ	1 MΩ	997.2 to 1002.8
7	20 MΩ	10 MΩ	9.972 to 10.028
8	2 mS	1 kΩ	.9985 to 1.0015
9	200 nS	10 MΩ	99.30 to 100.70

NOTE

When switching from kΩ to conductance, 200 nS range, the instrument will read -00.00 for a number of seconds. This settling time may be shortened considerably by momentarily shorting the test leads or by pushing the 200 nS range buttons before pushing the kΩ/S function button.

4-35. CALIBRATION ADJUSTMENTS

4-36. The calibration adjustment procedure should be used any time your instrument has been repaired or fails to pass the Performance Tests. Perform the U5 Jumper Selection Procedure if VR1 is replaced or if R11 does not

have enough adjustment range; perform the U33 Jumper Selection Procedure if the rms converter is replaced or if R7 does not have enough adjustment range. The RMS Converter Offset Adjustment should not normally need to be done. Adjust only if R24 does not have enough adjustment range or if the display reads .0040 or greater with AC V, 2V range selected and the input shorted.

NOTE

The pcb mounting arrangement is such that it is necessary to turn the instrument upside-down (when viewed from the front panel) to gain access to the calibration adjustments. This inverts the display. If you have trouble reading the inverted display, there are two alternatives. First, you can stand at the side of your instrument facing the front of the instrument, lean forward and the display will appear to be right-side-up. If this is unsatisfactory, turn the outer cover on its side with the handle perpendicular to the cover. Place a weight on the bottom leg of the handle. Connect the power cord to the power receptacle on the Main PCB and fully slide the Main PCB about halfway back into the outer case.

NOTE

Allow the UUT to warm up a minimum of 5 minutes and conduct the calibration at an ambient temperature of 23 ±5° C (73 ±9° F).

4-37. DC Calibration

4-38. On the UUT select DC V, 2V range, and connect the UUT to the DMM Calibrator, V/kΩ 'S terminal to HI and COMMON to LO. For each step in Table 4-7, select the listed range, program the calibrator for the corresponding UUT input, and make the specified adjustment or check.

4-39. AC Calibration

4-40. Select AC V, 2V range, and follow the steps in Table 4-8.

4-41. U5 Jumper Selection Procedure

4-42. Use the following procedure to select the proper resistance of U5. If VR1 is replaced, complete this procedure then complete the Calibration Procedure.

Table 4-7. DC Calibration

STEP	RANGE	INPUT	ADJUST	DISPLAY LIMITS
1	2V	+1.9000V	R11	+1.9000 exactly
2	200 mV	+190.00 mV	R12	+190.00 exactly
3	200 V	+190.00V	R5	+190.00 exactly
4	1000V dc	+1000.0V	R6	+1000.0 exactly

Table 4-8. AC Calibration

STEP	RANGE	INPUT	FREQ	ADJUST	DISPLAY LIMITS
1	2V	1.9000V	200 Hz	R7 -	1.8995 to 1.9005
2	2V	100.0 mV	200 Hz	R29	.0999 to .1001
	R7 and R29 are interacting adjustments. Repeat until both are within their limits.				
3	2V	Short circuit			Less than 40 digits
4	20V	19.000V	10 kHz	C1*	18.990 to 19.010
5	200V	100.00V	10 kHz	C2*	99.95 to 100.05
	C1 and C2 are interacting adjustments. Repeat until both are within their limits.				
	*Use an insulated screwdriver for these adjustments.				
If a complete checkout of the instrument is desired, refer to Section 4, Performance Test.					

1. Short all selectable jumper positions A-B-C-D with the 5-pin connector provided with the replacement parts kit.

2. Adjust R11 fully counterclockwise.

3. Select DC V, 2V range.

4. Connect the DMM Calibrator to the UUT: HI to the V/kΩ/S terminal and LO to the COMMON terminal.

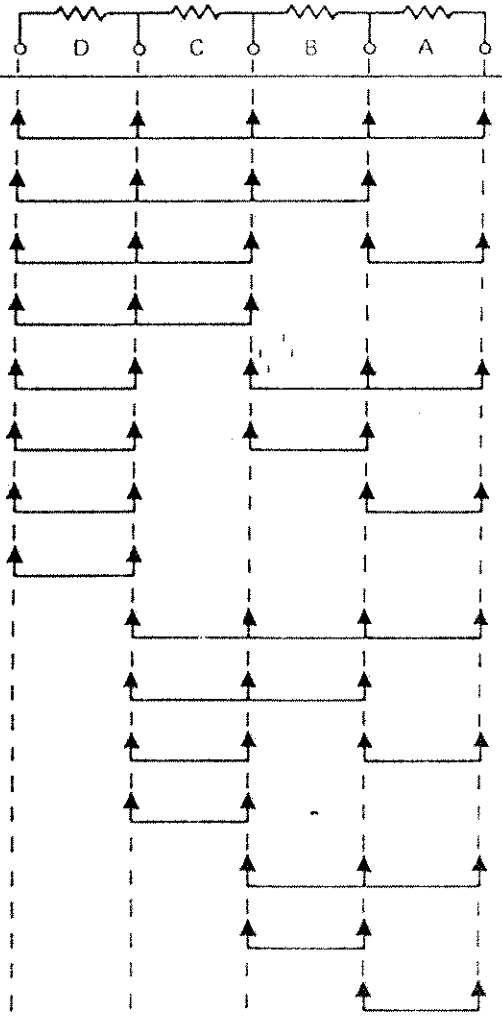
5. Program the calibrator for a UUT input of +1.8888V dc.

6. Compare the UUT display to Table 4-9 and short or open the jumper positions located near R11 as indicated. Use a pair of diagonal cutters to cut a piece out of the 5-pin connector per the table.

4-43. U33 Jumper Selection Procedure

4-44. Use the following procedure to select the proper resistance of U33, if U32, the RMS Converter is replaced.

Table 4-9. U5 Selection

DISPLAY (ALL JUMPER PINS INSTALLED)		JUMPER CONFIGURATION AS VIEWED FROM REAR OF 8050A
LOW	HIGH	
1.8773	1.8879	
1.8667	1.8772	
1.8562	1.8666	
1.8459	1.8561	
1.8356	1.8458	
1.8255	1.8355	
1.8155	1.8254	
1.8056	1.8154	
1.7958	1.8055	
1.7861	1.7957	
1.7765	1.7860	
1.7670	1.7764	
1.7576	1.7669	
1.7483	1.7575	
1.7391	1.7482	
1.7300	1.7390	NO JUMPER INSTALLED

SELECTABLE JUMPER CONFIGURATION FOR DC CALIBRATION (VOLTAGE REFERENCE VR1 CALIBRATION NETWORK, U5).

complete this procedure, then complete the Calibration Procedure.

1. Short all selectable jumper positions E-F-G with the 4-pin connector provided with the replacement parts kit.

2. Adjust R7 fully clockwise and adjust R29 to the approximate center of its adjustment range.

3. Select AC V, 2V range.

4. Connect the DMM Calibrator to the UUT: HI to the V kΩ S terminal and LO to the COMMON terminal.

5. Program the calibrator for a UUT input of 1.0000V ac rms at 200 Hz.

6. Compare the UUT display to Table 4-10 and open the jumper positions near TP4 as indicated. Use a pair of diagonal cutters to cut a piece out of the 4-pin connecter per the table.

4-45. RMS Converter Offset Adjustment Procedure

4-46. The rms converter in your 8050A has one, factory calibrated adjustment to set the initial offset of the conversion circuit. You will probably never have to make this adjustment during the entire life of your 8050A. However, if a shorted input results in a "floor" level >40 digits, complete the following procedure:

1. Complete the Calibration Access procedure.

2. Select AC V, 2V range.

3. Connect the DMM Calibrator to the UUT: HI to the V/kΩ/S terminal and LO to the COMMON terminal.

4. Program the calibrator for a UUT input of 1.0000V ac rms at 400 Hz.

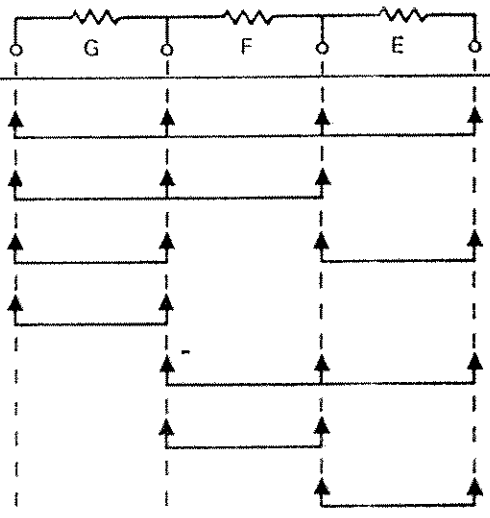
5. Use a DMM with .1 mV resolution (Fluke 8020A or equivalent), to measure the voltage at pin 7 of the rms converter with reference to ground TP1. This voltage must be between ±20 mV dc. Record the voltage to the nearest 0.1 mV.

6. Measure the voltage a pin 6. Is this voltage within ±0.5 mV of the voltage recorded at pin 7 (step 5)?

YES: There is no need for adjustment on the rms converter.

NO: Adjust the potentiometer on the rms converter so that pin 7 is within ±0.2 mV of pin 6.

Table 4-10. U33 Selection

DISPLAY (ALL JUMPER PINS INSTALLED)		JUMPER CONFIGURATION AS VIEWED FROM LEFT SIDE OF 8050A
LOW	HIGH	
1.0100	1.0497	
1.0498	1.0932	
1.0933	1.1366	
1.1367	1.1801	
1.1802	1.2236	
1.2237	1.2671	
1.2672	1.3106	
1.3107	1.3540	NO JUMPERS INSTALLED

SELECTABLE JUMPER CONFIGURATION FOR AC CALIBRATION (RMS CONVERTER U32, CALIBRATION NETWORK, U33).

4-47. Changing the Impedance Procedure

4-48. The 8050A can be configured to turn on and remain referenced to any one of 16 dBm reference impedances. Complete the CALIBRATION ACCESS at the beginning of this section. Solder in the diodes indicated for the reference desired in Table 4-11 Diode Configuration. The holes for the diodes are located on the display PCB and the diodes can be inserted without unfolding the instrument.

4-49. TROUBLESHOOTING

CAUTION

Failure to comply with the static awareness sheet located at the beginning of this section may result in damage to MOS components contained in your 8050A.

4-50. When troubleshooting your 8050A, never remove, install, or otherwise connect or disconnect components without first setting the POWER switch to the OFF position.

4-51. Test point information and a troubleshooting guide for the 8050A are given in Tables 4-12 and 4-13. Table 4-12 lists the test points in the instrument and the corresponding signal at each point. To properly use the guide given in Table 4-13, complete the performance test given earlier in this section and note any discrepancies. Then locate the heading of the procedure in question in the test and symptom column (Table 4-13). Under that heading, isolate the symptom that approximates the observed malfunction. Possible causes are listed to the right of the selected symptom. Details necessary to isolate a particular cause can be derived from the theory of operation in Section 3 and the schematic diagrams in Section 8.

Table 4-11. Diode Configuration

REFERENCE IMPEDANCE	CR8	CR9	CR10	CR11
50	–	◁|	◁|	–
75	–	◁|	◁|	◁|
93	◁|	–	–	–
110	◁|	–	–	◁|
125	◁|	–	◁|	–
135	◁|	–	◁|	◁|
150	◁|	◁|	–	–
250	◁|	◁|	–	◁|
300	◁|	◁|	◁|	–
500	◁|	◁|	◁|	◁|
600	–	–	–	–
800	–	–	–	◁|
900	–	–	◁|	–
1000	–	–	◁|	◁|
1200	–	◁|	–	–
8000	–	◁|	–	◁|

Diode Type: Use Fluke P/N 203323 (1N4448, 1N914 or equivalent)

Table 4-12. Test Points

TEST POINT	FUNCTION	TEST POINT	FUNCTION
1	COMMON	8	A/D Converter Integrator Output
2	+10V	9	First AC Buffer Output
3 or CR 12 Cathode	+6 V	10	Second AC Buffer Output
4	-5V	11	RMS Converter Output
5	-10V	12	Display Back Plane Drive (50 Hz Square Wave)
6	A/D Converter Input		
7	A/D Converter Buffer Output	13	Integrate Control Line

Table 4-13. Troubleshooting Guide

TEST AND SYMPTOM	POSSIBLE CAUSE
INITIAL TURN ON	
Display Blank	Power supply (Q6), power switch, interconnect, microcomputer U17
Display "stuck" with a constant reading	Touch and Hold on, Q11, Q12
Reads overload for several minutes after turn on	Q17, Power On Reset (U17 pin 8)
DISPLAY TEST	
All segments on	No drive (50 Hz squarewave, TP12) U10, interconnect, U17
All or no decimal points	U16, U17, interconnect
Decimal point in wrong location	U16, range switch input to U17
1 or more digits missing	
1 or more annunciator missing	U10-16, interconnect, U17
LINEAR VOLTAGE TEST	
Display reading is out of tolerance	Out of calibration
Constant overrange in DC V	A/D, Check TP6, 7, and 8 for proper waveforms, U18, U19, U20
Does not respond to input voltages	R2 open, A/D input
Does not range properly in AC V	U17, U31, U22, Q7, Q8
dB VOLTAGE TEST	
Does not go into dB	Function switch input to U17
Does not autorange	U17, U31, U22, Q7, Q8
Display reading is out of tolerance	AC V is out of calibration
CURRENT TEST	
Does not respond to input currents	Fuse F1, F2
Display reading is out of tolerance on 1 or more ranges	R16, R17, R18, U6, U28, CR1
RESISTANCE/CONDUCTANCE TEST	
Reading is out of tolerance on 200Ω and 2 kΩ range	R3
Reading is out of tolerance on other ranges	U1, check 190V dc calibration
Readings are out of tolerance on high ohms	RV1, RV2, RV3 overheated from severe overload
Readings are noisy on all ranges	RT1, C39
Residual reading with test leads open	PCB is contaminated, see cleaning procedure in Section 4