

LC53 CALIBRATION PROCEDURE

EQUIPMENT NEEDED

The following equipment is recommended for use in calibrating the "Z METER". These are high accuracy standards and will allow the calibration of the meter to the specifications in the manual. Lower accuracy standards will reduce the accuracy of the "Z METER". If capacitors and inductors of known values are available, they may be used for calibration.

If known values of capacitors and inductors or the following equipment is not available, the meter may be returned to the Sencore Service Department for check out and recalibration for a small service charge.

<u>EQUIPMENT</u>	<u>RECOMMENDED MINIMUM SPECIFICATIONS</u>		
Capacitance Sources	8000pF	+	.25%
	.8uF	+	.25%
	800uF	+	.5%
Inductance Sources	80mH	+	.5%
	10mH	+	.5%
	80uH	+	.5%
	800uH	+	.5%
	8mH	+	.5%
	800mH	+	.5%
	8000mH	+	.5%

METER CALIBRATION

The internal meter (readout) calibration should be checked and adjusted if necessary before calibration of any ranges of the "Z METER".

NOTE: Do not depress any of the push buttons on the "Z METER" when adjusting the meter zero on the rear or the meter calibration controls.

1. Turn the "Z METER" on and allow a 10 to 15 minute warm-up period.
2. If the readout does not show 000 with the negative sign appearing occasionally, adjust the rear panel meter zero control until the negative sign is just off or appears intermittently.
3. With the output control of the DC supply set to minimum, connect the positive lead to the ungrounded end of R1082. Connect the negative lead to the grounded end of R1082. Connect a DVM such as the DVM37 or DVM56 to the same points. Adjust the power supply for a reading of 0.9 volts DC across R1082.

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4. Adjust R1035 on the "Z METER" for a readout of 900 on the display.
5. Reduce the power supply output to 0.09 Volts DC and adjust R1031 for a readout of 089 on the display.
6. Repeat steps 3, 4, and 5 two or three times as the controls will have some interaction.

INPUT PROTECTION RELAY TRIP POINT ADJUSTMENT

The input protection relay trip point adjustment should be made before calibrating the other ranges of the LC53. The following procedure sets up the trip point at which the relay will open the input to the LC53 when an external voltage is applied to the test leads.

1. Connect a DVM to the sixth pin from the front panel on the RINGING TEST push button, on the side of the switch closest to the inside of the entire switch assembly.
2. Connect a power supply set to 7 volts DC capable of delivering 250MA of current to the test leads. Connect the positive lead to the red test lead, the negative to the black test lead.
3. Adjust R1107 counter-clockwise so that the DVM reads plus 7 volts DC. Slowly rotate R1107 clockwise until the relay opens and the DVM reads 0 volts. Then adjust R1107 counter-clockwise until the voltage just returns.

INDUCTANCE CALIBRATION

The following procedure requires the use of standard inductors or inductors of known value. The inductors of known value must be close to the values shown in the procedure to insure that the proper range is calibrated. Each time a control is to be adjusted, the VALUE push button must be depressed on the front panel.

1. Set all inductance cal pots to midrange (R1019, R1025, R1023, R1027, R1029 and R1070).
2. Connect the test leads to a standard 80mH coil. Adjust R1025 for a readout of 80.0.
3. Connect the test leads to a standard 10mH coil. Adjust R1070 for a readout of 10.0.
4. Repeat steps 2 and 3 at least two to three times as the controls will interact with each other. This sets the linearity of all the inductance ranges of the "Z METER" and calibrate the 10-100mH range.

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5. Short the test leads together, depress the VALUE button and adjust the front panel LEAD ZERO control for a readout of 000 with the negative sign appearing occasionally.
6. Connect the test leads to a standard 80uH coil. Adjust R1019 for a readout of 80.0uH.
7. Connect the test leads to a standard 800uH coil. Adjust R1021 for a readout of 800uH.
8. Connect the test leads to a standard 8mH coil. Adjust R1023 for a readout of 8.00mH.
9. Connect the test leads to a standard 800mH coil. Adjust R1027 for a readout of 800mH.
10. Connect the test leads to a standard 8 Henry coil. Adjust R1029 for a readout of 800mH.

RINGING TEST CALIBRATION

The calibration of the Ringing test is dependent upon the accuracy of the scope used to measure the 1000 Hertz sine wave input on the second half of the procedure.

1. Short the test leads together and set the IMPEDANCE MATCH switch to any one of the BLUE positions.
2. Connect a DVM to the collector of TR1017.
3. Depress the RINGING TEST button and adjust R1081 for a 6.0 - 6.5 VDC reading.
4. Unshort the test leads. Set the IMPEDANCE MATCH to any one of the RED (Yoke and Flyback) positions. Connect the vertical input from a scope and the output of an audio generator to the input of the "Z METER". The input of the scope and the hot lead of the generator are connected to the red test clip and the ground leads to the black test clip.
5. Set the audio generator to sine wave and the frequency to 1000 Hertz.
6. Depress the RINGING TEST button and adjust the output of the audio generator for 3.6 volts peak-to-peak.
7. Adjust R1054 with the RINGING TEST button depressed so the front panel display on the "Z METER" is counting. Slowly back off until the counting appears to be intermittent or the readout shows some number. The actual number is meaningless and only shows that you have reached the proper trip point in the ringing circuit. Carefully check that the point is the correct one by adjusting the control above and below the point to see that the counting starts and stops.

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CAPACITOR CALIBRATION

Use of the standards listed in the beginning of the procedure is recommended. If calibration must be done with known value capacitors, be sure that the three capacitors are close in value to the ones recommended. Calibrate the meter to read the value of the capacitor used regardless of the value listed for the most accurate readings. For runs below 23, use the following procedure.

1. Short the test leads together and depress the VALUE button under INDUCTANCE. Check to see that the meter is zeroed. If not, reset the front panel LEAD ZERO control until the readout shows 000 with the negative sign appearing occasionally. Do not touch the front panel LEAD ZERO again until after the next step.
2. Open the test leads and depress the VALUE button under CAPACITORS and adjust the internal capacity-inductance balance control R133 until the readout shows 000 with the negative sign appearing occasionally. This puts the inductance and capacitance lead zero at the same point on the front panel LEAD ZERO control.
3. Connect a standard 8000 pF capacitor to the test leads and depress the VALUE button under CAPACITORS.
4. Adjust R1083 for a readout of 8000pF.
5. Connect a standard 0.8 uF capacitor to the test leads and depress the VALUE button under CAPACITORS.
6. Adjust R1088 for a readout of .800uF.
7. Connect a standard 800uF capacitor to the test leads and depress the VALUE button under CAPACITORS.
8. Adjust R1090 for a readout of 800uF.

NOTE: For Runs 23-31, use the following calibration procedure but eliminate steps 5-6.
For Runs 31 and over, use the following procedure.

1. Short the test leads together and depress the VALUE button under INDUCTANCE. Check to see that the meter is zeroed. If not, reset the front panel LEAD ZERO control until the readout shows 000 with the negative sign appearing occasionally. Do not touch the front panel LEAD ZERO again until after the next step.

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2. Open the test leads and depress the capacitor VALUE button and adjust the L/C zero balance control in the back of the unit until the readout shows 00.0 with the negative sign appearing occasionally. This puts the inductance and capacitance lead zero at the same point on the front panel lead zero control.
3. Connect a standard 8000pF capacitor to the test leads and press cap VALUE button.
4. Adjust R1083 for a readout of 8000pF.
5. Connect a standard 100pF capacitor to the test leads and press cal VALUE button.
6. Adjust R133 for a readout of 100pF.
7. Connect a standard .800uF cap to the test lead and press cap VALUE button.
8. Adjust R1088 for a readout of .800uF.
9. Connect a standard 800uF cap to the test leads and press cap VALUE button.
10. Adjust R1090 for a readout of 800uF.