

f. Refer to Table 5-11 and verify that the RLC display is between the extremes listed for 1 mH, SLOW measurement rate (first line of table).

g. Similarly, with the inductance standards 1 mH, 100 mH, and 1 H, as indicated in the LS column, and with the indicated measurement rate, verify that the RLC display is acceptable for each line of the table, for ranges 4, 3, and 2.

h. Use the 2-terminal connections for the 10-H inductance standard, as described in the footnote to the table. Verify that the RLC display is acceptable for each corresponding line of the table, for range 1.

5.9 RECALIBRATION

5.9.1 Preparation

Introduction. This service procedure requires a set of external calibration resistors whose R and Q values are exactly known (and which are obtained from GenRad) and generally requires a frequency counter. For the frequency correction, the counter makes a measurement; but for the four internal resistance standards, the Digibridge makes the measurements. After recalibration, the Digibridge retains in RAM the corrections that the microprocessor needs to compensate for the small errors in the actual values of test frequency and internal standard resistor parameters. (Therefore, the Digibridge calculates its measurement results correctly, accomplishing by calculation the same result that would be obtained if the recalibration process actually trimmed the internal standards exactly to their nominal values.)

Required Equipment. Refer to Table 5-12.

Table 5-12
EQUIPMENT FOR RECALIBRATION

GenRad No.	Description	Requirements
---	Temperature stabilized room	23 degrees C (73.4 F) recommended
---	Set of four "calibration" resistors with nominal resistances of 24.9, 374 ohms; 5.97, 95.3 kilohms	R and Q values known at 1 kHz, R accuracy +/- .001%, calibration traceable to NBS; Q calibrated to +/- 10 ppm.
---	Universal counter/timer*, with ground strap	Accuracy better than +/- 10 ppm (+/- 2 ppm preferred) in averaging multiple period measurement
---	Screw*, bright plated brass	Size: 0.138-32 x 0.5 (diam-thds/in. x length, in.)

* Counter and screw are needed for frequency calibration only.

Decision Whether Frequency Calibration is Needed. The frequency calibration (paragraph 5.9.7) is necessary — and should be completed before recalibrating any range — if any of the following is true:

1. If the battery B1 has been replaced or disconnected for any reason.
2. If either of the RAM devices U33 or U34 has been replaced or disconnected.
3. If the RAM standby battery circuit has been serviced.
4. If oscillator U4 has been replaced.

Procedure

a. Remove any adaptor that may be in the test fixture. Inspect the Digibridge test fixture for cleanliness. If it is dirty or if it is scheduled for periodic cleaning soon, clean the test fixture as described in paragraph 5.6.

b. Place all equipment including the Digibridge(s) to be recalibrated in the temperature stabilized room, normally at 23 degrees C.

c. Switch Digibridge(s) ON and if frequency calibration is needed (see above) switch the counter power ON. Allow all equipment to warm up for at least two hours. Leave the Digibridge test conditions at the defaults.

d. If frequency calibration is needed (see "Decision ..." above), skip to the procedure of paragraph 5.9.7 before zeroing and recalibrating ranges 4, 3, 2, and 1.

5.9.2 Zeroing and Selecting "DQ in PPM"

This zeroing procedure is like the routine procedure in Operation, Section 3. In this process, the Digibridge automatically measures stray parameters related to the test fixture and associated circuits and retains the data, which it uses in each recalibration step below to correct measurements so that results most accurately represent parameters of the external calibration resistor alone.

Open Circuit.

- a. Press [FUNCTION] key (if necessary) to select MEASURE mode.
- Press [MEASURE MODE] key (if necessary) to select TRIGGERED mode.
- b. Be sure that the test fixture is open circuited.
 - c. Press these keys: [1] [6] [8] [9] [=] [SHIFT] [OPEN]. (A zero in each, left and right displays, and the GO indicator should be lit, confirming this step.)
 - d. Keep hands and objects at least 10 cm (4 in.) from test fixture.
 - e. Press the START button. The GO indication disappears.
 - f. Wait for the GO indicator to be lit again (approximately 10 seconds).

Short Circuit.

- a. Short the fixture with a very low-resistance "short circuit".
- b. Press the keys: [1] [6] [8] [9] [=] [SHIFT] [SHORT]. (A 5 in each, left and right displays, and the GO indicator should be lit, confirming this step.) Keep away from test fixture, as in step d above.
- c. Press the START button. The GO indication disappears.
- d. Wait for the GO indicator to be lit again (approximately 10 seconds). The RLC display should be .00000 (ohms or mH).
- e. Disconnect the short circuit.

DQ in PPM. Press [SHIFT][DQ in PPM] keys if necessary to light this indicator.

5.9.3 Recalibration for Range 4

a. Connect the 24.9-ohm calibration resistor to the Digibridge test fixture.

b. Enter the known parameters of the calibration resistor as in the following example, based on the values $R = 24.895$ ohms and $Q = 15$ ppm. (NOTES: The Digibridge will accept six digits for R, even though only five will be displayed. The Q is associated with "bin 00", and its value must be preceded with "-" if the known Q is negative.)

Select ENTER with [FUNCTION] key and CONTINUOUS with [MEASURE MODE] key.

Press [4][=][SHIFT][SPECIAL][1]

Press [2][4][.][8][9][5][=][SHIFT][NOM VALUE]

NOTE: the calibration resistance value should appear in the left display. The DQ in PPM indicator must be lit.

Press [1][5][=][SHIFT][BIN NO][0][0]

NOTE: the calibration Q value should appear in the right-hand display.

c. Enable and execute the recalibration for this range as follows. (The following keystrokes are the same for any range.)

Select MEASURE with the [FUNCTION] key and TRIGGERED with [MEASURE MODE] key.

Press [1][6][8][9][=][1][SHIFT][CALIBRATE]

NOTE: The GO indicator being lit and a 6 in the left and a 6 in the right displays confirm that calibration is enabled.

Press START (The GO indicator remains unlit while calibration proceeds.)

Keeping hands away from the test fixture, wait until the GO indicator is lit again. This completes recalibration of one range.

d. Check as follows that the Digibridge operates properly with the recalibration.

Select CONTINUOUS with the [MEASURE MODE] key.

The Digibridge should measure the calibration resistor like any ordinary resistor and display its R and Q (ppm) values. The Q display can be expected to "jump" a bit. (Precision and repeatability are in the order of 5 ppm). Also, the NO-GO indicator will probably be lit; this is normal.

e. Disconnect the calibration resistor from the test fixture.

5.9.4 Recalibration for Range 3

a. Connect the 374-ohm calibration resistor to the Digibridge test fixture.

b. Enter the known parameters of the calibration resistor as in the following example, based on the values $R = 374.06$ ohms and $Q = 5$ ppm. (NOTES: The Digibridge will accept six digits for R, even though only five will be displayed. The Q is associated with "bin 00", and its value must be preceded with "-" if the known Q is negative.)

Select ENTER with [FUNCTION] key and verify that measure mode is CONT.

Press [3][=][SHIFT][SPECIAL][1]

Press [3][7][4][.][0][6][=][SHIFT][NOM VALUE]

NOTE: the calibration resistance value should appear in the left display. The DQ in PPM indicator must be lit.

Press [5][=][SHIFT][BIN NO][0][0]

NOTE: the calibration Q value should appear in the right-hand display.

c. Enable and execute the recalibration for this range as follows. (The following keystrokes are the same for any range.)

Select MEASURE with the [FUNCTION] key and TRIGGERED with [MEASURE MODE] key.

Press [1][6][8][9][=][1][SHIFT][CALIBRATE]

NOTE: The GO indicator being lit and a 6 in the left and a 6 in the right displays confirm that calibration is enabled.

Press START (The GO indicator remains unlit while calibration proceeds.)
Keeping hands away from the test fixture, wait until the GO indicator is lit again.
This completes recalibration of one range.

d. Check as follows that the Digibridge operates properly with the recalibration.

Select CONTINUOUS with the [MEASURE MODE] key.

The Digibridge should measure the calibration resistor like any ordinary resistor and display its R and Q (ppm) values. The Q display can be expected to "jump" a bit. (Precision and repeatability are in the order of 5 ppm). Also, the NO-GO indicator will probably be lit; this is normal.

e. Disconnect the calibration resistor from the test fixture.

5.9.5 Recalibration for Range 2

a. Connect the 5.97-kilohm calibration resistor to the Digibridge test fixture.

b. Enter the known parameters of the calibration resistor as in the following example, based on the values R = 5.9581 kilohms and Q = -22 ppm. (NOTES: The Digibridge will accept six digits for R, even though only five will be displayed. The Q is associated with "bin 00", and its value must be preceded with "-" if the known Q is negative.)

Select ENTER with [FUNCTION] key and verify that measure mode is CONT.

Press [2][=][SHIFT][SPECIAL][1]

Press [5][.][9][5][8][1][=][SHIFT][NOM VALUE]

NOTE: the calibration resistance value should appear in the left display. The DQ in PPM indicator must be lit.

Press [-][2][2][=][SHIFT][BIN NO][0][0]

NOTE: the calibration Q value should appear in the right-hand display.

c. Enable and execute the recalibration for this range as follows. (The following keystrokes are the same for any range.)

Select MEASURE with the [FUNCTION] key and TRIGGERED with [MEASURE MODE] key.

Press [1][6][8][9][=][1][SHIFT][CALIBRATE]

NOTE: The GO indicator being lit and a 6 in the left and a 6 in the right displays confirm that calibration is enabled.

Press START (The GO indicator remains unlit while calibration proceeds.)
Keeping hands away from the test fixture, wait until the GO indicator is lit again.
This completes recalibration of one range.

d. Check as follows that the Digibridge operates properly with the recalibration.

Select CONTINUOUS with the [MEASURE MODE] key.

The Digibridge should measure the calibration resistor like any ordinary resistor and display its R and Q (ppm) values. The Q display can be expected to "jump" a bit. (Precision and repeatability are in the order of 5 ppm). Also, the NO-GO indicator

will probably be lit; this is normal.

e. Disconnect the calibration resistor from the test fixture.

5.9.6 Recalibration for Range 1

a. Connect the 95.3-kilohm calibration resistor to the Digibridge test fixture.

b. Enter the known parameters of the calibration resistor as in the following example, based on the values $R = 94.986$ kilohms and $Q = -280$ ppm. (NOTES: The Digibridge will accept six digits for R, even though only five will be displayed. The Q is associated with "bin 00", and its value must be preceded with "-" if the known Q is negative.)

Select ENTER with [FUNCTION] key and verify that measure mode is CONT.

Press [1][=][SHIFT][SPECIAL][1]

Press [9][4][.] [9][8][6][=][SHIFT][NOM VALUE]

NOTE: the calibration resistance value should appear in the left display. The DQ in PPM indicator must be lit.

Press [-][2][8][0][=][SHIFT][BIN NO][0][0]

NOTE: the calibration Q value should appear in the right-hand display.

c. Enable and execute the recalibration for this range as follows. (The following keystrokes are the same for any range.)

Select MEASURE with the [FUNCTION] key and TRIGGERED with [MEASURE MODE] key.

Press [1][6][8][9][=][1][SHIFT][CALIBRATE]

NOTE: The GO indicator being lit and a 6 in the left and a 6 in the right displays confirm that calibration is enabled.

Press START (The GO indicator remains unlit while calibration proceeds.)

Keeping hands away from the test fixture, wait until the GO indicator is lit again. This completes recalibration of one range.

d. Check as follows that the Digibridge operates properly with the recalibration.

Select CONTINUOUS with the [MEASURE MODE] key.

The Digibridge should measure the calibration resistor like any ordinary resistor and display its R and Q (ppm) values. The Q display can be expected to "jump" a bit. (Precision and repeatability are in the order of 5 ppm). Also, the NO-GO indicator will probably be lit; this is normal.

e. Disconnect the calibration resistor from the test fixture.

5.9.7 Frequency Calibration

a. If frequency calibration is not necessary (refer to "Decision ...", in paragraph 5.9.1), omit the procedures of paragraph 5.9.7. If necessary at all, these steps should be done before paragraphs 5.9.2 through 5.9.6.

b. Connect the counter as follows to measure the period of the test frequency, nominally 1 kHz. If the Digibridge is not disassembled, provide for a ground connection as follows. (Otherwise, see NOTE below.) Insert a 6-32 (1/2 - inch long) screw into the tapped hole at the right-hand end of the Digibridge's test fixture (tighten gently). Connect the ground return of the counter's probe to this screw.