1 GENERAL INFORMATION

The 1659 RLC Digibridge' is a microprocessor-controlled, automatic RLC meter. It measures impedance of the device under test (DUT) and displays its parameters: *R, L* or *C* and *D*, or *Q*. A front-panel keyboard is used to select and program measurement and test conditions. A test signal of 0.3 V at 100 Hz, 120 Hz, 1 kHz, or 10 kHz is applied to the device under test. (Default frequency is 1 kHz.) Capacitors under test can be biased with 2 V (internal d.c.) or up to 60 V (external source). Consult the instruction manual for details about operation, accuracy, specifications, and service.

2 START-UP

a. Set line-voltage switch (rear panel) to power-line voltage.

b. If the Digibridge includes an optional IEEE-488 interface, set TALK switch (rear panel) to TALK ONLY (unless instructions are to be received through the IEEE-488 bus).

c. Switch EXTERNAL BIAS OFF (front panel).

d. Connect power cord to source of proper voltage.

e. Press POWER button "in". Self-check codes will show briefly.

f. Wait until keyboard lights indicate MEASURE, VALUE, SLOW, SERIES. If a fault is detected, measurements are blocked and an error code remains displayed. (See manual, paragraph 3.13.) If keyboard lights remain dark, keyboard is locked. To unlock it, see manual paragraph 3.9. To switch power off, press POWER button and release.

3 ZEROING

Before measurement, zero the Digibridge as follows:

a. *Open Circuit.* The MEASURE keyboard light should be lit. Press **[MODE]** key to select TRIGGERED mode. If any test-fixture adaptors are to be used, install and position them for use. Be sure that test fixture is open circuited. Press keys: **[C/D] [1] [6] [5] [9] [=]** **[SHIFT] [OPEN]**. Keep hands and objects at least 10 cm (4 in.) from test fixture. Press **START** button. Wait for GO light.

b. *Short Circuit.* Short the fixture with a clean copper wire (AWG 18 to 30). Press **[1] [6] [5] [9] [=] [SHIFT] [SHORT]**. Press **START** button. Wait for GO light.

Note: For best accuracy, repeat this procedure every day and after any change of test-fixture adaptors.

4 MEASUREMENT

a. Verify or select measurement conditions as follows (indicated by keyboard lights); press the adjacent key to change a selection.
- Function: MEASURE (**[FUNCTION]** key)
- Display: VALUE (**[DISPLAY]** key)
- Measure rate: SLOW (**[MEASURE RATE]** key)
- Measure mode: TRIGGERED (**[MODE]** key)
- Equivalent circuit: SERIES (**[EQUIVALENT CIRCUIT]** key)

b. To measure *C and D of a Capacitor* (C Range .00001 pF to 99999 mF, D range .0001 to 9999): Press **[C/D]**. Place capacitor in test fixture. Press **START** . The RLC display shows C (series capacitance) and units (mF, μF, nF, pF); the DQ display shows D (dissipation factor). If RLC is negative, DUT is inductive.

c. To measure *L and Q of an Inductor* (L range .00001 mH to 99999 H, Q range .0001 to 9999): Press **[L/Q]**. Place inductor in test fixture. Press **START**. The RLC display shows L (series inductance) and units (mH, H); the DQ display shows Q (quality factor). (If RLC is negative, DUT is capacitive.)

d. To measure *R and Q of a Resistor* (R range .00001 Ω to 99999 MΩ Q range .0001 to 9999): Press **[R/Q]**. Place resistor in test fixture. Press **START**. The RLC display shows R (series resistance) and units (Ω kΩ MΩ); the DQ display shows Q (quality factor). (If DQ is negative, DUT is capacitive; if not, DUT is inductive.)

e. Special Displays. When a nominal value and bin limits have been programmed (see Limit Entry below), these displays can be selected with the **[DISPLAY]** key: "BIN NO" shows the assigned bin number.

f. Other Parameters, Rates, Modes. To measure C/D, L/Q or R/Q parallel, press **[EQUIVALENT CIRCUIT]** to select PARALLEL.

To measure faster, press **[MEASURE RATE]** to select MEDIUM or FAST. To measure continuously, press **[MODE]** to select CONT.

5 PROGRAMMABLE TEST CONDITIONS

(Accessible via ENTER function.)

a. Press **[FUNCTION]** key to select ENTER function.

b. Test frequency (normally 1 kHz) can be programmed by repeat keying of the **[SHIFT] [FREQUENCY]** keys until the appropriate indicator is lit.

c. Averaging. Results of 10 measurements can be averaged. To program averaging press **[MODE]** key to select AVERAGE. To cancel averaging, press **[MODE]** key to select CONTINUOUS or TRIGGERED.

d. For internal 2-volt dc bias for capacitors, press **[SHIFT] [INT BIAS]**. To remove internal bias, repeat **[SHIFT] [INT BIAS]**.

e. To hold a range: Measure a DUT in the range desired; or press one of the parameter keys (**[R/Q] [L/Q] [C/D]**) repeatedly to step through the four ranges. When the desired range is indicated (by RLC unit indicator), press **[HOLD RNG]**. To enable autoranging, repeat **[HOLD RNG]**.

6 LIMIT ENTRY, GO/NO-GO TESTING, AND SORTING INTO BINS

a. Press **[DISPLAY]** key to select VALUE. Press **[FUNCTION]** key to select ENTER.

b. To enter a single DQ limit (always bin 0): press parameter key (such as **[C/D]**) appropriate to DUT. To change range and unit multipliers, press same key repeatedly. Enter max limit of D or Q with R; enter min limit of Q with L, as follows. (Keyed numbers appear on left-hand display.) Example, for Q limit of 85, press **[8] [5] [=]** **[SHIFT] [BIN NO] [0]**. Value now moves to right-hand display, confirming storage of limit.

Note: If you make a mistake, press parameter key again and repeat the entry.

c. To enter RLC limits for bins 1-8, three methods are given:

- *Symmetrical percentage tolerances* (nested bins). Enter nominal value of DUTs to be sorted. (The value appears on the RLC display. Units were selected in step b.) Example, for nominal value 123.40, press **[1] [2] [3] [.] [4] [=] [SHIFT] [NOM VAL]**. Enter for bin 1 the narrowest percent tolerance to be sorted. Example, for a tolerance of ±0.2%: press **[.] [2] [%] [=] [SHIFT] [BIN NO] [1]**. The numerical limits for RLC are computed and rounded-off values displayed (upper limit at left, lower at right). For bin 2, enter the next wider tolerance, similarly; then bins 3. . .8.

- *Various nominal values* (bucket sort). Plan for non-overlapping bins, each with a nominal value and limits defined by percent tolerance. For bin 1, enter nominal value and tolerance as described above. For each successive bin, similarly enter a new nominal value, then the tolerance and bin number. (Changing the nominal value does not affect limits already stored. Any DUT that qualifies for 2 overlapping bins is assigned to the lower bin.)

- *Unsymmetrical tolerances.* To enter unsymmetrical limits, for example +2% −5% in bin 6: press **[2] [%] [−] [5] [%] [=] [SHIFT] [BIN NO] [6]**. Two percentages of the same sign can be entered. Always enter the more positive tolerance first.

d. You can close any bin that has been opened (steps b, c). For RLC bins, follow this example for bin 8: press **[0] [=] [SHIFT] [BIN NO] [8]**. To disable DQ sorting, close bin 0 thus: for D or Q with R, press **[9] [9] [9] [9] [=] [SHIFT] [BIN NO] [0]**; for Q with L, press **[0] [=] [SHIFT] [BIN NO] [0]**.

e. To enable GO/NO-GO lights after opening at least one bin, leave "nominal value" at any non-zero value. To disable GO/NO-GO and all bin sorting, press **[0] [=] [SHIFT] [NOM VAL]**.

Note: To see present numerical limits for bin 3 and nominal value, press **[SHIFT] [BIN NO] [3]**, and **[SHIFT] [NOM VAL]**.

f. To measure DUT with bin sorting: Press **[FUNCTION]** to select MEASURE, and **[DISPLAY]** to select BIN NO. Insert DUT. Press **START**. Observe GO/NO-GO and bin-number results. NO-GO indicates either DQ failure (bin 0) or RLC failure (bin 9). See manual, paragraph 3.8.