CONDENSED OPERATING INSTRUCTIONS

for

TYPE 1650-A IMPEDANCE BRIDGE

(For complete details, refer to Instruction Book for Type 1650-A.)

GENERAL PROCEDURE

a. Check the NULL meter mechanical zero with the function switch in the OFF position, and, if necessary, center the pointer with the mechanical zero adjustment on the meter.

b. Turn the SENSITIVITY control almost fully counter-clockwise.

c. Set the CRL SELECTOR switch to the parameter to be measured.

d. Connect the component to be measured to the UNKNOWN terminals.

e. Set the function switch to agree with the power source used.

f. Set the CRL MULTIPLIER switch and the CRL dial for a zero (center) meter reading, while adjusting the SENSITIVITY control to increase sensitivity. The value of the component measured is the product of the CRL dial indication and the CRL MULTIPLIER switch setting.

LIMIT TESTING

The Type 1650-A may be set up to provide a go-no-go indication useful for component testing. The panel meter is used as the indicator. The set-up procedure is as follows:

a. Balance the bridge with one of the components to be measured (preferably one within tolerance).

b. Offset the CRL dial by the desired tolerance, if the tolerance is symmetrical, or by one half of the total allowable spread if unsymmetrical.

c. Adjust the SENSITIVITY control for a five-division meter deflection.

d. Set the CRL dial to the center value (the nominal value if the tolerance is symmetrical).

e. Connect each component to the bridge (or Type 1650-P1 Test Jig). If the meter deflection is less than five divisions, the component is within limits.

When the unknown has a tolerance greater than ±10%, the limits may be in error by more than 1% if the above method is used. A sure method is to set the CRL dial so that unknown components at both limits give the same deflection.

ACCURACY

Resistance: ac, ±1% ±1mΩ. dc, ±1% ±10mΩ. An external dc supply is required for 1% accuracy above 100 kΩ.

Capacitance: ±1% ±1 pf.

Inductance: ±1% ±1 μh.

D: ±5%; ±0.001 at 1 kc or lower.

1/Q: ±5%; ±0.001 at 1 kc or lower.

Residual Resistance: 1 mΩ.

Residual Capacitance: 0.5 pf.

Residual Inductance: 0.2 μh.

Bridge Source: Four D cells, 1.5 volts, positive terminals facing down.

MAXIMUM DC THROUGH INDUCTORS OR RESISTORS (R or L_p)

Range Multiplier		Maximum Current	CRL Multiplier Setting
L	R		
100 μh	100 mΩ	100 ma	1Ω
1 mh	1 Ω	100 ma	10 Ω
10 mh	10 Ω	71 ma	100 Ω
100 mh	100 Ω	22 ma	1 kΩ
1 h	1 kΩ	7.1 ma	10 kΩ
10 h	10 kΩ	2.2 ma	100 kΩ
100 h	100 kΩ	0.5 ma	1 MΩ
	1 MΩ	0.5 ma	1 MΩ

When a battery is used to provide dc bias, ground the bridge panel. When a power-line-operated supply is used to provide dc bias, ground the supply.

GENERAL RADIO COMPANY
WEST CONCORD, MASSACHUSETTS, USA

CRL SELECTOR switch
Selects parameter to be measured.

Function switch
Turns bridge on, selects internal or external generator, ac or dc.

CRL MULTIPLIER switch

Multiply switch setting by CRL dial setting for result.

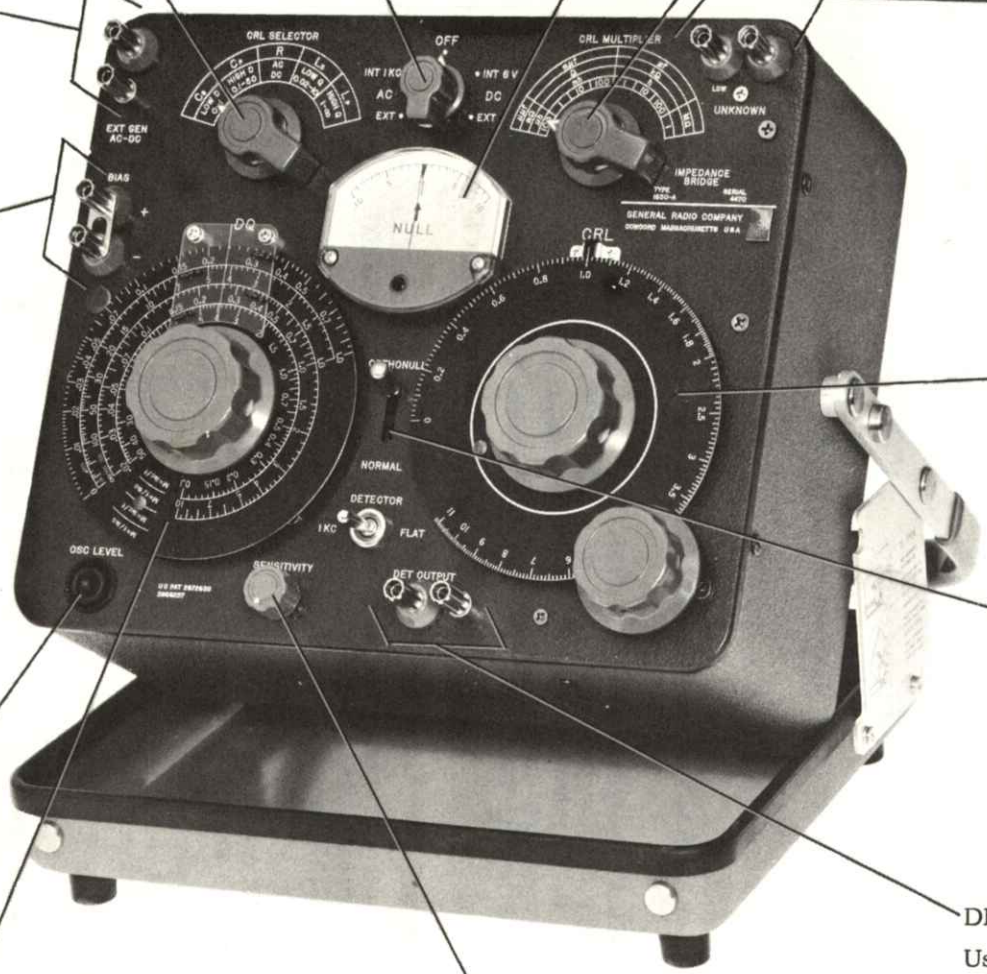
Mechanical meter zero adjustment

EXT GEN connectors

Max Power: 0.5 watt
Max Voltage: 500 volts dc; 60 or $\frac{f(\text{in cps})}{6}$ volts rms ac, whichever is smaller.
Frequency range for L and C measurements: 20 cps to 20 kc.

UNKNOWN terminals

With the internal source, maximum power is 0.1 watt.
Capacitance from LOW terminal to chasis shunts the detector and causes no error.
If the panel is not grounded, stray capacitance from unknown terminals and panel to ground can produce error.
Ground chasis for best results, especially when measuring small capacitors.



BIAS terminals

Short-circuit for normal operation.

Bias for Capacitors: Apply bias only if CRL SELECTOR switch is in C_S position. For C_P, refer to instruction book.
Max Voltage: 600 volts dc. Add resistor as a current limiter to prevent short circuit.
Max Power: 0.5 watt.

Bias for Inductors: Apply bias only if CRL SELECTOR switch is in L_P position, For L_S, refer to instruction book.

For current limits, see reverse side of this sheet.

CRL dial

Main balance control. For greatest accuracy, choose MULTIPLIER setting for balance between 1 and 10.

ORTHONULL® balance finder

Orthonull position (clutch engaged between the two main dials) avoids false nulls and speeds balance for high D and low Q measurements.
CRL dial must be in the range above 1.

OSC LEVEL control

Adjusts internal and external oscillator level. Use full output except when measuring nonlinear or low-power devices.

DQ dial

If external frequency differs from 1 kc, multiply D and Q by factor M, indicated on dial.

SENSITIVITY control

Adjusts sensitivity of ac or dc detector. For measurement of resistance higher than 100 kΩ, increase sensitivity by use of a higher external dc supply.

DET OUTPUT terminals

Useful to connect external amplifier or earphones for additiona' sensitivity or selectivity. particularly for frequencies other than 1Kc for which the FLAT position of the DETECTOR switch should be used.

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