INSTRUCTION
MANUAL
FOR

MODEL 950

Resistance-Capacitance
and
Comparator Bridge

EICO

ELECTRONIC
INSTRUMENT CO., Inc.

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INSTRUCTION BOOK
MODEL 950
RESISTANCE-CAPACITANCE-COMPARATOR BRIDGE

DESCRIPTION

Your new EICO Model 950 Resistance-Capacitance-Comparator Bridge, was designed to measure practically all resistances and capacitances encountered in Television, AM, FM, and Electroni Equipment. It is also invaluable as a R-C-L Comparator.

The Components utilized in this instrument form a careful balance of design, development, and practice, finally giving the operator the necessary ranges and accuracy with special emphasis on simplicity of operation.

FEATURES

(1) Capacity ranges from 10 mmfd, to 5000 mfd. in 4 overlapping ranges

(2) Resistance ranges from .5 ohm to 500 megohms in 4 overlapping ranges.

(3) Inductance, Capacitance, Resistance, Impedance Comparator for checking and comparing electrical components, matching coils, etc.

(4) Leakage-Test

(5) Continuously variable voltage, from zero to 500 volts, for testing condensers.

(6) Carrying Handle

(7) Durable steel case

(8) Checks intermittent condensers under load

(9) Electrical Specifications: 105-125V AC, 60 cycles, 18 watts.

(10) Mechanical Specifications: 10x9x6 inches overall; weight 6 lbs.

RANGES

CAPACITY RANGES

(1) 10 mmfd to 5000 mmfd
(2) .001 mfd to .5 mfd
(3) .1 mfd to 50 mfd
(4) 50 mfd to 5000 mfd

RESISTANCE RANGES

(1) .5 ohms to 500 ohms
(2) 50 ohms to 50,000 ohms
(3) 5000 ohms to megohms
(4) 5 megohms to 500 megohms

COMPARATOR RANGE

(1) .05 to 20

POWER FACTOR RANGE

(1) 0 to 80

CONDENSER TEST VOLTAGE RANGE

(1) Continuously variable and calibrated from 0-500 volts

CIRCUIT DESCRIPTION

The instrument consists basically of three electronic bridges, one of which is used for capacity, another for resistance and a third for comparison.

Each bridge operates on the principle of an unknown being balanced against a standard. Balance is achieved when the null detector (magic eye tube) shows maximum opening. This is accomplished by rotation of the calibrated potentiometer. The principle of maximum opening of the eye is used, instead of maximum closing, to avoid the overlap which occurs when too large a signal is fed to the control grid of the tube. By using the maximum opening method, more sensitivity and accuracy is obtained.

The expanded capacitance and resistance ranges are made possible by modifying the type of bridge used.

The POWER FACTOR is measured by series
balancing the leakage of the unknown condenser.
A qualitive or breakdown capacity check is
included in such a manner that the leakage
current causes a voltage to develop across the
grid of the magic eve. This is a positive
voltage and causes the eye to open more when
leakage is present. An intermittent condenser
will cause the magic eye to blink.

OPERATION: GENERAL

(1) Turn instrument on by rotating the POWER
    FACTOR knob to ZERO.

(2) Set the RANGE selector to the setting which
    covers the value to be checked.

(3) Connect the component across the two right
    hand terminals marked "VOLTAGE, CAPACITANCE,
    RESISTANCE, TEST."

(4) Rotate the center potentiometer until the
    eye shows mazimum opening. Read the value
    on the "Capacitance Resistance" scale.
    Note: Numerals indicating RESISTANCE are in
    BLUE: Numerals indicating CAPACITANCE are in
    RED.

OPERATION: EXPANDED RANGE

(1) The previous steps 1 through 4 also apply to
    the EXPANDED ranges of resistance and
    capacitance, except that the readings are
    now made on the EXPANDED scale.

OPERATION: COMPARATOR

The purpose of the comparator range is to
enable the operator to compare an unknown
against a standard.

AS AN EXAMPLE: Assume you wanted to compare
an unknown capacitor with one which is known.
Place the known value across the two left hand
terminals marked "COMPARATOR, PROTOTYPE OR

STANDARD", and the unknown across the other two terminals. Adjust the pointer until the eye reads maximum opening and read the ratio of the two on the RATIO scale. For Resistance and Inductance comparison, DIVIDE the standard by the reading on the ratio scale. For capacitance comparison, MULTIPLY the standard by the reading on the ratio scale.

Using the above case with values, assume a .01mfd condenser were used as a standard, and the ratio arm was set to 2 to achieve balance. The unknown would then be .01mfd x 2 = .02mfd.

Although it is undesirable to go to all this trouble to measure a condenser, since it can be read directly, it is extremely important when certain chokes, speakers, transformers, coils, or other impedances must be compared. The previous example could have been two speakers or two chokes, etc.

OPERATION: LEAKAGE

In checking for leakage; set the RANGE switch to the TEST VOLTAGE position; set the VOLTAGE potentiometer to the DC voltage rating of the condenser. Connect the negative side of the condenser to the NEGATIVE of the two right binding posts marked VOLTAGE. Connect the positive terminal of the condenser to the POSITIVE binding post.

The eye should instantaneously open wide as the condenser charges and then slowly return to its original position. If it remains wide open and does not come back to the "half-open" position, the condenser has excessive leakage. If the leakage is so slight that it is difficult to tell whether the eye has completely returned to its "half-open" position, rotate the RANGE switch clockwise from the VOLTAGE to the unmarked position observing whether the eye changes its opening.

If the opening changes, the condenser has leakage

Note: WHEN THE RANGE SWITCH IS IN THE "VOLTAGE." POSITION AND THE LEAKAGE POTENTIOMETER IS ABOVE ZERO, THERE IS A VOLTAGE ACROSS THE TWO RIGHT HAND TERMINALS. BE CAREFUL.

OPERATION: INTERMITTENTS

To check if a condenser is intermittent, follow the procedure previously described for leakage test, except that the RANGE switch will be left in the VOLTAGE position. If the part is intermittent, the eye will blink occasionally.

OPERATION: POWER FACTOR

To measure the POWER FACTOR of a condenser, follow the condenser test procedure previously described. In condensers with high Power Factors the opening of the eye will be slightly blurry due to the internal losses in the condenser. The POWER FACTOR potentiometer should be rotated until the blurriness disappears and the eye shows a clear opening. The setting of the POWER FACTOR potentiometer is the percent Power Factor of the condenser.

Inasmuch as high Power Factor is usually found in high capacity condensers, the Power Factor potentiometer is only in the circuit in the upper two capacity ranges.

A capacitor with a large percent POWER FACTOR is not as effective a filter as similar capacitors with a lower one.

OPERATION: OPEN RESISTOR-SHORTED CONDENSER

If, in testing a resistor or condenser, the eye opens only in the extreme clockwise position of the indicator dial, the RANGE switch should be moved up to the next higher position. If it still does not balance, even on the highest range, except in the extreme clockwise position of the last range, the resistor is probably open, and a condenser is probably shorted.

OPERATION: SHORTED RESISTOR - OPEN CONDENSER

If, in testing a resistor or condenser, the
eye opens only in the extreme counter-clockwise
position of the indicator dial, the range switch
should be moved down to the next lower position.
If it still does not balance, even on the lowest
range, except in the extreme counter-clockwise
position, the resistor is shorted, and a condenser
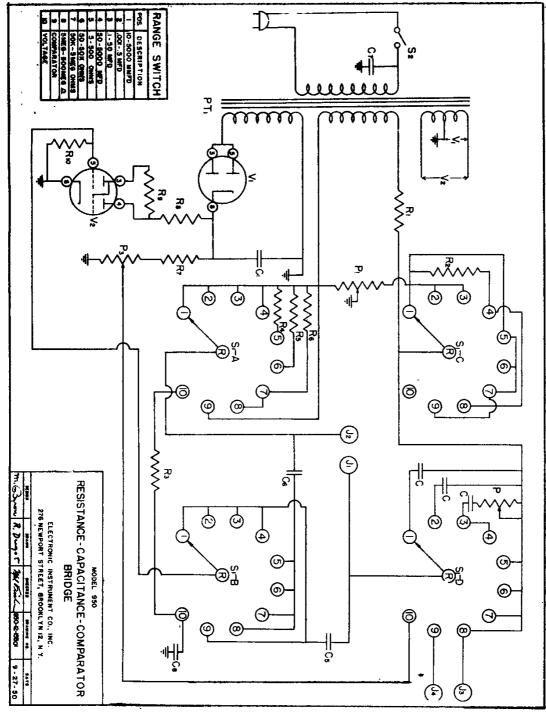is open.

OPERATION: CAPACITY COMPENSATION

Due to the distributed wiring capacities in the
construction of this instrument, it will be noted
that on the low capacity range (10mmfd-5,000mmfd)
the eye will initially balance around 10mmfd on
the dial. This assumes that no part has been
connected to the external terminals.

In order to compensate for this capacity on the
low range, subtract the initial reading by the
one obtained when the part is connected.
EXAMPLE:
If the initial reading is 12mmfd with no parts
connected and condenser is inserted that reads
112mmfd, the actual value of the condenser is
112mmfd-12mmfd=100mmfd. It is only necessary to
compensate for the initial capacity on 10mmfd
5000 mmfd range, since 10mmfd is a small fraction
of the other ranges and may, therefore, be
neglected.

NOTE: This compensation is required on
practically all equipment of this type and is
called for even in instruments costing over
10 times your cost.

SYMBOL	DESCRIPTION
C1	8 MFD FILTER CONDENSER
C2	200 MMFD PREC. CONDENSER
C3	.02 MFD PREC. CONDENSER
C4	2 MFD PREC. CONDENSER
C5,6,7	.01 MFD TUBULAR
C8	.25 MFD TUBULAR
P1	10K POTENTIOMETER
P2	1K POTENTIOMETER
P3	1 MEG POTENTIOMETER
PT1	POWER TRANSFORMER
R1	500 OHMS 5 WATT RESISTOR
R2	250K 1% RESISTOR
R3	1 MEG ½ WATT RESISTOR
R4	20 OHMS 1% RESISTOR
R5	2K 1% RESISTOR
R6	200K 1% RESISTOR
R7	30K 1 WATT RESISTOR
R8	100K ½ WATT RESISTOR
R9	270K ½ WATT RESISTOR
R10	10 MEG ½ WATT RESISTOR
S2	RANGE SWITCH
S1	ON-OFF SWITCH
V1	6X5 RECTIFIER TUBE
V2	1629 INDICATOR TUBE

RANGE SWITCH

POS	DESCRIPTION
1	10-5000 MMFD
2	.001-.5 MFD
3	.1-50 MFD
4	50-5000 OHMS
5	5-500 OHMS
6	50K-5MEG OHMS
7	5MEG-500MEG Ω
8	COMPARATOR
9	VOLTAGE

MODEL 950

RESISTANCE-CAPACITANCE-COMPARATOR
BRIDGE

ELECTRONIC INSTRUMENT CO., INC.
276 NEWPORT STREET, BROOKLYN 12, N.Y.

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