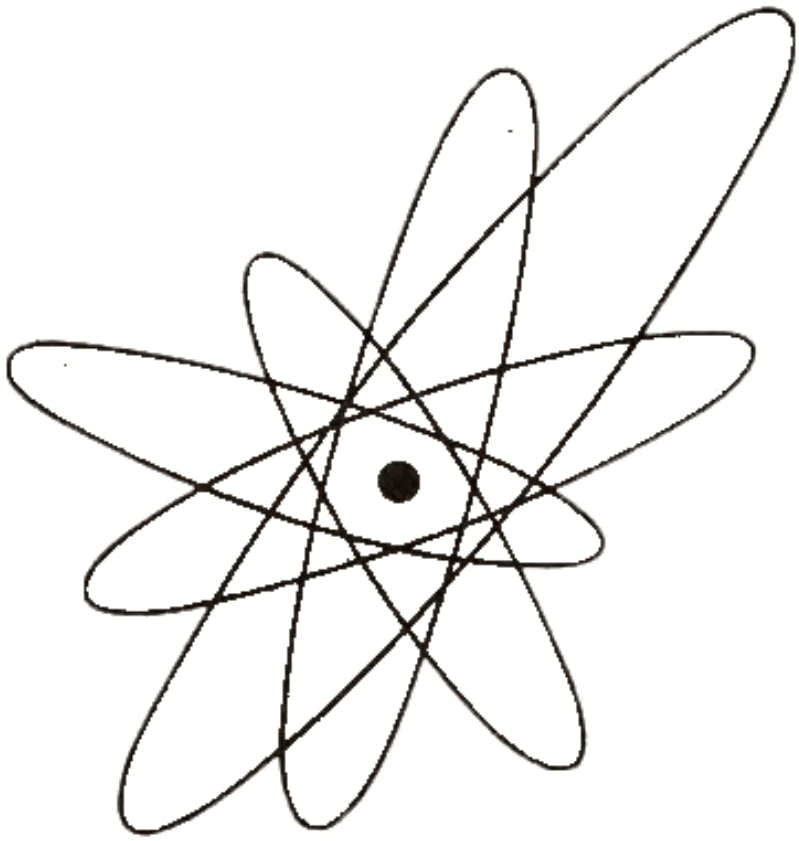
OPERATING INSTRUCTIONS

FOR

CAPACITANCE-RESISTANCE BRIDGE

TYPE YCW-1



GENERAL ELECTRIC

Electronics Department Specialty Division

Syracuse, N. Y.

GENERAL SPECIFICATIONS

POWER SUPPLY: 105-125 volts, 50-60 cycle input power consumption 15 watts (approx.)

CAPACITOR RANGES: 5 mmf to 2000 mmf; .002 mf to .2 mf; .2 mf to 200 mf.

RESISTANCE RANGES: 5 ohms to 5000 ohms; 5000 ohms to 20 megohms.

TURN RATIO RANGE: 1 to 40 or 1/40.

POWER FACTOR RANGE: 0 to 50% on high capacitor range.

INSULATION RESISTANCE RANGE: 0 to 3000 megohms.

POLARIZING VOLTAGE RANGE: 0 to 500 volts continuously variable.

ELECTROLYTIC CONDENSER LEAKAGE TEST: Based upon Commerical standards of reputable capacitor manufacturers, this test will pass or reject electrolytic capacitors.

INSTRUCTIONS FOR OPERATION

OF

CAPACITANCE-RESISTANCE BRIDGE

TYPE YCW-1

GENERAL DESCRIPTION

This instrument is a combination condenser and resistor bridge intended for use by the radio serviceman and in production testing. With this instrument it is possible to measure a wide range of capacity and resistance and electrical characteristics of condensers such as power factor, insulation resistance, and leakage current; in addition, turn ratio of transformers can be measured.

Capacitance-Resistance Bridge Type YCW-1 consists principally of a 500-volt d-c power supply which operates from any 50 to 60 cycle 105-125 volt a-c power source, a voltage adjusting potentiometer, linear bridge potentiometer, a visual indicator tube used as a null indicator, a voltmeter which is also used as a megohm meter and electrolytic capacitor leakage test indicator, and push button selector switch.

Power Supply

The power supply consists of a full-wave rectifier which uses a 5Y3 tube to feed an L-filter circuit. A special regulation feature prevents damage to components when a shorted capacitor is tested. A bleeder circuit supplies 140 volts to the visual indicator tube circuit.

Bridge

Two sections of the bridge consist of a linear potentiometer with a grounded variable tap. The other two sections are the standard capacitor or resistor and the unknown capacitor or resistor. The circuit is supplied with an a-c voltage. The indicator tube is connected across the bridge to indicate a zero voltage or a balance of the bridge. Balance is obtained by varying the potentiometer until the shadow angle of the indicator tube is a maxium. The value of the unknown is then read from the proper scale at the point indicated.

Voltmeter

Circuit and switch arrangements make it possible to measure the d-c voltage across the test condenser, insulation resistance of test condenser and to indicate acceptable and not acceptable leakage current of the electrolytic capacitors.

OPERATION

Installation

NOTE

Be sure the voltage and frequency of the power line used is 105-125 volts a. c., 50-60 cycles.

The ON-OFF toggle switch interrupts the line circuit in the OFF position. Connect a good ground to the terminal post marked GRD. Ground connection is not necessary for larger capacitors and resistors, but is essential for best accuracy on 250 mmf or less and for most accurate insulation resistance determinations.

To Measure Capacitance

Connect the unknown capacitor between terminal posts marked CAP. Observe polarity with electrolytic units. Depress the push button approximating the value of the unknown capacitor and rotate the dial pointer until bridge balance is indicated by the maximum shadow angle of the indicator tube. Read capacity on the proper scale.

If there are no numerals where the bridge is balanced, use a higher or lower range and re-balance for best accuracy. Open capacitors will balance at the extreme left; shorted capacitors will balance at the extreme right.

Power Factor

Broad balance point and a fuzzy edge of the indicator tube shadow indicate poor power factor. Turn the power factor dial until clean, sharp balance is obtained and read the percentage power factor from the dial. This adjustment is provided on the high capacitance scale only. Good electrolytics will show a power factor of 10 to 12% or less; good paper units will show less than .1%.

Polarizing Voltage

To avoid shock from the binding posts, the VOLTAGE knob will ordinarily be turned all the way left and the meter will read zero volts.

To measure electrolytic capacitors with polarizing voltage applied, depress the push button for the proper scale and adjust the voltage by the meter to the working voltage of the capacitor. Connect the capacitor to the terminal posts marked CAP and observe the polarity. The voltage will fall and then rise, indicating correct formation and charging of the condenser. If the voltage does not rise after two or three seconds, the capacitor is shorted or leaking badly and should be disconnected to avoid overloading the power supply. If the voltage rises, readjust to the exact working voltage of the capacitor and proceed to measure capacitance and power factor as in the preceding instructions.

Leakage in Electrolytic Capacitors

The connections and adjustments described under Polarizing Voltage are used to test leakage. After the unit has formed completely (15 to 20 seconds may be required if the capacitor has not been used for a long time), the meter voltage should be accurately adjusted to the working voltage of the capacitor. Depressing the CAP LEAKAGE push button will cause the meter to rise. If the reading rises beyond the intersection of the curved voltage line and the capacitance arc, the condenser is defective.

Example: The test capacitor is marked 20 mf-300 v. Adjust the meter to 300 volts after formation is complete. Depress CAP LEAKAGE push button. Follow the curved line from 300 on the scale to where it intersects the arc across the scale from 20 mf. If the meter indicator is below this intersection, the leakage is satisfactory. If the indicator is above, reject the capacitor.

Off-decimal values such as 8 and 16 mf may be tested in the same way and about 8/10 as much rise permitted for 8 mf, for example, as would be permitted for a 10 mf capacitor. Electrolytic capacitors usually run higher than the marked capacitance, so close rejections should be made on measured capacitance, not on the marked value.

To Measure Insulation Resistance

Insulation resistance of paper and mica capacitors and other parts is determined by connecting the sample between the terminal posts marked CAP and depressing the INS RES push button. The indicator tube pattern will close. Advance the VOLTAGE knob until the pattern *remains* just open.

With larger-size capacitors, each readjustment of the VOLTAGE knob may make the pattern open momentarily due to change of charge on the capacitor. When the voltage has been reached which makes the indicator tube pattern *just open permanently*, read the insulation resistance in megohms on the upper scale of the meter.

Under extremely humid weather conditions, it may be necessary to turn the power on for a few minutes before using the instrument in order to dispel moisture from the surface of the insulating parts. Proper operation can be assured by checking the resistance with the terminal posts open to see that the pattern remains closed at the higher voltages.

To Measure Resistances

Resistances from 5 ohms to 20 megohms are measured by connecting the resistors between terminal posts marked RES. Select a suitable range on the push button switch and balance the bridge in the same manner as for capacity.

To Measure Turn Ratio of Transformers

Connect one winding between terminal posts marked CAP and the other between terminal posts marked RES. Depress the TURN RATIO push button and balance the bridge. Read the outside scale and divide by 200 to obtain the ratio in the sense of RES/CAP.

If no balance is obtained, reverse the connections of one of the windings. If a fuzzy balance is obtained, reverse the connections to both windings to elimate the effect of adjacent capacitance between them.

MAINTENANCE

CAUTION

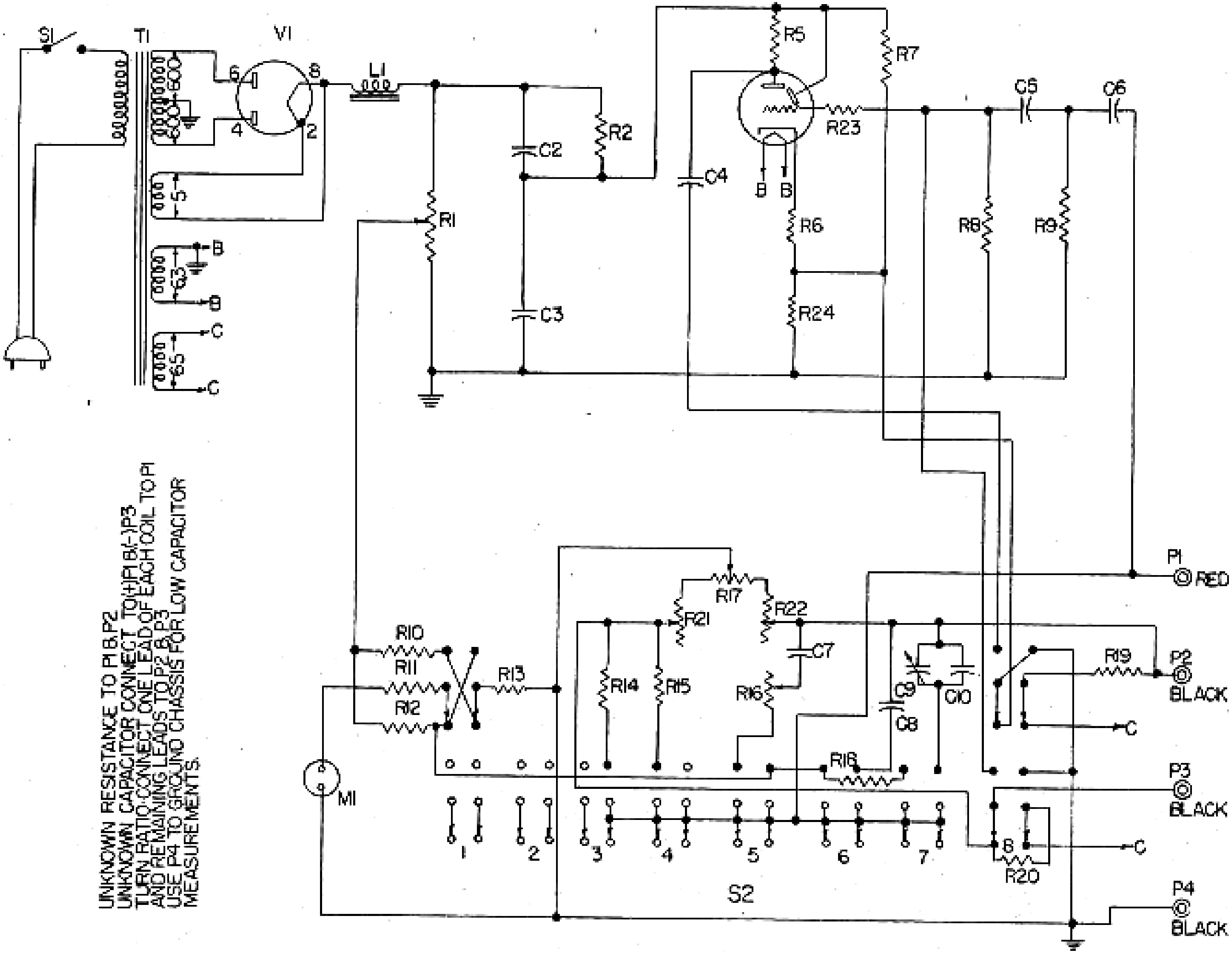
The voltage adjusting potentiometer is not grounded and will be at whatever voltage the meter indicates. Up to 600 volts are available.

To replace tubes, remove the screws on the front panel of the instrument and lift the panel from the case. In this condition, all components and tubes are available. No adjustments are necessary when tubes are replaced.

REPLACEMENT PARTS LIST

Symbol No.	Description	Catalog No.
C2	Electrolytic, 8 mfd 450 v.	SCE 017
C3	Electrolytic, 16 mfd 450 v.	SCE 016
C4	Paper, .5 mfd ± 20% 600 v.	SCC 024
C5, C6	Mica, .0039 mfd ± 10%	SCU 008
C7	2.00 mfd ± 1% 600 v.	SCC 023
C8	Mica, .02 mfd ± 1% 600 v.	SCU 009
C9	Trimmer, 5-25 mmfd.	SCY 004
C10	175 mmfd. ± 4.6 mmfd	SCW 004
R1	Potentiometer, 50,000 ohms 9 w.	SCR 036
R2	.15 megohm ± 10% 1 w.	URE 101
R5	1 megohm ± 5% ½ w.	URD 121
R6	3000 ohms ± 5% 1w.	URD 1060
R7	200,000 ohms ± 5% ½ w.	URD 1104
R8	10 megohms ± 5% ½ w.	URD 1145
R9	1 megohm ± 10% ½ w.	URD 121
R10	20,000 ohms ± 5% ½ w.	URD 1080
R11	.62 megohm ± 5% 1 w.	URE 1106
R12	20,000 ohms ± 5% 10 w.	SRW 023
R13	.62 megohm ± 5% 1 w.	URE 1106
R14	200,000 ohms 2% 1 w.	SRE 014
R15	200 ohms 2% 1 w.	SRE 013
R16	Potentiometer, 750 ohms 4 w.	SRC 035
R17	Potentiometer, 3,000 ohms 15 w.	SRC 034
R18	20 megohms ± 10% ½ w.	SRD 039
R19	510 ohms ± 5% 2 w.	SRF 003
R20	510 ohms ± 5% 2 w.	SRF 003

Symbol No.	Description	Catalog No.
R19	510 ohms ± 5% 2 w.	SRF 003
R20	510 ohms ± 5% 2 w.	SRF 003
R21	Variable, 100 ohms ± 10% 2 w.	SRW 007
R22	Variable, 100 ohms ± 10% 2 w.	SRW 007
R23	1 megohm ± 10% ½ w.	URD 121
L1	Choke, filter, 1545 ohms d. c. ± 10%	SLF 007
S1	Switch, toggle	SSS 006
S2	Switch, push button	SSP 003
T1	Transformer, power, 115 v.	STP 010
M1	Milliameter, 0-1 d. c.	SDV 007
	Case	SAW 010
	Post, binding	SEP 002
	Cover	SAC 005
	Post, binding	SEP 001
	Panel	SAP 005
	Knob	SDK 029
	Knob	SDK 033
	Knob	SDK 034
	Knob and pointer assembly	SDK 035
	Socket, octal	SJS 028
	Visual indicator tube assembly	SDX 005
	Terminal strip	SJB 011
	Power cord	SWL 002
	Instruction Book	SYB 007
	Tube type 5Y3GT	
	Tube type 6E5	



UNKNOWN RESISTANCE TO P1 & P2
UNKNOWN CAPACITOR CONNECT TO (+)P1 & (-)P3
TURN RATIO-CONNECT ONE LEAD OF EACH COIL TO P1
AND REMAINING LEADS TO P2 & P3
USE P4 TO GROUND CHASSIS FOR LOW CAPACITOR
MEASUREMENTS.