SYLVANIA
POLYMETER
TYPE 134Z

OPERATING MANUAL

SYLVANIA ELECTRIC PRODUCTS, INC.

Price $1.00

OPERATING INSTRUCTIONS

SYLVANIA

POLYMETER

TYPE 134Z

SYLVANIA ELECTRIC PRODUCTS, INC.
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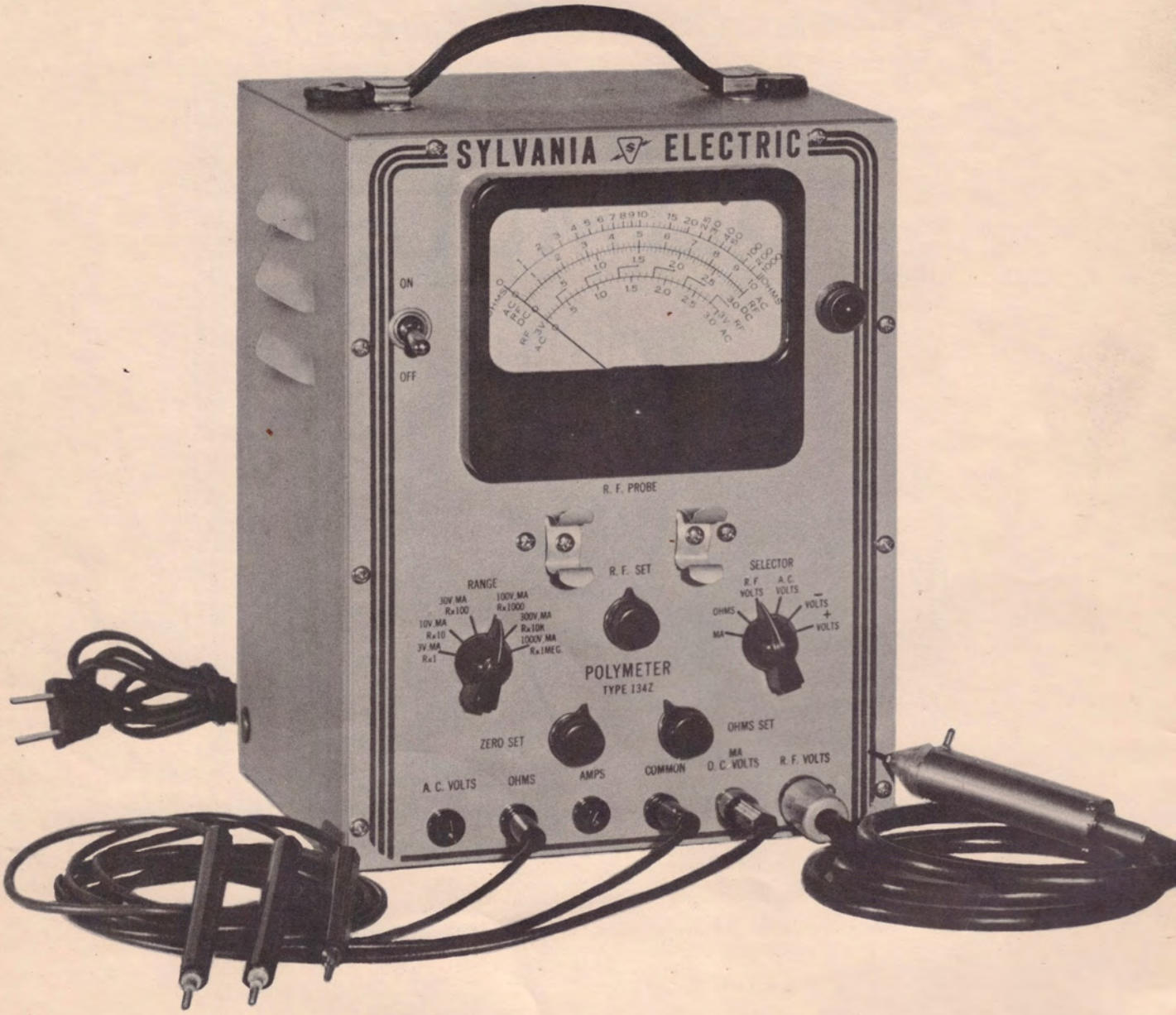

SYLVANIA
POLYMETER TYPE 134Z

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GENERAL DESCRIPTION

I. QUICK REFERENCE DATA

A. Power Requirements

105-125 volts AC, 50-60 cycles.

Power consumption—30 watts.

Fuse protection—1 ampere.

B. Ranges

0-3, 10, 30, 100, 300, 1000 volts DC.

0-3, 10, 30, 100, 300 volts AC.

0-3, 10, 30, 100, 300 volts RF.

0-3, 10, 30, 100, 300, 1000 ma DC.

0-10 amp DC.

0-1000, 10,000, 100,000 ohms, 1 meg, 10 meg, 1000 meg.

C. Frequency Range of RF and AC

AC volts 20 cps to 15,000 cps.

RF volts 10,000 cps to 300 mc.

D. Input Impedance

DC volts—16 megohms.

AC volts—2.7 megohms 40 mmf.

RF volts—2.3 megohms 3 mmf.

E. Tube Complement

2—7N7, 1—7Y4, 1—1247, 1—5679.

F. Size

Height 10⅛ inches, width 7 11/16 inches, depth 6 15/16 inches.

G. Weight

12½ pounds.

II. BRIEF DESCRIPTION

The Sylvania Polymeter Type 134Z is an AC operated, portable, general purpose Ammeter, Milliammeter and Vacuum Tube Volt-Ohm Meter. Special features of this instrument are:

(1) High input impedance on all voltage ranges which prevents loading of high impedance low power circuits.

(2) Extended frequency range from 20 cps to 300 mc.

(3) Stability against tube aging and line voltage variation. A duo-diode with a center tapped heater to equalize the cathode potential is used.

III. OPERATION

A. General

Remove the Polymeter carefully from the packing material. The following accessories are included in one complete shipment:

(1) RF Probe Assembly.

(2) One black test prod with lead.

(3) One red test prod with lead.

(4) One red test prod with a black lead.

(5) Operating Manual.

(6) Warranty Card.

1. Preliminary Check

a. Set mechanical zero on meter if necessary.

b. Insert RF Probe Assembly plug in RF VOLTS jack.

c. Plug power cord into AC line of voltage and frequency indicated on identification plate at rear of cabinet.

d. Turn POWER SWITCH to ON. Allow Polymeter to warm up for about three minutes.

e. Set SELECTOR switch on minus (−) VOLTS and RANGE switch to 3 v.

f. Set meter to zero with ZERO SET knob.

g. Rotate RANGE switch through all positions. Zero setting should not change.

h. Rotate SELECTOR switch through all positions except OHMS. Zero setting should not change materially. If meter is near strong AC fields from power lines or other AC sources, the leads may pick up enough voltage to indicate on the AC ranges. Shorting the leads will eliminate this deflection. Due to high impedance source of the stray fields, the accuracy of the meter will not be affected when measuring circuit potentials. The RF zero will vary somewhat with different line voltages between 105 and 125 and can be compensated for by the RF SET. (If meter zero variations are not negligible, correction may be applied as described in the Maintenance Section.)

2. Warranty Card—Fill out the Warranty Card as instructed and mail. The serial number of the card should agree with the serial number on plate at rear of cabinet.

3. Scales—There are five scales on the meter (for references, see Fig. 1). Resistances are read on scale "A." All DC voltages and currents are read on scales shown as "B." AC voltages to 3 v are read on scale "D"; above 3 volts, AC voltages are read on scales shown as "B." RF voltages to 3 v are read on scale "C"; above 3 volts, RF voltages are read on scales shown as "B."

Select the proper RANGE and SELECTOR switch positions before making any measurement.

CAUTION: When measuring high voltages, safe practice dictates that both prods be securely connected into the circuit under test BEFORE TURNING ON THE VOLTAGE.

B. DC Voltage

To measure DC volts, turn SELECTOR switch to minus (−) VOLTS, RANGE switch to 3 v and set meter on zero with ZERO SET knob. Then turn SELECTOR switch to plus (+) VOLTS or minus (−) VOLTS according to the polarity of voltage to be measured. Turn RANGE switch to range desired. Plug black prod and lead into COMMON (black) jack and red prod with black lead into DC VOLTS jack on front panel. Connect black prod with black lead to ground or common point of the circuit to be tested and the red prod with black lead to the high side of the circuit. Read meter on appropriate scale.

NOTE: The red prod with black lead has a larger panel plug and the prod contains a 1 megohm resistor. This prod and lead should be used for measuring DC volts only.

C. AC Voltages

1. To measure AC VOLTS (20–15,000 cps), turn SELECTOR switch to minus (−) VOLTS, RANGE switch to 3 v and set meter on zero with ZERO SET knob. Then turn SELECTOR switch to AC VOLTS and RANGE switch to range desired. Plug black prod and lead into COMMON (black) jack and red prod with red lead into AC VOLTS jack on front panel. Connect black prod with lead to ground or common point of the circuit to be measured and red prod to the opposite side of the circuit. Read the meter on the appropriate scale. The meter is calibrated for reading RMS sine wave voltages.

The maximum AC voltage that should be measured with the Polymeter is 300 volts.

2. Superimposed AC and DC Voltages—When DC voltages in excess of 500 volts occur in a circuit being tested for AC voltage, an external blocking capacitor of appropriate capacity and voltage rating must be employed between prod and voltage to be measured.

D. RF Voltage

1. To measure RF volts (10,000 cps−300 mc), turn SELECTOR switch to minus (−) VOLTS, RANGE switch to 3 v and set meter on zero with ZERO SET knob. Insert

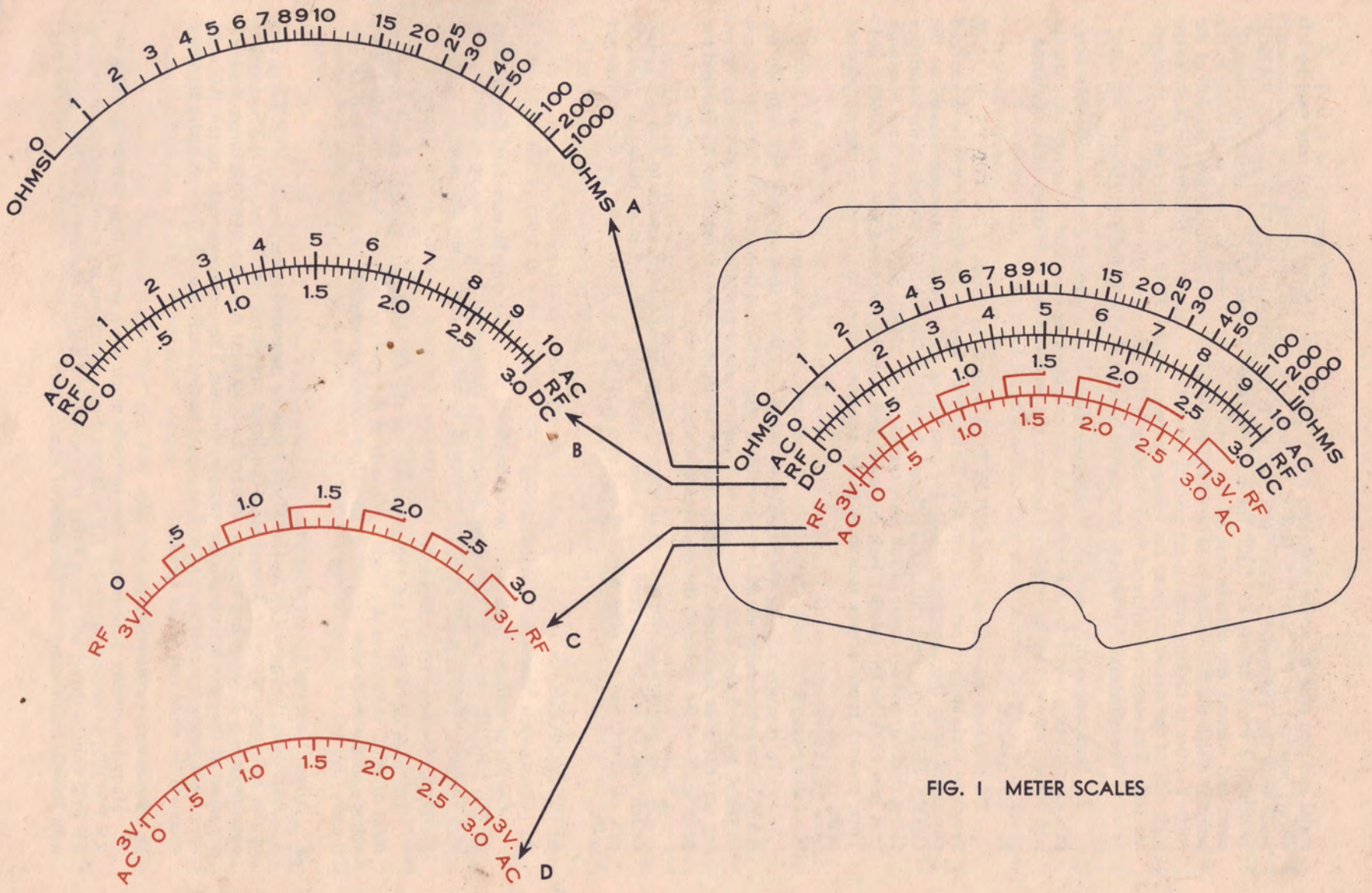


FIG. 1 METER SCALES

metal jacketed plug of probe cable into RF VOLTS jack. (Metal jacketed plug may be left always inserted in RF VOLTS jack if desired as it has no effect on other measurements made with the Polymeter.) Then turn SELECTOR switch to RF VOLTS and RANGE switch to 3 v and adjust RF SET for zero reference. Rotate RANGE switch to range desired and connect the outside case of the metal probe to ground as close as possible to the point at which the RF voltage is to be measured. A turret lug is mounted near the end of the probe for use in making convenient ground connections. Connect the point of the probe to the high side of the circuit carrying the voltage to be measured. Read the meter on the appropriate scale. The meter is calibrated for indicating RMS sine wave RF voltages.

The maximum RF voltage that should be measured with the Polymeter is 300 volts.

2. Superimposed RF and DC Voltages—When DC voltages in excess of 500 volts occur in a circuit being tested for RF voltage, an external blocking capacitor of appropriate capacity and voltage rating must be employed between the probe tip and the voltage to be measured.

E. Resistance

To measure resistances, turn SELECTOR switch to minus (−) VOLTS, RANGE switch to Rx1, and set meter to zero with ZERO SET knob. (The battery will be discharged unnecessarily if the ohm meter leads are shorted to make this adjustment directly on the OHMS RANGE.) Turn SELECTOR switch to OHMS, RANGE switch to the multiplier factor desired, and set meter to full scale reading with OHMS SET. Connect black plug with lead into COMMON (black) jack on panel, and red plug with red lead into OHMS jack. Then connect prods across resistance to be measured. Read the meter on the appropriate scale.

F. DC Current

1. To measure current (milliamperes) turn SELECTOR switch to MA and set the RANGE switch to range desired. Connect black plug with lead into (black) COMMON jack on panel, and red plug with red lead in MA jack. Connect prods in series with circuit carrying current to be measured. The black lead is the negative side of meter and the red lead the positive. Read the meter on the appropriate scale.

2. To measure DC currents to 10 amperes, turn SELECTOR switch to MA (RANGE switch may be left in any position). Connect black plug with lead into (black) COMMON jack on panel, and red plug with red lead into AMPS jack. Read meter on the appropriate scale.

IV. APPLICATIONS

A. Oscillator Voltage Measurements

Oscillator voltages at all points on all bands of a receiver may be measured directly with the RF PROBE due to its high input impedance. Voltages, at frequencies up to 300 mc, may be accurately measured. The meter is calibrated to indicate RMS volts sine wave.

B. AVC Voltage Measurement

The high input resistance (16 megohms) of the DC Voltmeter permits direct measurement of AVC voltages at the diode or directly at the grids of the tubes being controlled. This voltage on the diode may be used as an output indication when aligning the RF and IF sections.

C. Audio Voltage Measurements

All Audio Voltages (20 to 15,000 cps) may be measured using the AC VOLTS circuit of the Sylvania Polymeter Type 134Z. The input impedance of the AC VOLTS circuit is equivalent to a 2.7 megohm resistor shunted by a 40 mmf capacitor. At 10,000 cps, the loading effect of the capacity is negligible to audio circuits. These measurements include AC voltages from power transformers as well as signal tracing audio signals through audio amplifier stages to the voice coil of the speaker.

D. Transmitter Adjustments

Many transmitter adjustments may be made much more simply than before by using the RF PROBE to measure or detect RF voltages. Such operations are neutralization, measuring RF grid voltage drive, and many other tests which will suggest themselves to those concerned with design, maintenance and operation of transmitters.

E. Power Measurements

Power measurements may be made by using the following formula: Power (in watts) = E^2 / R, where E equals the voltage across the component in which power is dissipated and R equals the DC resistance of the component when measuring DC power or the AC resistance when measuring AC power.

Example: The voltage (undistorted) across an 8 ohm voice coil is 4 volts. Watts = 4 x 4/8 = 16/8 = 2 watts.

F. DC Voltages

All voltages at the various elements of any tube (i. e., plate, screen, etc.) can be checked against published values as well as all power supply voltages in the filter and on the rectifier tube. The voltage of bias cells may be measured directly without injury to the cell.

G. AFC Discriminator Voltage

This voltage may be measured directly either at the discriminator or the grid of the control tube without disturbing the circuit.

H. FM Discriminator Voltage

To measure these voltages, set meter at ½ scale with ZERO SET control. Then both positive and negative voltages will indicate without turning SELECTOR switch.

I. Television Receiver Adjustments

1. DC Voltage Tests.

a. High Voltage up to 10,000 volts. The Polymeter DC voltage ranges may be multiplied by use of an *external multiplier resistor* to read 10,000 volts DC. The resistor selected must be a 144 megohm unit capable of handling 10,000 volts.

To measure the high voltage in a television set, the utmost care must be exercised. First turn off the power to the receiver. Second, securely connect the "COMMON" ground of the Polymeter to the chassis of the television receiver. If the voltage to be measured is negative with respect to ground, turn the selector switch to minus (−) VOLTS. Then the RANGE switch should be rotated to 1000 v DC. Third, secure one end of the 144 megohm resistor to the voltage to be measured, and connect the DC volts prod to the other side of this resistor.

Turn on the power of the receiver and note voltage reading by reading it on the 0 to 10 scale and multiply by 1000.

b. DC voltage up to 1000 volts. Proceed as in regular receiver work exercising caution as not to come in contact with high voltage circuits.

2. AC Voltage Tests.

a. High voltage tests may be made on television sets using transformer type high voltage supplies. An external multiplier is required to measure voltages over 300 volts. Direct high voltage AC measurements are not recommended for either the "RF Power Supply" or the "Flyback Pulse Rectifying" circuit. In these instances, the measurement of DC rectified voltage is the best indication.

b. An AC multiplier for RMS sine wave voltages up to 10,000 volts may be made using two capacitors to form a capacitance divider across the input of the AC volts 300 range.

First, turn off power to the television set. One capacitor, a 5000 mmf mica 500 v rating, is connected across the AC VOLTS and COMMON terminals of the Polymeter. Another capacitor of 160 mmf 10,000 v rating is connected between the voltage to be measured and the AC VOLTS prod. The common lead is securely connected to the chassis of the receiver. Turn the range switch of the Polymeter to 300 v, the Selector Switch to AC VOLTS. Turn on the power to the television receiver and read the voltage on the 0 to 10 scale, multiplying by 1000 to get RMS voltage.

c. Low AC and Audio Voltages 300 volts and less. Procedure is the same as in regular receivers.

3. Resistances and DC current tests in television sets. Same as in regular service work except exercise caution when working with high voltage turned on in the television receiver.

4. RF Voltage Tests in Television Receivers Using RF Probe.

a. Oscillator Voltage may be measured at television frequencies as the RF probe is accurate to 300 megacycles. Connect the shell of the probe to chassis by a short lead and the tip of the probe to the grid or plate of the oscillator tube. The probe shell must always be connected to ground by a short lead in order that the advantage of low capacity design be realized.

b. RF Signal Voltage may be measured using the probe and a signal generator since the received signal from a station is seldom strong enough to actuate even the most sensitive scale of a vacuum tube voltmeter. The signal from a CW generator (no AM or FM) may be fed into the antenna terminals at a frequency in the tuning range of the receiver. Adjust the signal generator for maximum output. Connect the Polymeter RF probe between plate and ground of the tube where the signal is to be measured. For maximum precision, readjustment of tuning or trimmer capacitor may be necessary to compensate for the 3 mmf input capacity of the probe. This is done by peaking the voltage reading on the meter. When the voltage has been measured, return the trimmer to its original setting. Repeat where the RF signal voltage is to be observed.

c. IF (signal) voltage may be measured in the same way. It is not necessary to "tune" or to adjust anything on the Polymeter when changing from RF signal voltage to IF signal voltage because the RF probe frequency response is flat from 15 kc to 300 MC. This includes IF and signal frequencies.

The picture IF and sound IF may be tested for proper response by connecting the RF probe across the secondary of the last IF transformer in the picture amplifier, or across limiter grid to ground in the sound IF respectively. Vary the CW signal generator across the channel to which the receiver is tuned, and note the response curve. The picture IF may be adjusted in this way for proper response and injection frequency. Likewise, the sound IF may be properly aligned. When the Polymeter probe is removed from the test connection, increase the capacity of the IF trimmer which is across the terminals where the probe was connected by an amount equivalent to 3 mmf which is the input capacity of the probe.

d. RF power supply voltage in television receivers.

The LOW PRIMARY VOLTAGE of the RF power supply in television receivers may be measured using the RF probe provided it is not over 300 volts. The probe frequency response is flat from 15 kc to 300 mc which range includes most RF power supply frequencies. The high secondary voltage of such sets is well beyond the range of the probe. As such circuits are easily detuned, measurements of RF power supply secondary voltages should not be attempted as faulty results will probably be obtained. The measurement of rectified DC voltage from RF power supplies may be made following the external-multiplier high voltage DC technique of this section on television receivers. The AC multiplier system is not adaptable since it adds too much capacity to the RF power supply.

J. RF Signal Tracing Using RF Probe

1. AM Receivers. Measuring stage-by-stage gain of already aligned receivers.

a. Connect a CW signal generator to the antenna terminals of the set. Adjust for maximum voltage output. A generator output of at least 0.1 volt is desired for satisfactorily determining the gain of the first RF stage.

b. Tune receiver to signal generator. Short out receiver AVC.

c. Set Polymeter RANGE switch to 0-3 v RF scale, SELECTOR switch to RF VOLTS.

d. Remove RF probe from clips on front panel. For each measurement be certain that the shell of the RF probe makes contact with the receiver chassis or that it is connected to the chassis by a short length of wire. The higher the RF frequency to be measured, the shorter must be the connections between probe and circuit. Short ground and hot leads are the rule when using the RF probe.

e. With probe shell grounded, measure the voltage at the plate of RF tube. Similarly measure grid voltage of RF tube. Ratio of voltages gives gain of RF stage. It may be necessary in some sets, when tuning capacitor is near its all-out position, to readjust the trimmer capacitor to peak the voltage in order to compensate for the small amount of detuning caused by the 3 mmf input capacity of the probe.

f. Reduce signal generator to zero output and check receiver oscillator voltage at oscillator grid, plate and at converter tube injector grid.

g. Restore signal generator to output level which gives readable signal at RF tube plate. Measure the signal generator output voltage and voltage at converter tube plate. Ratio of these voltages is conversion gain of converter tube. Trimmers may have to be peaked for reading, then restored to original value.

h. Measure voltage at the plate of first IF tube; peak trimmer, if necessary, to compensate for 3 mmf input capacity of probe. This voltage divided by voltage at plate of converter tube is the stage gain.

i. Repeat for succeeding stages reducing signal generator output to keep from overloading stages under test or adjacent stage since AVC is not operating.

j. Return all trimmers to original positions and restore AVC voltage.

2. FM Receivers—Stage-by-stage gain measurements are made following the same procedure as in AM sets since the sets are similar up to the limiter and discriminator. FM IF circuits will probably be found to be less critical as to detuning caused by application of RF probe; however, this advantage may be offset by the increased detuning that may be experienced in the RF part of an FM receiver when the probe is connected across a tuned circuit.

In sets equipped with a limiter stage, it will be noticed that the gain of the limiter stage will vary as the input signal is changed. This is the natural result of the limiting action, since this stage is designed to produce a constant output voltage regardless of input voltage, as long as the input voltage is above a certain value, usually in the neighborhood of from two to six volts RF.

K. Capacitance Measurements

While only a bridge measurement of capacity is most accurate, a good approximate measurement of capacitors between .01 and 10 mf (not electrolytics) can be made with the Polymeter. Connect the unknown capacitor and a variable resistor in series across a variable source of AC voltage (3-125 volts). Adjust variable resistor until Polymeter reads the same amount of AC voltage across the condenser and the resistor. Disconnect the AC voltage and measure the value of the variable resistor with the OHMS scale. From Fig. 2, the capacity can be located as follows:

Locate the resistance value on the right-hand scale. Then locate the cross in the center corresponding to the frequency used (50 or 60 cps. If 25 cps is used, divide resistance measured by 2 and use 50 cps mark). Through these two points, lay a straight edge, and read the capacitance at the intersection of the left-hand scale.

V. MAINTENANCE

A. Removal from Cabinet

The unit is removed from the cabinet by removing the screws from the edge of the panel and lifting out the assembly. The battery connections are disassembled by loosening the screw accessible through the hole in the side of the cabinet.

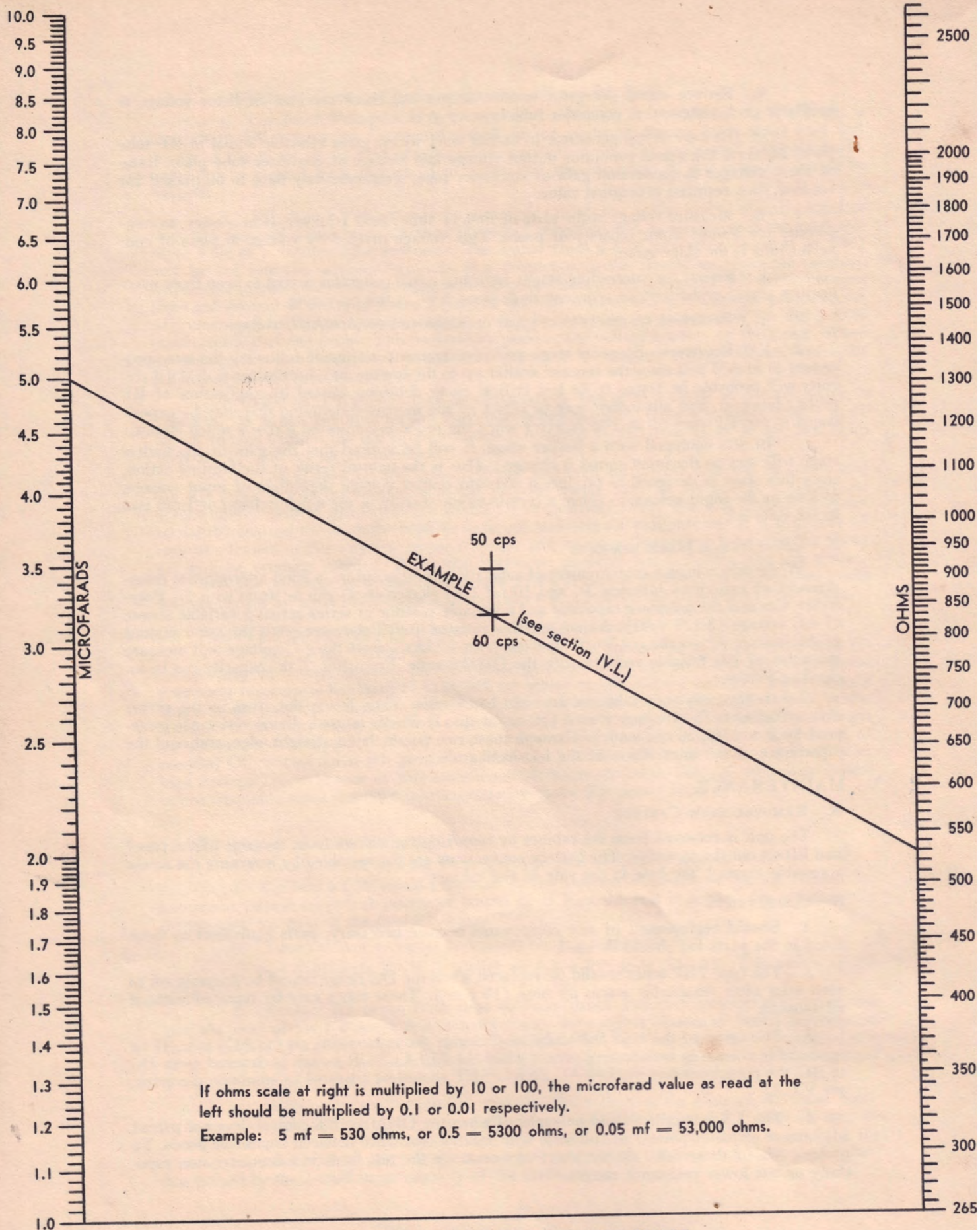
B. Components

1. Should replacement of any components become necessary, parts equivalent to those listed in the parts list should be used.

2. The type 7N7 tubes should be replaced when the DC range cannot be properly set to zero even after reasonable warm up time (10 min.). These tubes may be replaced without adjustment.

3. The aging of the type 5679 tube may change the zero setting on the AC range. If an appreciable change in zero setting occurs when the SELECTOR switch is changed from DC to AC, the potentiometers marked AC ZERO SET should be adjusted to eliminate the error, see V.C.3.

4. The 1.5 volt cells should be replaced when the OHMS SET control does not permit adjustment of meter pointer to full scale with infinite resistance between ohmmeter prods. To prolong life of these cells, do not short unnecessarily the test leads in Ohmmeter use, especially on the lower resistance ranges.



If ohms scale at right is multiplied by 10 or 100, the microfarad value as read at the left should be multiplied by 0.1 or 0.01 respectively.

Example: 5 mf = 530 ohms, or 0.5 = 5300 ohms, or 0.05 mf = 53,000 ohms.

FIG. 2 REACTANCE-CAPACITANCE CHART

To change the cells, remove the Polymeter from its cabinet, loosen the Phillips head screw, accessible through the hole in the side of the cabinet, then remove the bracket holding the cells. Place new cells in position and re-assemble the entire unit, noting that the positive terminal of the battery is grounded.

C. CALIBRATION

1. Recalibration is seldom necessary even when tubes are replaced, but if it should become necessary, proceed as follows:

NOTE: All potentiometers should be resealed with radio cement or lacquer after resetting.

2. DC Calibration—Zero the meter mechanically with the unit turned OFF. Turn the Polymeter ON and allow approximately fifteen minutes as warm-up time. Set the SELECTOR switch on plus (+) VOLTS and the RANGE switch in the 10 v position, zero the meter with ZERO SET, apply exactly 10 v DC and adjust the potentiometer on the chassis marked DC SET until the meter reads 10 v. This calibrates all DC ranges.

3. AC Calibration—Adjust ZERO SET as described in V.C.2. Set the SELECTOR switch on AC VOLTS and the RANGE switch in the 3 v position. Connect the AC VOLTS and COMMON test prods to each other for adjustment of the AC ZERO SET. Rotate FINE AC ZERO SET until the meter indicator rests on zero. If this is not possible, turn FINE AC ZERO SET to its complete clockwise position, and adjust the COARSE AC ZERO SET until the meter indicates 0.4 to 0.5 on the 10 v scale. (Caution—the COARSE AC ZERO SET is in the filament circuit of the Type 5679 tube. Allow sufficient time for the meter reading to stabilize after each adjustment to compensate for thermal delay in the circuit.) Rotate FINE AC ZERO SET until the meter reads zero. If this procedure fails, replace the type 5679 tube and repeat the procedure. Set the RANGE switch on the 10 v scale, apply exactly 10 v at line frequency to the Polymeter and adjust the potentiometer marked AC SET until the meter reads 10 v. (Note—This voltage should be free of harmonics.) This calibrates all AC ranges.

4. RF Calibration—Adjust ZERO SET as described in V.C.2. Set the SELECTOR switch on RF VOLTS and the RANGE switch in the 3 v position, short the contact in the point of the probe to the probe case and adjust the front panel RF SET until the meter pointer indicates zero volts. Set the RANGE switch on the 10 v scale, apply exactly 10 v at a frequency of 10,000 cps, or higher, to the Polymeter through the RF probe and adjust the RF SET located on the rear of the chassis until the meter reads 10 v. (Note—The calibrating voltage should be free of harmonics.) This calibrates all RF ranges.

PARTS LIST

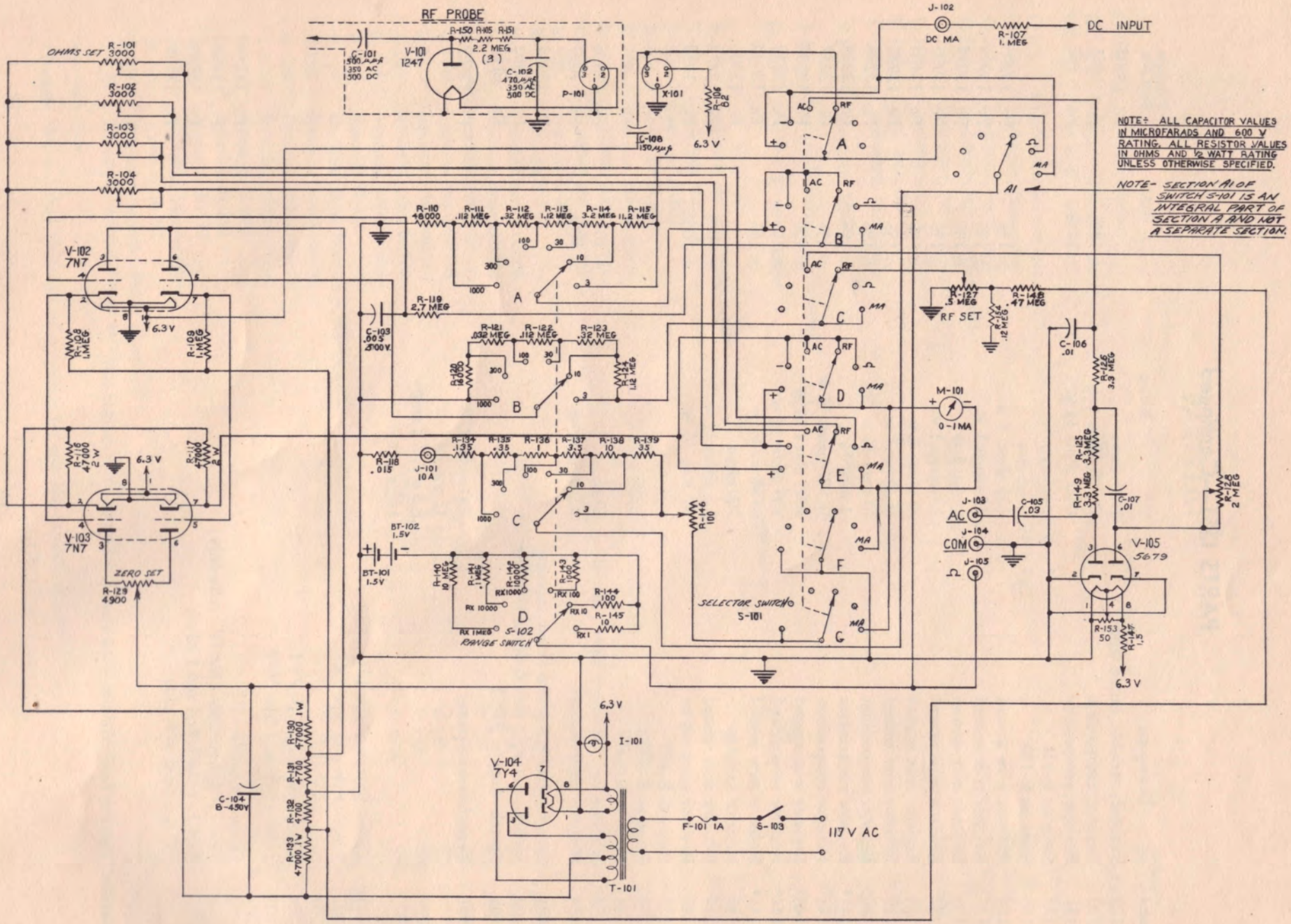
Symbol	Description	Rating	Tol.	Sylvania Part No.
BT-101	Battery—Dry	1.5 v		Pc. 17443
BT-102	Same as BT-101			
C-101	Condenser, button mica	500 mmf 500 v DC		Pc. 12980
C-102	Condenser, ceramicon	470 mmf 500 v DC		Pc. 6452
C-103	Condenser, fixed mica	.0056 mf 500 v		Pc. 15421
C-104	Condenser, tubular electrolytic	8 mf 450 v		Pc. 17249
C-105	Condenser, tubular paper	.03 mf 600 v		Pc. 13835
C-106	Condenser, tubular paper	.01 mf 600 v		Pc. 13878
C-107	Same as C-106			
C-108	Condenser, fixed mica	150 mmf 500 v DC		Pc. 15383
F-101	Fuse, type 3AG	1 amp		Pc. 2422
I-101	Lamp—Incandescent Bayonet	6-8 v, .15 amp		Pc. 2828
M-101	Meter 4½" rectangular	0-1 ma DC 50 ohm resistance	± 2% of full scale	Pc. 12985
R-101	Resistor, variable linear taper	3000 ohms		Pc. 13366
R-102	Resistor, variable linear taper	3000 ohms		Pc. 13200
R-103	Same as R-102			
R-104	Same as R-102			
R-105	Resistor, composition	2.2 meg ½ w	± 10%	Pc. 1080
R-106	Resistor, composition	82 ohms 1 w	± 10%	Pc. 1149
R-107	Resistor, composition	1 meg ½ w	± 10%	Pc. 1066
R-108	Same as R-107			
R-109	Same as R-107			
R-110*	Resistor, composition	48,000 ohms ½ w	± 1%	Pc. 12032
R-111*	Resistor, composition	.112 meg ½ w	± 1%	Pc. 12031
R-112*	Resistor, composition	.32 meg ½ w	± 1%	Pc. 12030
R-113*	Resistor, composition	1.12 meg ½ w	± 1%	Pc. 12029
R-114*	Resistor, composition	3.2 meg ½ w	± 1%	Pc. 12028
R-115*	Resistor, composition	11.2 meg ½ w	± 1%	Pc. 12027
R-116	Resistor, composition	47,000 ohms 2 w	± 10%	Pc. 1520
R-117	Same as R-116			
R-118	Resistor #18 Manganin Wire adjusted to	.015 ohms		Pc. 13838
R-119	Resistor, composition	2.7 meg ½ w	± 10%	Pc. 1083
R-120*	Resistor, composition	16,000 ohms ½ w	± 1%	Pc. 12034
R-121*	Resistor, composition	.032 meg ½ w	± 1%	Pc. 12033
R-122*	Same as R-111			
R-123*	Same as R-112			
R-124*	Same as R-113			
R-125	Resistor, composition	3.3 meg ½ w	± 10%	Pc. 1087
R-126	Same as R-125			
R-127	Resistor, variable, linear taper	.5 meg		Pc. 17378
R-128	Resistor, variable, linear taper	2 meg		Pc. 15339

* Signifies "Matched Pair." Wattage rating given is for each unit of matched pair.

PARTS LIST—Continued

Symbol	Description	Rating	Tol.	Sylvania Part No.
R-129	Resistor, variable, linear taper	4900 ohms		Pc. 13367
R-130	Resistor, composition	47,000 ohms 1 w	± 10%	Pc. 1265
R-131	Resistor, composition	4700 ohms ½ w	± 10%	Pc. 968
R-132	Same as R-131			
R-133	Same as R-130			
R-134	Resistor wire wound	.135 ohms 1 w	± 1%	Pc. 13996
R-135	Resistor wire wound	.35 ohms 1 w	± 1%	Pc. 13995
R-136	Resistor wire wound	1 ohm 1 w	± 1%	Pc. 13994
R-137	Resistor wire wound	3.5 ohms 1 w	± 1%	Pc. 13993
R-138	Resistor wire wound	10 ohms 1 w	± 1%	Pc. 13476
R-139	Resistor wire wound	35 ohms 1 w	± 1%	Pc. 13992
R-140*	Resistor composition	10 meg ½ w	± 1%	Pc. 13208
R-141*	Resistor composition	.1 meg ½ w	± 1%	Pc. 12036
R-142*	Resistor composition	10,000 ohms ½ w	± 1%	Pc. 12037
R-143*	Resistor wire wound	1000 ohms ½ w	± 1%	Pc. 12038
R-144*	Resistor wire wound	100 ohms ½ w	± 1%	Pc. 12039
R-145*	Resistor wire wound	10 ohms ½ w	± 1%	Pc. 12040
R-146	Resistor variable	100 ohms		Pc. 13201
R-147	Resistor wire wound	1.5 ohms ½ w	± 10%	Pc. 2472
R-148	Resistor composition	.47 meg ½ w	± 10%	Pc. 1052
R-149	Same as R-125			
R-150	Same as R-105			
R-151	Same as R-105			
R-153	Resistor variable linear taper (special)	50 ohms	± 10%	Pc. 17326
R-154	Resistor composition	.12 meg ½ w	± 10%	Pc. 1027
S-101	Switch—rotary 8 pole 6 throw shorting			Pc. 13959
S-102	Switch—rotary 4 pole 6 throw shorting			Pc. 13960
S-103	Switch—toggle SPST			Pc. 6145
T-101	Transformer—power	300 v AC CT 12 ma DC 6.3 v AC 2 amp 117 v pri		Pc. 12622
V-101	Tube—Sylvania type 1247			
V-102	Tube—Sylvania type 7N7			
V-103	Same as V-102			
V-104	Tube—Sylvania type 7Y4			
V-105	Tube—Sylvania type 5679			
	Probe Assembly—RF			Pc. 14218
	Test Prod Assembly (for DC volts only)			Pc. 13458
	Test Leads—1 Red and 1 Black			Pc. 12984
	AC line cord with plug			Pc. 13501

* Signifies "Matched Pair." Wattage rating given is for each unit of matched pair.



SCHEMATIC CIRCUIT—SYLVANIA POLYMETER TYPE 134Z

WARRANTY

Sylvania Electric Products Inc. warrants each new Polymeter manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to us or to our authorized wholesaler from whom purchased, intact, for our examination, with all transportation prepaid to our factory, within 90 days from the date of sale to original purchaser and provided such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any Polymeter which has been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor to units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other warranty liability.

This warranty is void unless warranty card included with instrument is filled out completely and mailed upon initial sale of the instrument by the distributor.

SYLVANIA ELECTRIC PRODUCTS, INC.
500 FIFTH AVENUE,
NEW YORK 18, N. Y.

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