SYLVANIA DELUXE POLYMETER

TYPE 302

OPERATING MANUAL

SYLVANIA ELECTRIC PRODUCTS, INC.

PRICE $1.00

SYLVANIA DELUXE POLYMETER TYPE 302

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GENERAL DESCRIPTION

The Sylvania Polymeter Type 302 is intended for use by the serviceman, engineer, and maintenance man to make measurements of DC, RMS, Peak to Peak voltage, current, and resistance in radio, TV, and industrial, as well as laboratory applications. It is a rugged, versatile, and accurate instrument, which combines the functions of many instruments in one. Voltage readings can be made up to 1,000 volts AC or DC and 2800v Peak to Peak on this instrument, and the DC range can be extended to 10,000 volts by using the Sylvania Voltage Multiplier Probe Type 223 and to 30,000 volts by using the Sylvania Voltage Multiplier Probe Type 225. An input resistance of 17 megohms on DC minimizes any effect on the circuit being tested. On AC the input resistance of 2.7 megohms and input capacitance of 125 mmf. when using the shielded lead supplied or 40 mmf. when using an unshielded lead gives a minimum of loading to high impedance circuits. The RF Probe effective input resistance is 2.3 megohms shunted by 3 mmf. up to 300 megacycles. This is made possible by using an exclusive self-contained sub-miniature probe diode. For measurement of discriminator and ratio detector and similar circuits, a zero centering scale is provided, and enough range is included in the zero adjust control so that the meter needle may be zeroed at center scale. A decibel scale is provided and is calibrated using a zero reference level of one milliwatt into a 600 ohm load.

AC linearity is insured by special patented Sylvania circuits, and balance is insured by an exclusive tube with individually controlled heater voltage for each of its two sections. The illuminated meter is easier to read, and all the leads are firmly attached to the connecting jacks by microphone plugs.

SPECIFICATIONS

1. Power Requirements: 105-125 volts AC, 50-60 cycles. Power consumption: 30 watts. Fuse protection: 1 ampere.

2. Ranges:
   0-3, 10, 30, 100, 300, 1000 volts DC.
   0-3, 10, 30, 100, 300, 1000 volts AC.
   0-8, 28, 80, 280, 800, 2800 volts Peak to Peak.
   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.
   —20 db. to +61.4 db. in 6 ranges.

3. Frequency Range of RF and AC:
   AC volts 20 cps. to 20,000 cps.
   RF volts 10,000 cps. to 300 mc.

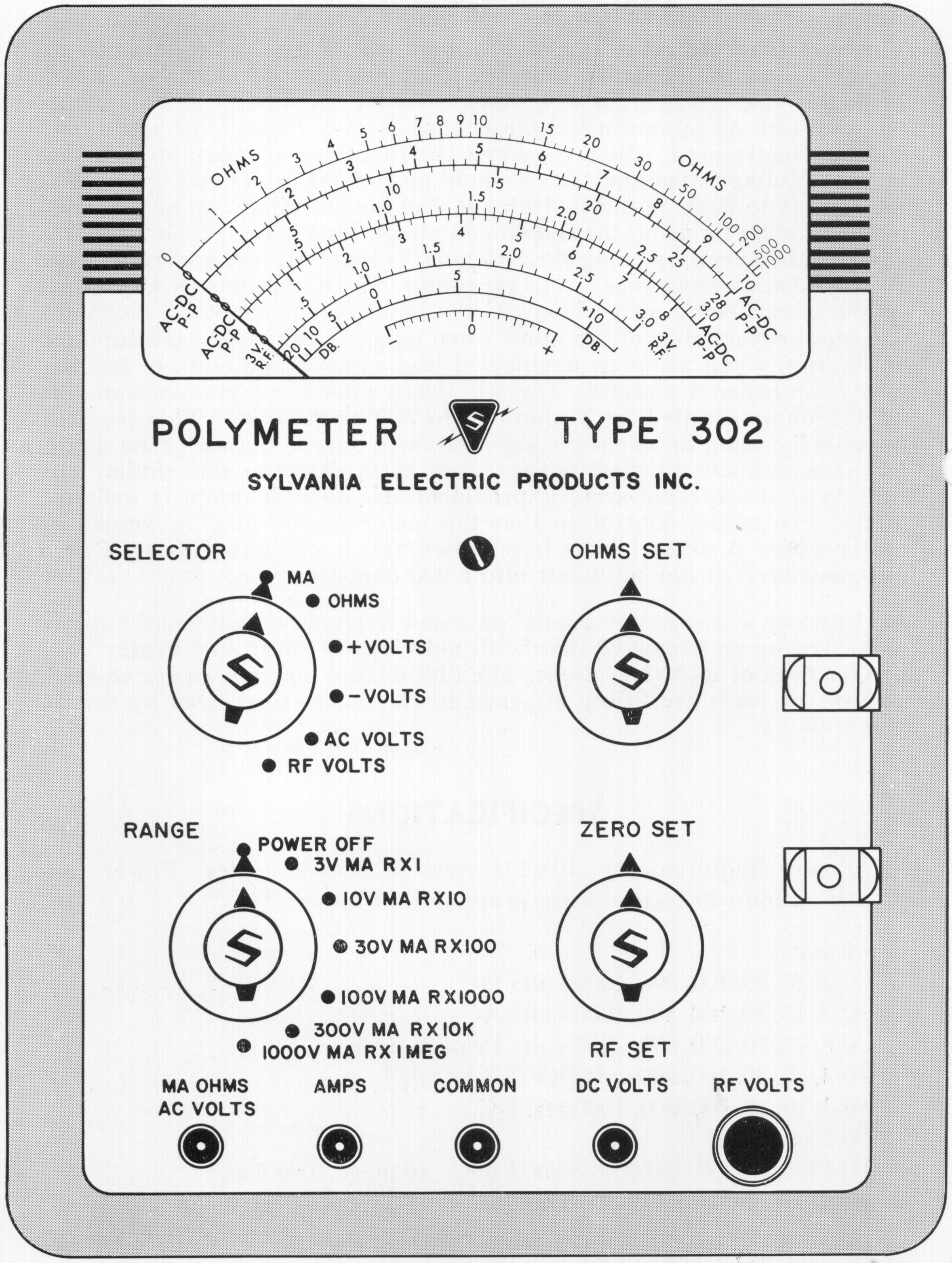

Fig. 1—Front panel of the Type 302 DeLuxe Polymeter. Controls are located for most convenient operation.

4. Input Impedance:
   DC volts—16 megohms. (17 megohms when using DC probe).
   AC volts—2.7 megohms, 125 mmf. using the shielded lead supplied, or 40 mmf. if an unshielded lead is substituted.
   RF volts—2.3 megohms, 3 mmf.
5. Tube Complement:
   2 Sylvania Type 7N7 duotriodes.
   1 Sylvania Type 7Y4 rectifier.
   1 Sylvania Type 1247 sub-miniature diode.
   1 Sylvania Type 5679 special duodiode.
   1 Sylvania Type 7A6 duodiode.
6. Size: Height 11½ inches, Width 8½ inches, Depth 7 inches.
7. Weight: 11 pounds (less probes). 12 pounds with probes.

OPERATING INSTRUCTIONS

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

   RF Probe Assembly and tip extension.
   One black test prod with black lead.
   One red test prod with red lead.
   One red test prod with a shielded grey lead.
   Warranty Card.
   Service Policy.
   Operating Manual.

2. **Preliminary Check:**
   A. Set mechanical zero on meter if necessary.
   B. Insert RF Probe Assembly 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 Range Switch to 3v to turn power on. Allow Polymeter to warm up for about three minutes. The instrument will reach maximum stability after about 15 minutes warm-up time.
   E. Set SELECTOR switch on minus (—) VOLTS.
   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. However, the AC lead is shielded to reduce this stray pickup and it will not ordinarily affect the accuracy of readings taken across impedances normally encountered. 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.)

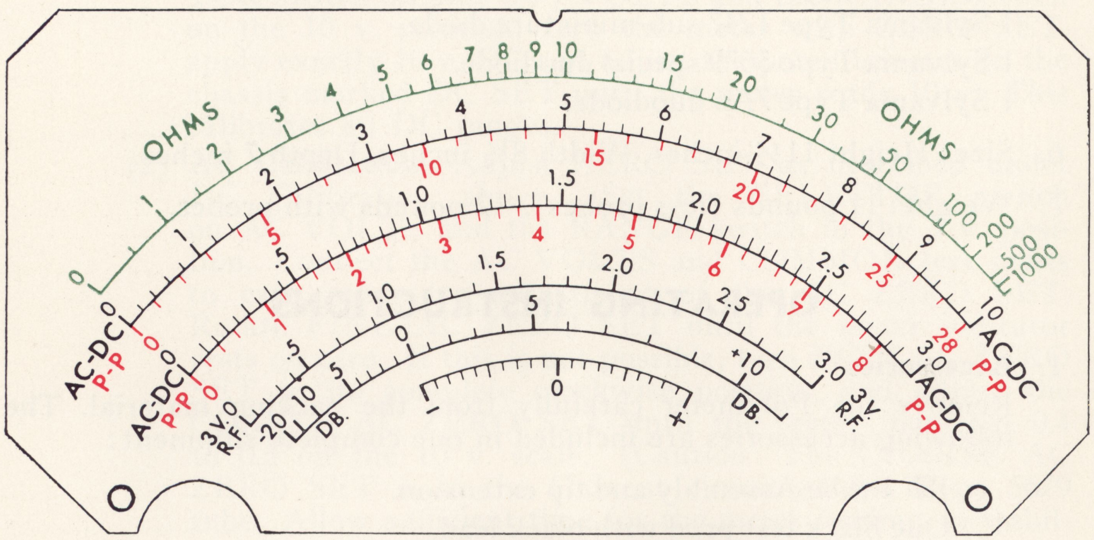

Fig. 2—METER SCALE

3. **Scales**

There are eight scales on the meter (Fig. 2). Resistance is read on the ohms scale. AC(RMS) and DC voltages and current are read on scales labeled AC-DC. Peak to Peak voltages are read on scales labeled P-P. RF voltages to 3v are read on scale labeled 3V R.F. Higher voltages of RF are read on scales labeled AC-DC. Decibels are read on scale labeled db. The scale marked + and — is used to indicate polarity when meter is zeroed at center by adjusting zero set knob.

Select the proper RANGE and SELECTOR switch positions before making any measurement. Note that the same panel terminal and test lead are used for measuring OHMS, AC, and MA.

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

4. **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. Connect black prod with black lead to COMMON terminal and red prod with red lead to DC VOLTS terminal 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 red lead to the high side of the circuit. Read the meter on the appropriate scale.

NOTE: The red prod with red lead contains a 1 megohms resistor. This prod and lead should be used for measuring DC volts only.

5. **AC and Peak to Peak Voltage:**

To measure AC and Peak to Peak VOLTS (20-20,000 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. Connect black prod with black lead to COMMON terminal and red prod with shielded grey lead to AC VOLTS terminal on front panel. Connect black prod with black lead to ground or common point of the circuit to be measured and red prod to the high side of the circuit. Read the meter on the appropriate scale. The meter is calibrated for measuring directly the peak to peak voltage of complex waveforms. Read the meter on the appropriate red colored peak to peak scale. The RMS voltage of sinusoidal waveforms can be read directly on the AC-DC scales which are opposite the peak to peak scales.

6. **Decibels:**

To measure decibels, use the same procedure as in AC volts. The decibel scale is calibrated using a zero reference level of 1 milliwatt into a 600 ohm load. The scale printed on the meter face is read directly when the range switch is on the 3 v. range. For each higher range a number must be added to the scale reading as in the following chart.

Range	Add db.
3 v.	0
10 v.	10.4
30 v.	20
100 v.	30.4
300 v.	40
1000 v.	50.4

For example: A scale reading of 6 db. with the range switch on 30 v. means 26 db. above the zero reference level of 1 milliwatt into a 600 ohm load.

7. **RF Voltage:**

A. 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 plug of probe cable into RF VOLTS jack and turn threaded sleeve tight. (Plug may be left inserted in the 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. An alligator clip 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. An extension is supplied which may be screwed on the probe tip for use up to 30 megacycles without introducing noticeable error in voltage measurements. No extension should be used either on the probe tip or probe case above this frequency. The meter is calibrated for indicating rms sine wave r-f voltages.

The maximum r-f voltage that should be measured with the Polymeter is 300 volts.

B. When DC voltage in excess of 350 volts occur in a circuit being tested for r-f voltage, an external blocking capacitor of appropriate capacitance and voltage rating must be employed between the probe tip and the voltage to be measured.

8. **Resistance:**

To measure resistance, turn the SELECTOR switch to minus (—) VOLTS, the RANGE switch to R x 1, and set meter to zero with ZERO SET knob. (The battery will be discharged unnecessarily if the ohmmeter leads are shorted to make this adjustment directly on the OHMS ranges.) Turn the SELECTOR switch to OHMS, the RANGE switch to the multiplier factor desired and set meter to full scale reading with OHMS SET. Connect black prod with black lead to COMMON terminal on panel, and red prod with shielded grey lead to OHMS terminal. Then connect prods across resistance to be measured. Read the meter on appropriate scale.

9. **Direct Current:**

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

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

APPLICATIONS

1. **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 measured accurately. The meter is calibrated to indicate rms volts sine wave.

2. **AVC VOLTAGE MEASUREMENT:**
The high input resistance (17 megohms) of the DC voltmeter permits direct measurement of AVC voltages either at the diode, or directly at the grids of the tubes being controlled. The voltage on the diode may be used as an output indication when aligning the RF and IF sections of receivers.

3. **AUDIO VOLTAGE MEASUREMENTS:**
All audio voltages (20 to 20,000 cps.) may be measured using the AC VOLTS circuit of the Sylvania DeLuxe Polymeter Type 302. The input impedance of the AC VOLTS circuit, when using the shielded lead supplied, is equivalent to a 2.7 megohm resistor shunted by a 125 mmf. capacitor. The input impedance may be increased by using an unshielded lead in place of the shielded lead supplied when circuits under test may be affected by the higher capacitance of the shielded lead. If an unshielded lead is used, the input impedance is equivalent to a 2.7 megohm resistor shunted by a 40 mmf. capacitor. (The shielded lead has a capacitance of 85 mmf.)

   Audio voltage measurements include reading AC voltages from power transformers as well as tracing audio signals through amplifier stages to the voice coil of the speaker.

4. **PEAK TO PEAK MEASUREMENTS:**
The Polymeter is calibrated to read simultaneously the RMS and Peak to Peak voltage of a sinusoidal wave. The Peak to Peak scale may be used to measure the output of the video amplifier, horizontal oscillator, horizontal discharge, and the value of many of the other complex waves found in a television chassis. Thermal noise in the front end and i-f stages may be determined if the Polymeter is placed across the detector load and the inherent noise voltage increased by a factor of 1.414. As this is equivalent to doubling the noise power, the noise injected by the noise diode is therefore equal to the inherent noise.

5. **TRANSMITTER ADJUSTMENTS:**
Many transmitter adjustments may be made much more simply with the Polymeter than by other means, by using the RF PROBE to measure or detect RF voltages. Such adjustments include neutralization, measuring RF grid drive, and many other tests which will suggest themselves to those concerned with the design, maintenance, and operation of transmitters. Care must be taken not to exceed the 300 volt maximum rating on the RF PROBE, and the circuit under test should not be at more than a maximum of 350 v. DC above ground, unless a protective series capacitor of sufficient break-down voltage rating is used.

6. **POWER MEASUREMENTS:**

DC 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.

EXAMPLE: The voltage read across an 8 ohm resistor is 4 volts.

$$\text{Watts} = 4 \times 4/8 = 16/8 = 2 \text{ watts.}$$

AC power may be calculated by using the following formula: Power $= E\, I \cos \Theta$. In a series circuit E is the vector sum of the voltage drops, I is the current in the circuit, and $\cos \Theta$ is the power factor of the circuit.

EXAMPLE: A circuit containing a 10 millihenry inductance with 20 ohms DC resistance is connected across a 10 v., 1000 cycles input.

$$P = E\, I \cos \Theta$$
$$10 \times .1515 \times .91$$
$$P = 1.37 \text{ watts}$$

7. **DC VOLTAGES:**

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

8. **AFC DISCRIMINATOR VOLTAGE:**

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

9. **TELEVISION RECEIVER ADJUSTMENTS:**

A. **DC Voltage Tests**

(1) To measure the high television anode voltage, a multiplier must be used with the Polymeter. To increase the range to 30,000 volts, external resistance of 493 megohms must be added in series with the probe. The Sylvania DC Voltage Multiplier Probe Type 225 is designed to conveniently and accurately perform this function. The Type 225 extends the DC range of the Polymeter to 30,000 v. by multiplying all DC voltage ranges by 30.

The utmost care must be exercised in measuring the high voltages in a television receiver. First, turn off the power to the receiver. Second, securely connect the COMMON ground lead of the Polymeter to the chassis of the receiver. Then after setting the range and polarity controls on the Polymeter, connect the Polymeter DC lead to the multiplier, and touch the multiplier to the set where the voltage is to be measured. Note the reading on the Polymeter, and multiply by the proper factor.

Readings should be taken with the "brightness" control at minimum, so that the picture tube screen will be dark. Under this condition the current drawn by the Polymeter will be approximately equal to that drawn by the picture tube at high brilliance, and the voltage read will be reasonably accurate, in spite of the fact that r-f and flyback type power supplies have very poor regulation.

(2) The Polymeter may be used as a sensitive and accurate resonance indicator in alignment of the radio frequency amplifiers of television receivers, as well as all AM and FM receivers. In each case the Polymeter is connected across the detector diode load resistor, turned to the VOLTS DC position, and a signal of the frequency of the stages under test fed into the set.

The AVC or AGC must be temporarily disconnected or grounded for these adjustments. Fig. 3 shows the connection to the first limiter grid circuit of an FM set; Fig. 4A connection shows the connection to a ratio detector; Fig. 5, to a typical video detector. In each case the reading obtained on the Polymeter will be higher the closer the RF and IF tuning of the receiver is to the frequency of the signal generator used.

(a) In order to obtain the exact response curve of the stage or stages between the signal generator and the detector or limiter where the Polymeter is connected, it is necessary merely to move the signal generator frequency slowly by small equal steps from a frequency well below resonance to a frequency well above resonance, and plot a graph of the Polymeter reading in volts against frequency, for each point.

(b) FM detectors may be aligned very accurately by connecting the Polymeter in such a way as to indicate point of balance. Fig. 6 shows this connection for the balanced discriminator, Fig. 4B connection shows the connection for one version of the ratio detector. In either case, the IF frequency of the set is fed in from an unmodulated signal generator somewhere ahead of the detector, and the secondary of the detector inductance is tuned for zero indication. On one side of perfect balance there will be a high plus reading obtained, and on the other side, a high minus reading. The zero center scale on the Polymeter is specifically provided for this purpose.

(3) Intermediate frequency voltage and gain may be measured in the same way as RF voltages. It is not necessary to "tune" or adjust anything on the Polymeter when changing

from RF to IF frequency signals because of the broad bandwidth of the probe. It is possible to accomplish alignment of all IF and RF stages by use of an unmodulated signal manually, using the probe to indicate the resonance curve. However, the slight effect of the probe capacitance on the tuned circuit makes this method less accurate than using the Polymeter as a direct voltage reading instrument as outlined in Paragraph A-2.

(4) TV traps may be tuned by applying a signal of the rejection or pass frequency to the trap and reading the RF voltage appearing on the other terminal of the trap, by using the Polymeter RF PROBE. Adjust the trap tuning for maximum or minimum output, as applicable.

B. **AC Voltage Tests:**

(1) High voltage tests may be made on television power supplies which use transformers for the high voltage source. External multipliers will be required for AC measurements over 1,000 volts. However, use of the AC ranges of the Polymeter is not recommended for measuring the value of the voltage ahead of the rectifier tube when flyback type supplies are used, as the current drain of the meter as well as the wave form of the voltage would lead to inaccurate results. The rectified DC may be measured however, using the proper multiplier. See Paragraph A.

(2) For frequencies up to 20 kc. the regular AC probe may be used, up to 1,000 volts. For higher frequencies, the RF PROBE should be used, up to 300 volts.

(3) Readings of AC deflecting voltage may be taken across the deflecting plates of electrostatic type cathode ray tubes to indicate proper functioning of sweep oscillators and amplifiers. The AC probe may be used on the vertical plates, and the RF PROBE on the horizontal deflecting plates. Do not use the RF PROBE on deflecting coils of electromagnetic type tubes, as very high peak voltages may appear here. However, measurements of deflection oscillator voltages may be made at points where the inductive pick is not present, such as the plate circuit of the oscillator tubes. The Sylvania Oscilloscopes Type 132, 132Z, 400, 404, and 403 may be used advantageously to measure such voltages and study their wave form.

C. **Resistance and Direct Current Measurements:**

Resistance and direct current measurements in television sets are made in exactly the same way as in ordinary radio receivers, except that great caution must be used to avoid coming in contact with high voltage points when the television receiver is turned on.

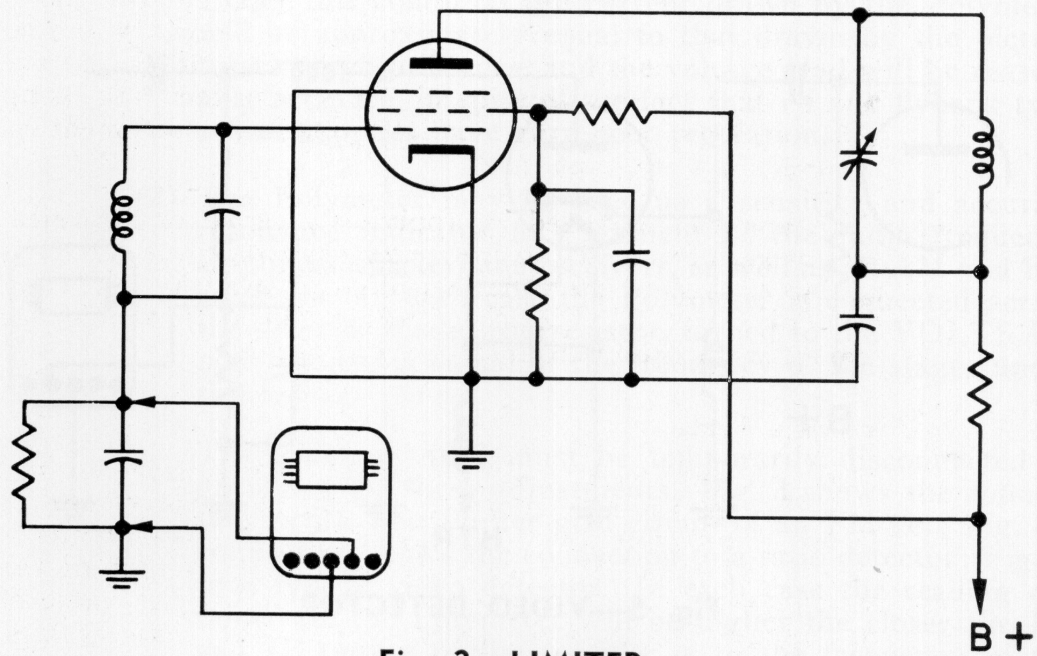

Fig. 3—LIMITER

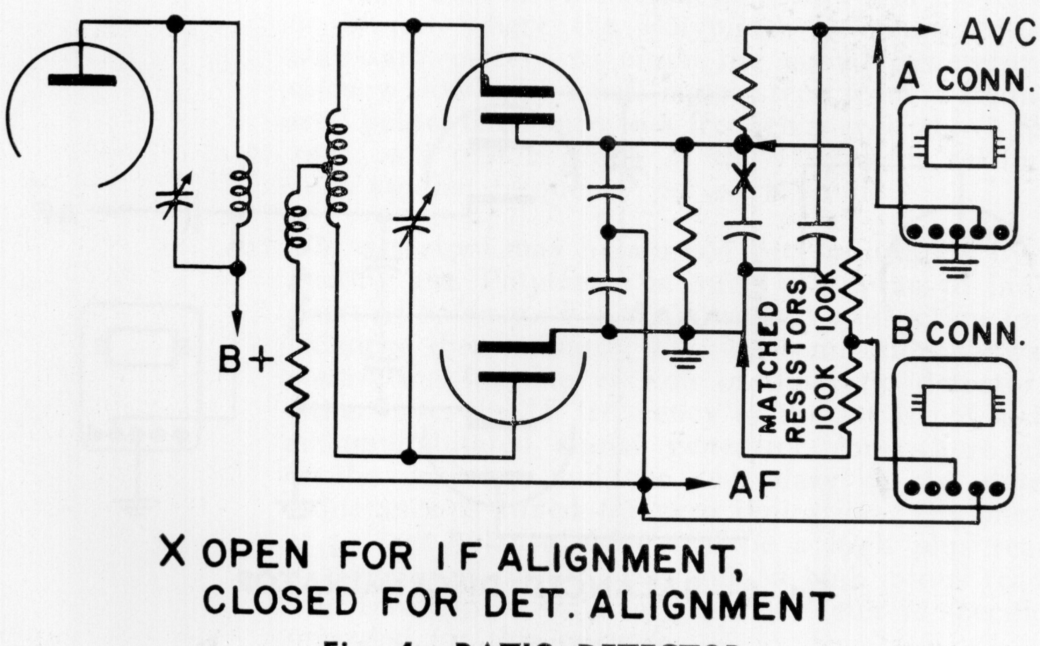

Fig. 4—RATIO DETECTOR

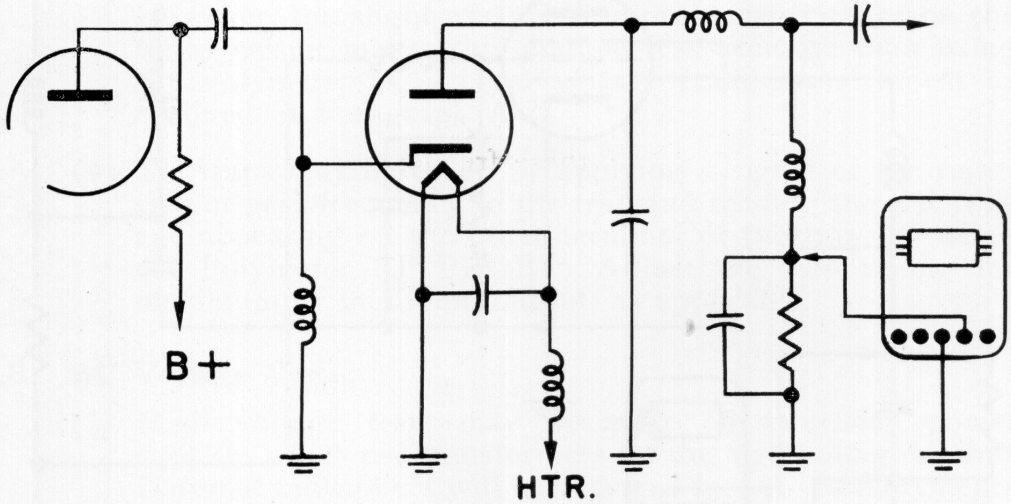

Fig. 5—VIDEO DETECTOR

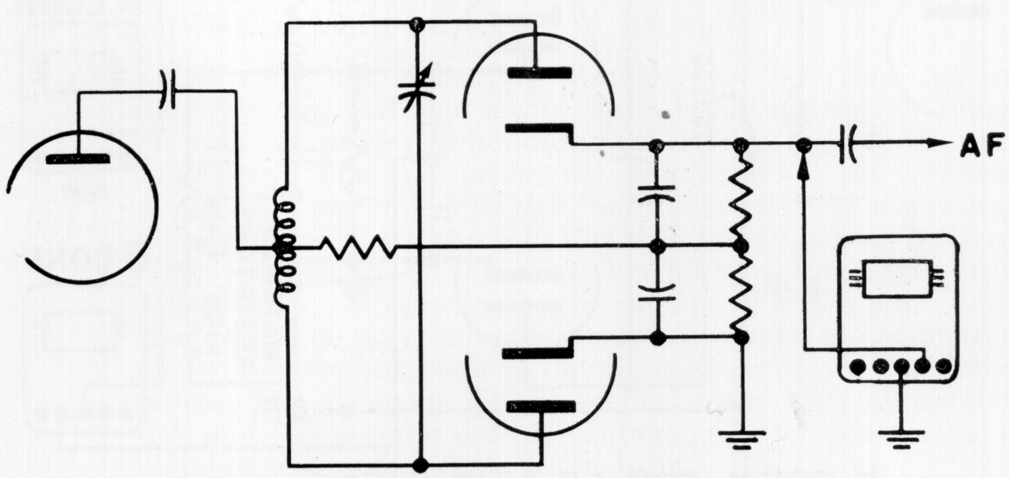

Fig. 6—BALANCED DISCRIMINATOR

D. **Radio Frequency Voltage Tests in Television Receivers Using the RF Probe:**

(1) As the Polymeter RF PROBE is accurate up to 300 megacycles, it may be used to measure the amplitude of local oscillator voltage in television receivers, which is usually of a frequency equal to the sum of the signal frequency plus the intermediate frequency. On channel 13 this frequency is of the order of 250 mc. Do not use any extensions to the probe at these frequencies, either at the probe tip or at the case, as inaccuracies will result from the inductance of even a small length of wire. Touch the probe tip to the plate circuit of the oscillator tube, or the anode grid of the oscillator section of the converter tube, if used. Hold the probe so that its metal case comes in contact with a ground point close to the point where the tip is applied, or to a common ground if possible. Comparatively little detuning will result, as the input capacitance of the probe is only 3 mmf.

(2) Adjustments in the RF portion of television receivers are very critical and are not usually attempted unless necessary. If measurements of stage gain are desired, an unmodulated signal of about .1 volt from an RF signal generator may be applied to the input of the receiver, and the voltage gain measured by using the RF PROBE. In comparing voltage measurements to determine stage gain, the impedance of the circuits must be considered so that transformer voltage gain will not be confused with tube gain.

(3) The PRIMARY RF voltage of RF power supplies in television receivers may be measured using the RF PROBE, provided it is not over 300 volts. The probe frequency response is flat from 10 kc. to 300 mc., which includes most RF power supply frequencies. The high secondary voltage of such sets is well beyond the range of the probe. The measurement of rectified DC voltage from RF power supplies may be made following the external-multiplier high voltage DC technique of Section A.

10. RF SIGNAL TRACING USING RF PROBE

A. **AM Receivers. Measuring stage-by-stage gain.**

(1) Connect a CW signal generator to the antenna terminals of the set. Adjust for maximum voltage output. A generator output of about 0.1 volt is desired for determining the gain of the first RF stage.

(2) Tune receiver to signal generator. Short out receiver AVC.

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

(4) 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 the alligator clip. The higher the RF frequency to be measured, the shorter must be the connections between probe and circuit. Direct ground and short leads are the rule when using the RF PROBE. A short ground wire may be used below 25 megacycles, if necessary; or the shell may be grounded by the alligator clip, and the tip extension used.

(5) With probe shell grounded, measure the voltage at the plate of RF tube. Similarly measured grid voltage of RF tube. Ratio of voltages gives gain of RF stage.

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

(7) 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.

(8) Measure voltage at the plate of first IF tube. This voltage divided by voltage at plate of converter tube is the stage gain.

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

(10) Restore AVC voltage.

B. **FM Receivers**

(1) 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 sentitive to detuning caused by application of RF PROBE.

In sets equipped with a limiter stage, it will be noticed that the gain of the limiter stage will vary with input signal strength only below a certain signal level. 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.

See paragraph on DC voltage tests for further information.

11. CAPACITANCE MEASUREMENTS:

It is possible to make a good approximate measurement of capaci-

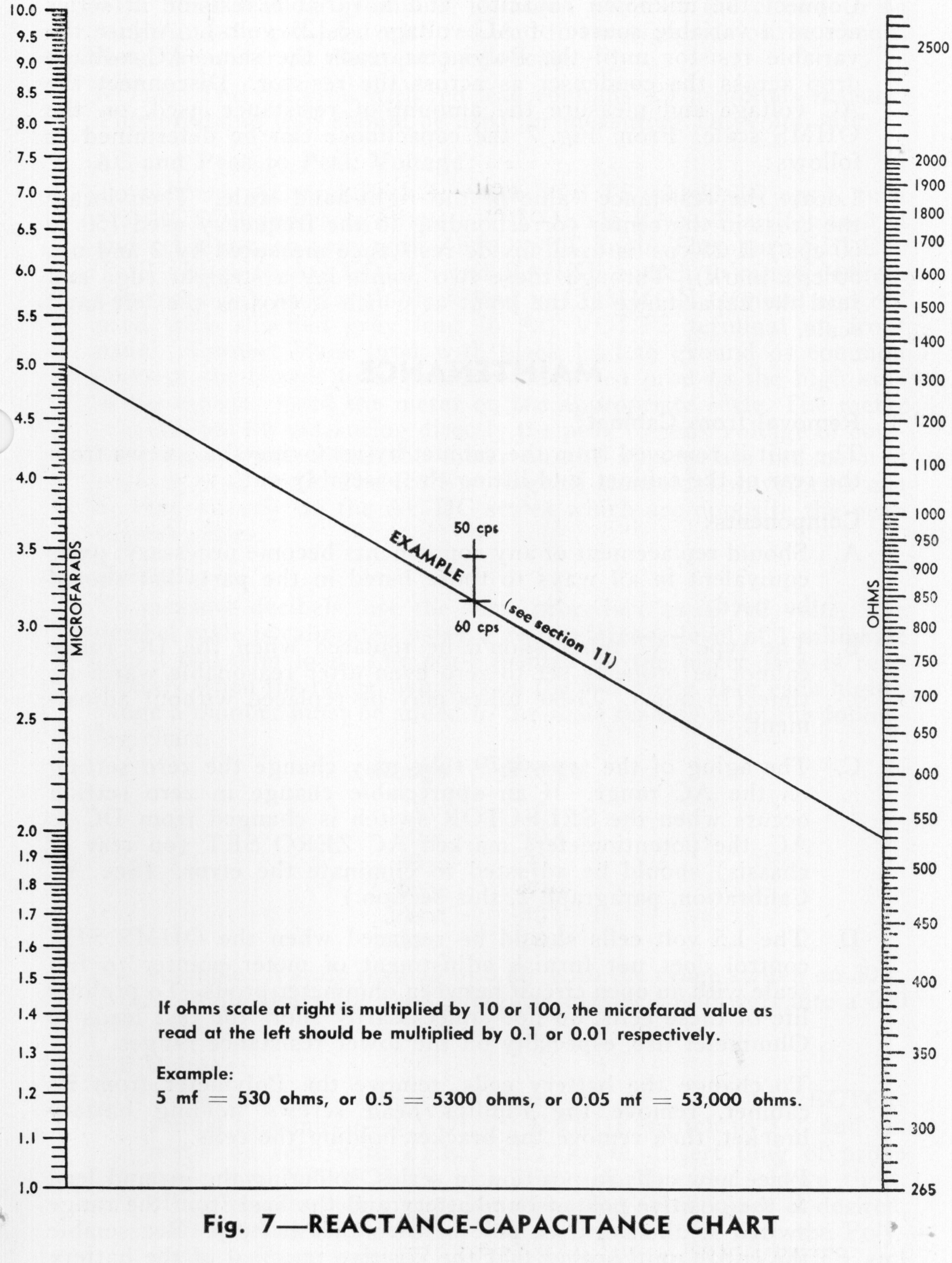

Fig. 7—REACTANCE-CAPACITANCE CHART

tors between 0.01 and 10 mf. (not electrolytics) using the Polymeter. Connect the unknown capacitor and a variable resistor in series across a variable source of AC voltage (3-125 volts). Adjust the variable resistor until the Polymeter reads the same AC voltage drop across the condenser as across the resistor. Disconnect the AC voltage and measure the amount of resistance used, on the OHMS scale. From Fig. 7 the capacitance can be determined as follows:

Locate the resistance value of the right-hand scale. Then locate the cross in the center corresponding to the frequency used (50 to 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 point at which it crosses the left-hand scale.

MAINTENANCE

1. **Removal from Cabinet:**

   The unit is removed from the cabinet by removing the screws from the rear of the cabinet, and lifting the assembly out.

2. **Components:**

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

   B. The type 7N7 tubes shou'd be replaced when the DC range cannot be properly set to zero even after reasonable warm up time (15 min.). These tubes may be replaced without adjustment.

   C. 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 (on rear of chassis) should be adjusted to eliminate the error. (See AC Calibration, paragraph 2, this section.)

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

   To change the battery cells, remove the Polymeter from its cabinet, remove the Phillips head screws holding battery bracket, then remove the bracket holding the cells.

   Place new cells in position in series, soldering the ground lead to the positive pole of one battery and the lead from the range switch to the negative pole of the other battery. Reassemble the entire unit, noting that the positive terminal of the battery is grounded.

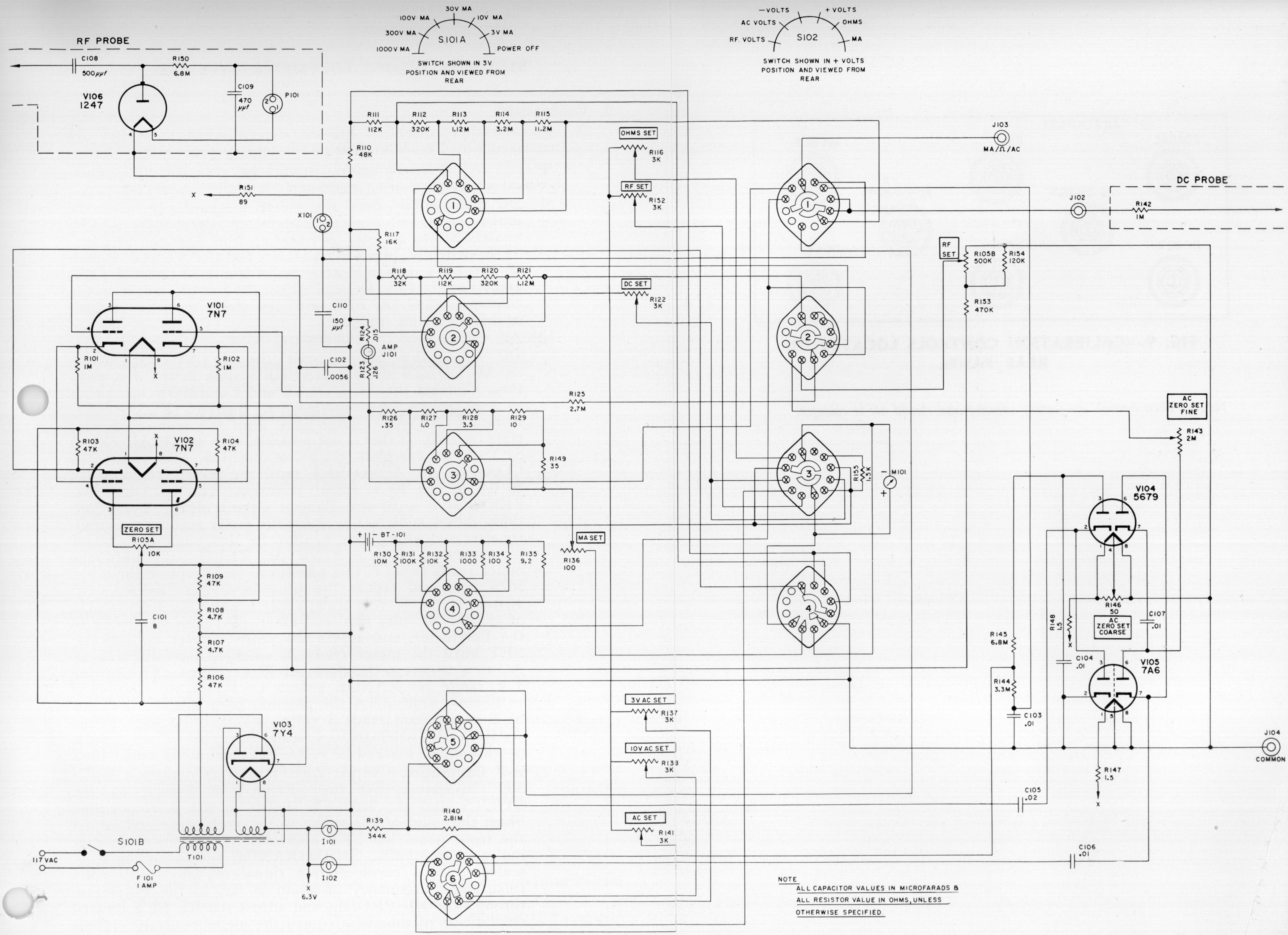

Fig. 8—POLYMETER SCHEMATIC

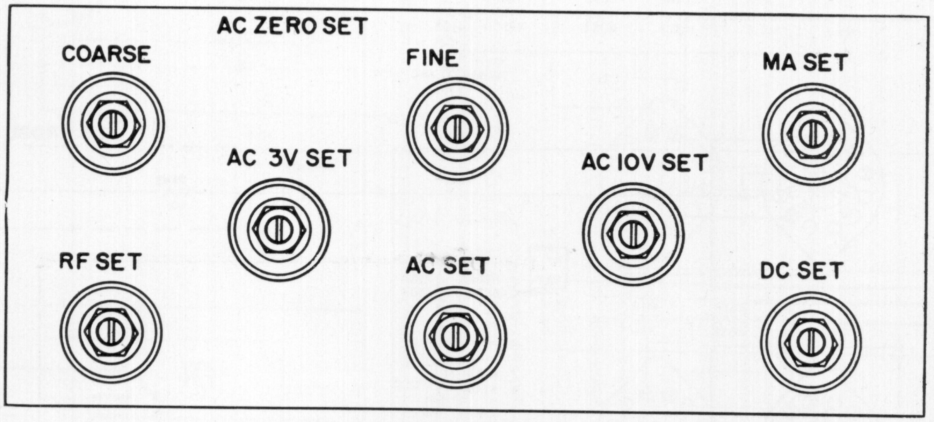

FIG. 9—CALIBRATION CONTROLS LOCATED ON REAR PANEL.

Note: These controls are factory adjusted and should not be changed.

SYLVANIA DELUXE POLYMETER TYPE 302

PARTS LIST

Symbols	Descriptions	Rating	Tol.	Part No.
		Capacitors		
C-101	Electrolytic	8 mf., 450 v.	±20%	17249
C-102	Fixed-Mica	.0056 mf., 500 v.	±20%	756210-301
C-103	Fixed-Paper	.01 mf., 600 v.	±20%	410360-5
C-104	Fixed-Paper	.01 mf., 1000 v.	±20%	410330-5
C-105	Fixed-Paper	.02 mf., 1000 v.	±20%	420330-5
C-106	Fixed-Paper	.01 mf., 400 v.	±20%	410340-5
C-107	Fixed-Paper	.01 mf., 400 v.	±20%	410340-5
C-110	Fixed-Mica	150 mmf., 500 v.	±10%	615110-252
		Resistors		
R-101	Fixed-Comp.	1 meg., ½ w.	±10%	410573
R-102	Fixed-Comp.	1 meg., ½ w.	±10%	410573
R-103	Fixed-Comp.	47 k., 2 w.	±10%	847373
R-104	Fixed-Comp.	47 k., 2 w.	±10%	847373
R-105-A	Variable-W.W.	10 k., 2 w.	±10%	3V-25088
R-105-B	Variable-Comp.	500 k., ¼ w.	±20%	3V-25088
R-106	Fixed-Comp.	47 k., 1 w.	±10%	647373
R-107	Fixed-Comp.	4.7 k., ½ w.	±10%	447273
R-108	Fixed-Comp.	4.7 k., ½ w.	±10%	447273
R-109	Fixed-Comp.	47 k., ½ w.	±10%	647373
R-110	Fixed-Nobleloy	48 k., ½ w.	±1%	3M-20216
R-111	Fixed-Nobleloy	112 k., ½ w.	±1%	3M-20215
R-112	Fixed-Nobleloy	320 k., ½ w.	±1%	3M-20214
R-113	Fixed-Nobleloy	1.12 meg., ½ w.	±1%	3M-20213
R-114	Fixed-Nobleloy	3.2 meg., ½ w.	±1%	3M-20212
R-115	Fixed-Nobleloy	11.2 meg., 2 w.	±1%	3M-20219
R-116	Variable-W.W.	3 k., 2 w.	±10%	3R-25429
R-117	Fixed-Nobleloy	16 k., ½ w.	±1%	3M-20218
R-118	Fixed-Nobleloy	32 k., ½ w.	±1%	3M-20217
R-119	Fixed-Nobleloy	112 k., ½ w.	±1%	3M-20215
R-120	Fixed-Nobleloy	320 k., ½ w.	±1%	3M-20214
R-121	Fixed-Nobleloy	1.12 meg., ½ w.	±1%	3M-20213
R-122	Variable-W.W.	3 k., 1 w.	±10%	3R-13200
R-123	Fixed-Nobleloy	.126 ohm, 1 w.	±1%	3P-18033
R-124	Fixed-W.W.	.015 ohm, ½ w.	±1%	2Z-13838
R-125	Fixed-Comp.	2.7 meg., ½ w.	±10%	427573
R-126	Fixed-W.W.	.35 ohm, 1 w.	±1%	3P-13995
R-127	Fixed-W.W.	1.0 ohm, 1 w.	±1%	3P-13994
R-128	Fixed-W.W.	3.5 ohm, 1 w.	±1%	3P-13993
R-129	Fixed-W.W.	10 ohm, 1 w.	±1%	3P-13476
R-130	Fixed-Comp.	10 meg., ½ w.	±1%	3C-13208
R-131	Fixed-Comp.	100 k., ½ w.	±1%	3C-12036
R-132	Fixed-Comp.	10 k., ½ w.	±1%	3C-12037
R-133	Fixed-W.W.	1 k., ½ w.	±1%	3P-12038
R-134	Fixed-W.W.	100 ohm, ½ w.	±1%	3P-12039
R-135	Fixed-W.W.	9.2 ohm, ½ w.	±1%	3P-18840
R-136	Variable-W.W.	100 ohm, 1 w.	±10%	3R-13201
R-137	Variable-W.W.	3 k., 1 w.	±10%	3R-13200
R-138	Variable-W.W.	3 k., 1 w.	±10%	3R-13200
R-139	Fixed-Nobleloy	344 k., 2 w.	±1%	3M-20248-19
R-140	Fixed-Nobleloy	2.81 meg., 2 w.	±1%	3M-26263-4
R-141	Variable-W.W.	3 k., 1 w.	±10%	3R-13200
R-142	Fixed-Comp.	1 meg., ½ w.	±10%	410573
R-143	Variable-Comp.	2 meg., ¼ w.	±20%	3U-15339
R-144	Fixed-Comp.	3.3 meg., ½ w.	±10%	433573

PARTS LIST — Continued

Symbols	Description	Rating	Tol.	Part No.
	Resistors			
R-145	Fixed-Comp.	6.8 meg., ½ w.	±10%	468573
R-146	Variable-W.W.	50 ohm, 2 w.	±10%	3R-17326
R-147	Fixed-W.W.	1.5 ohm, ½ w.	±10%	3P-2472
R-148	Fixed-W.W.	1.5 ohm, ½ w.	±10%	3P-2472
R-149	Fixed-W.W.	35 ohm, 1 w.	±1%	3P-13992
R-151	Fixed-W.W.	89 ohm, 1 w.	±1%	3P-18034
R-152	Variable-W.W.	3 k., 1 w.	±10%	3R-13200
R-153	Fixed-Comp.	470 k., ½ w.	±10%	447473
R-154	Fixed-Comp.	120 k., ½ w.	±10%	412473
R-155	Fixed-W.W.	1.5 k., 1 w.	±10%	3N-25695
J-1	Connector-Male Contact			7A-14574
J-2	Connector-Male Contact			7A-14574
J-3	Connector-Male Contact			7A-14574
J-4	Connector-Male Contact			7A-14574
F-101	Fuse	1 amp.		7G-24091-3
	Grommet-Rubber			7S-481
	Holder-Fuse			7S-18843
	Holder-Pilot Lamp			7K-25396
	Knob—Large			7K-25397
	Knob-Small			7K-25432
	Knob-Single Control			2F-24125-1
I-101	Lamp-Miniature	6-8 v., .25 amps.		6T-239
I-102	Lamp-Miniature	6-8 v., .25 amps.		6T-239
M-101	Meter-Special Dial	0-1 ma.		6D-25404-1
	Probe-Assembly-A.C.			1X-18897
	Probe-Assembly-D.C.			1-18043
	Probe-Assembly-Common			1-18045
	Strap-Carrying			7H-24953
S-101-A	Switch, Rotary (Range)			2R-24950
S-101-B	Switch-S.P.S.T. (on-off)			2R-24950
S-102	Switch-Rotary (Selector)			2R-24952
T-101	Transformer-Power			5P-12622-2
V-101	Tube-Electron-7N7			6R-21531
V-102	Tube-Electron-7N7			6R-21531
V-103	Tube-Electron-7Y4			6R-20691
V-104	Tube-Electron-5679			6R-22655
V-105	Tube-Electron-7A6			6R-20670
	Parts for R.F. Probe			
C-108	Fixed Mica	500 mmf.	±10%	4M-12980
C-109	Fixed-Ceramic	470 mmf.	±10%	4C-54100-216
R-150	Fixed-Comp.	6.8 meg., ½ w.	±10%	3E-468573
P-101	Connector-Male			7A-18885
X-101	Connector-Female Contact			7A-13014
	Probe-Assembly			1X-20082
V-106	Probe-Assembly (Extension)			1X-18984
	Tube-Electron-1247			6T-22656

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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 any defect, provided the unit is delivered by the owner to a Sylvania Authorized Service Station or to our authorized wholesaler from whom purchased, intact, for our examination, with all transportation prepaid, within 90 days from the date of the sale to original purchaser and provided 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.

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