

SYLVANIA POLYMER

TYPE 134

INSTRUCTION BOOK



SYLVANIA ELECTRIC PRODUCTS, INC.

PRICE 50 CENTS

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GENERAL DESCRIPTION

I. QUICK REFERENCE DATA

A. TUBE COMPLEMENT

1 Sylvania type 1247, 2 Sylvania type 7N7, 1 Sylvania type 7Y4, 1 Sylvania type 7A6.

B. RANGES

0-3, 10, 30, 100, 300, 1000 volts D. C.
0-3, 10, 30, 100, 300 volts A. C.
0-3, 10, 30, 100, 300 volts R. F.
0-3, 10, 30, 100, 300, 1000 ma D. C.
0-10 Amps D. C.
0-1000, 10000, 100000, 1 Meg. 10 Meg. 1000 Meg. ohms

C. FREQUENCY RANGE OF R. F.—A. C.

A. C. volts 20 c. p. s. to 15000 c. p. s.
R. F. volts 10000 c. p. s. to 300 mc.

D. INPUT IMPEDANCE

D. C. volts—16 megohms
A. C. volts—2.7 megohms 40 uuf.
R. F. volts—2.7 megohms 3 uuf.

E. POWER SUPPLY SOURCE

105-125 volts at 50-60 cycles
Power Consumption—30 watts
Fuse Protection—1 ampere

F. SIZE

10 $\frac{3}{4}$ " high, 8 $\frac{1}{8}$ " wide, 6 $\frac{7}{8}$ " deep

G. WEIGHT

16 pounds

II. BRIEF DESCRIPTION

The Sylvania Polymeter Type 134 is an A. C. operated, portable, general purpose Vacuum Tube Volt-ohm Meter. High impedance inputs permit connection to grid and other similar circuits with negligible loading. A means for measuring D. C. current is also provided.

III. OPERATION

A. GENERAL

1. Before plugging in A. C. power cord, make sure mechanical zero on meter face is correctly set. Plug Polymeter power cord into an appropriate A. C. source and allow to warm up for about three minutes. Next, with selector switch on -VOLTS and the Range switch on 3V, set the meter to zero with ZERO SET knob. Then check variation of meter zero at all settings of RANGE and SELECTOR switches. If this variation is not negligible, correction may be applied as described in the Maintenance Section.

2. There are four scales on the meter. The top scale indicates ohms only. The second scale (0-10 above line, 0-3 below line) indicates all D. C. voltage and current ranges and all A. C. and R. F. ranges except the three volt A. C. and R. F. ranges. The proper multiplier must be kept in mind when using these scales. The red scales indicate the R. F. (above) and A. C. (below) three volt ranges.

B. D. C. VOLTAGE

WARNING! HANDS OFF HIGH VOLTAGES! THEY ARE DANGEROUS!

When measuring high voltages, safe practice dictates that both prods be securely connected into the circuit under test before turning on the voltage.

1. TO MEASURE D. C. VOLTS—Turn SELECTOR switch to -VOLTS or + VOLTS according to the polarity of the voltage to be measured. Turn RANGE switch to range desired. Set meter on zero with ZERO SET knob (do this on + VOLTS). Plug black prod and lead into the (black) COMMON jack on front panel. Plug red prod with black lead into D. C. VOLTS jack. Connect black prod (with black lead) to ground or common point of circuit to be tested and connect the red prod (with black lead) to the high side of 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. Use this prod and cord set for measuring D. C. volts only.

2. ACCURACY—The accuracy on all D. C. VOLTS ranges is $\pm 3\%$ of full scale.

C. A. C. VOLTAGE

WARNING! HANDS OFF HIGH VOLTAGES! THEY ARE DANGEROUS!

When measuring high voltages, safe practice dictates that both prods be securely connected into the circuit under test before turning on the voltage.

CAUTION—When D. C. voltages in excess of 500 volts appear in a circuit being tested for A. C. voltage, an external blocking capacitor of appropriate capacity and voltage rating must be employed between prod and voltage to be measured.

1. TO MEASURE A. C. VOLTS (20-15000 c. p. s.)—Turn SELECTOR switch to A. C. VOLTS. Turn RANGE switch to range desired. Set meter on zero with ZERO SET knob (do this on + VOLTS). Plug black prod and lead into (black) COMMON jack on front panel. Plug red prod with red lead into A. C. VOLTS jack. Connect black prod and lead to ground or common point of circuit to be measured and connect red prod to the other side of circuit. Read meter on the appropriate scale.

While it is possible to measure A. C. voltages higher than 300 volts, such practice is not recommended. Possible damage to the Type 7A6 diode may result.

2. The accuracy of this range is $\pm 5\%$ of full scale if used at 30 V. or below, and $\pm 7\%$ if used on the 100 and 300 volt ranges.

D. R. F. VOLTAGE

WARNING! HANDS OFF HIGH VOLTAGES! THEY ARE DANGEROUS!

When measuring high voltages, safe practice dictates that both outside case and point of the probe be securely connected into the circuit under test before turning on the voltage.

CAUTION—When D. C. voltages in excess of 500 volts appear in a circuit being tested for R. F. voltages, an external blocking capacitor of appropriate capacity and voltage rating must be employed between probe and voltage to be measured.

1. TO MEASURE R. F. VOLTS (10000 c. p. s.—300 mc.)—Turn SELECTOR switch to R. F. VOLTS. Turn RANGE switch to range desired. If necessary set meter on zero with ZERO SET knob. Insert metal jacketed plug into R. F. VOLTS jack. Connect the outside case of the metal probe to ground as close as possible to the point at which the R. F. is to be measured. Connect the point of the probe to the high side of the circuit to be measured. Read meter on the appropriate scale. A turret lug to which any short ground lead may be soldered is located near end of probe jacket.

While it is possible to measure R. F. voltages higher than 300 volts, such practice is not recommended. Possible damage to the Type 1247 diode may result.

2. ACCURACY—The accuracy of this range is $\pm 5\%$ of full scale if used on the 3 and 10 volt ranges, $\pm 7\%$ if used on the 30 and 100 volt ranges and $\pm 10\%$ on 300 volt range.

E. RESISTANCE

1. TO MEASURE OHMS—Turn SELECTOR switch to OHMS. Turn RANGE switch to range desired. Set meter to full scale reading with OHMS SET. Plug black prod and lead into (black) COMMON jack on panel. Plug red prod and lead into OHMS jack. Set meter on zero, if necessary, by switching to the + VOLTS and adjusting the ZERO SET knob. (Shorting the leads while making this adjustment discharges the battery unnecessarily.) Then connect the prods to ends of resistance to be measured. Read meter on the appropriate scale.

2. ACCURACY—The accuracy of this range is $\pm 6\%$ if measurements are made on the first half of the scale. This can usually be done on one of the ranges supplied.

NOTE—When using Rx1 and Rx10 ranges, touch prods to the resistor just long enough to read meter. Longer contact will unnecessarily discharge battery.

F. D. C. CURRENT

1. TO MEASURE CURRENT (MILLIAMPERES)—Turn SELECTOR switch to MA. Turn RANGE switch to range desired. Plug black prod and lead in (black) COMMON jack on panel. Plug red prod 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 meter on appropriate scale.

2. TO MEASURE CURRENT (AMPERES) (0-10 scale)—Turn SELECTOR switch to MA. (RANGE switch may be left in any position.) Plug black prod and lead in (black) COMMON jack on panel. Plug red prod with red lead in AMPS jack. Connect in circuit as above. Read meter on the appropriate scale.

3. ACCURACY—Accuracy of current meter is as follows: On all ranges through 1000 ma. $\pm 3\%$ of full scale. On 10 AMP range $\pm 5\%$ of full scale.

IV. APPLICATIONS

WARNING! HANDS OFF HIGH VOLTAGES! THEY ARE DANGEROUS!

When measuring high voltages, safe practice dictates that both prods be securely connected into the circuit under test before turning on the voltage.

A. SIGNAL TRACING

The SYLVANIA Polymeter Type 134 may be used for signal tracing by connecting the R. F. PROBE to successive stages and noting the increase of voltages. The stage gain or loss may be estimated or calculated from these readings. Due to the very low input capacity (3 uuf) of the R. F. probe, only very slight retuning of resonant circuits is necessary for the greatest accuracy. As in any signal tracing the AVC must be rendered inoperative.

B. OSCILLATOR VOLTAGE MEASUREMENTS

Oscillator voltages may be measured directly with the R. F. PROBE due to its high input impedance. Voltages of frequency up to 300 mc. may be accurately measured.

C. A. V. C. VOLTAGE MEASUREMENT

The high input resistance (16 megohms) of the D. C. Voltmeter permits direct measurement of A. V. C. voltages.

D. AUDIO VOLTAGE MEASUREMENTS

All Audio Voltages (20 to 15000 cycles) may be measured using the A. C. VOLTS circuit of the Sylvania Polymeter Type 134. The input impedance of the A. C. VOLTS circuit is equivalent to a 2.7 megohm resistor shunted by a 40 uuf. capacitor. At 10000 cycles the reactance of this capacity is 400000 ohms. Hence this need be considered only for the most precise audio measurements.

E. SUPERIMPOSED VOLTAGE MEASUREMENTS

A. C. and R. F. voltage superimposed on D. C. may be measured easily with the Sylvania Polymeter Type 134. Internal D. C. blocking capacitors are provided for this purpose in both circuits.

Likewise, D. C. voltages with superimposed A. C. or R. F. may be easily measured by using the regular D. C. voltmeter circuit. An effective filter is built in for this application.

CAUTION—When D. C. voltages in excess of 500 volts are superimposed on A. C. or R. F. voltages, a capacitor of suitable capacity and voltage must be employed between tip of A. C. prod or R. F. probe and the voltage to be measured.

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 cabinet screws are of the thread-cutting type and may be replaced by 6-32 steel machine screws, if necessary.

B. COMPONENTS

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

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

3. The aging of the 7A6 or 1247 tube may change the zero setting on the A. C. or R. F. range. If an appreciable change in zero setting occurs when the selector switch is changed from D. C. to A. C. or R. F., the potentiometer marked A. C. zero or R. F. zero should be adjusted to eliminate the error. If either range cannot be corrected by this method, the associated tube must be replaced.

4. The 3 volt battery should be replaced when the OHMS SET control does not permit adjustment of meter pointer to full scale with infinite resistance between ohmeter prods.

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. **D. C. CALIBRATION**—Apply exactly 10 V. D. C. to the 10 V. +D. C. range of the Polymeter and adjust potentiometer marked D. C. SET until meter reads 10 V. This calibrates all D. C. ranges.

3. **A. C. CALIBRATION**—Set ZERO SET as described in the preliminary adjustments. Apply exactly 10 V. A. C. at line frequency to the 10 V. A. C. range of the Polymeter and adjust potentiometer marked A. C. SET until meter reads 10 V. The voltage applied must be free of harmonics. This calibrates all A. C. ranges.

4. **R. F. CALIBRATION**—Set ZERO SET as described in the preliminary adjustments. Apply exactly 10 V. at 10,000 c. p. s. or more to the 10 V. A. C. range of Polymeter and adjust potentiometer marked R. F. SET until meter reads 10 V. The voltage applied must be free of harmonics. This calibrates all R. F. ranges.

PARTS LIST

| Symbol | Description | Rating | Tol. | Sylvania Part No. |
|--------|--|-------------------------------|--------------------|----------------------|
| BT-101 | Battery | 3 V. | | Pc. 12976 |
| C-101 | Condenser, button mica | 500 uuf. 500 V. D. C. | | Pc. 12980 |
| C-102 | Condenser, button mica | 500 uuf. 500 V. D. C. | | Pc. 4948 |
| C-103 | Condenser, postage stamp mica | .005 uf. 2000 V. | | Pc. 13322 |
| C-104 | Condenser, tubular electrolytic | 8 uf. 450 V. | | Pc. 2786 |
| C-105 | Condenser, tubular paper | .03 uf. 600 V. | | Pc. 13895 |
| C-106 | Condenser, tubular paper | .01 uf. 600 V. | | Pc. 2775 |
| C-107 | Same as C-106 | | | |
| F-101 | Fuse, type 3AG | 1 Amp. | | Pc. 2422 |
| I-101 | Lamp—Incandescent Bayonet | 6-8 V., .015 A | | Pc. 2828 |
| M-101 | Meter 4½" rectangular | .0-1 Ma. D. C. 50 ohm resist. | ± 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. 14265 |
| 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 | 48000 ohms 1 W. | ± 1% | Pc. 12032 |
| R-111* | Resistor composition | .112 Meg. 1 W. | ± 1% | Pc. 12031 |
| R-112* | Resistor composition | .32 Meg. 1 W. | ± 1% | Pc. 12030 |
| R-113* | Resistor composition | 1.12 Meg. 1 W. | ± 1% | Pc. 12029 |
| R-114* | Resistor composition | 3.2 Meg. 1 W. | ± 1% | Pc. 12028 |
| R-115* | Resistor composition | 11.2 Meg. 1 W. | ± 1% | Pc. 12027 |
| R-116 | Resistor composition | 47000 ohms ½ W. | ±10% | Pc. 1010 |
| 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 | 16000 ohms 1 W. | ± 1% | Pc. 12034 |
| R-121* | Resistor composition | .032 Meg. 1 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. 14307 |
| R-128 | Resistor variable, linear taper | 2 Meg. | | Pc. 2469 |
| R-129 | Resistor variable, linear taper | 4900 ohms | | Pc. 13367 |
| R-130 | Resistor composition | 47000 ohms 2 W. | ±10% | Pc. 1010 |
| R-131 | Resistor composition | 4700 ohms ½ W. | ±10% | Pc. 968 |

* Signifies "Matched Pair"

| Symbol | Description | Rating | Tol. | Sylvania Part No. |
|--------|--|---|------------|----------------------|
| R-132 | Same as R-131 | | | |
| R-133 | Same as R-130 | | | |
| R-134 | Resistor wire wound | .135 ohms 1 W. | $\pm 1\%$ | Pc. 13996 |
| R-135 | Resistor wire wound | .35 ohms 1 W. | $\pm 1\%$ | Pc. 13995 |
| R-136 | Resistor wire wound | 1 ohm 1 W. | $\pm 1\%$ | Pc. 13994 |
| R-137 | Resistor wire wound | 3.5 ohms 1 W. | $\pm 1\%$ | Pc. 13993 |
| R-138 | Resistor wire wound | 10 ohms 1 W. | $\pm 1\%$ | Pc. 13476 |
| R-139 | Resistor wire wound | 35 ohms 1 W. | $\pm 1\%$ | Pc. 13992 |
| R-140* | Resistor composition | 10 Meg. 1 W. | $\pm 1\%$ | Pc. 13208 |
| R-141 | Resistor composition | .1 Meg. 1 W. | $\pm 1\%$ | Pc. 12036 |
| R-142* | Resistor composition | 10000 ohms 1 W. | $\pm 1\%$ | Pc. 12037 |
| R-143* | Resistor wire wound | 1000 ohms 1 W. | $\pm 1\%$ | Pc. 12038 |
| R-144* | Resistor wire wound | 100 ohms 1 W. | $\pm 1\%$ | Pc. 12039 |
| R-145* | Resistor wire wound | 10 ohms 1 W. | $\pm 1\%$ | Pc. 12040 |
| R-146 | Resistor variable | 100 ohms | | Pc. 13201 |
| R-147 | Resistor composition | 3.3 ohms 1 W. | $\pm 10\%$ | Pc. 3660 |
| R-148 | Resistor composition | 470,000 $\frac{1}{2}$ W. | $\pm 10\%$ | Pc. 1052 |
| R-149 | Same as R-125 | | | |
| R-150 | Same as R-105 | | | |
| R-151 | Same as R-105 | | | |
| R-152 | Same as R-105 | | | |
| S-101 | Switch—Rotary 7 pole 6 position shorting | | | Pc. 13959 |
| S-102 | Switch—Rotary 4 pole 6 position shorting | | | Pc. 13960 |
| S-103 | Switch—toggle 2 pole 1 position | | | Pc. 3264 |
| | 2 pole 2 position | | | Pc. 2424 |
| | 2 pole 1 position | | | Pc. 13506 |
| F-101 | Transformer—power | 300 V. A. C. c. t. 12 Ma. D. C. 6.3 V. A. C. 2 amp. 117 V. Pri. | | Pc. 12622 |
| V-101 | Tube Sylvania type 1247 | | | |
| V-102 | Tube Sylvania type 7N7 | | | |
| V-103 | Tube Same as V-102 | | | |
| V-104 | Tube Sylvania type 7Y4 | | | |
| V-105 | Tube Sylvania type 7A6 | | | |

* Signifies "Matched Pair"

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.

CORRECTIONS

Page 2 - Section D-1

This paragraph should be changed to read "Insert metal jacketed plug into R.F. VOLTS jack. Turn SELECTOR switch to R.F. VOLTS. Turn RANGE switch to range desired. If necessary set meter on zero with ZERO SET knob. Connect the outside case, etc."

Section D-2

This paragraph should read as follows:

2. ACCURACY - The accuracy of this range at frequencies between 10 Kc and 100 mc. is $\pm 5\%$ of full scale if used on the 3 and 10 volt ranges, $\pm 7\%$ if used on the 30 and 100 volt ranges and $\pm 10\%$ on the 300 volt range. At frequencies between 100 mc. and 300 mc. an additional error of $\pm 5\%$ applies so that the total error between 100 mc. and 300 mc. is $\pm 10\%$ of full scale if used on the 3 and 10 volt ranges, $\pm 12\%$ if used on the 30 and 100 volt ranges and $\pm 15\%$ of full scale on the 300 volt range.

Page 5 - Parts List

Change Pc. 12976 to Pc. 3757 on first line of list.

Add C-108 after C-107 as follows:

Condenser, postage stamp mica 150 uuf. 500 V. D.C.
Pc. 5953

Page 7 - Schematic

The connections from the meter, M-101, to sections F and G of switch, S-101 are shown reversed.

Add a condenser, C-108 between pin 3 of socket X-101, and the 6.3V side of resistor, R-106. Beside the condenser mark 150 uuf. 500 V. D.C.

These changes have been made at the factory but these books were printed before the changes were found necessary.

SYLVANIA ELECTRIC

