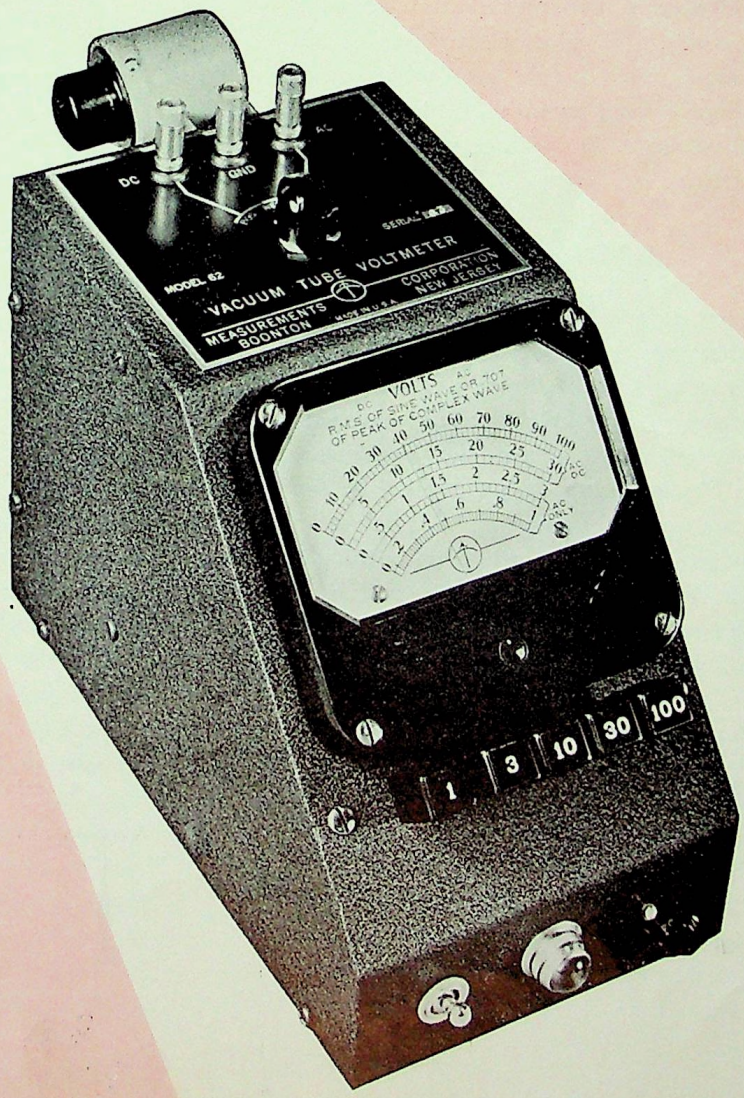
V.T.V.M.



Instructions for the Model 62 Vacuum Tube Voltmeter

General:

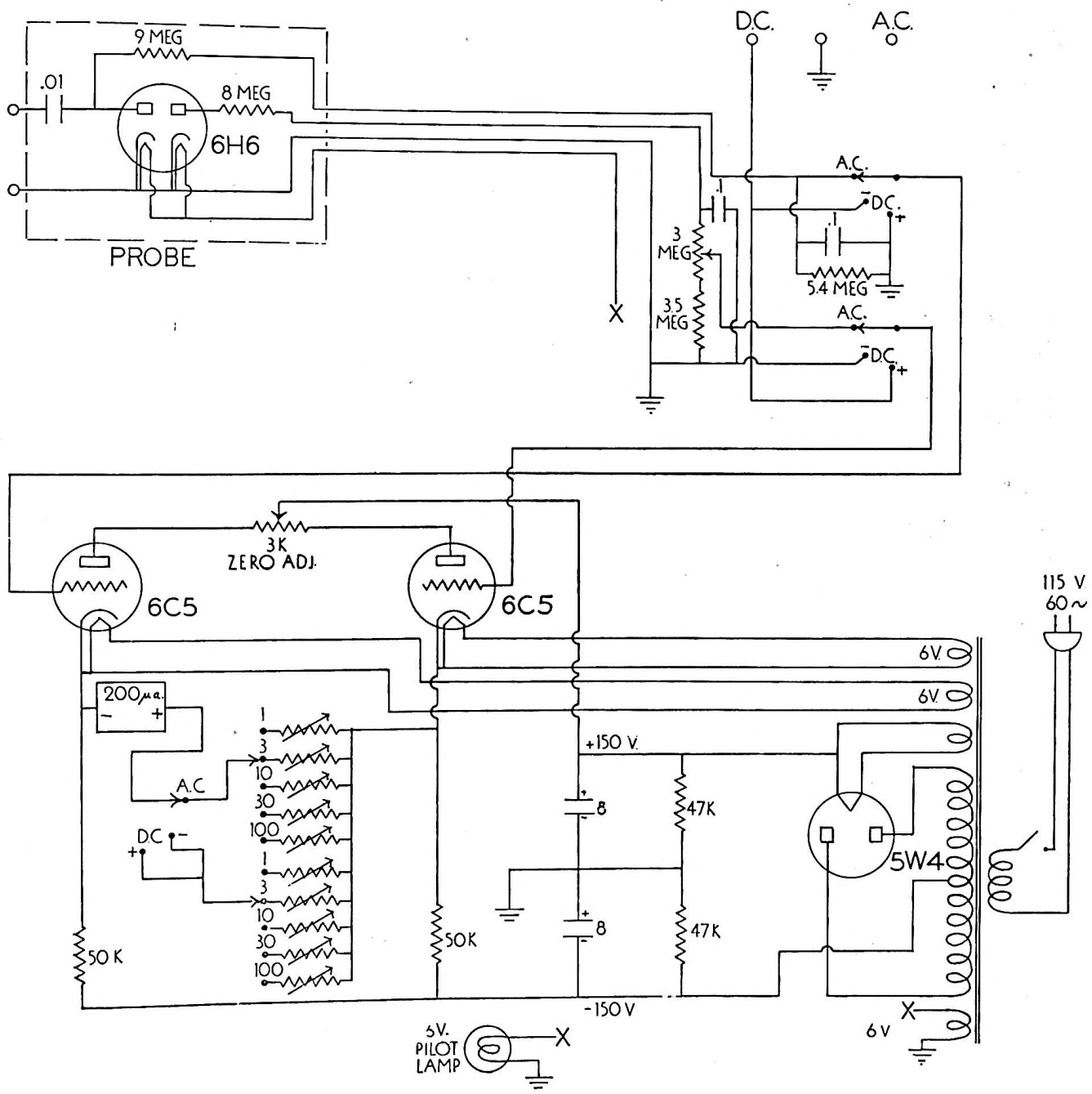
The Model 62 employs a degenerative, balanced, d.c. amplifier circuit for reading d.c. voltage. For measuring a.c. voltage a high impedance diode probe is available using a de-based 6H6 diode rectifier. One diode plate is used in the measuring circuit connected to the grid of a d.c. amplifier, while the other diode plate is used for balancing out the initial velocity potential of the measuring diode. Since the initial velocity potentials of the two diodes are bucked against each other rather than against some fixed potential, a high order of stability with respect to line voltage variation, etc., is thereby attained.

Operation:

This instrument is designed for operation from 115 volts, 60 cycles, a.c. only. A three position switch provides for measurement of either a.c. or d.c. and a means for changing the polarity of d.c. measurements. Convenient plugs are provided at the rear of the three binding posts for attachment of the a.c. probe when working with frequencies below ten or twenty megacycles. When setting up initially it is desirable to check the zero. With the switch on either of the two d.c. positions and the d.c. terminals shorted, and the push button marked "1" depressesd, it should be possible to set the meter to zero by means of the lower right hand knob adjacent to the pilot lamp. This balances the d.c. amplifier only. There is an additional screwdriver adjustment accessible through the top rear for balancing the diodes. This balance must be made with the switch in the "probe" position. In general, a slight variation between the a.c. and d.c. zeros can be corrected by means of the front panel knob; however, if more than .1 volt shift on the meter occurs when switching from d.c. to probe with the "1" button depressed, this screwdriver adjustment can be reset for exact balance. The separate balance of the diode maintains maximum stability with line voltage variation. There is no further change of zero on the other ranges once the "1" range has been set. It is desirable to keep a ten megohm resistor across the d.c. terminals since otherwise the grid circuit would be open on d.c., and the meter will go off scale. It is not likely that the meter can be seriously overloaded because of the circuit arrangement; however, it is advisable to depress the "100" button when changing connections, etc.

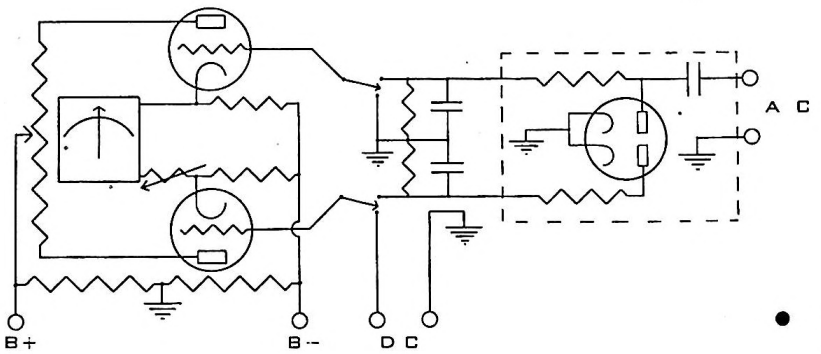
Accuracy:

The accuracy of this instrument is chiefly limited by the indicating meter which is 2% of full scale. The Voltmeter is adjusted correctly at full scale on each range. When checking calibration accuracy against an r.m.s. standard, the voltage source should have less than 1.% harmonics. Because of the .01 mfd diode condenser, the meter reads approximately 4% low at 60 cycles. The input capacity of the probe when not plugged into the carrying jacks is about seven mmfd. Since a ten megohm diode leak is employed, the input impedance is approximately five megohms at the lower frequencies. If the binding posts of the probe are shorted at their base the resonant frequency of the resulting circuit is approximately 350 megacycles. The probe is suitable for operation up well beyond 100 megacycles. There is, of course, some loading; however, this loading is less than that usually present in other types of vacuum tube voltmeters at those frequencies. Since the probe is readily detachable by means of its four prong plug, other types of specialized probes can be substituted. Correspondence regarding those special probes is invited.



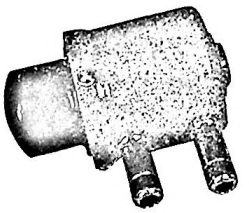
WIRING DIAGRAM

Model 62 Vacuum Tube Voltmeter



The Circuit

- Stabilized, balanced, degenerative amplifiers eliminate "zero shift"—no change of zero with range selection. Very high input resistance on d.c. voltage measurements. The balanced diode circuit reduces zero drift on a.c. voltage measurements.
- Light, compact design economizes on laboratory bench space.
- Versatile: D. C. voltmeter plus photo-electric tube form the basic units for a wide-range light **intensity** or light **quantity** instrument. With the aid of a 90 volt battery, resistances from 0.1 to beyond 100,000 megohms can be measured. The d.c. voltmeter can be used as a direct reading Ph meter for use with a glass electrode. Write for further information regarding special applications.



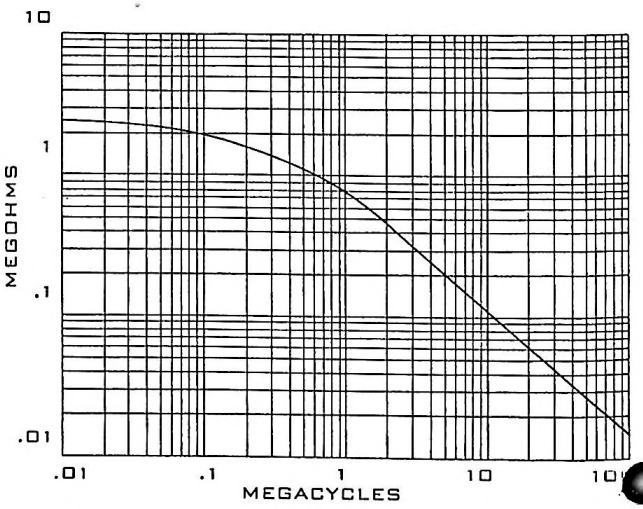
The Probe

- The shunt capacitance of the probe is 7 mmfd. The shunt resistance is plotted below as a function of frequency (measured on the 160-A "Q" meter). The resonant frequency of the probe with input terminals shorted is 350 megacycles.
- The frequency error in the probe is negligible from 30 cycles to over 150 megacycles. Since the probe cable connects by means of a plug to the amplifier, special ultra high frequency probes can be interchanged with the standard probe to extend the upper frequency limit.
- A built-in blocking condenser removes the d.c. component.
- Convenient carrying jacks are provided on the rear of the amplifier case suitable for holding the probe during measurements at low and medium frequencies where lead length is not a source of trouble.

Specifications

Range:	Push button selection of five ranges—1, 3, 10, 30 and 100 volts a.c. or d.c.
Accuracy:	2% of full scale on each range both d.c. and sine-wave a.c.
Indication:	Linear for d.c. and calibrated to indicate r.m.s values of a sine-wave or 71% of the peak value of a complex wave on a.c.
Power supply:	115 volts, 60 cycles—no batteries.
Dimensions:	4¾" wide, 6" high, and 8½" deep.
Weight:	Approximately six pounds.
Price:	$135.00 f.o.b. Boonton, N. J.

Probe Input Resistance



MEASUREMENTS CORPORATION

BOONTON NEW JERSEY

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MODEL 62 U. H. F. PROBE

The Special Ultra High Frequency Probe for the Model 62 Vacuum Tube Voltmeter has been designed to load high frequency circuits as little as possible. The Probe uses the special RCA Type 9005 diode which has a low plate to cathode capacity and a high resonant frequency. The input capacity of the Probe including the tube, is approximately 2 mmf. The blocking condenser as shown in the accompanying diagram is approximately 50 mmf., which allows the Probe to be used at frequencies down to approximately 100 k.c. The resonant frequency of this probe is approximately 1100 megacycles.

Since the Probe is to be used primarily on high frequency circuits where the impedance level is of necessity, rather low, the actual a.c. load impedance has been reduced to 470,000 ohms and this should be taken into account when using the instrument at lower radio frequencies on high impedance circuits.

Since the heater terminals in the Probe are somewhat exposed, care should be taken not to short circuit them as this will result in doubling the heater voltage on the bucking diode and may result in blowing it.

Any information not contained in this instruction sheet can be obtained from Measurements Corporation.