MODEL 1200-A
VOLT-OHM-MILLIAMMETER

GENERAL DESCRIPTION

The Triplett Model 1200-A Volt-Ohm-Milliammeter has been designed for simplicity of operation, extreme accuracy - both D.C. and A.C., assurance against absolescence and a maximum of safety.

A most unique and practical arrangement is the separate A.C. and D.C. instruments combined in a single Bakelite case and fastened to the panel on two strong hinges. The purpose of this exclusive type of mounting is to give an accurate reading angle at any position the tester may be placed, thereby avoiding parallax, one of the most common errors. Often the variation of readings due to parallax is greater than the difference between precision and non-precision instruments. By pulling forward on the knob at top of meter case the Bakelite case housing the two meters can be instantly tilted to any desired reading position, which will place the meter scale in direct vision with the operator's eyes.

The instrument scale readings are - 0-10-50-250-500-1000 volts, both A.C. and D.C. The D.C. meter is used also for measuring 0-1-10-50-250 milliamperes and resistances - on a low ohm scale from .5 to 500 ohms with approximately 13 ohms center scale and on 1500 ohms, 1.5 megohms and 3 megohms scale with approximately 240, 24,000 and 48,000 ohms center of scale. All meter readings are obtainable by setting the selector switch to the proper position, marked to correspond with the scale numerals. The zero setting for ohms readings is accomplished by adjusting the meter needle to full scale by using a small screw driver to turn any one of the three rheostats. The shafts of these rheostats have slotted heads projecting through the panel and marked "Ohms Adjustment". There is an individual rheostat adjustment for each of the HI OHM scale readings making it unnecessary to readjust each time the scale is changed. A single rheostat con-

trols the zero adjustment for the LOW OHMS and 1500 ohm scales as the current consumed is the same, and one setting serves for both adjustments.

Two jacks are used for the measurement of A.C. and D.C. volts, D.C. milliamperes - 1500, ohms 1.5 and 3 megohms. A third jack is used for the measurement of output voltages when the meter is used in conjunction with an oscillator, and another jack is used when measurements are made in the low ohms scale. No. 32 cords with prods and tips are used in conjunction with these jacks. The output jack has a condenser in series with the meter movement to prevent the application of D.C. current to the A.C. output meter.

This tester lends itself readily to set testing by the voltage method, also by the point-to-point voltage and resistance method. A thorough knowledge of the tester as well as the receiver circuit you are servicing must be had.

TECHNICAL DESCRIPTION

VOLTMETER - Since the deflection of the meter depends upon the amount of current passing through the moving coil of the D'Arsonval meter, a Voltmeter must necessarily have a resistance in series with the movement so as to regulate the amount of current passing through for different voltage ranges. The D.C. movement of the Model 1200-A Tester is a 500 microampere movement with 200 ohms internal resistance, thus sufficient resistance must be placed in series with this movement so that for the maximum reading of any voltage scale the current passing through the meter will be exactly 500 microamperes. By the application of ohms law $R = \frac{E}{I}$ it is readily seen that 2000 ohms are necessary to allow only 500 microamperes to pass through the meter when one volt is being measured. Thus, to make a 0-1 D.C. Voltmeter from this instrument, it would be necessary to have a total resistance of 2000 ohms. Therefore, the instrument is known as a 2000 ohm per volt meter.

The voltage ranges for the Model 1200-A are 10, 50, 250, 500 and 1000 volts. By multiplying these ranges by the 2000 ohms that are necessary for each volt, it is readily seen there must be effective resistances of

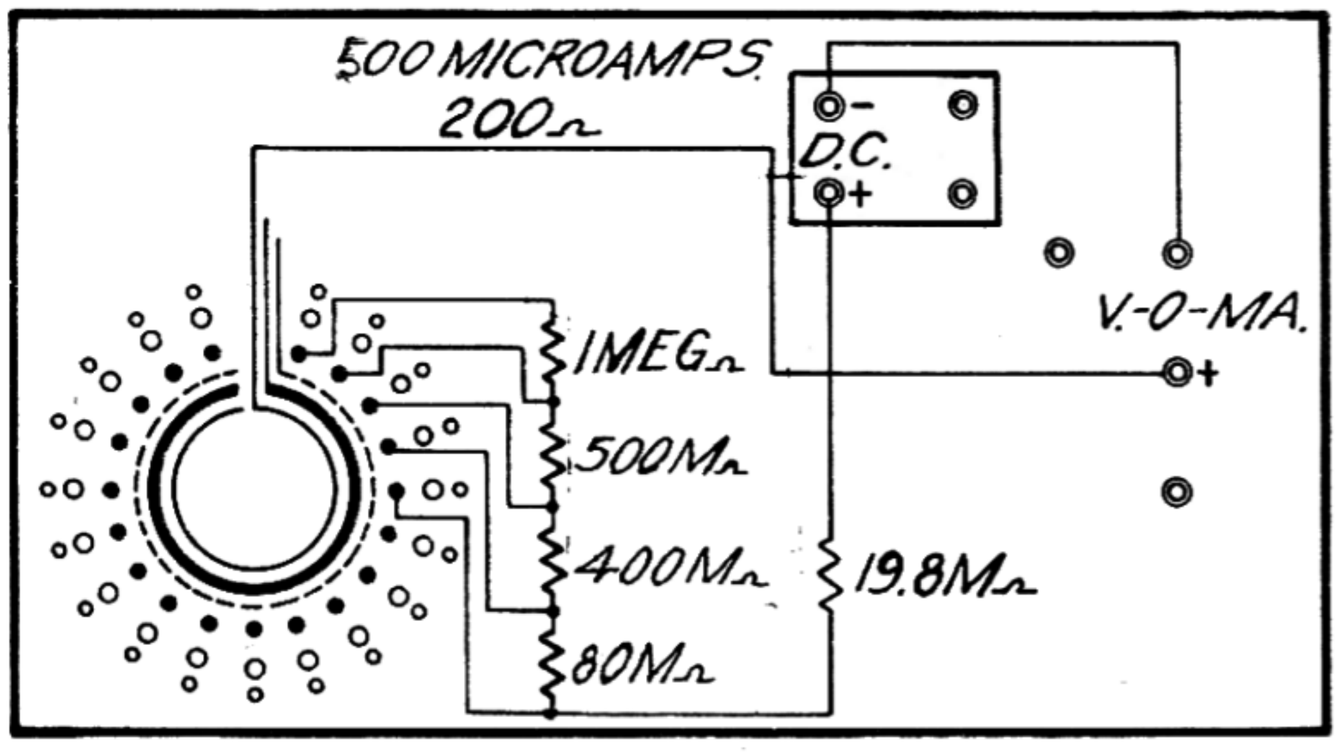


Fig. 1

20,000, 100,000, 500,000,1,000,000 and 2,000,000 ohms for these ranges. These resistances are obtained by inserting series resistances into the circuit by means of a multi-point selector switch as is represented in Figure No. 1. The additional series resistance necessary can be found by subtracting the meter resistance from the total resistance required.

The A.C. Voltmeter acts in the same manner. However, in this case the instrument is a 0-25 A.C. Milliammeter with 400 ohms internal resistance. By again applying ohms law we can readily note that one volt acting through 40 ohms will allow 25 Milliamperes of current to flow. Thus, this instrument is a 40 ohm per volt meter. Since 400 ohms are internal to the meter it will immediately follow that this meter will read directly on a 0-10 A.C. volt range. The higher ranges are 50, 250, 500 and 1000 A.C. volts for which it will be necessary there be respectively 2000, 10,000, 20,000 and 40,000 ohms. The circuit of the A.C. voltage measurement is shown in Figure No. 2. The variations between the marked resistances and the calculated resistances are due to the inductance and capacity values which enter into the A.C. circuit and which make it necessary to alter slightly the actual calculated resistance values.

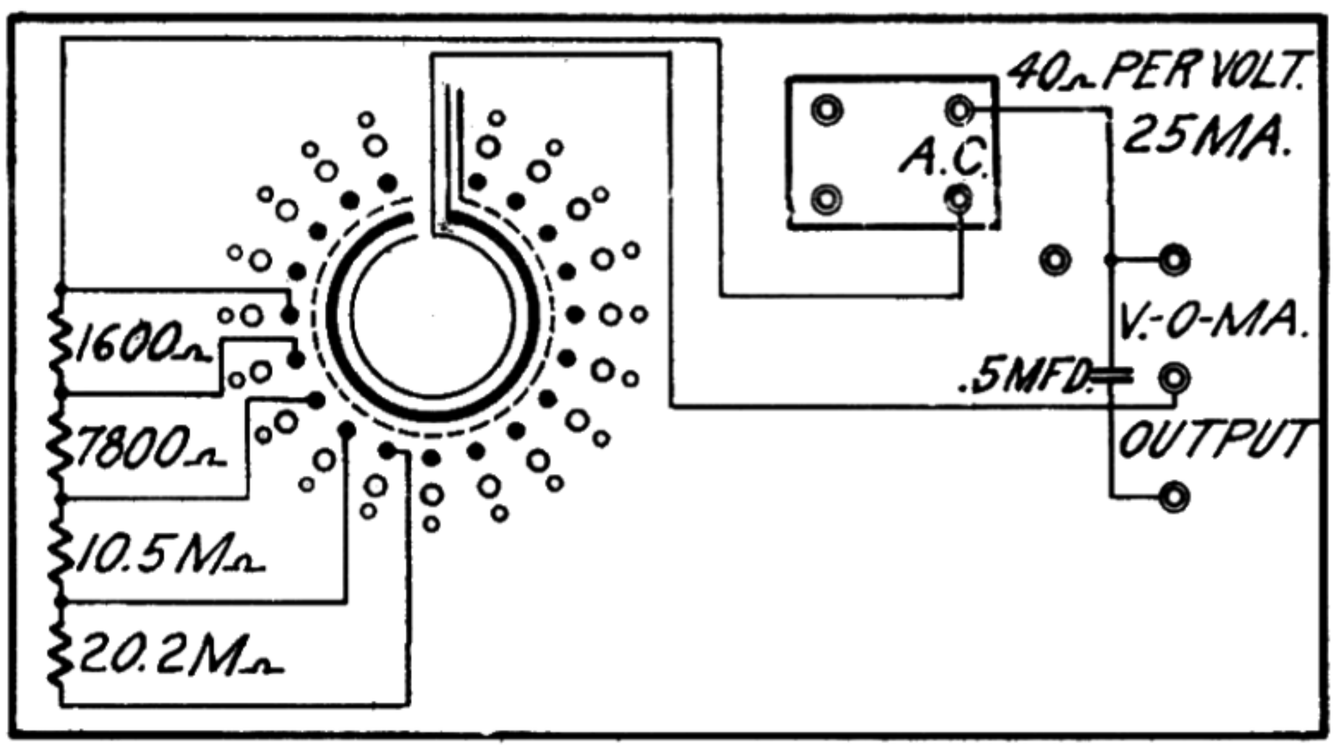


Fig. 2

In order to measure output on this instrument a

separate jack has been inserted with a .5 Microfarad Condenser in series with it so that it is only necessary to use this extra jack for the output measurements. The condenser is placed in series with this jack in order to prevent the application of D.C. current to the meter.

MILLIAMMETER - The customary method of increasing the range of a Milliammeter is to shunt the meter. In this way the sum of the current carried around the meter and the small portion of the current allowed to pass through the movement equals the total current in the circuit.

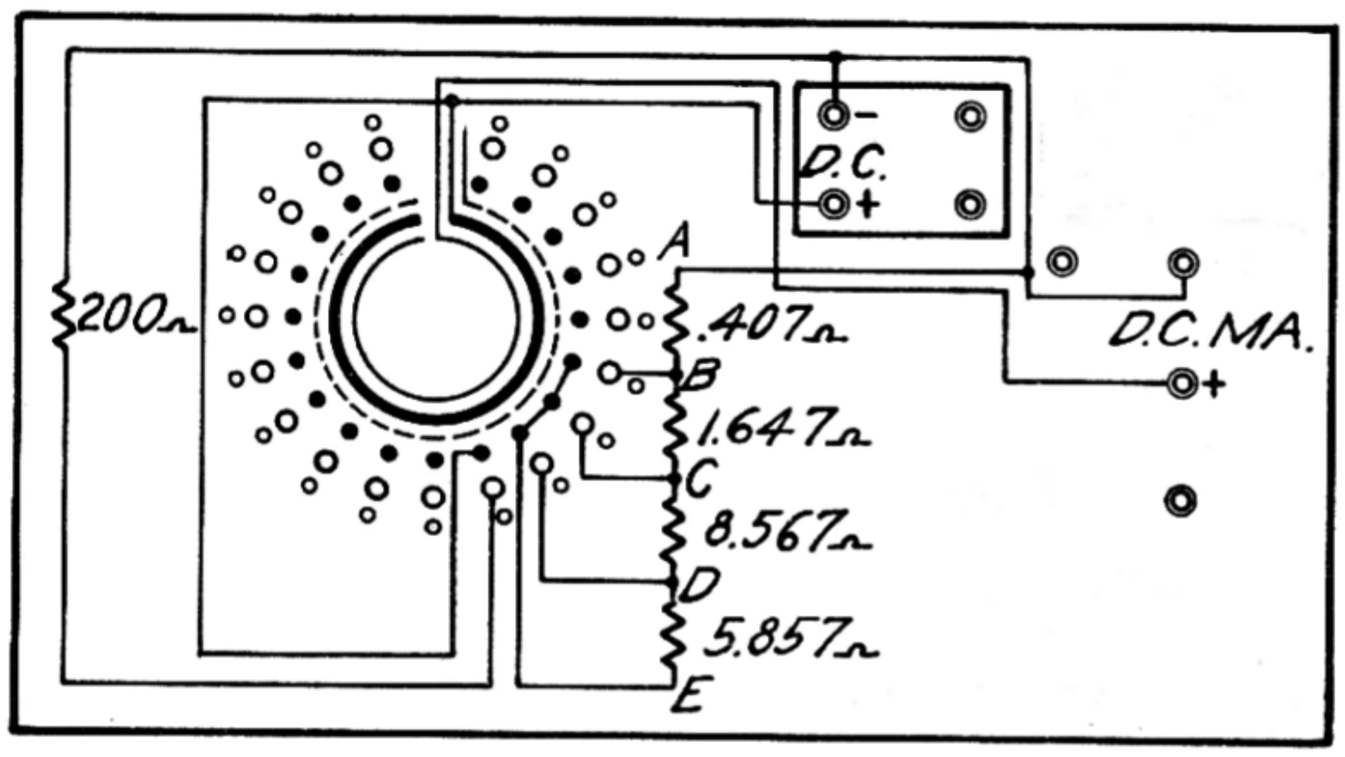


Fig. 3

In order to do away with trouble involved in the ordinary method of switching shunts across the meter, the Triplett Model 1200-A Tester makes use of a semi-ring shunt. Here the current passes through the complete resistance, part of which is to be used as a shunt. Figure No. 3 shows that the current enters at the positive jack and passes through the resistances to the three connected positions on deck one of the selector switch into the collector ring and out through the other Milliampere jack. The meter is placed across a certain portion of this resistance and acts as a 100 Millivolt meter, which is then placed across the portion of the shunt in which the product of the current flowing and the resistance is 100 millivolts. In Figure 3 it will be noted that the millivolt drop is taken between the point "A" which is connected directly to the meter and the successive points "B", "C" and "D" for the 250, 50 and 10 milliampere ranges respectively. One side of the meter is connected through the switch to the proper taps while the other side is connected directly to the point "A".

This method of shunting is more satisfactory since the contact resistance set up by the passage of the larger current through the contacts of the selector switch is external to the meter circuit and consequently does not affect the shunting values.

OHMMETER - Figure No. 4 represents the Ohmmeter circuit of the Model 1200-A Tester. The 1500 ohms, 1.5 megohms and 3 megohms resistance range measurements are of the conventional series type in which the current from a battery passes through a current-limiting resistor and variable zero adjuster through the unknown resistance and through the meter in series, as shown in position 17, 18 and 19 of the selector switch. The outstanding point in these 1200-A resistance ranges is the fact that each range has its separate zero adjuster so that repeated adjustments are not necessary as the operator changes from one range to another.

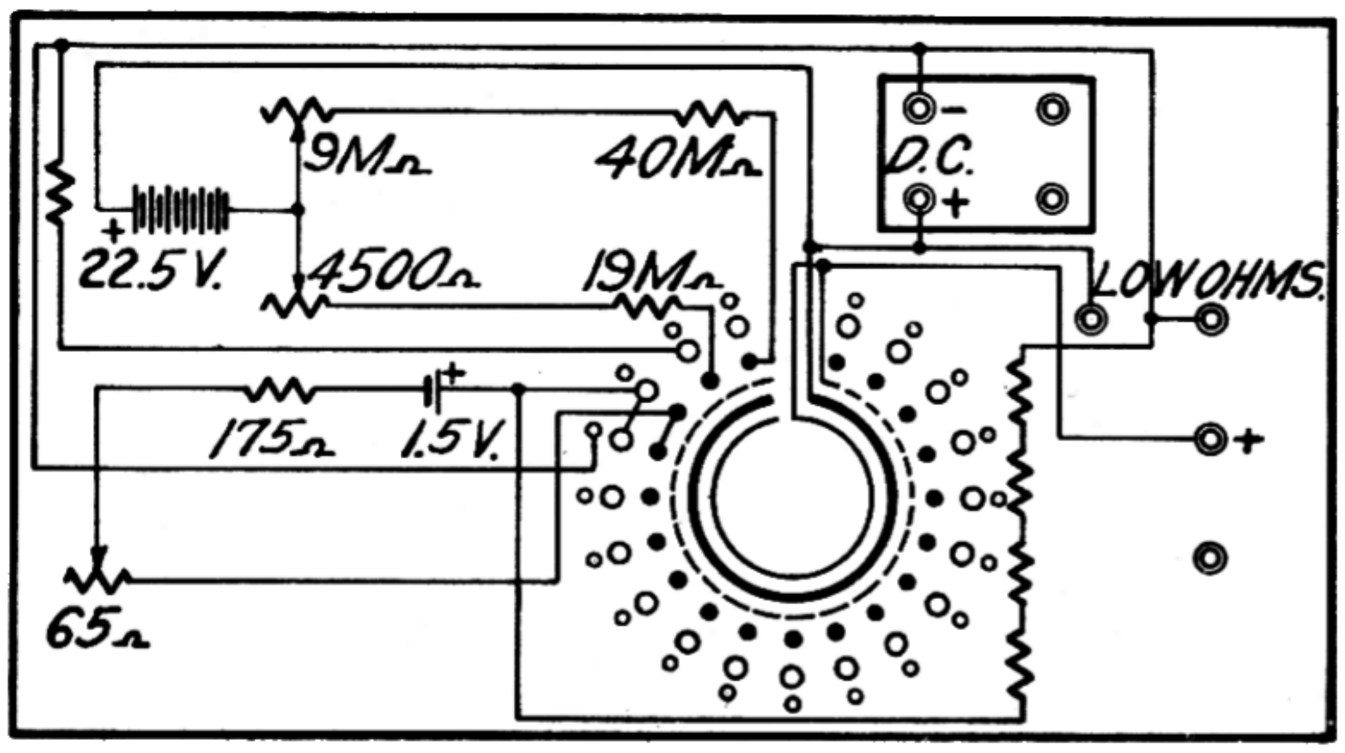


Fig. 4

The low ohm scale is of the shunt or back-up type. In this circuit the current from the battery passes through the series resistance and zero adjuster of the 1500 ohm range, is jumped immediately through the meter and back to the battery by means of a third deck of the selector switch. Here the unknown resistance is shunted across the meter rather than placed in series with the current, giving a very satisfactory method of measuring extremely low resistances with minimum current draw.

The resistors used in the Model 1200-A unit are of a special composition containing material having a slight positive temperature coefficient and moulded into a special compound adding just enough negative coefficient to make a definite, unchanging zero resultant. They are non-inductive, non-capacitive and are individually calibrated after which they are sealed with a heavy coating and properly aged which makes them absolutely non-hydroscopic. Common wire wound resistors have, in addition to inductive and capacitive properties, a positive temperature coefficient. Ordinary composition resistors have a negative temperature coefficient. Under the test of long usage the special resistors used in this tester have proven to be the best obtainable for the purpose.

OPERATING INSTRUCTIONS

VOLTMETER -

1 - Plug the No. 32 cords, furnished as an accessory to the tester, into the jacks marked "VOLTS" - "OHMS" - MILLIAMPERES" observing the proper polarity by inserting the red lead in the red jack.
2 - Set the selector switch to the proper position for the voltage to be measured. If the value of this voltage is not known set the selector switch to the 1000 volt range, note the reading, and then rotate the switch to the proper lower range which will give a larger deflection of the meter.
3 - The unknown voltage may now be measured across the ends of the No. 32 cords. The red lead should be connected to the positive side of the voltage when D.C. values are measured.
Note: The A.C. meter will work on D.C. current, but the D.C. meter will not work on A.C. current. Consequently it is necessary that the selector switch be turned to the proper range under either D.C. or A.C. current, as the condition necessitates.

MILLIAMMETER -

1 - Plug the No. 32 cords into the jacks marked "VOLTS"- "OHMS"- "MILLIAMPERES" again observing the proper polarity by attaching the red lead to the red positive jack.
2 - Set the selector switch to the proper milliampere range. If the value of the current is unknown, place the selector switch on the 250 milliampere range, observe the reading, and then rotate selector switch to the proper range for greater scale deflection.
3 - The current to be measured may now be connected in series with the free ends of the No. 32 cords always observing polarity.

OHMMETER - Low Ohms Range -

1 - Connect the No. 32 cords to the jacks marked "LOW OHMS".
2 - Rotate the selector switch to the LOW OHMS position.

3 - Insert a screw driver in the slotted shaft which is marked "ZERO ADJUST - 1500 OHMS" and rotate the shaft until the D.C. meter needle registers exactly full scale deflection.

4 - Low Ohms up to 500 ohms may be measured on the LOW OHMS scale by insertion between the free ends of the No. 32 cords.

OHMMETER - 1500 Ohms, 1.5 megohm and 3 megohm ranges -

1 - Insert No. 32 cords in the jacks marked "VOLTS" - "OHMS" -"MILLIAMPERES".

2 - Rotate the selector switch to the required resistance range.

3 - Touch free ends of No. 32 cords together, insert screw driver in slotted shaft marked with the desired resistance range and adjust meter needle to full scale deflection by rotating this shaft.
Note: There are three separate zero adjustments which make it unnecessary to readjust the zero each time the resistance range is changed. However, this zero adjustment should be checked carefully before each reading.

4 - The unknown resistance value may now be read directly on the meter by inserting the resistance between the free ends of the No. 32 cords.
Note: In reading the 1500 ohm range the last two zeros after the dash in the numbers on the scale should be omitted. For instance, 300-00 would be read 300 ohms.
In reading the 1.5 megohm all the figures on the scale should be included. For instance, the 300-00 reading would be 30,000 ohms.
In reading the 3 megohm range it is necessary to multiply the scale reading by two. For instance, the 300-00 reading would be 60,000 ohms.

OUTPUT METER -

1 - Connect the No. 32 cords to the jacks marked "OUTPUT".

2 - Set the selector switch on the A.C. voltage position depending upon the output potential to be measured. If this is not definitely known, it is wise to set the selector switch to the highest position and rotate back to lower voltage ranges if the sensitivity of the meter is not sufficient on the

high range.

3 - The output voltage may now be read by connecting the free ends of the No. 32 cords between the plate or plates of the output tube and the chasis.

CONDENSER CHECKING -

1 - Condensers may be checked for leakages and shorts by means of the Ohmmeter. Follow the general directions for the use of the Ohmmeter. Then by connecting the Condenser in place of the unknown resistance the amount of leakage of short may be measured.

2 - Set the selector switch on the 250 A.C. volts position for condensers between .1 and 1 microfarad and on the 10 A.C. volt position for condensers between 1 and 10 microfarads.

3 - To test for opens and capacity place an external A.C. voltage source in series with the condenser and the jacks marked "VOLTS"- "OHMS" - "MILLI-AMPERES" by means of the No. 32 cords.
For capacities between .1 and 1 microfarad 110 A.C. volts should be used and for capacities between 1 and 10 microfarads 5 A.C. volts should be used.

4 - An open condenser will now show no meter deflection with the A.C. potential applied to the condenser.

5 - If the condenser is not open, the capacity can be determined by noting the meter reading and referring to the capacity graph. To do this note the reading of the meter. Find this reading along the left hand vertical side of the diagram marked volts. Follow this horizontal line across the graph until it intersects the curve then follow the vertical line from that point down to the horizontal bottom of the graph where the capacity may be read directly in microfarads.

GENERAL INSTRUCTIONS

One 22.5 volt battery corresponding to Eveready or Burgess No.4156 and one No. 2 1.5 volt flash light cell are used in this tester. When Ohms Zero Adjustment is no longer obtainable these batteries should be replaced. To do this these instructions must be followed:

1 - Remove the Tester from the case by removing the four screws around the side and top of the case. The whole tester may then be removed from the case by lifting up on the panel and top of case.
2 - The batteries may be released by loosening the two screws holding the bracket over the batteries.
3 - Remove leads from batteries and insert new batteries.
4 - The yellow lead goes to the 1.5 volt negative connection. The blue lead goes to the 1.5 volt positive connection. The white lead goes to the 22.5 volt negative connection and the red lead goes to the 22.5 volt positive connection.

The hinge movement for the meter is controlled by a friction action holding the meter in any desired positic This control is adjusted for permanent use. However, should adjustment be required after a long period of use due to wear on the parts the following instructions shou be followed:

1 - Remove Tester and panel as above.
2 - Increase the tension by tightening the screw at th hinge joint.
3 - Be sure the lock nut is kept tight and free from working loose.

No attempt can be given in these instructions for specific servicing of radio receivers or for specific uses of this Tester. However, it is imperative that the operator visualize the meter across the circuit or in series with the circuit which is under test. The meter is always used across the circuit in measuring voltages and in series with the circuit when measuring current. In order to get the best service from the tester it is necessary that every component part of the radio circuit under test is visualized completely by the operator. This information can best be gained by wirir diagram and data obtained from the manufacturer of the set.

For any further information concerning this tester that is needed write directly to The Triplett Electrical Instrument Co., Bluffton, Ohio giving specific questions concerning the information required.

Form 72836 THE TRIPLETT ELECTRICAL INSTRUMENT CO.
Bluffton - - - - Ohio

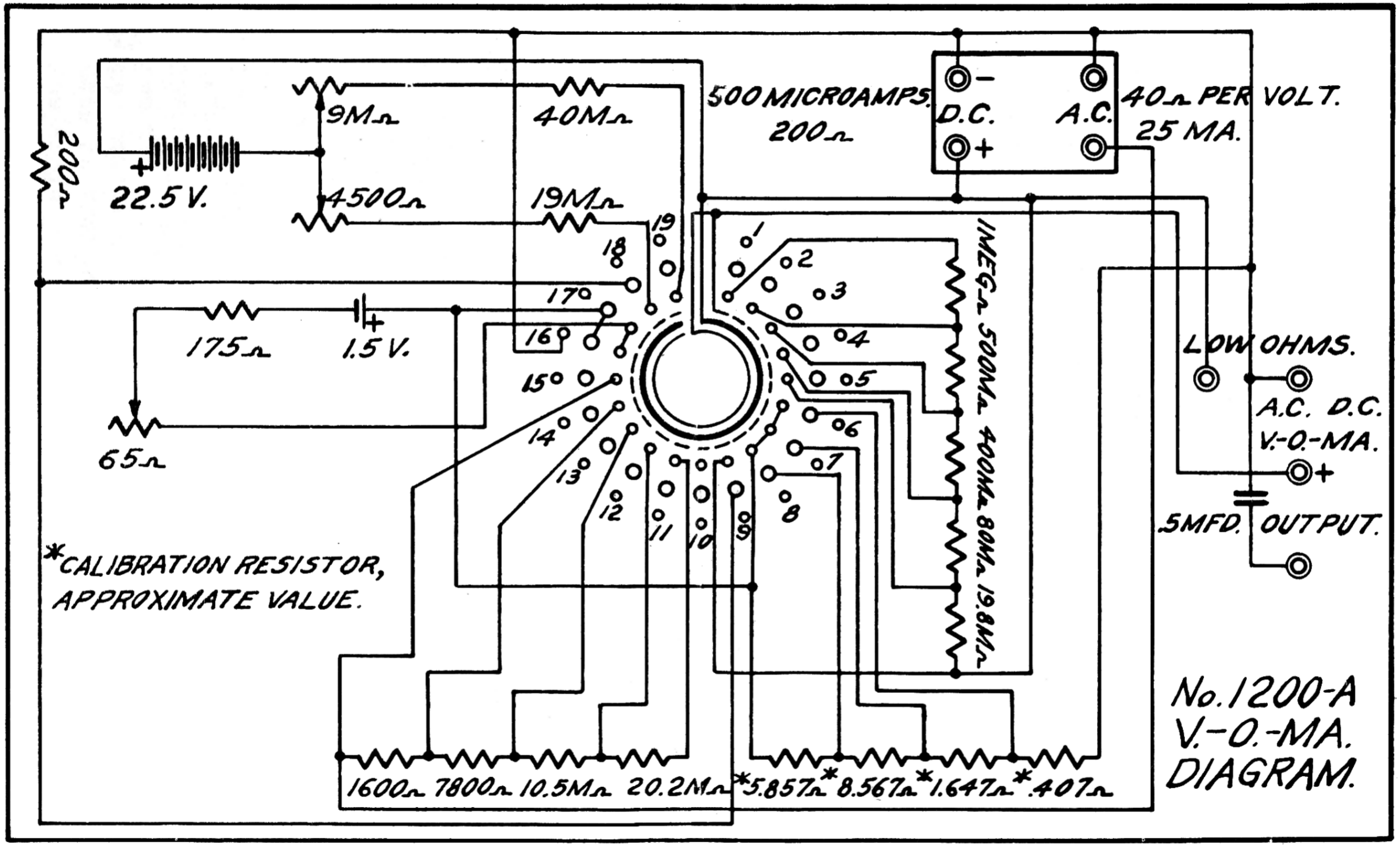
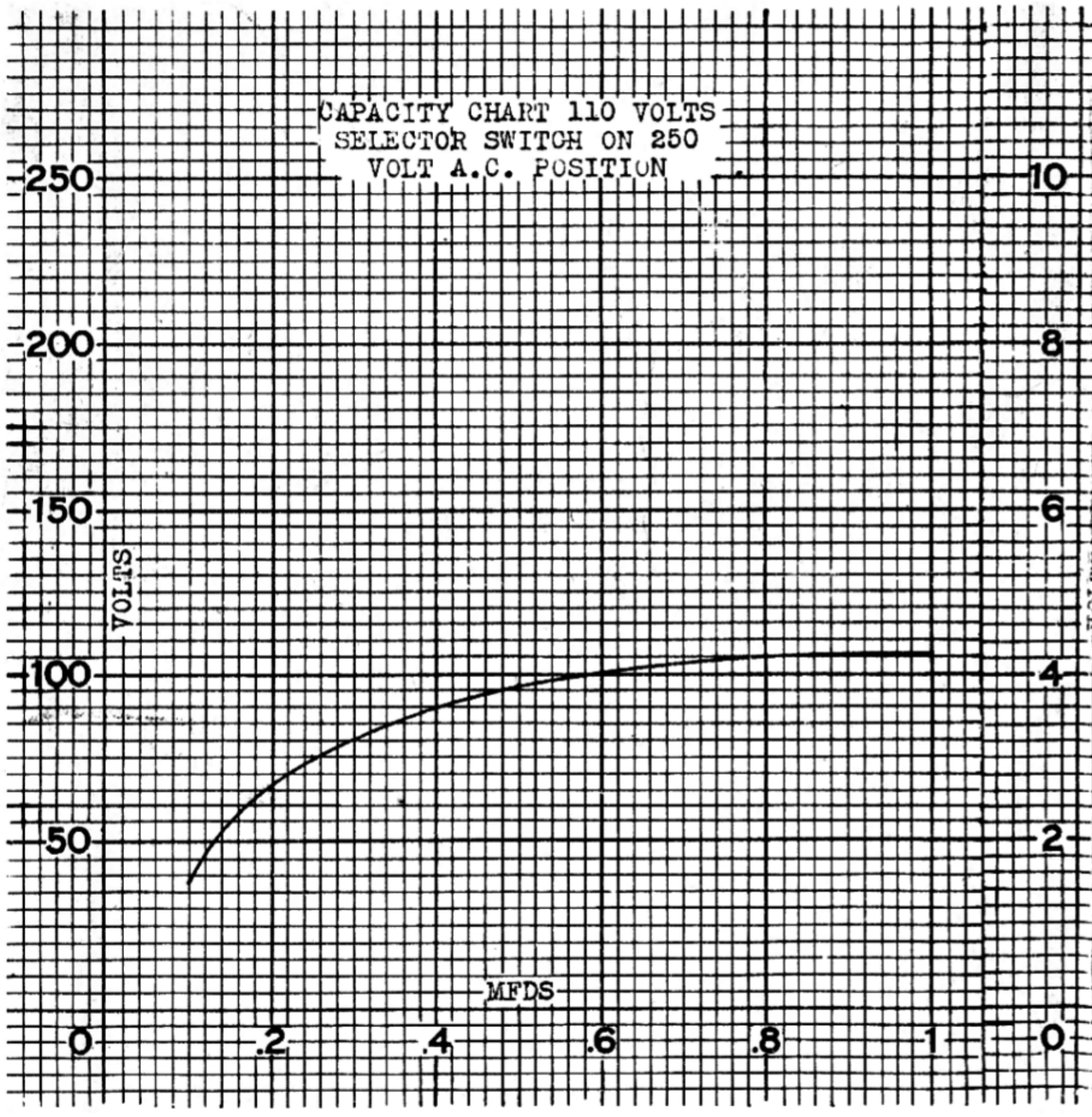


Fig. 5

Notes ~

CAPACITY CHART 110 VOLTS
SELECTOR SWITCH ON 250
VOLT A.C. POSITION



CAPACITY CHART 5 VOLTS.
SELECTOR SWITCH ON 10
VOLT A.C. POSITION.