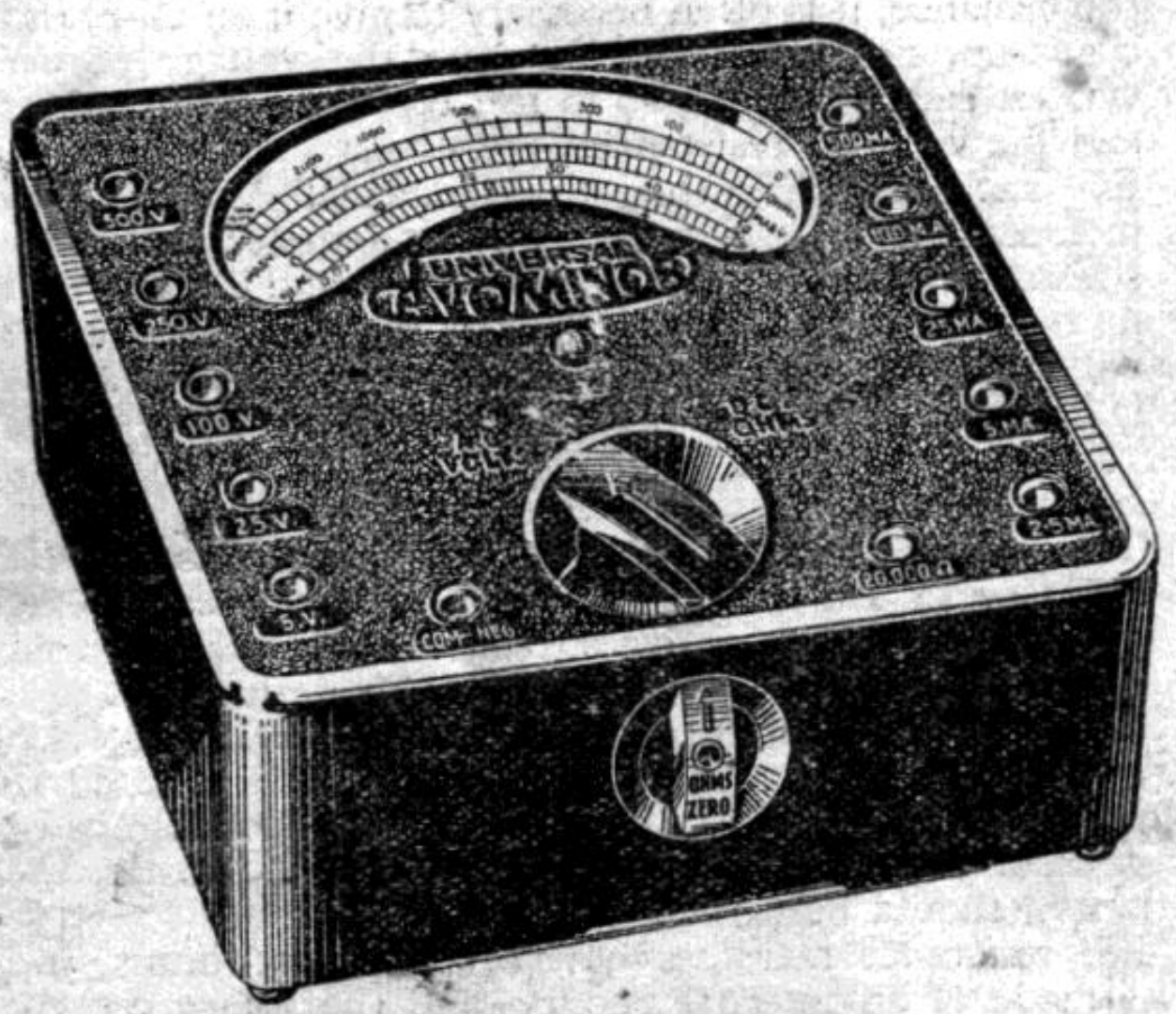
INSTRUCTIONS FOR USING THE

UNIVERSAL AVOMINOR

REGD. TRADE MARK

ELECTRICAL MEASURING INSTRUMENT



British Made

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
Winder House, Douglas Street, London, S.W.1.

INSTRUCTIONS FOR USING THE UNIVERSAL AVOMINOR

In order to ensure that your radio set is giving its best performance, it is often necessary to give it an all-round check-up, not merely to measure the voltage of the various batteries, but also to test the emission of valves and the value of resistances, etc.

For such a job as this, the Universal AvoMinor is indispensable. It is a self-contained meter of such a size as to slip easily into the coat pocket, and incorporates no fewer than 22 ranges. Besides the more usual D.C. voltage and milliamp ranges, this ingenious little instrument provides for the measurement of A.C. voltages up to 500, and resistance values up to 10 megohms with a suitable voltage supply.

The various ranges are selected by means of sockets on the face of the instrument, the negative lead being plugged into the negative socket, and the positive lead into the socket denoting the range it is desirable to use.

The rotary switch on the panel is the A.C./D.C. switch and should be turned to the left when it is desired to use the A.C. voltage ranges. When D.C. milliamps or volts or resistance measurements are to be made, the switch should be turned to the right.

For resistance measurements up to 20,000 ohms, use is made of an internal battery, and the rotary control sunk in the front end of the instrument is for the purpose of adjusting the ohms range should the battery be slightly run down.

The adjuster should be rotated until the meter reads zero ohms with the leads plugged into the appropriate sockets and shorted.

In the case of ranges greater than 20,000 ohms, an external battery should be used in conjunction with the voltage sockets. (See instructions on back of instrument). The external voltage required on any given range is that necessary to give full scale deflection, i.e., to make the instrument read zero ohms. If this exact voltage is not obtainable, an excess voltage up to 30% may be employed. In this case the short lead supplied with the instrument should be connected from the $2\frac{1}{2}$ m.a. socket to that in the ohms adjuster, and the latter should be rotated until the pointer indicates zero ohms.

By using the $2\frac{1}{2}$ m.a. range as a millivoltmeter (0–75 m.v.), the meter may be used with standard shunts (75 m.v. drop) to extend the current ranges.

A resistance range extension unit is available for use with this meter, by means of which resistances down to $\frac{1}{10}$ ohm may be measured.

D C. VOLTS

0- 75 millivolts
0- 5 volts
0- 25 ,,
0-100 ,,
0-250 ,,
0-500 ,,

MILLIAMPS

0- 2.5 milliamps
0- 5 ,,
0- 25 ,,
0-100 ,,
0-500 ,,

A.C. VOLTS

0- 5 volts
0- 25 ,,
0-100 ,,
0-250 ,,
0-500 ,,

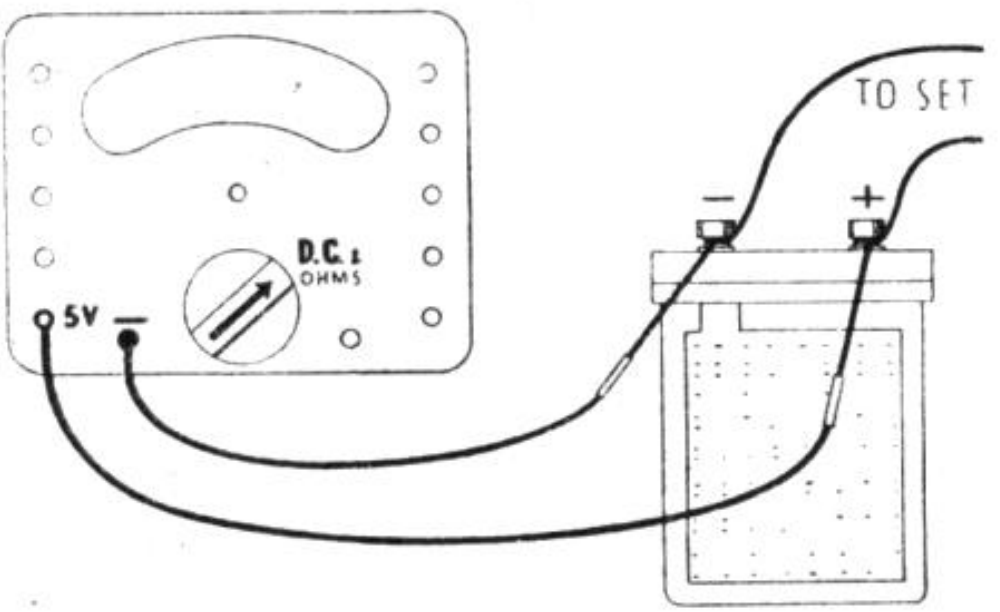
RESISTANCE

0- 20,000 ohms
0 100,000 ,,
0-500,000 ,,
0- 2 megohms
0 5 ,,
0 10 ,,

To measure the Voltage of L.T. Accumulator.
Turn switch to right (D.C. and ohms) and plug leads into 5-volt range if 2-volt accumulator (25-volt range if 6-volt type). 2-volt accumulator should read about 2.2 volts if fully charged. If reading is below 1.9 volts have accumulator recharged. Reading should be taken with the accumulator in use.

To test Voltage of G.B. Battery.
With switch turned to D.C. and ohms, use leads plugged into 25-volt range. Intermediate tappings can be tested on 5-volt range.

To test Voltage of H.T. Battery or Mains Eliminator.
Turn switch to D.C. and ohms and use 250-volt or 500-volt range depending on the H.T. voltage. In any case use the highest range which will give an easily readable deflection. These readings should be taken with the set switched on, especially in the case of the H.T. eliminator.
If the H.T. Battery registers less than two-thirds of its rated voltage, it should be replaced.



CHECKING VOLTAGE OF L.T ACCUMULATOR

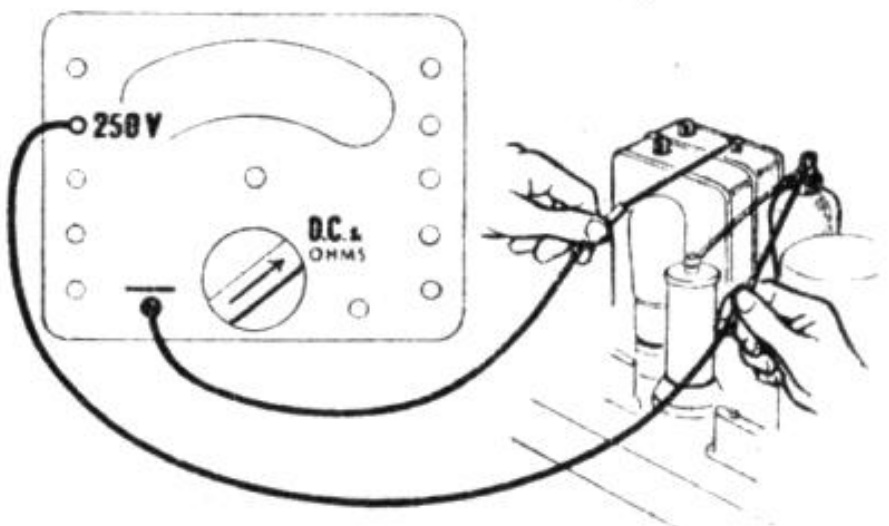
Point-to-point Voltage Measurement.

It is often necessary when tracing faults in a set to measure the voltage at various parts in the set under working conditions.

Examples of this are the measurement of anode and screen voltages directly at the valve holder terminals, also the voltages developed across bias resistors, etc. For these measurements the switch should be set to D.C. and ohms and the leads plugged into the 250-volt sockets, or better still, the 500-volt sockets if the voltage to be measured is high enough to give a readable deflection.

When measuring voltages at live points in a set, it is usually best to use the test prods to prevent the possibility of getting a shock.

The negative prod should be placed on the negative L.T. bus bar or any convenient point connected to H.T.—. The positive prod is then touched directly on the terminal at which the voltage is to be measured.



MEASURING VOLTAGE DIRECTLY AT ANODE OF S.G VALVE

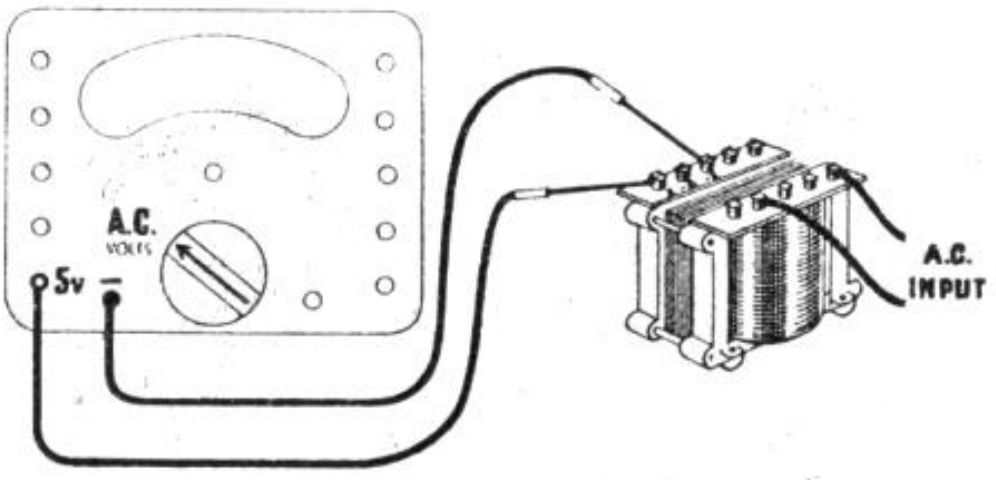
Testing Voltage across Mains Transformer Windings.

Turn switch to A.C. volts (left) and if it is required to measure voltage of mains input or H.T. secondary windings, connect leads to 500-volt range.

If the H.T. winding is centre tapped, measure total voltage across the two outside terminals and also from the centre tap to each outside terminal. In the latter case the two voltage readings should be similar and equal to half that obtained across the full winding. If not, the centre tap is not accurately placed.

Similar tests can be carried out on the heater windings, which are usually rated at four volts, by using the meter on the 5-volt A.C. range. If, of course, the heater voltage is rated at over 5 volts, the meter must be used on the 25-volt range.

It is advisable to make all mains transformer tests under load, although care must be taken to see that the body is well insulated from live parts when making tests with the set working.

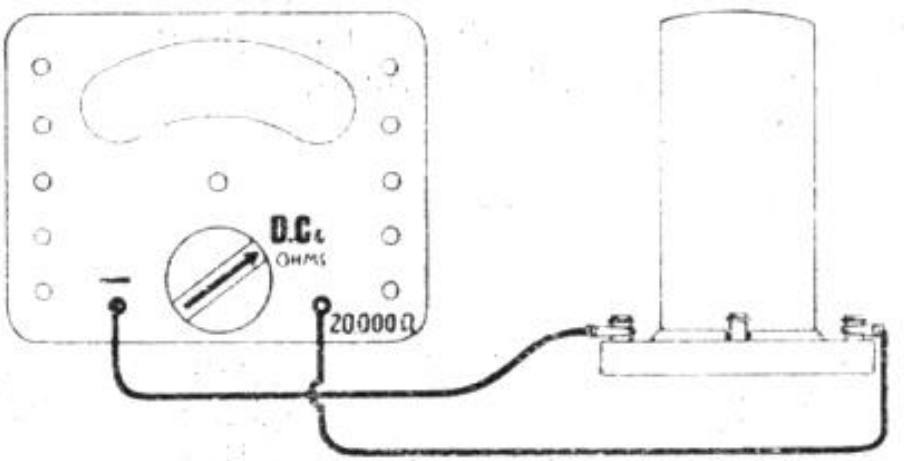


MEASURING VOLTAGE OF HEATER WINDING

General Continuity Tests.

Under this heading comes the testing of continuity of tuning coils, transformer windings, H.F. chokes, valve filaments, etc.

Set the switch to D.C. and ohms position and plug the leads into the 20,000 ohms sockets. Apply the testing leads to the terminals of the component being tested. A steady deflection will denote continuity. In the case of tuning coils this should be of the order of 2—10 ohms on medium waves and somewhere between 20 and 100 ohms on long waves. Thus, by altering the wave-change switch, a change in deflection of the above order will denote continuity of both medium and long wave coils and correct working of the wave-change switch.



TESTING CONTINUITY OF COIL

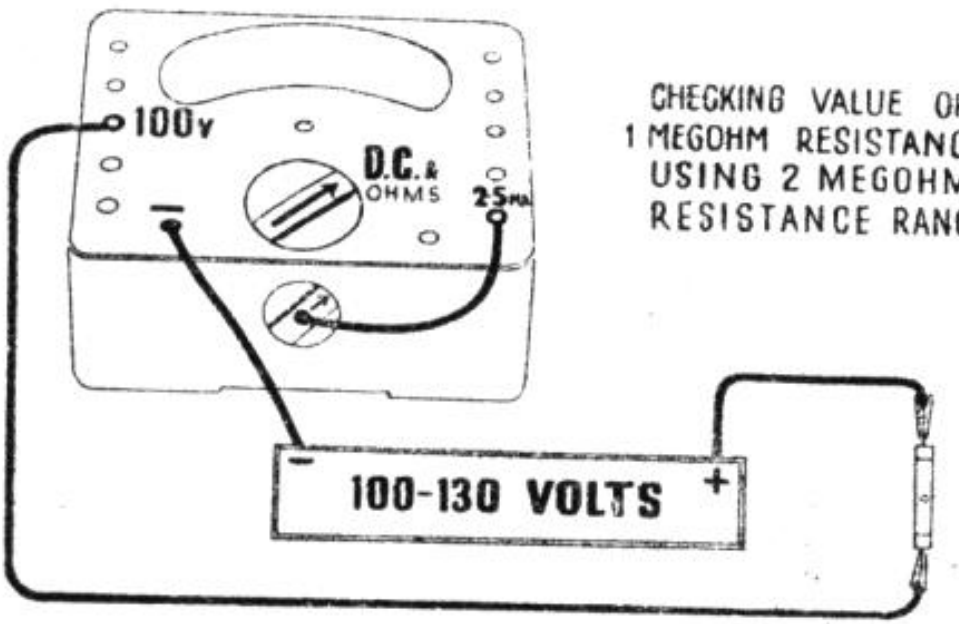
Tests involving the Direct Measurement of Resistance.

This type of test will consist of checking of values of fixed and variable resistances and also of the measurement of the resistance of choke and transformer windings.

Set the switch to D.C. and ohms. For measurement of choke windings, etc., and for resistances less than 20,000 ohms, plug the leads into "negative" and "20,000 ohms" sockets, and with the leads shorted, adjust the rotary ohms adjuster until zero ohms is registered on the scale.

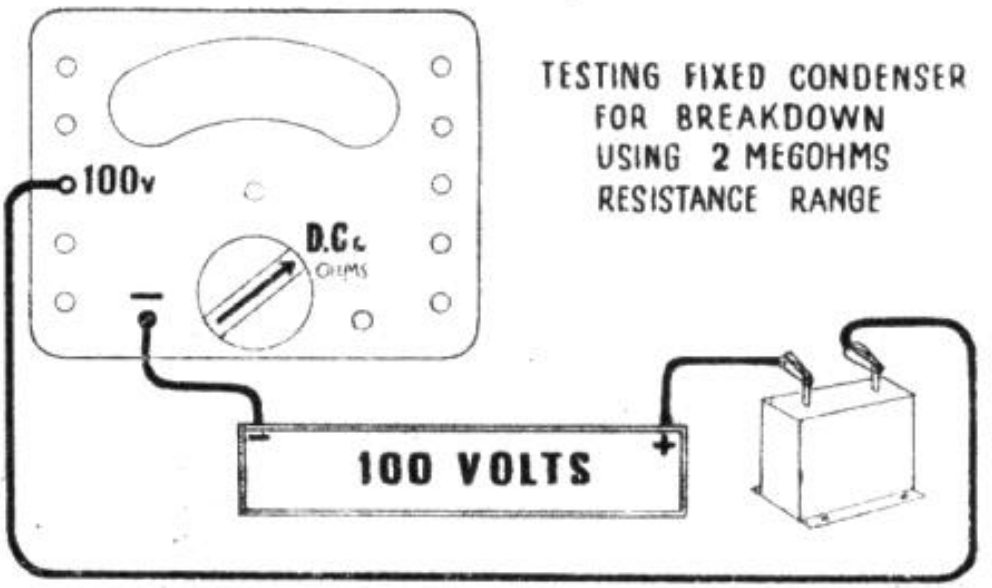
Then apply the test prods to the component under test and note the reading on the meter scale.

For values of resistance over 20,000 ohms, external batteries should be used and the + lead should be plugged into the appropriate voltage socket. (See instruction plate on back of meter). For instance, on the 2-megohm range a 100-volt external battery would be used and the + lead plugged into the 100-volt socket. It is usually better to use a higher ohms range than is absolutely necessary, as by doing so, more accurate readings can be taken since the pointer deflection will then be of reasonable length.



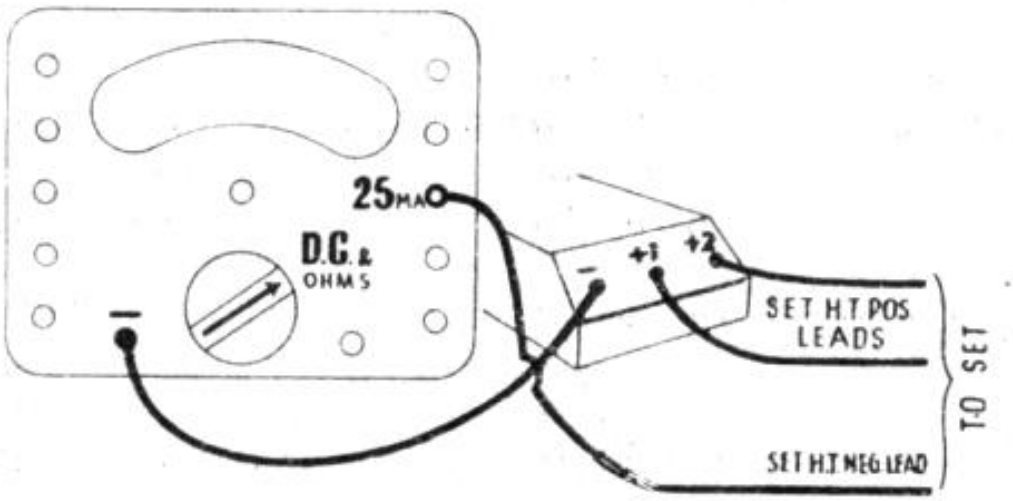
CHECKING VALUE OF 1 MEGOHM RESISTANCE USING 2 MEGOHMS RESISTANCE RANGE

Other Tests involving the use of Resistance ranges.
The most important of these are tracing faulty switch contacts and testing condensers for breakdown.
To test the efficiency of switch contacts, plug the meter leads in the 20,000 range and apply the prods directly across the terminals of the suspected switch. When the latter is closed, the meter should read a steady deflection of zero ohms. Should there be any appreciable resistance reading, or should the needle waver instead of remaining steady, the switch should be examined for dirty contacts.
If a condenser is suspected of having broken down, its insulation can be tested on the two megohm range of the Universal AvoMinor. With the meter set up correctly to read on the two megohm range, the test prods should be applied to the terminals of the suspected condenser.
If the insulation of the latter is up to standard the meter needle should not give a continuous deflection (it should read infinity ohms). Any reading on the meter denotes a faulty insulation and the condenser should be replaced. (See that the condenser is not holding any charge before making the test.)



TESTING FIXED CONDENSER FOR BREAKDOWN USING 2 MEGOHMS RESISTANCE RANGE

To measure the total current taken by the set.
Set the switch to D.C. and ohms and plug the leads into the 25 or 100 milliamp sockets (depending on the approximate current taken by the set).
Then remove negative wander plug from H.T. battery or eliminator and connect the positive meter lead to it. The negative meter lead is then connected to the negative socket of the battery or eliminator. When the set is switched on, the meter will show the total H.T. current taken by the set.

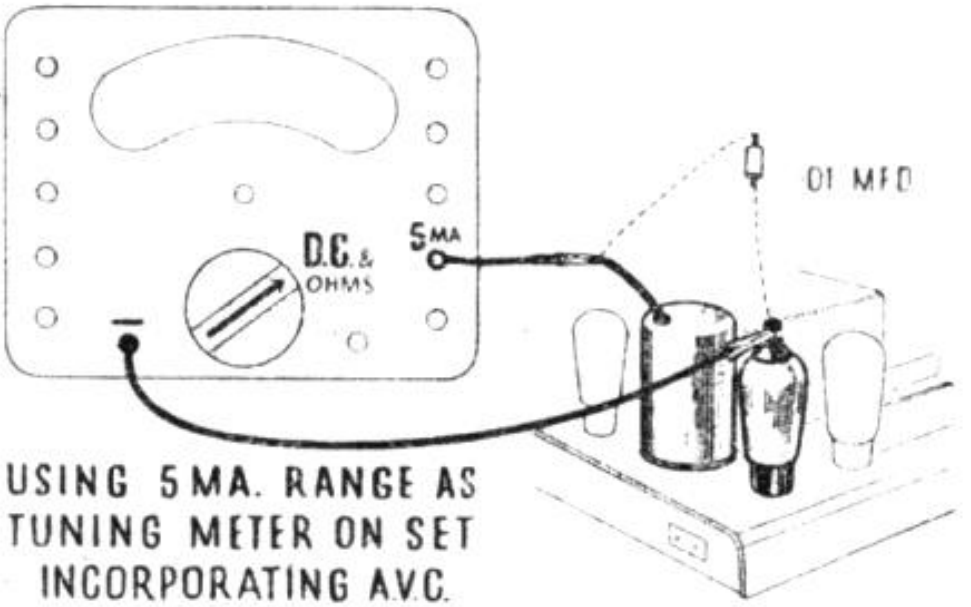


MEASURING TOTAL CURRENT TAKEN BY SET

To measure the current taken by separate valves, if fed by separate battery leads, remove the appropriate H.T.+ wander plug from the battery and with the meter set to a suitable current range (5 or 25 milliamps) connect the wander plug to the negative meter lead. Then connect the positive meter lead to the H.T. tapping vacated by the wander plug, and when the set is switched on the meter will read the current taken by the valve.

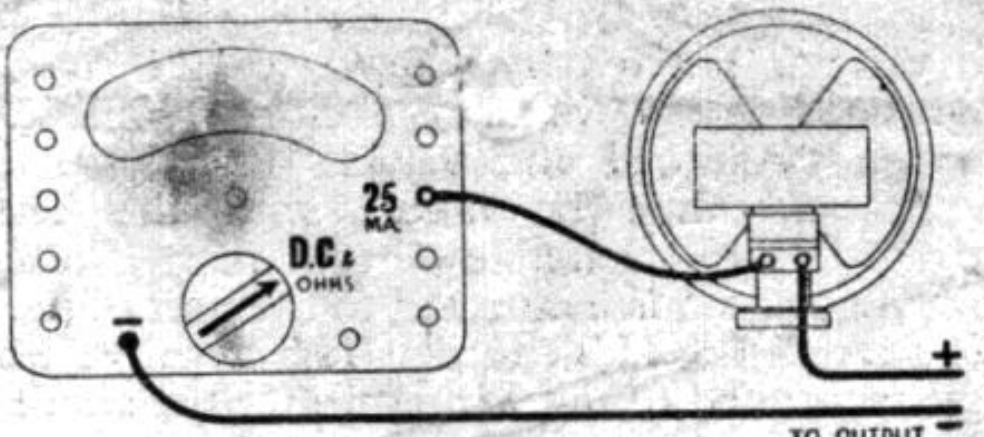
If the valve is not fed by a separate H.T. tapping, it will be necessary to break the circuit somewhere in the anode circuit of the valve. The break in the wiring should then be linked with the Universal AvoMinor, set to a suitable current range, so that the positive meter lead is connected to the part of the anode circuit nearest the H.T. feed. The negative lead will then be connected to the wiring nearer the anode of the valve.

A milliameter connected thus will act as a tuning meter when connected in the detector anode circuit in ordinary sets, or in the anode circuit of one of the controlled H.F. valves when dealing with sets incorporating A.V.C. When used as a tuning meter, it is often advisable to bridge the leads of the meter with a condenser of .01—.1 mfd., to prevent instability.



USING 5 MA. RANGE AS TUNING METER ON SET INCORPORATING A.V.C.

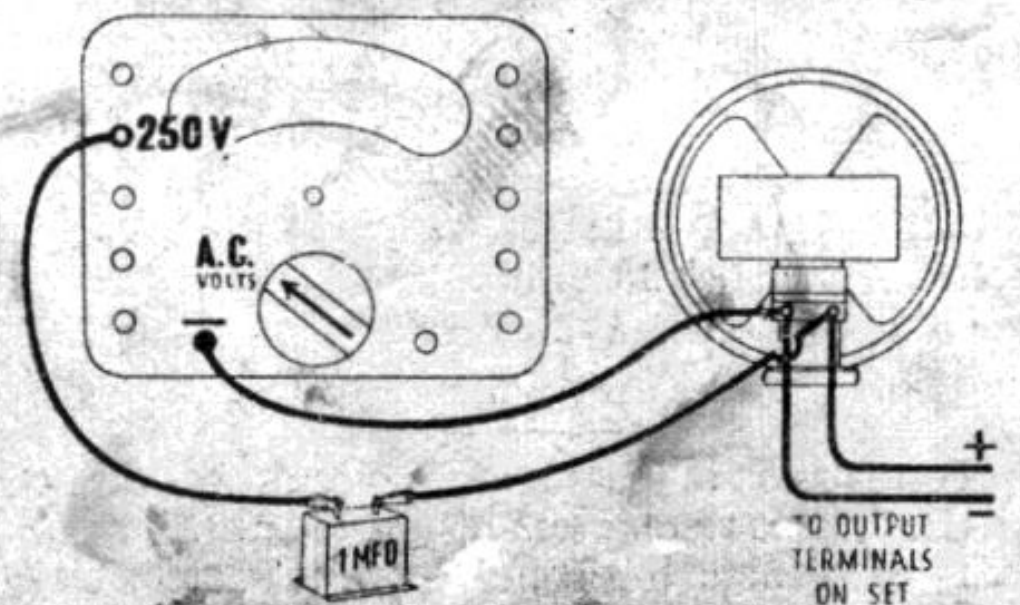
When connected in the anode circuit of the output valve, the milliameter will show distortion, or bad matching of speaker to output valve if it kicks on heavy music passages.



TRACING DISTORTION WITH
M.A. METER IN ANODE CIRCUIT
OF OUTPUT VALVE

How to use the Universal AvoMinor as an Output Meter.

Turn the switch to A.C. and plug the leads into the 250 or 500 volt sockets. Then connect one lead to one of the L.S. terminals and the other lead, through a condenser of about 1 mfd. to the other speaker terminal. When speech or music is now transmitted, not only will it be heard in the speaker, but the A.C. meter will fluctuate in accordance with the A.C. speech voltage developed across the speaker windings.



USING A.C. VOLTMETER IN SERIES WITH 1 MFD
CONDENSER AS OUTPUT METER