

INSTRUCTIONS FOR USING

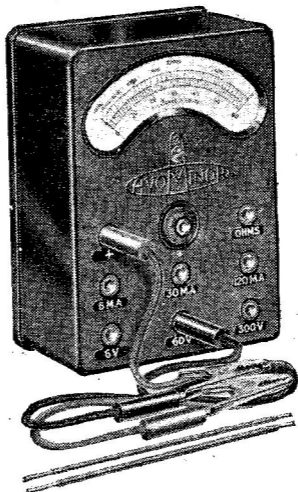
*The*

# 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.

Telephone: Victoria 3404 9

## INSTRUCTIONS FOR USING THE

# AVOMINOR

The AvoMinor is a fourteen-range moving coil meter, having a total resistance of 100,000 ohms, and capable of reading D.C. milliamps, volts and ohms without having recourse to any external shunts or multipliers.

*The following ranges are obtainable :—*

CURRENT	VOLTAGE	RESISTANCE
0-3 mA.	0-6 volts	0-10,000 ohms.
0-6 "	*0-12 "	0-60,000 ohms. (6v range)
0-30 "	0-60 "	0-600,000 ohms. (60v " )
0-120 "	*0-120 "	0-600,000 ohms. (60v " )
	0-300 "	
	*0-600 "	0-3 megohms. (300v " )

The 3 mA. range is obtained by rotating the ohms adjuster to its limiting clockwise position, and plugging the negative lead into the socket. Full scale deflection is produced with a pressure of 120 mV. in this setting. In addition to the ranges shown above, the 6 mA. range can be used as one of 240 mV., this, as well as the 3 mA. range, being useful to extend the current limits by means of external shunts, if desired.

All ranges, except those marked \*, are obtained by plugging the red lead into the + socket, and the black lead into the socket marked with the appropriate range.

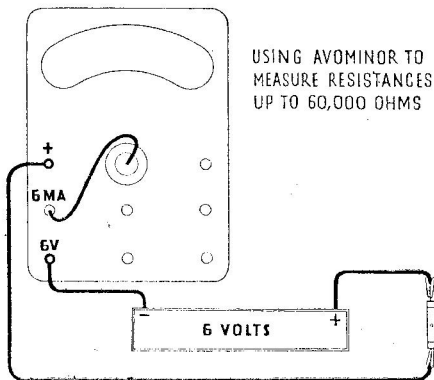
To obtain the 12 volt, 120 volt and 600 volt ranges, the red lead should be inserted in the 6 mA socket and the black lead into the 6 volt, 60 volt and 300 volt sockets respectively. The voltage ranges will then be twice those indicated on the panel. The meter resistance remains the same as on the normal ranges, i.e., 2,000, 20,000 and 100,000 ohms.

The small knurled knob on the face of the instrument just below the zero adjuster is an ohms adjuster to

compensate for any loss in voltage of the self contained  $1\frac{1}{2}$  volt cell. Before reading on the ohms scale, the leads should be inserted in the appropriate sockets and shorted. This will cause the needle to show a deflection. The knob should then be rotated until the needle indicates just full scale deflection (zero ohms).

The leads should then be connected across the unknown resistance, and the pointer will indicate the value of the unknown resistance in ohms.

If it is desired to measure resistances greater than 10,000 ohms, an external battery should be used in series with the meter leads plugged into a voltage range. For instance, when measuring resistances up to 60,000 ohms a battery of 6 - 8-volts is used in conjunction with the 6-volt range of the meter. The positive meter lead is plugged into the + socket in the usual way. The negative lead is inserted in the 6-volt socket, and the other end of this lead goes to the negative of the battery.

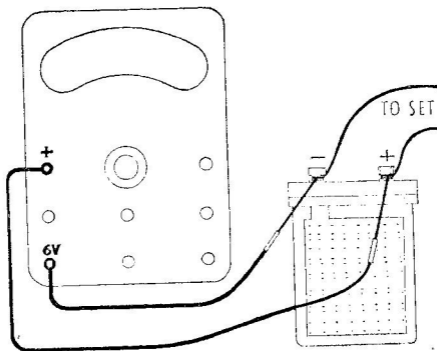


USING AVOMINOR TO  
MEASURE RESISTANCES  
UP TO 60,000 OHMS

The short lead is connected between the 6 mA. and the ohms adjuster socket, which may then be used to bring the pointer to zero ohms.

The resistance measured is then inserted between the positive meter lead and a lead taken to the positive terminal of the battery. The value of the resistance in ohms is that shown on the ohms scale multiplied by six. In a similar manner, using a voltage of not less than 60 volts or 300 volts respectively, the 60 and 300 volt ranges may be used to measure up to 600,000 ohms and 3 megohms, the multiplying factor for the ohms indication being 60 and 300 respectively.

In each case voltage compensation is provided to the extent of 30 per cent. over that of the voltage range employed. Only a battery or other source of constant voltage should be used. Radio battery eliminators are seldom sufficiently constant in output for accurate work.

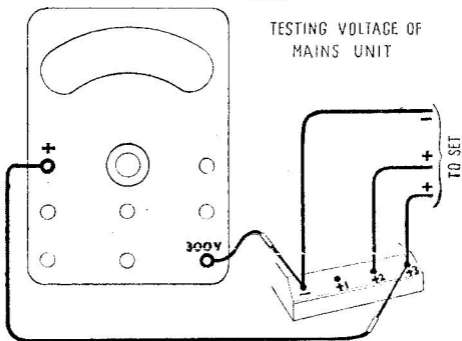


CHECKING VOLTAGE OF L.T. ACCUMULATOR

### To measure L.T. Accumulator Voltage.

Insert leads in 6-volt range with positive lead to socket marked + and negative lead in socket marked 6v. Apply positive meter lead to + accumulator terminal and negative meter lead to — terminal. Reading should be about 2.2 volts if accumulator is fully charged. Recharge if reading is below 1.9 volts.

Test should preferably be carried out with accumulator in use.



### To test Voltage of H.T. Battery or Mains Eliminator.

Plug negative meter lead into socket marked 300 volts and read in usual way. Readings should be taken with set switched on, especially in the case of H.T. Eliminator. If battery registers less than two-thirds rated voltage, it should be replaced.

### To test Grid Bias Battery.

Plug the leads into the sockets for 12 or 60 volts, and

test for voltage across the battery in the usual way. For intermediate tappings on the battery use the 6-volt meter range.

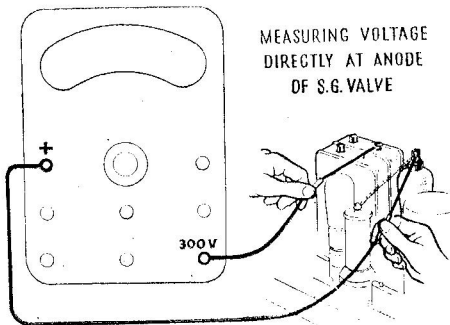
### Point-to-point Voltage Measurement.

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. Negative plugged into the 60-volt socket, or better still, the 300-volt socket 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

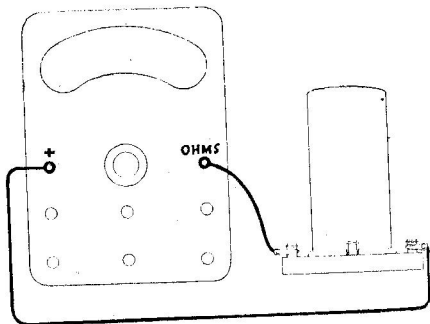


H.T.—The positive prod is then touched directly on the terminal at which the voltage is to be measured.

### General Continuity Tests.

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

Plug the negative lead into the ohms socket. 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 about 20 or 30 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 the values of fixed and variable resistances and also of measuring the resistance of choke and transformer windings. For measurement of choke windings, etc., and for resistances less than 10,000 ohms, plug the negative lead into the ohms socket and, with the leads shorted, adjust the rotary ohms adjuster until zero ohms is registered on the scale. Then apply the test prods directly to the component under test and note the reading on the meter scale.

For values of resistance over 10,000 ohms, external batteries in series with the meter voltage ranges should be used, as explained in an earlier paragraph.

## **Other Tests involving the use of Resistance ranges.**

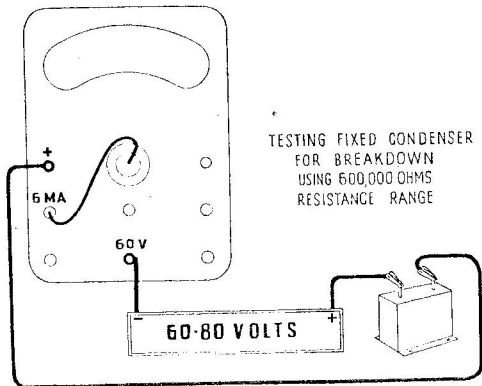
The most important of these are tracing faulty switch contacts and testing condensers for breakdown. To test the efficiency of switch contacts, plug the negative meter lead in the ohms socket and apply the prods directly across the terminals of the suspected switch. When the latter is closed, the meter 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. (See page 12 also).

If a condenser is suspected of having broken down, its insulation can be tested on the 600,000 ohms range (60 v. range with a 60 - 80-volt battery in series) of the AvoMinor. With the meter set up correctly to read on the above range, the test prods should be applied to the terminals of the suspected condenser (provided it is not electrolytic). If the insulation of the latter is up



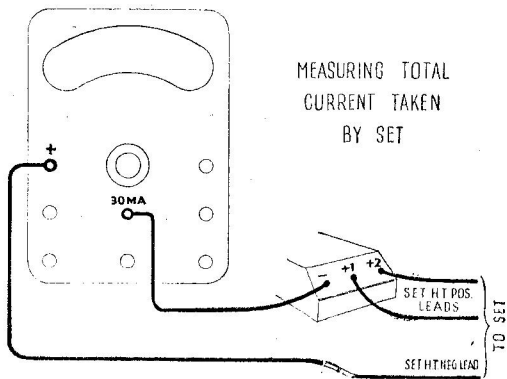
to standard the meter needle should not give a continuous deflection (it should read infinity ohms). Any steady reading on the meter denotes a faulty insulation and the condenser should be replaced. (See that the condenser is not holding any charge before making the test.)

As accuracy of measurement is unimportant in this case, the use of the short lead and adjuster may be dispensed with, if desired.



**To measure the total current taken by the set.**  
Plug the negative lead into the 30 or 120 milliamp sockets (depending on the approximate current taken by the set).

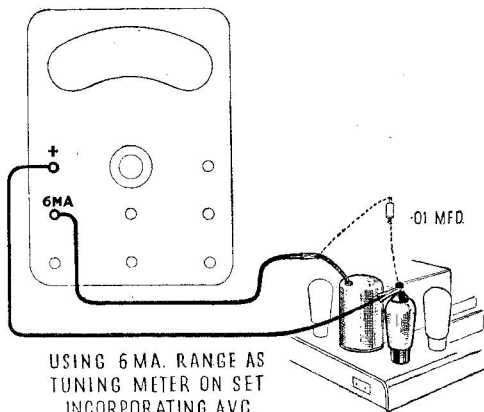
Then remove negative wander plug from H.T. battery or eliminator and connect the positive meter lead to the plug. The negative meter lead is then connected to the negative socket of the battery or eliminator. When the set is switched on, the meter will show the total H.T. current taken by the set.



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 (3, 6 or 30 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 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.

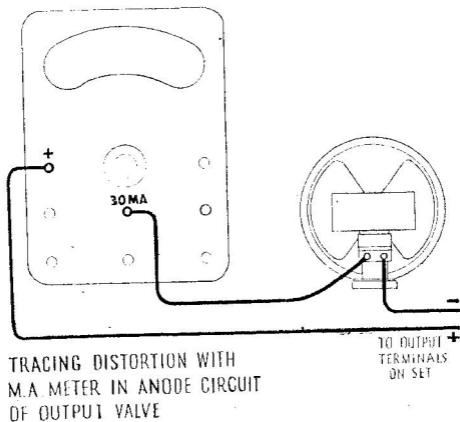
A milliammeter connected thus will act as a tuning meter when connected in the detector anode circuit in ordinary sets, or in the anode circuit of one of the controlled H.F. valves when dealing with sets incorporating A.V.C. When used as a tuning meter, it is often advisable to bridge the leads of the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



USING 6 MA. RANGE AS  
TUNING METER ON SET  
INCORPORATING A.V.C.

## Using the AvoMinor as a Distortion Indicator.

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



To extend the utility of the "AVOMINOR," a series of shunts and multipliers have been developed for convenient use with this instrument. Further particulars of these can be obtained on application. To measure low resistance, the Resistance Range Extension Unit provides two ranges of 1/10th and 1/100th of the existing ohms scale, thus permitting the measurement of resistances down to 1/10th ohm. This is particularly useful for testing switch contacts and low resistance coils.