

KS-8340 OHMMETER DESCRIPTION AND APPLICATION

1. GENERAL

1.01 This Section describes the KS-8340 ohmmeter which is suitable for measuring the resistance of apparatus contacts normally having but a small amount of current, such as speech currents only, passing through them. In order to obtain an accurate measure of the contact resistance existing in service the method of measuring should be such that the amount of current permitted to flow through the contacts during the measuring process is limited to a value not to exceed that of the service condition.

1.02 The KS-8340 ohmmeter has been designed to limit the measuring current to a value not to exceed 400 microamperes (0.4 milliampere) when the resistance of the circuit under measurement is zero. This value of current is about as low as can be used for a practical measuring device of this type and yet in most cases is not large enough to cause "burning out" of the cause of contact resistance.

1.03 This meter, of course, may be used for measuring contact resistance of contacts that normally carry a much larger current than that permitted to flow by the instrument. However, in such cases the resistance, as measured, may be somewhat larger than that which would normally exist in service due to the burning out action of the larger service current.

2. CIRCUIT AND EQUIPMENT FEATURES

2.01 Fig. 1 shows a schematic circuit of the KS-8340 ohmmeter. The potentiometer arrangement permits the use of a voltage less than that of the 1-1/2-volt dry cell provided with the meter. A switch is provided so that the battery circuit may be left open during

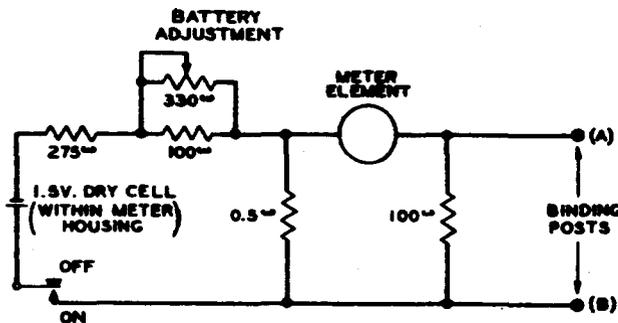


Fig. 1 - Schematic Circuit of KS-8340 Ohmmeter

periods when the meter is not in use. The drain on the battery is about 4 milliamperes when the switch is closed.

2.02 The battery adjustment resistance is provided to permit compensation for changes in battery voltage with time. With a short circuit applied across the binding posts, the battery adjusting knob should be adjusted until the meter reads zero. Whenever the resistance of the test leads connected to the meter is important, this resistance, if not larger than about 0.1 ohm, may be compensated for by shorting together the terminals of the test leads and adjusting the battery dial until the meter reads zero. No attempt should be made to compensate for test lead resistance in this way if the resistance is larger than about 0.1 ohm since an error will be introduced.

2.03 With the switch in the ON position and with a short circuit applied across the binding posts, a maximum of 400 microamperes flows between the binding posts. Fig. 2 shows the amount of current permitted to flow for various values of resistance inserted between the binding posts.

2.04 Fig. 3 shows the face view of the ohmmeter. The meter is approximately 5-1/2 x 3-3/4 x 2-3/4 inches overall and weighs approximately 1-1/2 pounds. The line on the scale between infinity and 50 ohms represents approximately 100 ohms.

2.05 As shown in Fig. 3 the needle rests on the line at the extreme left of the scale marked OFF when the switch is in the OFF position. With the switch in the ON position the needle comes to rest on the line designated ON. This line is red to warn the

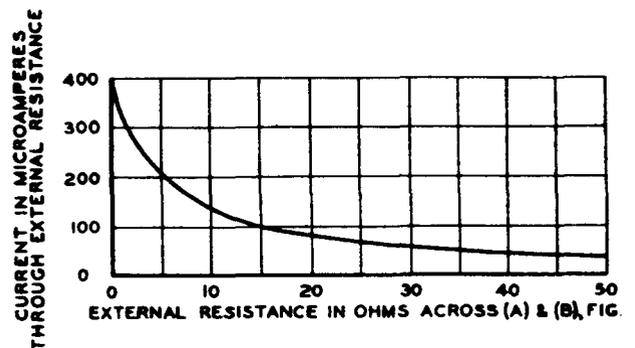


Fig. 2

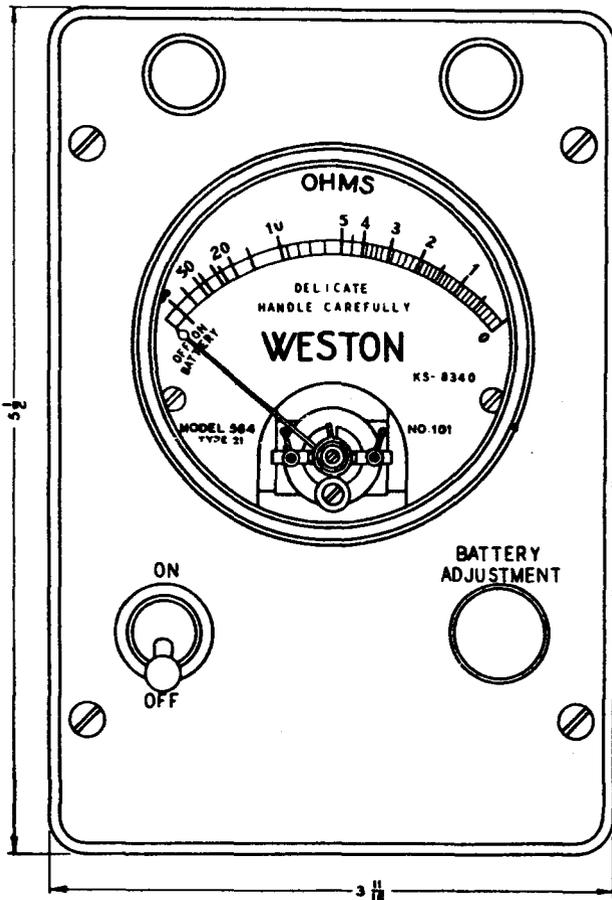


Fig. 3

attendant to operate the switch to OFF before it is placed in its carrying case or on the shelf.

2.06 The meter element used with this instrument is more sensitive and in consequence more delicate than that of the ordinary portable meter. Consequently a reasonable amount of care should be exercised in its use. As a warning a notation "Delicate - Handle Carefully" is provided on the scale plate of the meter element in red, as shown in Fig. 3. In order to protect the meter from damage when it is not in use, a carrying case per KS-8340, List 4 is provided.

2.07 The guaranteed accuracy of this meter is within 3 per cent. of the full scale length at any point on the scale. However, if carefully calibrated to zero resistance as covered in Paragraph 2.02, the errors introduced in the range from 0 to about 2 or 3 ohms will not exceed about 0.1 ohm. This is a low torque meter and as such, may have a small amount of residual friction holding the pointer from its true position. When accuracy is important in the range mentioned above the meter should be tapped lightly to free this residual friction.

2.08 Two low resistance test leads per KS-8340, List 3, are provided for use with the meter. The test picks associated with these test leads are insulated to within about 1/8" of the sharp point to reduce the possibility of short circuits to adjacent equipment when they are being used. Other test leads or cords may be used, as specified, for particular applications.

3. GENERAL APPLICATION

3.01 The measurement of the resistance of contacts such as those associated with relays, jacks, etc., must be considered in a different light than the measurement for resistance of a fixed type normally associated with circuits. This is due to the fact that the energy used in the measuring process has a bearing on the value of resistance of the contact. There is an inherent resistance existing at the contact of all mechanically made contacts. The value of this resistance varies for different metals and normally is so small that it would not be apparent when measured with a device of this type. However, insulating films, foreign material or lack of pressure may cause the contact to have a resistance in the order of magnitude that might be detrimental to the performance of the circuit with which it is associated and often it is desirable to determine when such a condition exists.

3.02 The amount of current necessary to "burn out" a contact resistance varies somewhat with the cause of such resistance. It has been found that values of direct-current below about 400 microamperes normally do not affect the resistance values existing in contacts. Consequently, contacts which might have a current flowing through them in the service condition of only a few microamperes would not have their resistance changed materially by a testing current if it did not exceed about 400 microamperes.

3.03 When measuring the resistance of contacts which normally have a much larger amount of current flowing than the 400 microampere maximum value of the KS-8340 meter, it should be realized that in some cases the value of resistance thus measured, is probably somewhat larger than that that would exist in the service condition.

3.04 If the circuit on which contact resistance measurements are being made is connected to line conductors or to some source of power, earth potentials or other foreign energies may be supplied to the contact, which will cause an erroneous resistance reading to be obtained due to the drop in potential produced across the contact resistance. This might be indicated as an increase in resistance, or might be indicated by reversal of the meter (indicating apparent negative resistance). In these cases the

contact should be segregated from the circuit while being measured for contact resistance.

3.05 As mentioned in Paragraph 2.02, if it is necessary to compensate for test lead resistance and this resistance is greater than about 0.1 ohm it must be done by means other than that of using the battery adjusting feature provided with the meter. A suggested method would be first to adjust the meter to read zero resistance with the binding posts short circuited. Then, with the test leads connected to the meter, measure their resistance by short circuiting the test lead terminals. Subtract this value of

resistance from subsequent resistance values measured using the test leads.

3.06 The standard 1A carrying tray may be utilized to hold the KS-8340 meter when in use so that both hands may be free. This is particularly desirable when working on a ladder or moving about equipment.

3.07 A 1-1/2-volt dry cell battery is required and housed in the case of the instrument. A KS-6522 dry cell battery, a No. 2 Burgess battery or a No. 950 Eveready battery may be used in the instrument.