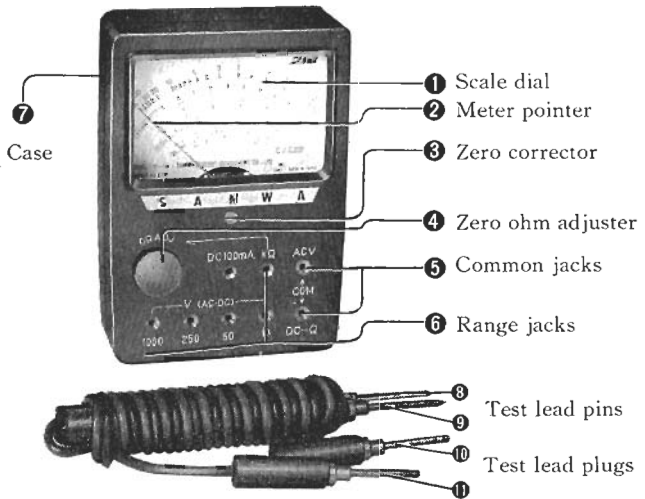


SANWA

INSTRUCTION MANUAL

MULTITESTER
model P-1B



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SPECIFICATIONS

1. Measurement Ranges Available.

DC voltage: 10v 50v 250v 1000v (1000 Ω /v)

AC voltage: 10v 50v 250v 1000v (1000 Ω /v)

DC current: 100ma

Resistance: 100 Ω ~100K Ω

Volume Level: -10~+22db +20~+36db

Megohm: Up to 10mg Ω } Use an external power
Capacity: 0.001~0.1mfd } jointly.
Inductance: 10~1000H }

2. Accuracy.

DC volts: within $\pm 3\%$ at full scale deflection

AC volts: within $\pm 4\%$ at full scale deflection

DC milliamperes: within $\pm 3\%$ at full scale deflection

Ohms: within $\pm 3\%$ of full scale length

3. Battery. One 1.5v (UM-3 or equivalent) dry cell.

4. Size & weight. 104 \times 74 \times 38mm 260 gr

PRECAUTIONS

Observe the following precautions for maximum satisfaction from this fine instrument :

1. Before using the meter, select and confirm the correct range in order to prevent overloading the meter.
2. Ranges are selected by plugging the black test lead in either of the "COM" jacks, and the red test lead in one of the range jacks desired.
3. When in doubt as to the approximate voltage present, always start with the highest range. After the first reading, the test lead can be plugged in a lower range for a more accurate reading.
4. Exhausted battery must be immediately replaced: a leaky battery can damage the internal components. To remove the battery, the rear bolt is loosened and the case is removed. After the battery is replaced, do not tighten the holding bolt too much, or the battery mount may become cracked.
5. Do not check resistances of radios and amplifiers while power is on. Switch off the power and discharge the condensers before measurements.
6. Avoid placing the meter in the direct sun or where there is high temperature or moisture.

OPERATION

1. Zero Correction.

Before the meter is put to operation, confirm if the pointer (2) is exactly on zero at the left extremity. If it is off the position, adjust it by turning the zero corrector (3) slowly to the right or left.

2. DC Voltage Measurements.

- The test leads are connected to the meter as shown in Fig. 1.
- Choose a range which will allow the pointer to fall within the right hand half of the scale.
- The test leads are applied across the voltage to be measured, the red test lead to the plus and the black test lead to the minus potential of the circuit.

The position "A" of the black test lead checks

the terminal voltage of the power (battery) or the voltage of R1 and R2. The position "B" checks that of R2.

- Use the black scale second from the top marked "V&mA"

For 10, 50, and 250 volt ranges, read the figures directly on 0-10, 0-50 and 0-250 lines respectively.

For 1000 volt range, read the figures on 0-10 line multiplied by 100.

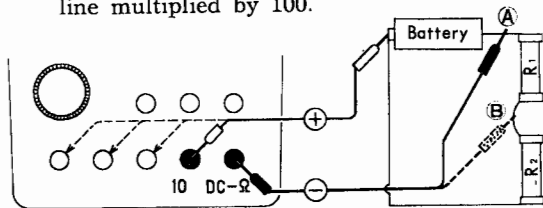


Fig. 1

3. AC Voltage Measurements.

- a. The test leads are connected to the meter as shown in Fig. 2.
- b. Choose a range which will allow the pointer to fall within the right hand half of the scale.
- c. The test leads are applied across the voltage to be measured. Since alternating current is being checked, readings are correct to which side of the circuit the test leads are connected.

The position "A" checks the secondary voltages of a transformer, and the position "B" the voltage of power distribution line.

- d. For the 10 volt range alone, read the red scale third from the top marked "AC10V". For the 50 and 250 volt ranges, use the black scale second from the top in common with

DC voltage measurements. Read the figures directly on 0-50 and 0-250 lines.

For the 1000 volt range, read the figures on 0-10 line (V&mA) multiplied by 100.

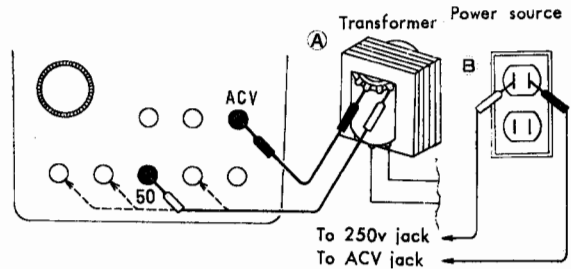


Fig. 2

4. DC Current Measurements.

- a. The test leads are connected to the meter as shown in Fig. 3. The circuit to be checked must be opened and the meter is connected in series with it taking note of the polarities. If they are connected in parallel by mistake (A or B of Fig. 1), the meter will be overloaded causing damage to the movement or shunt.
- b. Use the black scale second from the top marked "V&mA" in common with DC voltage measurements. Read the figures on 0-10 line multiplied by 10.

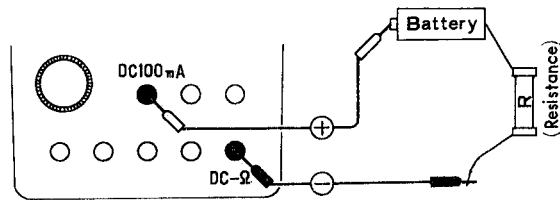


Fig. 3

5. Resistance Measurements.

- a. The test leads are connected to the meter as shown in Fig. 4.
- b. Before making a measurement, the test leads are shorted together, and the pointer position is adjusted to zero ohm at full scale deflection by rotating the "0ΩADJ" knob. Do not force it beyond its stop position.

If it is impossible to adjust the pointer to zero by turning the knob full clockwise, the internal battery must be replaced.

- c. The test leads are opened and are applied across the resistance to be measured.
- d. Resistance is read directly on the top red scale in kilo-ohm.

- Note. (1) Do not allow the fingers to touch the metal parts of the test leads.
- (2) For the resistance range only, the red test lead is in minus and the black test lead in plus potential. Remember it when checking polarity sensitive components as semiconductors.

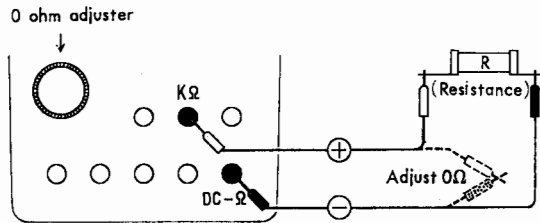


Fig. 4

6. Volume Level Measurements.

- a. A paper condenser of 0.1 microfarad, or more, is connected in series with meter as shown in Fig. 5. Do not use an electrolytic condenser.
- b. The test leads are applied in parallel with the circuit to be measured.
- c. The AC voltage scales of the meter read output voltage (AF). They are converted to sound level by reading the decibel scales in pair on the bottom.

Note. (1) 0db is set at a voltage when 0.001 watt is dissipated across a 600-ohm line, and the zero reference level is established at approximately 0.775 volt. If the circuit is coupled at the impedance of 600 ohms,

the meter reads the output in decibel. The difference between the output and input is either amplitude or attenuation.

- (2) For a circuits coupled at the impedance of other than 600 ohms, the readings on the meter only serve to compare the output and input in voltage.

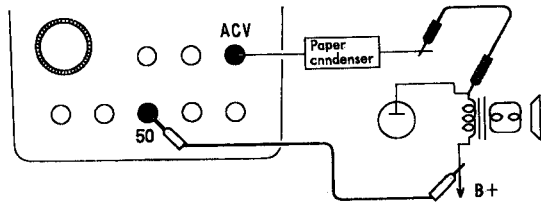


Fig. 5

7. High Resistance (Megohm) Measurements.

The resistance range of the meter can be extended up to 10 megohms by the use of an external power (DC 250 volts) jointly, for which B (+) power of a radio set is available. See Fig. 6 for the connections of the external power.

- Connect the red test lead as shown by the dotted line and bring the pointer to full scale deflection by adjusting the DC power voltage. In the Fig. 6, $R=100k\Omega$ ($\frac{2}{3}W$ or more) and $VR=50k\Omega$ ($\frac{1}{2}W$ or more).
- The top "K Ω " scale is read multiplying the figures by 100.

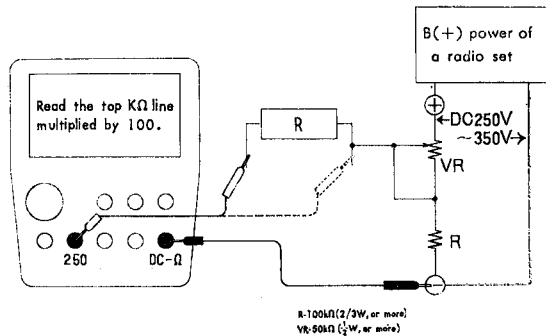


Fig. 6

8. Capacity and Inductance Measurements.

- a. For the connections of the measuring elements, See Fig. 7 and 8.
- b. First connect the red test lead as shown by the dotted line and bring the pointer to full scale deflection by adjusting the AC power voltage.
- c. The test lead is moved across the test piece and the meter reading is noted. The capacity and inductance are read on the graph.
- d. When a variable resistor is used to adjust the power of 50 cycles, if the meter reads 31 volts, the value to be obtained on the graph is 0.025 (mfd).

- Note. (1) Use a proper graph curve depending on the cycles of the external power.
- (2) This measurement does not apply to checking polarized condensers.
- (3) Note the set position of the variable resistor or voltage regulator not to allow the meter overload.
- (4) C and L measurements are just available to know their approximate values.

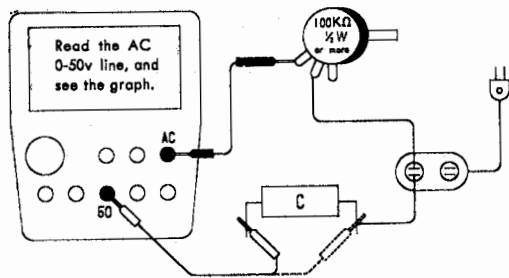


Fig. 7

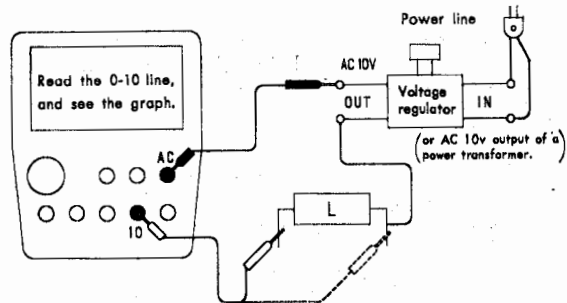
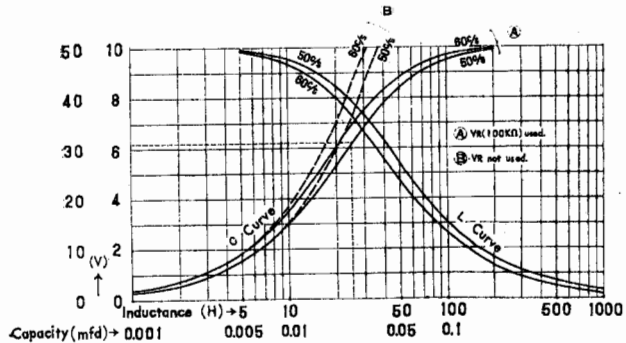


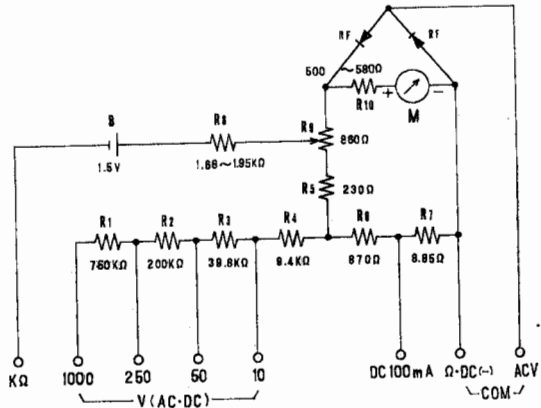
Fig. 8

SUPPLEMENTARY CHARTS

1. Graph to read Capacity and Inductance.



2. Schematic Diagram



3. Checking a Radio Set.

