

SERVICE

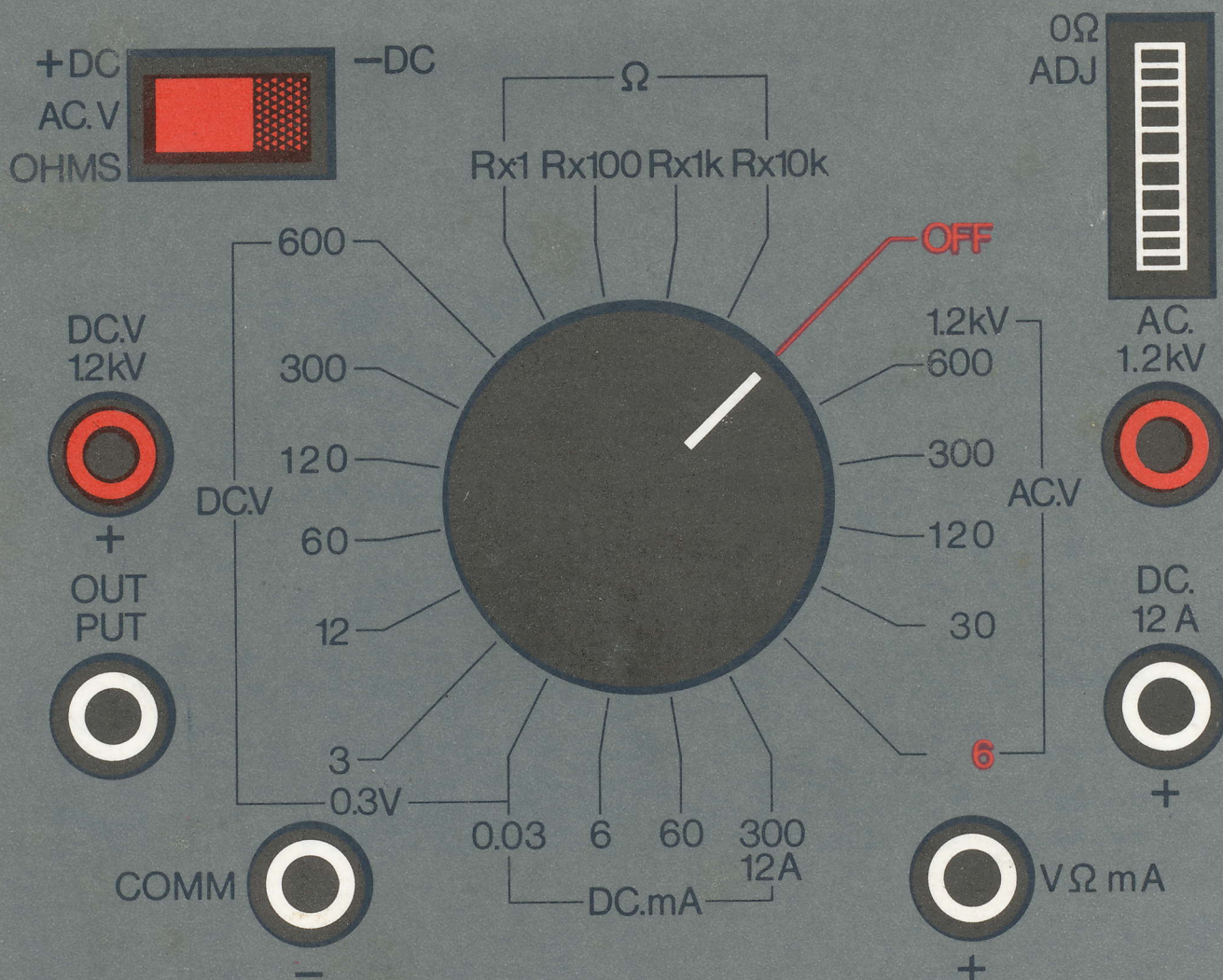
AC V RANGE	ADD dB
30	0
120	12
300	20
600	26
1200	32

6V ONLY
AC 6V

AC 30V

50.000 Ω /V DC
10.000 Ω /V AC

MULTITESTER



Specifications

DC Voltage: 0-0.3, 3, 12, 60, 120, 300, 600, 1,200 V at 50,000 Ω/V
AC Voltage: 0-6, 30, 120, 300, 600, 1,200 V at 10,000 Ω/V
Audio Output Voltage: 0-6, 30, 120, 300, 600, 1,200 V
DC Current: 0-30 μA , 6, 60, 300 mA, 12 A
Resistance: 0-10 K, 1 M, 10 M, 100 MOhm
Decibel: -20 to +17 dB (Reference: 0 dB = 0.775 V = 1 mW in 600 Ω)
Overload Protection Circuit: Zener Diode (1S990) \times 2
Condenser (0.05 μF) \times 1
Battery: UM-3 (1.5 V) \times 2, BL-015 (22.5 V) \times 1
Size and Weight: 6³/₅" \times 4²/₅" \times 1⁴/₅", 660 grams
Fundamental Sensitivity of the meter movement: 20 μA
Internal Resistance of the meter movement: 2,000 Ω
Allowance: For DC Voltage \pm 3% of specified value
 For AC Voltage \pm 4% of specified value
 For DC Current \pm 3% of specified value
 For Resistance \pm 3% of scale length
Equipment Supplied: Red and Black Test Leads
Accessory Available: High Voltage Probe for 30,000 V DC range.

General remarks on the use of the multimeter

- 1 Select the most suitable range.
For example: when the voltage to be checked is 100 V-AC the most suitable range is 120 V-AC. When checking batteries of 1,5 V the range to be selected is 3 V-DC.
It will be clear that for the best measurements a range should be selected closest to the expected value.
Measurement of resistance. Select the range so that the reading of the expected value is near the middle of the resistance scale.
- 2 When the value to be measured is unknown, check first on the highest range in order to obtain an indication of the value to be measured.
- 3 Do not measure resistance values in an operating circuit and moreover first discharge all condensers in the circuit.
- 4 The multimeter is provided with a switch for reversing the meter polarity. It is to be used when the pointer moves in the reverse direction and the test leads cannot be interchanged easily (D.C. ranges).
Make sure that this switch is positioned on +DC, AC V, Ohm when the multimeter is used in the normal way.
- 5 Do not store the multimeter in any hot or humid place and avoid strong magnetic fields.
- 6 When the multimeter is not used the selector knob should be turned to position "OFF".

D.C. Voltage measurements (DC.V)

The multimeter is connected in parallel with the circuit to be tested. For the voltage ranges 0,3 V - 600 V the red test lead is connected to the + socket and the black test lead to the — (COMM.) socket of the multimeter.

The pin of the red test lead is to be connected to the + side of the circuit to be tested.

For the 1200 V (1.2 kV) DC range the selector knob has to be positioned on 600 V DC and the red test lead connected to the red socket marked DC-V-1.2 kV.

The black test lead is connected to the — (COMM.) socket.

The high tension probe is used for measurement of voltages of 5000 V - 30.000 DC.

The selector knob must be positioned on 600 V DC. The red test lead of the probe is connected to the red socket marked DC.V - 1.2 kV and the black test lead to the — (COMM.) socket.

D.C. current measurements (D.C. mA)

For measuring currents the multimeter is connected in series with the circuit to be tested.

For the current ranges of 0,03 mA - 300 mA the red test lead should be connected to the + socket and the black test lead to the — (COMM.) socket.

When the DC. 12 Amp. range is used, the red test lead must be connected to the socket marked DC 12 A and the black test lead to the — (COMM.) socket. The selector knob must be turned to the 300 mA/12A position.

AC Voltage measurements (AC.V)

Turn the selector knob to one of the AC.V ranges.

For voltage ranges from 6V - 600V AC connect the red test lead to the + socket and the black test lead to — (COMM.) socket.

The selector knob must be set on the 600 V/1.2 kV AC range.

The polarity switch must be positioned on the +DC, AC.V, Ohm position.

Audio output measurements (AC.V)

Connect the red test lead to the socket "Output" and the black one to the — (COMM.) socket.

Proceedings are the same as for A.C. voltage measurements.

Important

The voltage across the secondary of an audio transformer has a higher value when not loaded with a loudspeaker or resistor. Keep this in mind when taking measurements in output stages.

Resistance measurements (Ohm)

- 1 Zero adjustment of the multimeter.
First adjust the zero reading of the meter by short circuiting the pins of the red and black test leads (plugged into the + and — sockets of the meter).
The reading on the Ohm scale should be exactly 0.
Adjustments can be made by turning the adjusting knob marked ADJ.
For accurate measurements the zero check and adjustments should be made when switching from one resistance range to another and after each resistance measurement.
When the zero Ohm point cannot be reached or the reading of the meter fluctuates in the range $R \times 1$, the batteries have to be replaced. They can be reached by loosening the 2 screws in the back and removing the back cover. The type of batteries is given in the specification.
- 2 Resistance readings are more accurate when the value is read near the centre of the scale. The resistance range should be chosen to obtain such a reading.

Do not touch the pins of the test leads while measuring resistances

3 Polarity

For the resistance ranges (Ohm) of the multimeter the + and — polarity of the sockets is reversed.

This is due to the fact that the — pole of the battery is connected to the + socket and the + pole of the battery to the — socket.

Important: In circuits incorporating semiconductors this reversed polarity may affect the results of the resistance measurements.

The result can be checked by changing the polarity (the position in the circuit of the black and red test lead).

When measuring resistances in a circuit incorporating condensers make sure that the latter are completely discharged before starting the measurement.

Decibel measurements (dB)

Proceed as for AC.V measurements, except that the values are read on the dB scales. At the right hand sides of the scales the AC.V range to be used is indicated.

General

The dB is a unit which expresses the ratio in power between two signals. The level of zero (0) dB is expressed as a power of 1 mW in a 600 Ω resistance. The dB unit is a logarithmic figure expressing this ratio.

dB scale of the multimeter

The scale is calibrated on the zero level of 1 mW in 600 Ω . This gives a voltage of 0,775 V.

0 dB point of the dB scale is equal to this 0,775 V when the impedance is 600 Ω .

Consequently direct reading of the dB scale is only accurate when the impedance on which the measurement is made is 600 Ω .

For example, when the output of an amplifier has to be measured and the secondary of the output transformer is 8 Ω (output impedance) an 8 : 600 Ω matching transformer has to be used to match the meter to the circuit.

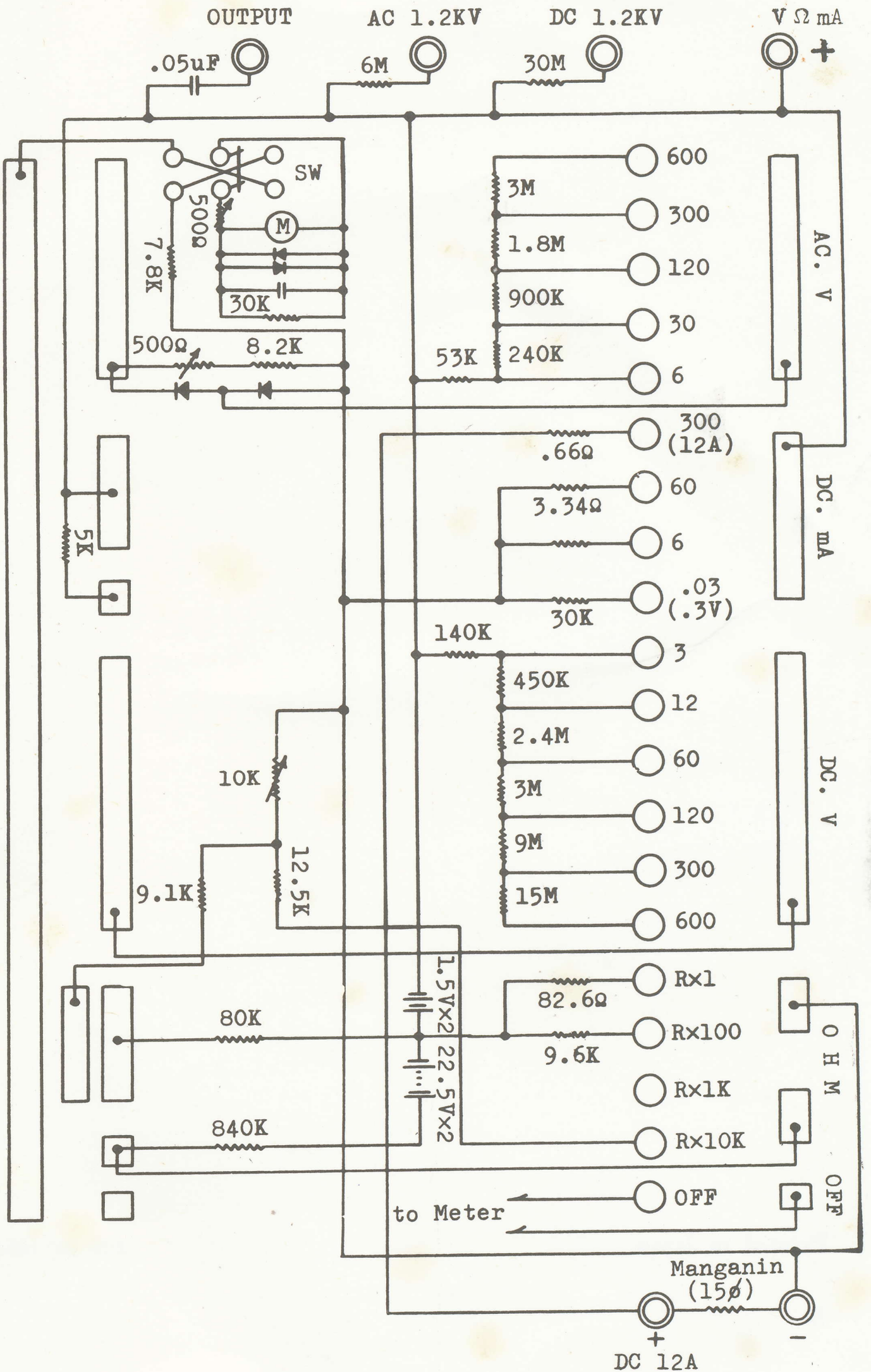
When 600 Ω cannot be obtained the figures of the dB scale are comparative provided the impedance on which the measurements are made is the same for all measurements.

The lowest range is 6 V AC. If this range is too low the other AC voltage ranges can be used but for each range the dB reading has to be corrected.

Range	Addition
AC 30 V range	14 dB
AC 120 V range	26 dB
AC 300 V range	34 dB
AC 600 V range	40 dB

List of spare parts and accessories:

Rear plastic case	4822	447	70027
Knob (selector switch)	4822	411	20187
Zener diode	4822	130	30708
Transparant plastic dial protector	4822	447	70028
Carrying case	4822	600	30006
High voltage probe	4822	395	30038



Printed in Japan

4822 900 10079