Bridge-Megger and Bridge-Meg. Test Sets

The Bridge-Megger Set consists of a special "Megger" and an external Decade Resistance Box. The "Megger" section of the instrument is normally used for the measurement of insulation resistance. When making conductor resistance measurements and fault location tests, the external Resistance Box is also used. Changeover and Ratio Switches are fitted on the Bridge-Megger for the latter purpose, the changeover switch setting up the condition required for Varley's Loop test.

The Bridge-Meg. Test Set is a single unit performing the same functions as the Bridge-Megger and its associated Resistance Box.

These instruments are designed for a range of constant pressure testing voltages, viz., 100, 250, 500, 1000, and it is important to use the correct voltage instrument for the line or apparatus being tested.

ADJUSTMENTS

The instrument must first be set on a firm horizontal base. Before commencing any test see that the true point of balance is at the INFINITY mark on the scale. To test this, disconnect all external wires from the instrument, set the changeover switch to MEG., turn the generator handle until the speed is reached at which the clutch slips, then turn the INDEX or INFINITY ADJUSTER knob until the instrument pointer stands on the INFINITY mark.

MEASUREMENT OF INSULATION RESISTANCE

Figs. 1 and 2 show the connections for measurement of insulation resistance between a conductor and earth. To measure insulation resistance between two wires, connect one wire to the LINE terminal and the second to the EARTH terminal. The insulation resistance is read directly from the position on the scale taken up by the instrument pointer as the generator handle is turned at a speed producing clutch slip.

MEASUREMENT OF CONDUCTOR RESISTANCE OR RESISTORS

See Figs. 3, 4, 5.

Set the changeover switch to BRIDGE, the Ratio Switch to 1, and all adjustable resistances to 0. Turn the generator handle until the clutch slips while raising the resistances step by step, first the thousands, then the hundreds, tens and units successively, until the pointer shows balance by resting on scale mark $\frac{\text{Increase R}}{\text{Decrease R}}$ G (BRIDGE-MEGGER) or $\frac{\text{Increase}}{\text{Decrease}}$ (BRIDGE-MEG. TEST SET). The Ratio Switch should also be adjusted when measuring resistances less than 100 ohms or greater than 10,000 ohms. The generator may be driven slowly until a balance is approached, but if much inductance is present it should be turned above slipping speed from the beginning. Read the value shown on the resistance dials and multiply or divide by the factor shown on the ratio switch. The result is the unknown conductor resistance in ohms.

FAULT LOCATION BY VARLEY'S LOOP TEST BRIDGE-MEGGER

Set changeover switch to bridge. Connect the faulty line and the good line together at the distant end and measure the looped conductor resistance "L" ohms. Re-arrange connections exactly as in Fig. 6, turn generator handle until clutch slips, meanwhile adjusting Ratio Switch and Resistance Box dials until instrument pointer shows balance by resting on scale mark $\frac{\text{Increase R}}{\text{Decrease R}}$ G. Read Resistance Box value "R" ohms. Then distance to the fault from the "A" terminal of the Resistance Box is "d" ohms calculated from formula below.

BRIDGE-MEG. TEST SET

See Fig. 7. Connect faulty line and good line together at the distant end, faulty line to EARTH terminal and good line to LINE terminal of the instrument. Connect a good earth to the VARLEY EARTH terminal. Set Changeover Switch to BRIDGE and measure the looped conductor resistance of faulty plus good line "L" ohms. Set Changeover Switch to VARLEY, turn generator handle until clutch slips, meanwhile adjusting Ratio Switch and Resistance dials until pointer shows balance by resting on scale mark $\frac{\text{Increase}}{\text{Decrease}}$. Resistance dial reading is "R" ohms. Then distance to fault from EARTH terminal of Test Set is "d" ohms, calculated from formula below.

Ratio Switch Setting Bridge Megger	Bridge-Meg. Test Set	Distance to Fault in Ohms
1	1	$d = \frac{L - R}{2}$
10	÷ 10	$d = \frac{10\,L - R}{11}$
100	÷ 100	$d = \frac{100\,L - R}{101}$

d = Distance to fault in ohms.
L = Looped faulty line plus good line resistance.
R = Actual Resistance dial reading.

A.P.O. Standard Conductor Resistances at 60° F.

Open Wires

Conductor Lbs./Mile	Resistance Loop Mile	Conductor Lbs./Mile	Resistance Loop Mile
100 HDC.	17.7 ohms	40 CC.	52.0 ohms
150 ,,	11.8 ,,	70 ,,	30 0 ,,
200 ,,	8.8 ,,	118 ,,	18.7 ,,
300 ,,	5.9 ,,	237 ,,	9.4 ,,
200 GI.	53.3 ,,	400 GI.	26.6 ,,

H.D.C. Hard Drawn Copper.
C.C. Cadmium Copper.
G.I. Galvanised Iron.

Underground Cables

Conductor Lbs./Mile	Metallic Circuit Resistance Loop Mile	Yards per Ohm (Single Wire)
6.5	270 ohms	13.0
10	176 ,,	20.0
12.5	141 ,,	25.0
20	88 ,,	40.0
40	44 ,,	80.0
* No. 16 AWG.	42.5 ,,	83.0

* No. 16 American Wire Gauge is used in spiral four disc insulated cables for Western Electric type J. line carrier systems.

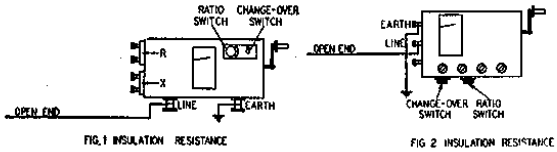
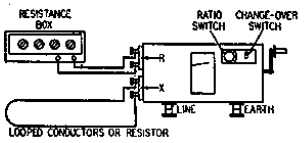
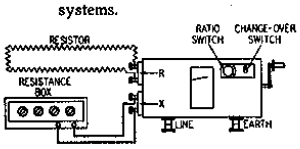


FIG. 1 INSULATION RESISTANCE

FIG 2 INSULATION RESISTANCE



RESISTANCE LESS THAN 10,000 OHMS
X=R DIVIDED BY "RATIO" SWITCH READING
FIG. 3



RESISTANCE GREATER THAN 10,000 OHMS
X=R MULTIPLIED BY "RATIO" SWITCH READING
FIG 4

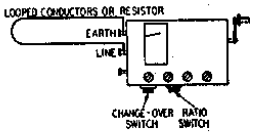


FIG 5

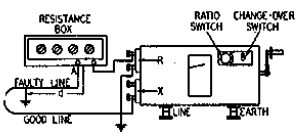


FIG 6 VARLEY'S LOOP TEST

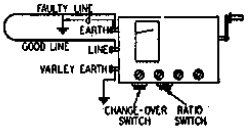


FIG. 7 VARLEY'S LOOP TEST

MG 014

E.T.S. 3750