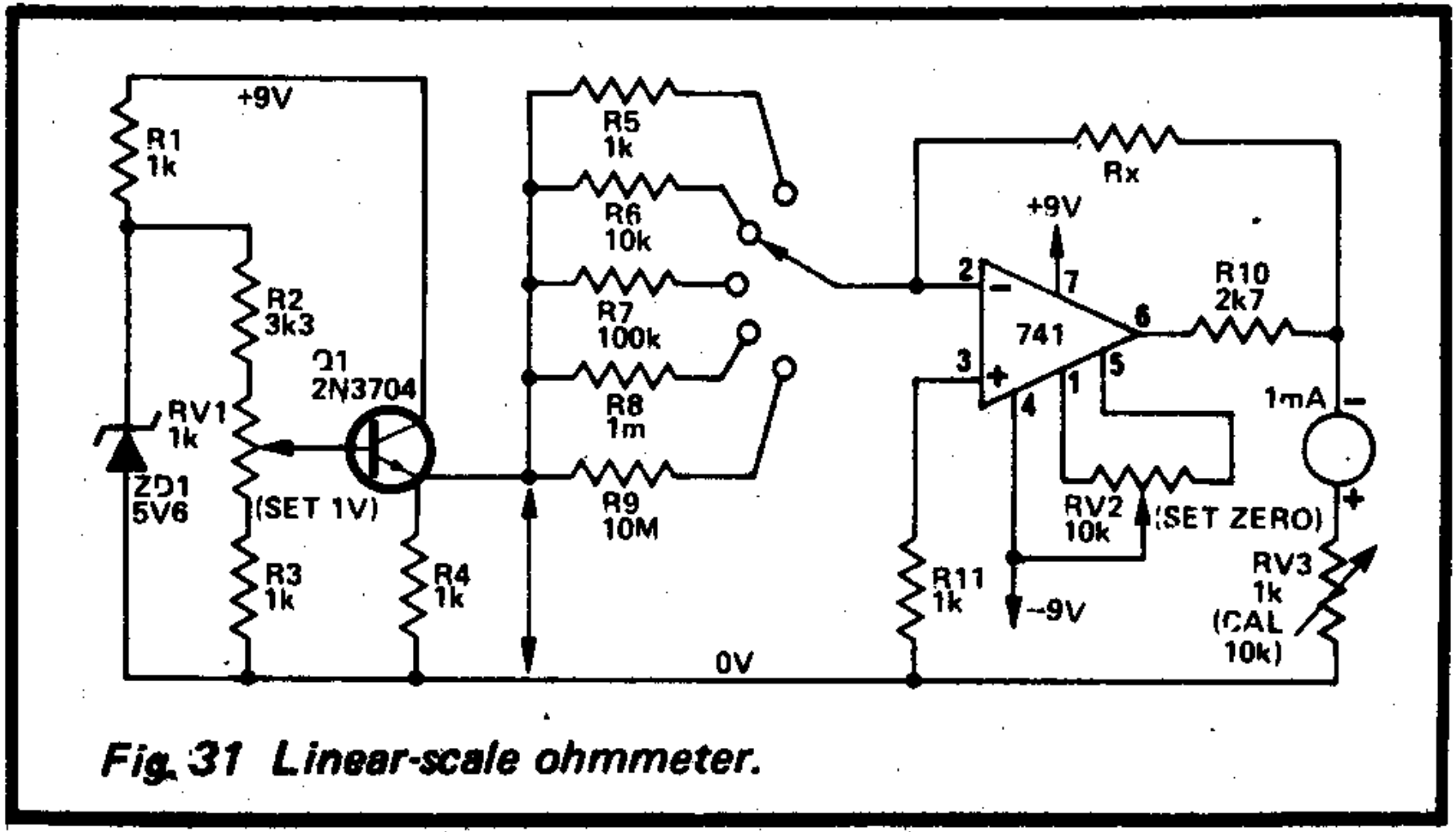

Fig. 31 Linear-scale ohmmeter.

HOME OHM

Finally, to conclude, Fig. 31 shows how the 741 op-amp can be used in conjuncton with a 1mA f.s.d. meter to make a linear-scale ohmmeter that has five decade ranges from 1k to 10M.

The circuit is divided into two parts, and consists of a voltage generator that is used to generate a standard test

voltage, and a readout unit which indicates the value of the resistor under test.

The voltage generator section of the circuit comprises zener diode ZD_1, transistor Q_1, and resistors R_1 to R_4. The action of these components is such that a stable reference potential of 1V is developed across R_4, but is adjustable over a limited range via RV_1. This voltage is fed to the input of the op-amp readout unit. The op-amp is wired as an inverting d.c. amplifier, with the 1mA meter and RV_3 forming a 1V f.s.d. meter across its output, and with the op-amp gain determined by the

values of ranging resistors R_5 to R_9 and by negative feedback resistor R_x.

Since the input to the amplifier is fixed at 1V, the output voltage reading of the meter is directly proportional to the value of R_x, and equals full scale when R_x and the ranging resistor values are equal. Consequently, the circuit functions as a linear-scale ohmmeter.

CALIBRATION

The procedure for intially calibrating the Fig. 1.31 circuit is as follows. First, switch the unit to the 10kΩ range and fix an accurage 10kΩ resistor in the R_x position. Now adjust R_3 to give an accurate 1V across R_5, and then adjust R_{12} to give a precise full scale reading on the meter. All adjustments are then complete, and the circuit is ready for use.