P. Stringer 1978

TESTER SA 9083 MARK 4 ONWARDS - FAULTSMEN'S TEST SET

Description and Use

1 GENERAL The "Tester SA 9083" Mark 4 onwards (see Fig 1 for typical tester) are portable testers and are primarily intended for use by faultsmen for maintenance testing of subscribers' installations connected to exchanges where faultsmen do not have testing access to a test desk, or where the testing equipment at the local exchange is not staffed during normal working hours. This Instruction describes the facilities afforded by the instrument and how they are used for making the various tests.

2 DESCRIPTION The testers which afford facilities similar to those obtainable at a test desk, consist essentially of a first-grade moving-coil meter.

The scales of which, are arranged to indicate volts, milliamperes and ohms. The ranges of the instrument are as follows:-

0-250V a.c.
0-5 megohms
0-50 000 ohms
0-5V d.c.
0-50V d.c.
0-250V d.c.
0-50 mA
0-500 mA
0-5 amperes (with shunt)

Facilities are available on all of these instruments for testing batteries on the 0-5V and 0-50V ranges. The tester is self-contained in a plastic case and includes two batteries (Cells Dry R6) see par 17; these batteries are used for insulation-resistance tests and for loop-resistance tests, respectively. Connexions to the line are made by means of terminals 'A' and 'B' and terminal 'E' is used for earth connexions.

3 RANGE SELECTION is effected by rotating a rotary-type switch, which selects the tests to be applied. On these instruments the switch has 12 positions, wired for tests as follows:-

Position 1 0-250V a.c.
" 2 Testing for earth B (and earth on A), see par 6
" 3 Testing for battery B (and batt on A), see par 7
" 4 Measurement of insulation resistance, and ballistic test of subscribers' lines
" 5 Measurement of loop resistance of subscribers' lines
" 6 Measurement of 0-5V d.c., and testing two primary cells in series, see par 10
" 7 Measurement of 0.50V d.c., and testing of ten primary cells in series, see par 11
" 8 Measurement of 0-250V d.c.
" 9 Measurement of 0-50 mA d.c.
" 10 Measurement of 0-500 mA d.c.
" 11 Measurement of 0-5 amps d.c.
" 12 Measurement of Insulation resistance 0-5 MΩ

The ranges to be used for individual tests and data for these tests, are shown in Table 1.

TABLE 1

Scale	Range	Value per division
AC volts	0-250 volts	5 volts
DC volts	0-5 volts 0-50 volts 0-250 volts	0.1 volt 1 volt 5 volts
DC mA	0.50 mA 0-500 mA	1 mA 10 mA
Ohms (loop test)	x1 x100	- -
Test battery B (or A)†	0-50 volts	1 volt
Test earth B (or A)† S (Shunt)	- 0-5 Amps	As for ohms x 100 0.1 Amp
MΩ	0.5 MΩ	100k

†By operation of line-reversing push button.

4 METHOD OF USE At subscribers' premises, the tester should be used at the point where the internal and external wires are joined. When making resistance measurements, the external line should, preferably, be disconnected to avoid damage to the instrument (see par 21). At those exchanges provided with a test case or a portable tester without a permanently-connected voltmeter, the "Tester SA 9083" may be used instead of a "Detector No. 4". If the ohms ranges of the tester are to be used, however, the exchange battery must be disconnected from the test-case voltmeter terminals. The facilities for testing provided on each position of the selecting switch, and the circuit condition obtaining during each test, are described in the paragraphs which follow.

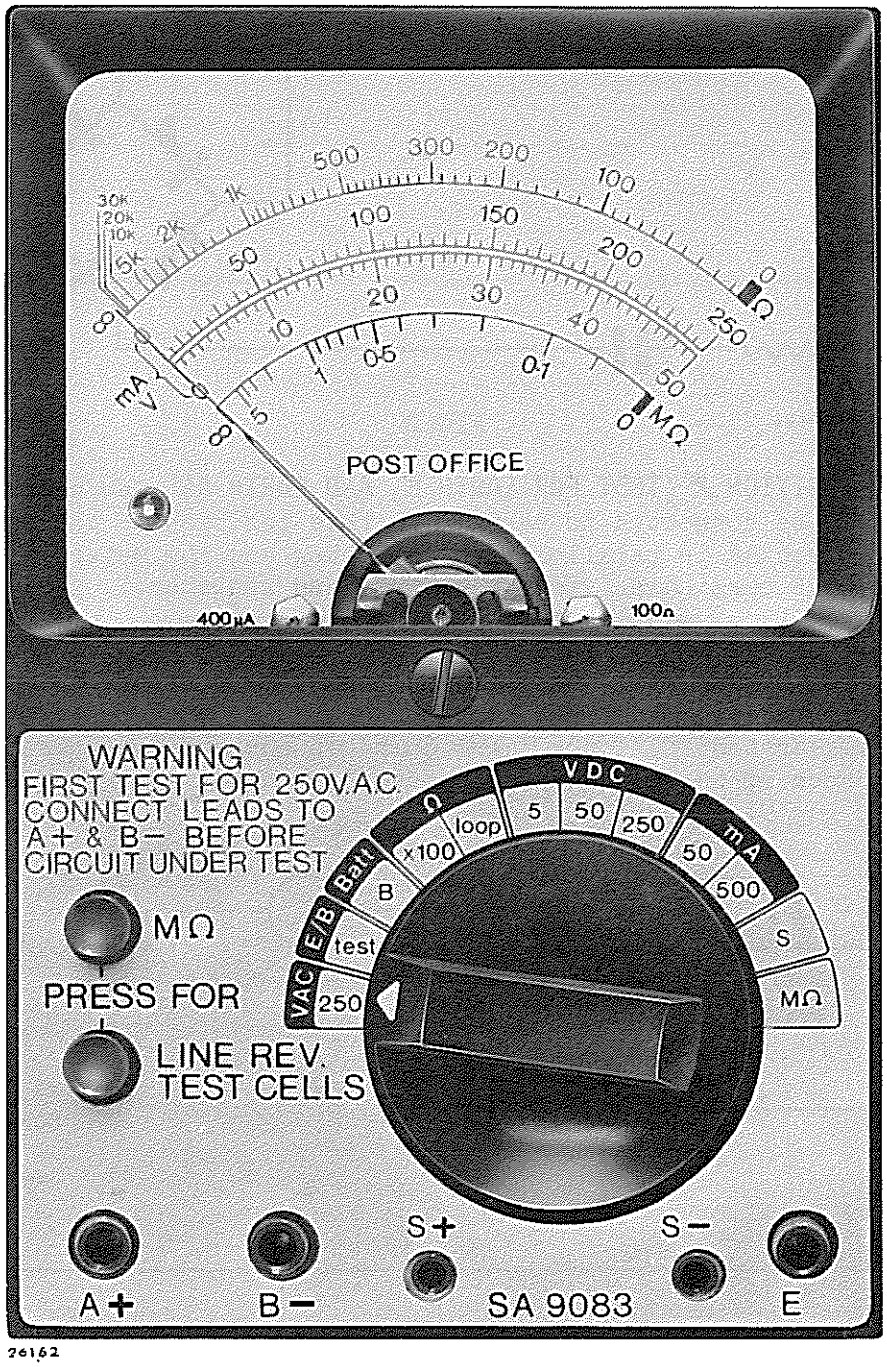

FIG 1 TYPICAL TESTER

5 **SWITCH IN POSITION 1 (0-250V AC)** This range is intended primarily to check that there is no a.c. on the line which is being tested. In this position of the switch, the A and B terminals are extended to one side of a bridge rectifier, via a resistor and a capacitor, the instrument being connected across the other two terminals of the rectifier as shown in Fig 2. The capacitor prevents the flow of d.c. when making a.c. measurements. See warning notice on tester.

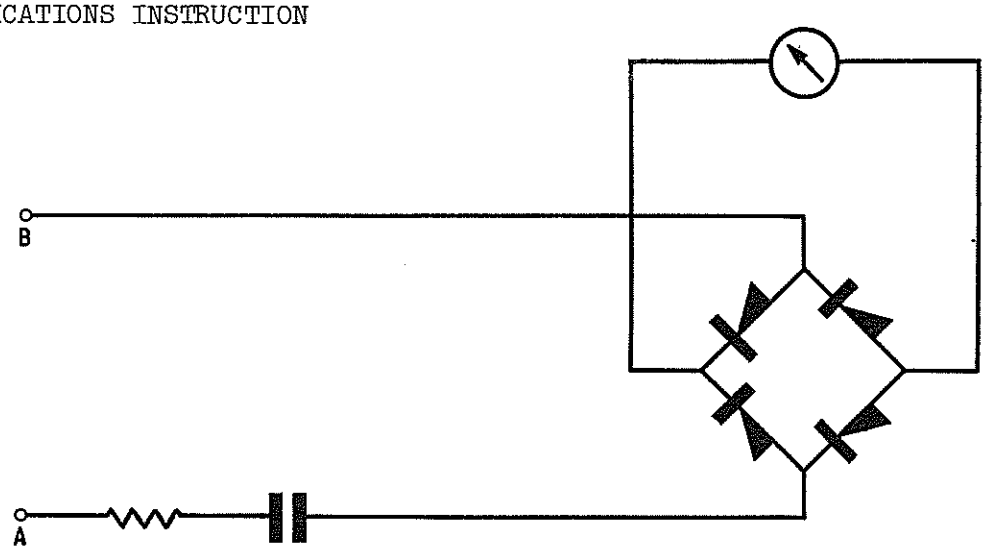

FIG 2

6 SWITCH IN POSITION 2 (TEST FOR EARTH B, AND EARTH A) The earth terminal of the tester should be connected to earth. In this position of the switch, a resistance is connected in parallel with the meter and the meter is connected between the B and E terminals, via the battery and resistor.

The circuit condition for this test is shown in Fig 3 and, with these connexions, it is also possible to measure insulation resistance to earth on the B line. Operation of the line reversing button connects the instrument to the A line for a similar test. If the 'zero ohms' is correct (see par 8) the combined resistance of the earth and line can be read directly on the meter scale; see also par 9.

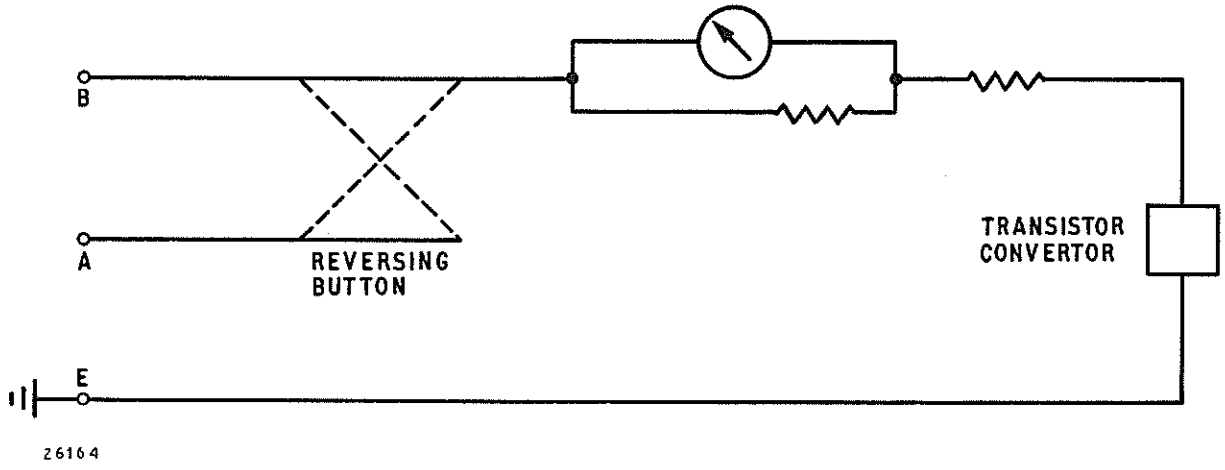

FIG 3

7 SWITCH IN POSITION 3 (TEST FOR BATTERY B, AND BATTERY A) In this position of the switch, a resistor is connected in series with the meter between terminals B and E and the meter then acts as a voltmeter with a full-scale deflexion of 50 volts d.c. The circuit for this test is shown in Fig 4. Operation of the line-reversing button enables tests for battery on the A line to be made.

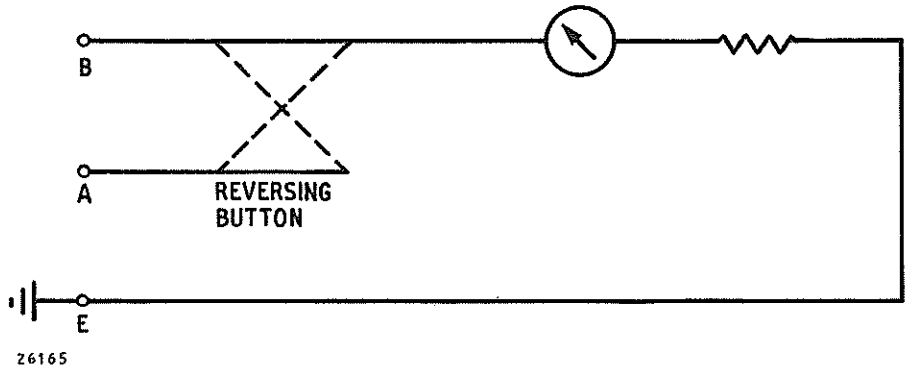

FIG 4

8 SWITCH IN POSITION 4 (MEASUREMENT OF INSULATION RESISTANCE - Ohms x 100)

The meter scale is calibrated from 0 to 30 000 ohms; the reading with the switch in this position is multiplied by 100 to obtain the actual value of the resistance measured. The accuracy of the meter is least at the extremes of the scale but can be relied upon for all normal measurements between 5000 and 100 000 ohms; for resistance below 5000 ohms, the lower scale should be used see par 9. (Before making a resistance measurement, it is first necessary to check the 'zero ohms' reading. This is done by short-circuiting the terminals A and B on the tester, while operating the MΩ or Resistance button, checking that the pointer is within the black portion of the scale at the zero ohms position; if so, the meter will indicate correctly. If the pointer is outside the black portion of the scale, the batteries are faulty and must be changed).

NOTE:- There is not zero setting adjustment when measuring resistance values on these meters.

The insulation-resistance between A and B lines may then be obtained by connecting the A and B terminals of the tester to the apparatus, or line, to be tested and depressing the MΩ button (see par 18). Note that the earth terminal of the tester is left disconnected during this test. The circuit conditions are similar to those for position 3 (see par 7), except that the test circuit is applied between terminals A and B, as shown in Fig 5. With the switch in position 4 it is also possible to make the normal ballistic test of a subscriber's line. The presence of any capacitance across the line may be checked by repeated operations of the line-reversing button (with the MΩ button released) when the A and B terminals are connected to the subscriber's line. The operation of the button charges and discharges the capacitor and causes the pointer to be momentarily deflected to a point near the centre of the scale.

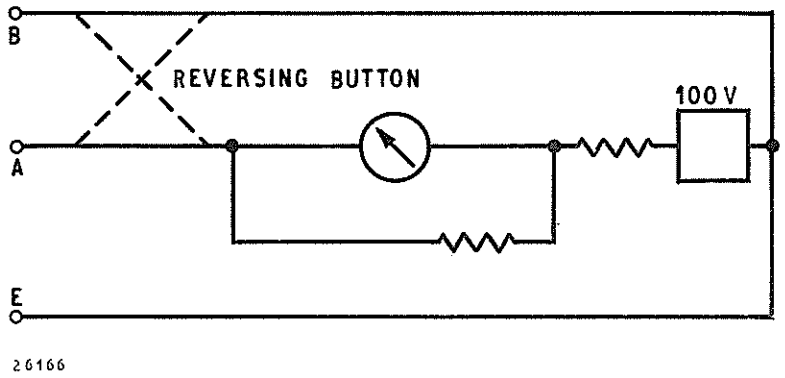

FIG 5

9 SWITCH IN POSITION 5 (MEASUREMENT OF RESISTANCE OF A SUBSCRIBER'S LINE) (FIG 6) Measurements on this range are accurate only between 1/10th and ten times the mid-scale value, ie from 30 to 3000 ohms. The 'zero ohms' check is made, as described in par 8, after short-circuiting the A and B terminals. When a previous check has been made in switch position 4, it is still advisable to check the zero ohms before making a measurement, because different voltages are used for the two ranges. Provided the pointer is still within the black portion of the scale, no further action need be taken.

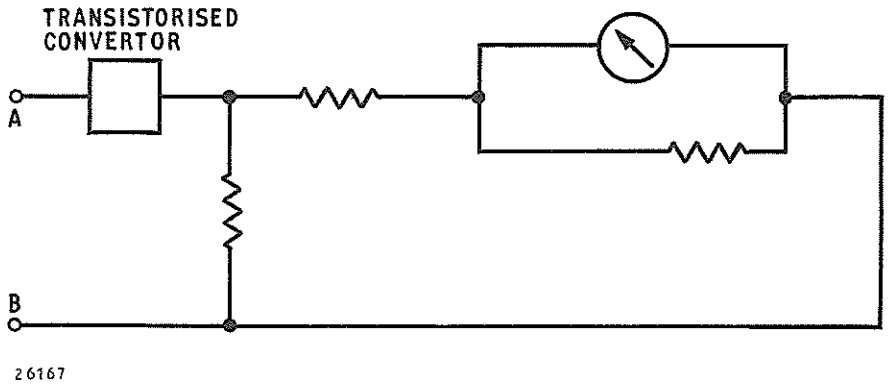

FIG 6

10 SWITCH IN POSITION 6 (5V DC, AND TESTING OF PRIMARY CELLS) With the switch in this position, the instrument is suitable for use as a d.c. voltmeter with a range of 0-5 volts. Operation of the non-locking button connects a resistor across terminals A and B and enables the V1 and V2 tests of two primary cells to be made (see E12 C5001).

The circuit for this test is shown in Fig 7 from which it will be seen that the meter is joined in series with a resistor and acts as a voltmeter with full-scale deflexion of 5 volts. When the non-locking button is operated a resistor is connected in parallel to enable the V2 and V3 tests to be taken on primary cells, see E12 C5001.

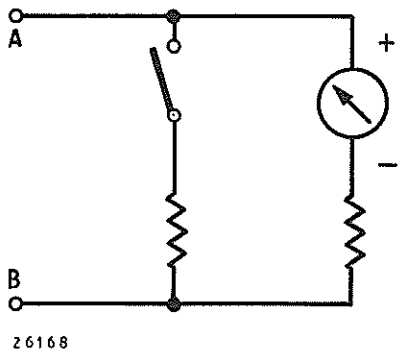

FIG 7

11 SWITCH IN POSITION 7 (50V DC, AND TESTING OF PRIMARY CELLS) This range permits d.c. voltage measurements from 0 to 50 volts. A resistor is introduced into the circuit and the meter then gives a full-scale deflexion with 50 volts. Operation of the non-locking button connects a resistor across terminals A and B, to enable testing of ten primary cells in series; the connexions are shown in Fig 8.

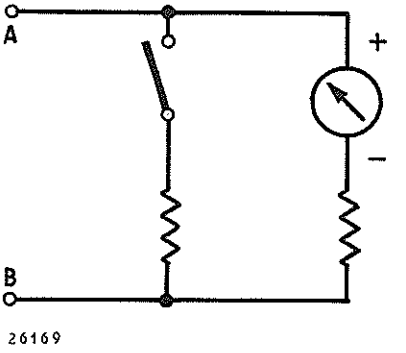

FIG 8

12 SWITCH IN POSITION 8 (0-250V DC) The meter is connected in series with a resistor and then gives a full-scale deflexion with 250 volts. The circuit is shown in Fig 9.

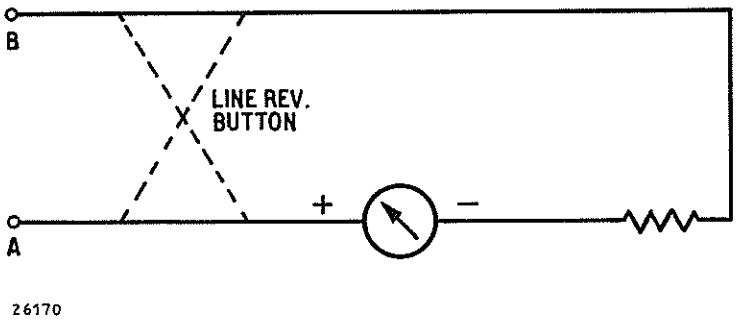

FIG 9

13 SWITCH IN POSITION 9 (0-50 mA DC) The meter movement is shunted by a resistor giving a full-scale deflexion of 50 mA. The circuit for this test is shown in Fig 10.

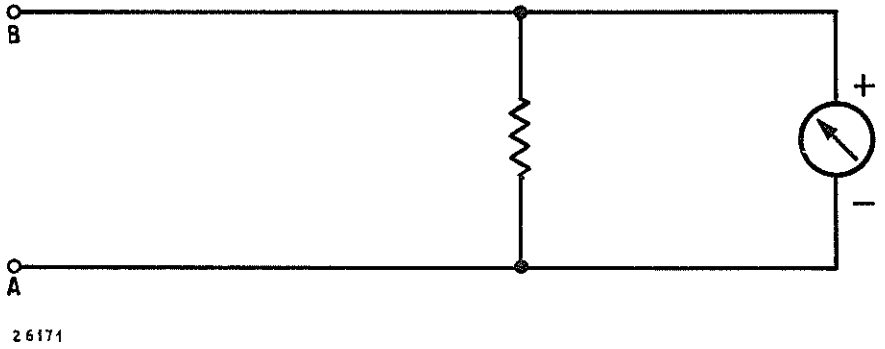

FIG 10

14 SWITCH IN POSITION 10 (0-500 mA DC) The connexions for this test are shown in Fig 11. The shunt resistance is approximately 1/10th of that used for the 0-50 mA range and increases the maximum reading by ten times to 500 mA.

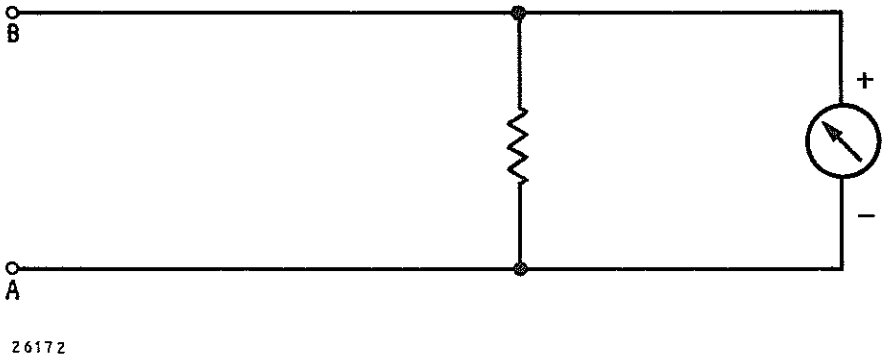

FIG 11

15 SWITCH IN POSITION 11 (S) For measurement of current up to 5 Amperes. The connections for this test are shown in Fig 12. A Shunt No. 6/5 is plugged into sockets S+ and S- the test leads are then fitted to the terminals on top of the shunt.

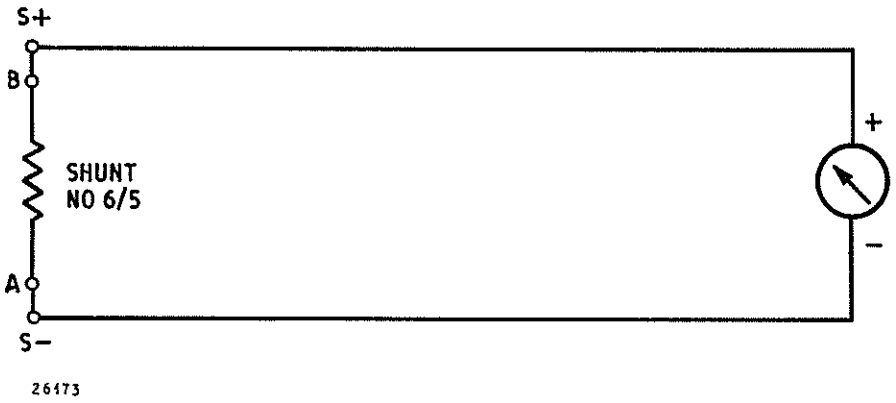

FIG 12

16 **SWITCH IN POSITION 12 (MΩ)** For measurement of insulation resistance. The connections are shown in Fig 13.

With the operation of the MΩ button a 100V potential is connected to the circuit under test, the insulation resistance being measured directly from the MΩ meter scale.

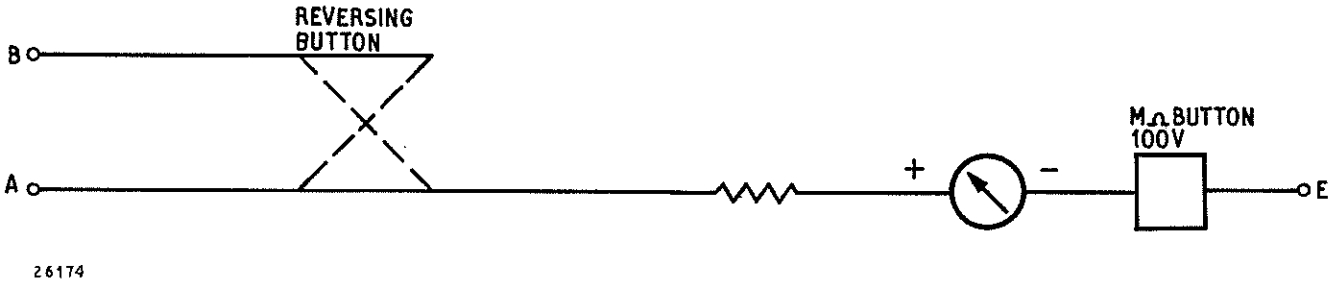

FIG 13

17 **REVERSING BUTTON** The tester connexions are such that the B line is normally connected and operation of the button is, therefore, necessary to apply similar tests to the A line. This button is also used when making the ballistic test of a subscriber's line, as described in par 8.

18 **MΩ BUTTON** is used whenever a resistance or insulation resistance measurement is taken. With the switch on the range selected, the MΩ button is momentarily depressed, an electronic timing device then allows approximately 14 seconds for measurements to be taken before the device automatically switches off, the period that the device is switched on is indicated by a red light on the face of the meter. This applies to the Mark 5 version onwards. On the Mark 4 version only, the button has to be held down while the measurements are taken as there is no time delay device.

19 BATTERIES Two Cells Dry R6, should be fitted before the tester is first used. Access is gained by removing the two screws in the back of the case. Both batteries should be changed when the voltage is insufficient to give a full-scale deflexion on the ohms ranges.

To avoid damage due to exudation from the batteries, testers must not be stored for long periods with the batteries fitted inside them.

20 LEATHER CARRYING CASE This is provided to protect the instrument against unavoidable shocks. The instrument should be removed from the case only when it becomes necessary to change the batteries. There is additional space in the case large enough to contain 2 Cords Test 1/60, 2 Clips Test 38A and 2 Spikes Testing No. 10. The Rate Book description of the case for the Mark 4 tester is "Case Inst 7C" and for the Mark 5 onwards is "Case Inst 7D". The instrument is secured in the carrying case by means of a leather strap.

21 REQUISITIONING OF ACCESSORIES The tester rate book title "Tester SA 9083/1" is stocked complete with accessories but without batteries which should be requisitioned separately.

22 CARE IN THE USE OF THE INSTRUMENT Care should be exercised in using and handling the instrument. When the rotary switch is in the 'measure ohms' positions 4 and 5, the instrument must not be connected to any external source of battery supply. The correct way to use the instrument is to start with the rotary switch in the first position and apply all the tests until the fault is identified or the desired switch position is reached. After use, the switch should be returned to the first position ('0-250V a.c.') so that the instrument is ready for instant use and also because the bridge rectifier for the a.c. range acts as a low-resistance shunt across the moving-coil and damps the movement when the instrument is being transported.

As no overload protection is provided, great care must be taken to choose the correct scales before connecting tester to the circuit under test - see also the warning notice on front of tester.

23 MAINTENANCE PROCEDURE Faulty instruments should be replaced under maintenance exchange procedure. No attempt should be made to repair instruments in the field.

Sv5.1.3 E N D