SUBSCRIBER'S LINE INSULATION TEST SET

PER DRAWING NO. SKIN-4647 - SLEEVE SUPERVISION

1. GENERAL

1.01 This Appendix replaces Section A204.426 Appendix C and is reissued to provide additional information and to renumber the section.

1.02 References should be made to B.S.P. Section A299.526, Issue 1, for information concerning the general procedure to be followed when making Subscriber's Line Insulation tests.

1.03 This Appendix describes the use of the subscriber line insulation test set, electronic type in testing the quality of insulation on subscriber lines. The set depends on the line sleeve condition for busy and idle indication prior to testing each line.

1.04 The test set is designed to operate in five test ranges, 1 to 5, inclusive.

The approximate equivalent resistance and voltage value of each of these ranges is shown below:

Test Range	Maximum Resistance Detected	Minimum Voltmeter Reading on Ground Tests
1	10,000	90
2	50,000	66
3	250,000	28
4	1,000,000	9
5	4,000,000	2.5

The resistance values apply to detection of leaks on both battery and ground tests.

For any leak to battery the voltage reading on the local test desk 100,000^{W} voltmeter (F EMF key operated) will be approximately one half the value shown for ground tests. This is because the crosses to battery normally have the 48 to 50 volt central office battery as a source, therefore a leak resistance will show only about one half as high as if the 100V test desk battery were used on the same resistance value to ground.

1.05 Test ranges 1, 2 and 3 are intended primarily for use during and immediately following wet weather to detect leakage on drop wires.

1.06 Test range 4 is intended for use during the early morning period in dry weather. Cable sheath breaks will be detected during this period.

1.07 Test range 5 is intended for use in dry weather to detect cable sheath breaks during early morning hours. This range should be used after the Test Range 4 has ceased to produce indications of leakage.

1.08 Since cable trouble frequently shows up better when the tests are made for leaks to battery rather than for leaks to ground the schedule for the use of the set may include cycles with the FEMF keys 1 to 3 operated to the IN position.

1.09 The TR key is provided to reverse the line to the detection circuit.

1.10 Tests should be made in most of the offices at the VIDF where there is a sleeve lead.

Tests may be made on the HIDF but they have the disadvantage of repeating the tests on two and four-party lines.

In No. 9 manual offices the tests must be made at the line jack and a busy test made with a regular cord circuit before inserting the test cord. This arrangement is needed because of the cut-off type of line jack.

1.11 The description of the set and more details about its operation are given in the addendum to A702.997.

1.12 The following table will show the required key arrangement for making the various tests.

Table 1

	FEMF 1	FEMF 2	FEMF 3	TR
Short Circuit and Ring Ground	Out	Out	Out	Out
Short Circuit and Tip Ground	Out	Out	Out	In
FEMF (Crossed Batt.)	In	In	In	Out

1.13 Tip ground tests are intended primarily to determine Terminal Face Plate Leakage. This leakage is determined by comparing the Tip Ground indications with FEMF indications. It will be found that the matching indications generally indicate Face Plate Leakage.

2. APPARATUS

Manual Offices Without Sleeve at IDF

2.01 One 3P6G cord or equivalent where the switchboard end of the cord requires 309 plugs.

2.02 One 3P6B cord or equivalent where the switchboard end of the cord requires 310 plugs.

2.03 One 2W12A cord.

2.04 One AC Power cord.

2.05 One 329A Plug or equivalent having Tip, ring and sleeve shorted.

2.06 One test set per SKIN-4647.

Other Manual Offices

2.07 One 2W12A cord.

2.08 One AC power cord.

2.09 One special test cord having the special test shoe per drawing CN-4707. If the older type of cord P5B is available, the unused two conductor portion may be attached at the plug end to a 309 plug in which the 3 conductors are shorted. This gives a convenient type of (TST1) plug for figures 4 and 5 on drawing SKIN-4647. Otherwise, if a 3P15B cord is used then a separate 309 plug having shorted conductors will be necessary.

2.10 One test set per SKIN-4647.

2.11 A supply of 1A (red), 2A (yellow) and 3A (green) trouble signals with any suitable container.

Crossbar Offices

2.12 One 2W12A Cord.

2.13 One A-C power cord.

2.14 One 3P27B cord or the equivalent.

2.15 One test per SKIN-4647.

Panel, SxS (No. 1, 350 and CDO) Offices

2.16 One 2W12A Cord.

2.17 One A-C power cord.

2.18 One special test cord having a special test shoe per drawing CN-4707.

2.19 One 309 plug having its three conductors shorted. This cord may be loose or attached to the unused conductors of the P5B cord which may be furnished with the special test cord.

If Figure 3 is used for SxS offices, no 309 plug is needed.

2.20 One test set per SKIN-4647.

2.21 A supply of 1A(red), 2A (yellow) and 3A (green) trouble signals with any suitable container.

3. TEST SET PREPARATION

Manual Offices without Sleeve at the IDF

3.01 These tests have to be made at the switchboard and therefore the test set must be set up nearby. A suitable battery source of 48V and ground should be located in or near the switchboard. This should be connected to the set using the 2W12A cord or its equivalent.

3.02 Then connect the A-C power cord between the set and an appropriate 110V 60-cycle supply.

3.03 Insert the shorted No. 309 plug or equivalent in the (TST1) jack.

3.04 Insert the 3P6B or 3P6G cord in the (TST) jack of the set.

3.05 The set should now be ready for calibration as described in Part 5.

Crossbar Office

3.06 Place the set on a portable test wagon near the line link frames.

3.07 Connect the AC power cord between the set and an appropriate 110V 60-cycle supply.

3.08 Connect the 2W12A DC power cord between the set and an appropriate 48V DC battery source and ground.

3.09 Insert the No. 310 plug of the 3P27B test cord in the (TST) jack.

3.10 If the test set in the crossbar office is equipped with figure 2 instead of figure 3, then the shorted No. 309 plug must be inserted in the (TST1) jack and the set is ready for calibration as described in Part 5.

All Offices where Sleeve Leads appear at the IDF or equivalent. (Manual, Panel and SxS (No. 1, 350 and CDO's.)

3.11 Place the set on a test wagon or table near the VIDF.

3.12 Connect the AC power cord between the test set and an appropriate 110V 60-cycle supply.

3.13 Connect the 2W12A DC power cord between the set and an appropriate 48V DC battery source and ground.

3.14 Insert the shorted No. 309 plug or the equivalent if attached to the special test cord.

3.15 Insert the 310 plug of the special test cord in the (TST) jack and the set is ready for calibration as described in Part 5.

4. METHOD

Manual Offices where Tests are Made at the Switchboard

4.01 Normally these offices are of the No. 9 type and a test should not be made on a line until the tester has determined that the line is idle by using a telephone set and a regular switchboard cord.

4.02 Then the test cord is inserted into the jacks of the idle line and the set makes a test of the line in accordance with range that is set on the range selector.

4.03 When a line leak to battery or ground (according to position of the (TR), (F EMF) keys and Range Selector) is encountered, the visual indicator is lighted and a buzzer is sounded.

The line having the leak should be recorded and then testing of other lines may proceed.

Crossbar Offices

4.04 Since this is a sleeve supervision type of set for line busy and idle conditions the test must be made at the line jacks on the line link frames.

4.05 The 225A plug of the test cord must be inserted in each line jack for the tests because the T and R leads do not appear with the S lead at any other convenient location.

4.06 The dwell time when the plug is in the line jacks is more than ample for the tests because the normal insertion and removal time will probably be at least one second and this is considerably more than the trouble detection circuit of the set requires.

4.07 When a line leak to battery or ground (according to the position of the (TR), (F EMF) keys and Range Selector) is encountered the trouble should be recorded on the proper form before proceeding to the subsequent lines.

All Offices Where Sleeve Leads Appear at the IDF or Equivalent (Panel, SxS (No. 1, 350 and CDO's) and Manual)

4.08 Place the special test shoe on the first line to be tested in such a manner that the handle forms about a 30^{o} angle with the vertical line of the terminal blocks. The shoe should be used on the right hand side of the block where the line terminals read in a T, R and S order away from the tester (front to back of blocks).

4.09 The test shoe should then be pulled down over the terminals lightly and slowly.

A pressure of a few ounces against the handle should provide adequate contact with the T, R and S terminals and if the shoe is pulled down over the terminals at about 2 or 3 per second a reliable test will be obtained. As with all of the later electronic type of test sets a complete test of a line is not made, particularily on test ranges 3, 4 and 5 if the terminals are tested too rapidly. Time must be allowed for proper charging and discharging of the line capacity by the test set.

4.10 When a line leak to battery or ground (according to the position of the (TR), (F EMF) keys and Range Selector) is encountered one of the trouble signals should be placed over that line terminal to indicate a failure without recording it at that time on the proper form. After all of the lines have been tested then the proper written record may be made.

4.11 The color of trouble signal is optional. If more than one type of test is made in succession, then the different colors can be used to denote failures on a certain test.

5. CALIBRATION

All Offices

5.01 After setting up the set and allowing about 30 seconds for the 6SC7 tube in the detection circuit to become heated the set may be calibrated.

5.02 Calibration is accomplished by setting the range selector knob to the desired range and then after setting the (F EMF) keys to the proper positions the (CAL) key may be depressed. This connects the maximum resistance, that the selected range can detect across the detector tube.

Then the (CAL) potentiometer should be rotated until the buzzer and visual signals just operate.

This completes the calibration and the set is ready for use.

5.03 Normally the position of the (CAL) potentiometer will correspond quite closely on the different ranges so that if a trouble is detected on the higher ranges the Range Selector can be rotated to lower ranges while the line is still connected to the set to determine the value of the resistance more closely without immediately testing the line with the local test desk voltmeter.

5.04 The set should retain its calibration reliably throughout the tests but if desired it may be verified occasionally during the testing cycle.

5.05 The calibration is the same for either battery or ground testing.

5.06 The type of test to be made will be specified in other instructions.

6. REPORTS

6.01 The required record of tests should be entered on Form E-3826.

6.02 The description of this form is given in section 5 of B.S.P. Section A299.526.

In columns E on Form E3826 only the "R" column need be used.

In the indicated "Test Range" check spaces 1, 2, 3, 4 and 5 should be used instead of A, B, C and D.