BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G50.244.1
Issue 2, June, 1954
AT&T Co Standard

CABLE TESTING—
TESTING PROCEDURE FOR COAXIALS

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1. GENERAL

1.01 This section replaces Issue 1 and covers the testing of .270 and .375-inch coaxials during construction work. The paper-insulated conductors in cables containing coaxials should be tested in the manner covered in other sections of the Practices.

1.02 This section has been reissued to cover additional types of high voltage meggers.

1.03 Because of the high voltages used in testing coaxials, workmen making such tests should be thoroughly familiar with the safety procedures to be observed. These are outlined in Section G50.244.3 (Precautions in Testing Coaxials).

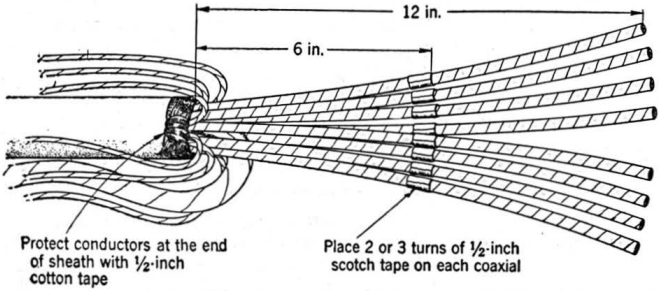
2. PREPARATION FOR TESTS

2.01 Tests may be made in connection with splicing work or in advance of such operations.

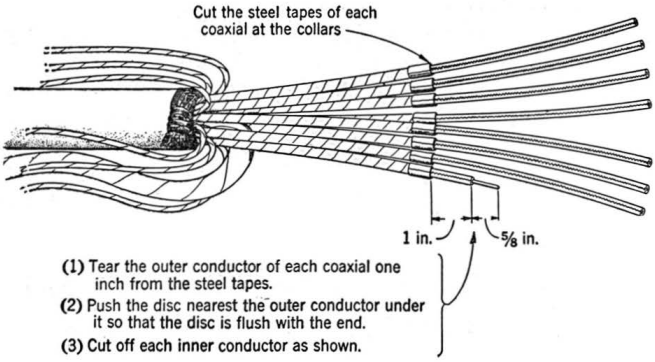
2.02 If the tests are to be made in connection with splicing work, the ends of the cable should be cleared as follows:

(1) If the end is sealed with solder, cut off about 10 inches of the end of the cable. Then remove about 12 inches of the sheath and protect the end of the sheath with dry or freshly boiled 1/2-inch cotton tape.

(2) Bend the paper-insulated conductors, including the interstice and center conductors, over the end of the sheath and expose the coaxials. Then secure the steel tapes as illustrated below:



(3) The steel tapes of each coaxial are removed to the tape collars and the end of each coaxial is then prepared as shown below:



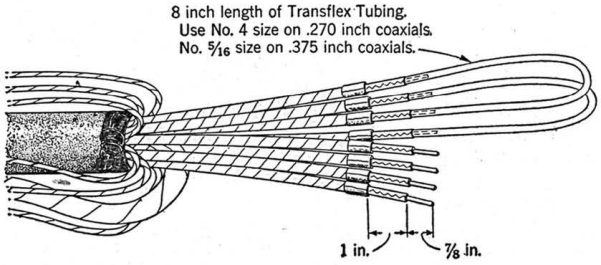
(4) Remove about 6 inches of insulation from the ends of the paper-insulated conductors. Bunch these conductors. Then wrap a bare conductor around the exposed wires of the paper-insulated conductors and the outer conductors of

the coaxials near the sheath and ground the wire to the sheath. If the cable has steel tapes, armor wires or a copper jacket, the bunching wire should also be connected to the outer metallic covering.

2.03 If the testing is to be done considerably in advance of splicing, the two ends of the cable should be prepared as follows:

(1) Open the cable, expose and prepare the conductors as outlined in (1), (2) and (3) of Paragraph 2.02.

(2) Keep the ends of the coaxials clear at the distant end by placing an 8-inch length of Transflex Tubing under the end of the outer conductor of one coaxial for a distance of about one inch. No. 4 size tubing should be used on .270-inch coaxials and No. 5/16 size tubing on .375-inch coaxials. Place the free end of the tubing in a second coaxial. Prepare the other coaxials in a similar manner.



(3) Wrap the coaxials with polyethylene tape and prepare the ends of the paper-insulated conductors as required for other electrical tests. Then wrap the paper-insulated conductors with polyethylene tape, applying the required quantity of desiccant.

(4) Cap the end of the cable with a lead sleeve or its equivalent.

2.04 If the tests are to be made with the cable open at the far end or at an intermediate point, or if the work is to be done at a location where it is not possible for the megger operator to see the other man handling the leads, a suitable communication circuit shall be established between the testing end and other points.

3. SEQUENCE OF TESTS

3.01 The sequence of the tests made on coaxials follows:

Type of Test	Test Set Used
Insulation Resistance	Megger Test Set
Breakdown (slivers)	94A Test Set
Fault Location	90A Test Set

3.02 After the fault has been burned out or located and cleared, the insulation resistance tests are repeated to ensure that the coaxial is satisfactory.

4. TEST WITH HIGH VOLTAGE MEGGER TEST SETS

4.01 The description and the operation of the high voltage Megger Test Sets is covered in another section of the Practices.

4.02 In using the high voltage Megger Test Sets, .270-inch coaxials should be tested using the 1250- or 1500-volt output, and .375-inch coaxials with the 2500-volt output.

4.03 **Test on Individual Reel Lengths:** The coaxials should be tested for insulation resistance as follows:

(1) If the conductors at the far end are exposed, the megger operator should indicate his readiness to test and wait for a response that the workman has left the manhole or splicing pit at the far end before proceeding.

(2) After checking the operation of the megger, the megger operator should pass the connector end of the W2DD Cord to the other man in the manhole or pit. The ground lead should be connected to the bunched and grounded conductors. The 206A Connector should be connected to each of the inner conductors of the coaxials in turn. The megger operator should then assure himself by communication or by observation that the other man is entirely clear of the cable and leads before operating the megger.

(3) The megger operator then operates the megger. The coaxial is satisfactory if it measures at least 500 megohm-miles and remains steady about 10 seconds. (Megohm-miles can be determined by multiplying the scale reading in megohms by the length of the coaxial under test in miles.) The table below shows the minimum permissible insulation resistances for various lengths of cable in feet.

Length of Cable	Minimum Permissible Insulation Resistance
(feet)	(megohms)
1000	2500
1500	1800
3000	900
6000	450
10000	250

(4) If the test indicates an insulation resistance of less than 500 megohm-miles, the procedure outlined in Paragraphs 4.04 to 4.07, inclusive, shall be followed.

4.04 **Procedure for Low Insulation:** If the scale reading is 10 megohms or less, a fault of some type is indicated. Subsequent tests with an ohmmeter, lower voltage megger or receiver and battery, together with the performance of the other coaxials and paper-insulated conductors in the cable will show whether low insulation resistance is general or confined to one or two coaxials. If low insulation is general, and particularly if the paper-insulated conductors are involved, the trouble is due to moisture, and steps should be taken to locate and remove the moisture. In case of moisture trouble the sliver burner should not be used.

4.05 If the reading on the megger is 10 megohms or less and moisture trouble is not indicated, it is probable that the fault is due to a sliver. The suspected coaxial should then be tested with the 94A Test Set (sliver burner) as covered in Paragraph 5.01.

4.06 If the scale reading is more than 10 megohms but less than 500 megohm-miles, the insulation resistance test should be repeated using a lower testing voltage as shown below. At these voltages a scale reading equivalent to 500 megohm-miles or more shall be considered satisfactory.

Size of Coaxial	Testing Potential
.270-inch	400 volts
.375-inch	1250 or 1500 volts

4.07 **Tests on Spliced Lengths:** In making megger tests on one or more completed loading sections, an insulation resistance of at least 500 megohm-miles or a scale reading at least as high as the values tabulated in Paragraph 4.03 (3) should be obtained. If not, the coaxial is unsatisfactory and should be investigated for the presence of a fault that can be located and cleared.

5. BREAKDOWN TEST WITH 94A TEST SET

5.01 If as outlined in Paragraph 4.05, the megger test indicates the presence of a sliver, an attempt should be made to clear it by using the 94A Test Set (sliver burner) following the procedure outlined in Section G50.244.7. If the voltmeter in the 94A set quickly drops to zero or near zero in making this test, it indicates that the sliver has not been burned out and the test should be repeated. While many slivers can be cleared with two or three discharges, some require as many as 10 to 20 discharges. The sliver burner test should be repeated (15 or 20 discharges if necessary) until in the megger operator's judgment it is reasonably certain that the trouble is not a sliver but a fault which can not be burned out. If after making this test, the voltmeter in the sliver burner does not drop appreciably below the voltage to which the condenser was charged it is an indication that the trouble has been cleared.

6. FAULT LOCATION WITH 90A TEST SET

6.01 If the fault can not be burned out with the 94A Test Set, a bridge measurement should be made using the 90A Test Set following the procedure outlined in Section G50.250.1.

6.02 After the fault has been burned out or located and cleared, the insulation resistance tests should be repeated as outlined in this section.

6.03 Immediately after completion of high voltage tests, each inner conductor should be shorted to its outer conductor to dissipate the charge on the coaxial.

6.04 If the far end of the cable under test is open, the test set operator should then communicate with the other man at that location, advising him that the tests are complete and that he may re-enter the manhole or testing pit.

7. TEST FOR CONTINUITY

7.01 A continuity check of coaxials should be made at regular intervals with a battery and receiver, to ensure that like numbered coaxials are continuous throughout the cable.