

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

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CABLE TESTING—GENERAL

IDENTIFYING CONDUCTORS IN LONG CABLES

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1. GENERAL

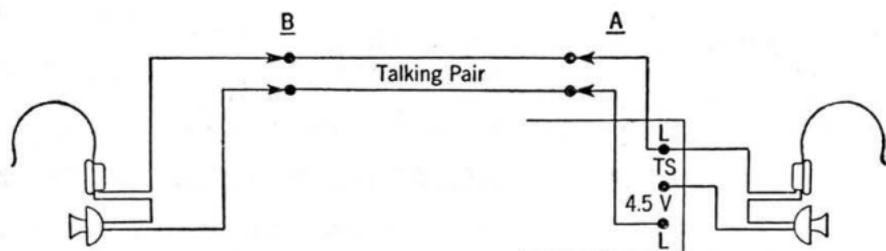
1.01 In long cables, particularly if they are loaded, it is not always possible to identify the individual conductors of a pair or quad by tone methods, because the tone may be heard with equal volume on each of the conductors. If individual conductors must be identified, it can be done using the tone method to find the pair or quad and then identifying the individual conductors by one of the direct current methods described in this section.

1.02 Since direct current tests may cause interference on working circuits, these methods should not be used on working pairs or quads unless permission is obtained to open them momentarily, or unless arrangements are made to turn down or reroute the circuits involved.

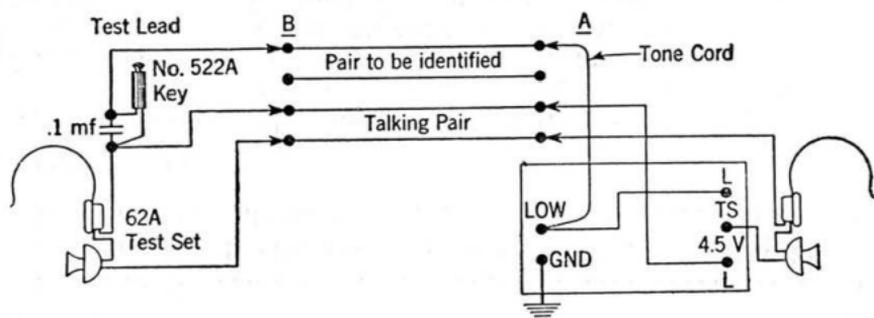
2. RELAY TEST WITH 76-TYPE TEST SET

2.01 The 76-type test set is equipped with a relay operated buzzer which can be used to identify the individual wires. This circuit will operate over a length of approximately 20 miles of 19-gauge, 10 miles of 22-gauge and 6 miles of 24-gauge cable.

2.02 In order to use the relay circuit for identifying individual wires the talking circuit must be set up as shown in the following illustration.



2.03 **Identifying with Grounded Tone and 62A Test Set:**
The relay test can be combined with the grounded tone method of identifying pairs in exchange distribution and trunk plant. The connections are made as illustrated in the following sketch.



2.04 The identifying procedure is as follows:

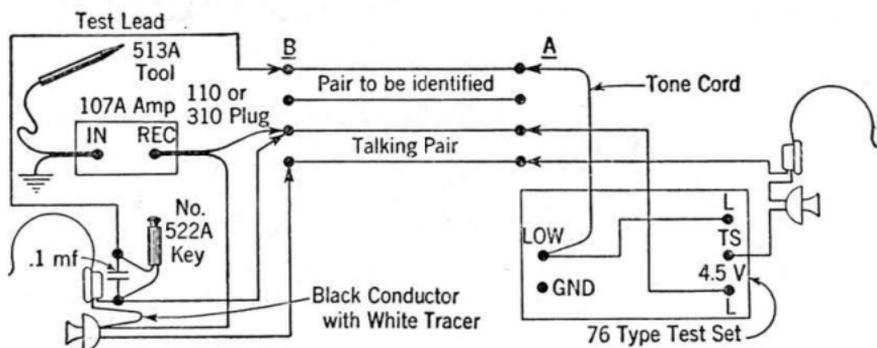
- (1) **At A.** With the keys in the LIS and TLK positions, connect the sending cord to one side of a pair and listen to see that the pair is not busy; then operate the key from LIS to SIG and then to SND.
- (2) **At B.** Using the test lead from the 1/10 mf condenser, run over the pairs until the one with tone is found.
- (3) After the pair has been located, **A** moves the key from SND to LIS. **B** holds the test lead on the ring side of the pair, depresses the No. 522A key and tells **A** to make the relay test.
- (4) **At A,** operate the key from TLK to WAIT and test each conductor of the pair with the tone sending cord.

One of the conductors should complete the relay circuit and cause the buzzer to operate. **A** then restores the key to TLK and tells **B** to shift his test lead to the tip side of the pair and repeat the relay test.

2.05 The presence of terminating equipment on the pair that is being identified may lead to false tests. A connection of less than 2500 ohms resistance between the individual conductors may cause the relay and buzzer to respond to both conductors. Therefore, it is always necessary to check all conductors of a quad or pair when making a relay test. If the relay operates on more than one conductor of a pair or quad without changing the position of the test lead at the identifying end, the presence of terminating equipment should be checked. If the identification is being done at a main frame and if permission is obtained to momentarily open the circuits, the relay test can be made rapidly with the No. 522A key after removing the heat coils from the pair.

2.06 **Identifying with Grounded Tone and 107A Amplifier:**

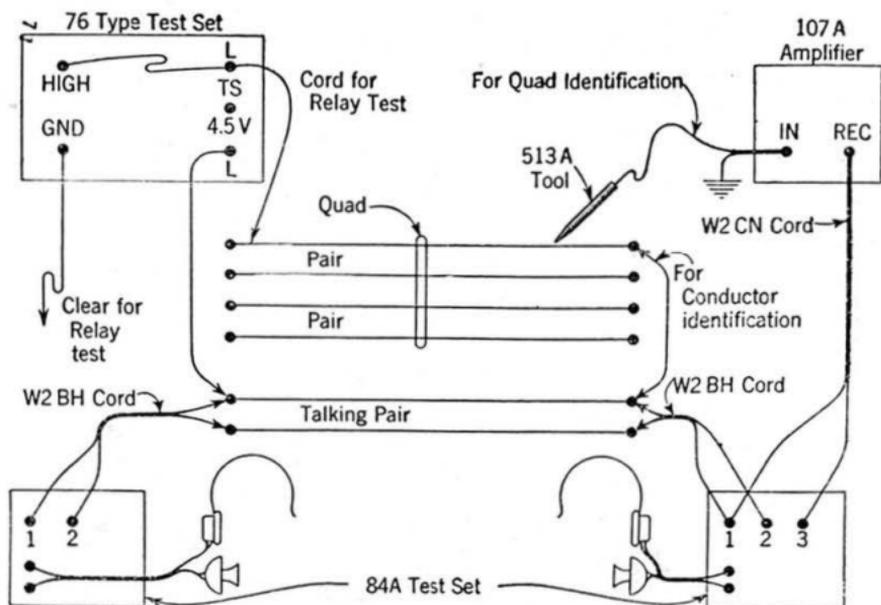
The 107A Amplifier may be combined with the talking circuit as shown in the following illustration. However, if this arrangement is inconvenient the amplifier may be used with a separate receiver. The procedure to be followed is essentially the same as that outlined in Paragraph 2.04.



2.07 If the identification is being done in a dead cable the .1 mf condenser and the No. 522 key may be omitted.

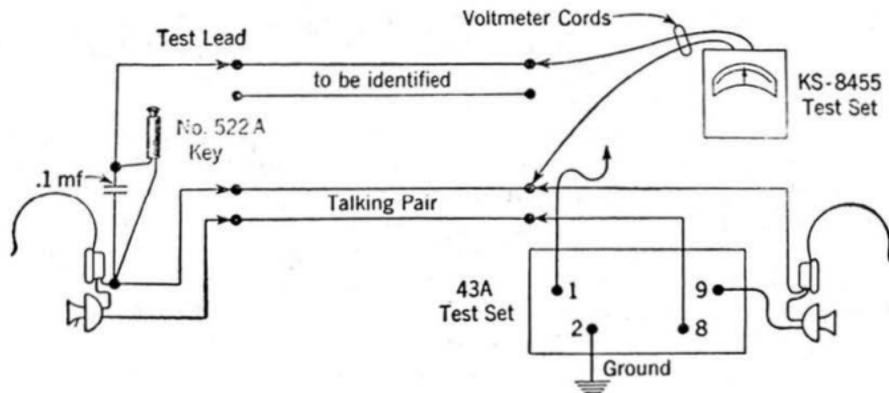
2.08 **Identifying with Non-Grounded Tone and 107A Amplifier:**

The relay test for identifying individual wires can be combined with the non-grounded HIGH tone and 107A Amplifier method of identifying quads or pairs in toll cable. The circuit arrangement on Page 4 shows the standard telephone sets used for the talking circuit in long cables.



3. VOLTMETER METHOD

3.01 A direct current voltmeter and battery, such as are provided in the KS-8455 or 89A test sets, may be used to identify the individual conductors in a long cable. The following illustration shows a typical connection using a KS-8455 test set and a modified 43A test set.



3.02 The general procedure in using the above circuit arrangement is as follows:

- (1) Identifying the pair or quad by the tone method in the usual way.
- (2) Disconnect the tone sending cord and identify the individual conductors with the KS-8455 test set, using the No. 522A key to short-circuit the condenser of the 62A test set. When using the KS-8455 set, the OFF-ON key should be in the ON position. Test each conductor in the pair or quad to make sure that a reading on the voltmeter can be obtained on only one conductor at a time. If a reading is obtained on more than one conductor it generally indicates the presence of terminating equipment that must be disconnected before the test can be made.

3.03 If one of the above mentioned sets is not available, any high resistance voltmeter, 1000 ohms per volt, and a battery may be substituted. The voltmeter should have a scale range of approximately 50 or 100 volts, and the battery should provide a voltage of approximately half the full scale reading of the voltmeter.