

**CABLE TESTING—GENERAL**  
**GENERAL RULES FOR USING IDENTIFICATION TONE**  
**AND FOR ESTABLISHING A TALK CIRCUIT**

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**NOTICE**

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## SECTION 634-020-501

**1.02** This section is being reissued to include the information formerly provided in Section 634-040-500 and to add new test sets. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

**1.03** Before sending tone in a working cable, determine if the cable contains repeater operated voice frequency circuits, carrier or data transmission, or special circuits such as radio program and teletypewriter. Such circuits will be referred to as *special circuits* in the various cable testing sections.

### 2. PRECAUTIONS

**2.01** Audible tone *should not* be sent on a busy pair or quad.

**2.02** Audible tone *must not* be connected to a working coaxial, video pair, spiral-four disc-insulated quad, J, K, N, L, or T carrier pair, unless the power supply (if any) has been disconnected and the carrier circuit has been taken out of service.

**2.03** The inaudible tone from the 116A or AT-8121 test sets may be applied when identifying carrier circuits or working lines. The HB11111/HB11112 Cable Restoral System is used when lines to be identified may be working lines.

**2.04** If audible identification tone must be transmitted in a cable containing radio program circuits, it is preferable to use the tone from the 76-type or 146A test sets rather than the tone from the 20C test set.

**2.05** Since the tip side of the POTS circuit may have such low resistance to ground that the detection of the tone may be impossible, it is advisable to send tone on the conductor that is used for the ring side of the circuit.

**2.06** Care must be taken in using tone for identifying conductors used as battery feeders. Sending grounded tone on such pairs may introduce noise in the extensions from a PBX supplied by battery pairs.

**2.07** Serious interference may be caused by testing operations on teletype, data communication, and remote control circuits. Pairs or quads used for such circuits are specifically marked at the main

frame and are indicated on pair transfer sheets. Specific routines discussed in maintenance practices of those systems must be followed when working on such conductors.

### 3. SOURCES OF IDENTIFICATION TONE

#### AUDIBLE

**3.01** The identification tone may be classified as audible or inaudible depending on whether it can be heard with an ordinary telephone receiver. The tone of the following test sets is audible:

20C	139A
76-Type	145A
81A	146A
114A	CB100D
122A	KS-14103,L5
138A	KS-14103,L6

The signal from the 116A and AT-8121 test sets and the HB11111 Cable Restoral System is inaudible.

**3.02** The 84A (e/w 147C amplifier) test set utilizes the employee's voice or a separate signal generator as a tone source. The 79D also utilizes a separate tone source (ie, 76 type) when used to identify exchange cable pairs. The 108A test set is used at the main frame with a 109A test set in the field; this arrangement requires a separate tone generator.

#### 20C Test Set (Section 634-220-500)

**3.03** Grounded tone from a 20C test set should not be used for identification purposes in a working cable. After limiting the output, the 20C set equipped with an approved network filter is sometimes used in toll cables on a nongrounded basis.

#### 76-Type Test Set (Section 634-200-501)

**3.04** Tone from the LOW and GND (ground) posts is generally used for identification. Tone from the GND and HIGH posts should not be used as a grounded tone for identification purposes in a working cable except as required with the 79-type

test sets. The high level tone can be transmitted nongrounded.

**81A Test Set (Section 105-240-100)**

**3.05** The 81A test set is a low level tone source for use in DC continuity testing and tracing nonworking lines. Also supplies talk battery for communicating between two or more terminations of wires or cable. This set *shall not* be used on working lines. The buzzer tones would interfere with subscriber's use and might result in customer trouble reports.

**114A Test Set (Section 106-450-101)**

**3.06** This test set is a 500 Hz signal generator used for locating open conductors in multiple line wire and for identifying cable pairs. The signal produced by this test set is equivalent to that from the low terminals of the 76C test set.

**122A Test Set (Section 634-220-515)**

**3.07** This set is a 20 Hz signal generator used as a source of tracing current for locating and measuring depth of buried cable. This test set is part of the 121A test set.

**138 Test Set (Section 634-200-450)**

**3.08** This set generates the same 577.5 Hz tone as the KS-14103 L6 breakdown test set. The 138A set is particularly useful in situations where noise or power influence is a problem.

**139A Test Set (Section 105-242-100)**

**3.09** The 139A test set generates a distinctive alternating 2 frequency (550 and 1100 Hz) tone. Do not connect this test set to a working line as the tone may interfere with the line and result in a customer trouble report.

**145A Test Set (Section 634-200-225)**

**3.10** The test set produces a distinctive 2 frequency warbling tone of approximately 550 and 1000 Hz used for pair identification. The tone is detected at the far end of the cable pair or drop wire by using the AT-8629 test probe.

**146A Test Set (Section 634-200-504)**

**3.11** The frequency of the tone source generated by this test set is accurately controlled at 577.5 Hz. Both the signal level (amplitude) and interruption rate are controllable from the front panel allowing the user to tailor the tone to his specific needs: wire identification, balance testing, or fault locating.

**CB100D Test Set (Section 634-210-510)**

**3.12** This central office unit transmits an interrupted 500 Hz tone and together with the CB101D (field) test set makes up the CB Automatic Pair Identifier.

**KS-14103, L5 Test Set (Section 634-305-501)**

**3.13** This test set is equipped with a 7A buzzer used as the tone source for the exploring coil. The buzzer may be operated continuously or intermittently and is controlled by the TONE key.

**KS-14103, L6 Test Set (Section 634-305-502)**

**3.14** The KS-14103,L6 test set consists of the L7 power unit and L8 control unit. The L8 control unit contains the signal generator which produces a 577.5 Hz interrupted or continuous tone. The period of interrupted signal may be varied (internal adjustment) from 0.1 to 1.0 seconds.

**INAUDIBLE**

**3.15** The signal from the 116A and AT-8121 test sets and the HB11111 Cable Restoral System is inaudible.

**116A Test Set (Section 106-310-116)**

**3.16** The 116A test set is a transistorized oscillator which generates a 300 kHz signal. The level of the output can be controlled by means of a HI-LO switch and an output level control. This set is part of the 120A test set. This test set is used as a signal generator for wire identification on J, K, L, N, ON/K, ON1/K, ON2/K, P1 and P1T carrier circuits.

**AT-8121 Test Set (Section 634-200-520)**

**3.17** The AT-8121 test set produces a 20 kHz inaudible tone used to identify cable pairs

in exchange area loop and trunk plant without interfering with service. The test set has a limit of about 2 miles on nonloaded loops. Identification of loaded loops is limited to approximately 9000 feet.

#### Methods of Applying Tone

3.18 There are two ways of sending audible tone on conductors:

(a) **Grounded tone**—The source is connected through a condenser, to the conductor under test and to a ground. This method is generally used in subscriber and interoffice trunk cables and in short quadded cables.

(b) **Nongrounded tone**—The tone source is connected between the two conductors of a pair, two pairs of a quad, or between single conductors from the two pairs of a quad. This method is generally used in long toll cables and when inaudible tone is applied across a pair.

#### 4. AUDIBLE TONE FROM A SPLICE OR SHEATH OPENING

4.01 Before applying audible tone at a splice or sheath opening, the special circuits (paragraphs 2.02 and 2.07) should first be disposed of by identifying first and then:

- (a) Rerouting if possible
- (b) Identifying them from a termination when the circuits are spare and then transferring the pairs
- (c) Segregating the special circuits in the cable by gauge, type of conductors (pairs or quads), or by color group or units in exchange cable.

4.02 Before connecting tone to an interoffice trunk or subscriber pair, the pair should be monitored to be sure it is not busy.

#### 5. AUDIBLE TONE FROM A TERMINATION

5.01 In cables or complements containing special circuits, identification tone must be transmitted from a termination where identity of the circuits

and the conductors is known. This tone is sent in accordance with the following rules:

- (a) After a listening test has been made on spare conductors and on conductors that are used for subscriber circuits or interoffice trunk circuits
- (b) After authorization has been obtained to reroute, transfer, or open conductors that are used for special circuits.

#### 6. DETECTION OF AUDIBLE TONE

6.01 There are four ways in which the audible tone on a conductor can be detected:

- (1) Direct contact with the wire, terminal binding posts, or springs by using a needle point test pick or a test probe connected to a listening circuit. This method is permitted only in dead cables.
- (2) Direct contact with the wire, terminal binding posts, or springs using a needle point test pick or a test probe connected **through a condenser** to a listening circuit. This method is generally used in working cables or complements that do not contain special circuits.
- (3) By means of a probe or exploring coil, such as the 513A tool, AT-8629 test probe, or 79-type test set and a suitable amplifying apparatus such as the 107A or 147A amplifier or the audio-frequency circuit of the 71A test set. The probe and amplifier must be used in cables containing special circuits.
- (4) By means of the CB Automatic Pair Identifier for rapid identification of both spare and working noncolor coded pairs.

#### 7. USE OF INAUDIBLE TONE

7.01 Inaudible tone, from the 116A or AT-8121 test set, is connected directly to working conductors. On carrier or data circuits, the tone must be limited to specific values.

7.02 The high frequency tone will not operate through loading coils; therefore, this tone cannot be used if there is a loading coil on the conductor between the source and the identifying point.

**7.03** Inaudible tone on a conductor can be detected only by the use of a probe such as the 572B tool with the 115A test set. This method is intended primarily for use at splices and sheath openings.

**7.04** The inaudible tone may be connected to a conductor without a listening test, and conductors that are used for special circuits must not be opened unless specific authorization has been obtained. Therefore, the 116A test set is not equipped with a listening circuit to determine if the circuit is in use.

## 8. ESTABLISHING TALKING CIRCUIT

**8.01** In many splicing operations, it is necessary to have a circuit for talking between sheath openings, splices, and terminations. Detailed instructions covering the use of specific types of test sets used for this purpose are given in other sections. General rules to be followed in establishing a talk circuit are provided in Part 9.

## 9. RULES FOR ESTABLISHING TALK CIRCUIT

**9.01** Spare conductors should be used for the talk circuit whenever possible. If no spare conductors are available, permission to use conductors of a working circuit should be obtained in accordance with local routine.

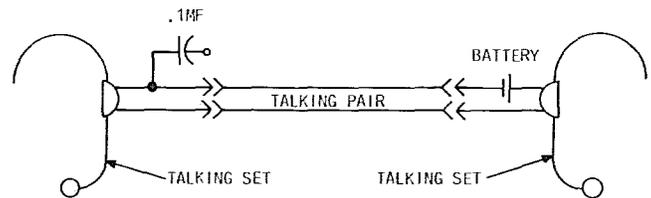
**9.02** In establishing a talk circuit between two cable terminations, such as a central office main frame and a distribution terminal, select a good spare pair that is included in the count of the terminal.

**9.03** Between adjacent splices, it is generally possible to select a tracer or marker pair, or quad for the talk circuit. In a working cable, make sure that the tracer or marker pair selected is spare.

**9.04** The talk circuit can be identified with tone, following the general rules given for identifying conductors. In toll cables that are terminated on a primary toll testboard, the tone may be supplied from the board. In some central offices, permanently wired identification tone is available at convenient points along the frame.

## 10. TYPICAL CIRCUIT AND APPARATUS

**10.01** A typical talk circuit is shown in Fig. 1.



**Fig. 1—Typical Talking Circuit**

**10.02** The apparatus generally used in the talk circuit is as follows:

- (a) 52E test set consisting of a receiver and transmitter plus a  $0.1\mu\text{F}$  condenser for use in listening and testing
- (b) 84A test set used with the 52AC headset
- (c) The battery supply is usually obtained from a test set such as the 76-type; however, a separate  $4\frac{1}{2}$  volt dry cell is sometimes used.

**10.03** In cables where the talk circuit may be operated through repeaters, the 84A cableman's talking set or D-161013 test set should be used.