

## QGL7A TONE GENERATOR

### DESCRIPTION, OPERATION, AND MAINTENANCE

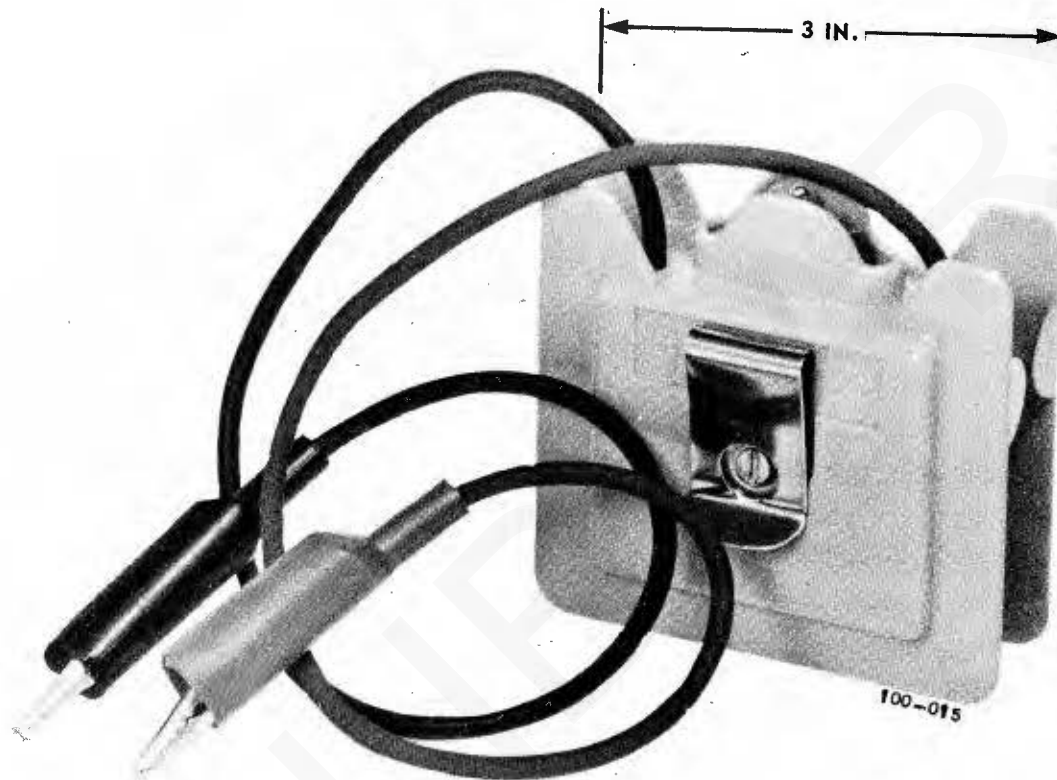


Fig. 1 — QGL7A Tone Generator (Closed)

#### 1. GENERAL

1.01 The QGL7A Tone Generator (Fig. 1) is a compact self-powered device for conductor and telephone circuit verification. It is used to:

- trace and verify cable pairs;
- test for continuity, opens, and shorts on conductor pairs;
- identify tip and ring, and various line conditions on working lines;
- supply talk battery for communicating on a cable pair;

- trace concealed wires;
- test for grounded conductors.

1.02 A test handset (QSE4-Type or equivalent) is used in conjunction with the tone generator when tracing or verifying conductors by the tone method.

1.03 The tone generator can be used as a replacement for buzzer type test sets; e.g., the 81A test set.

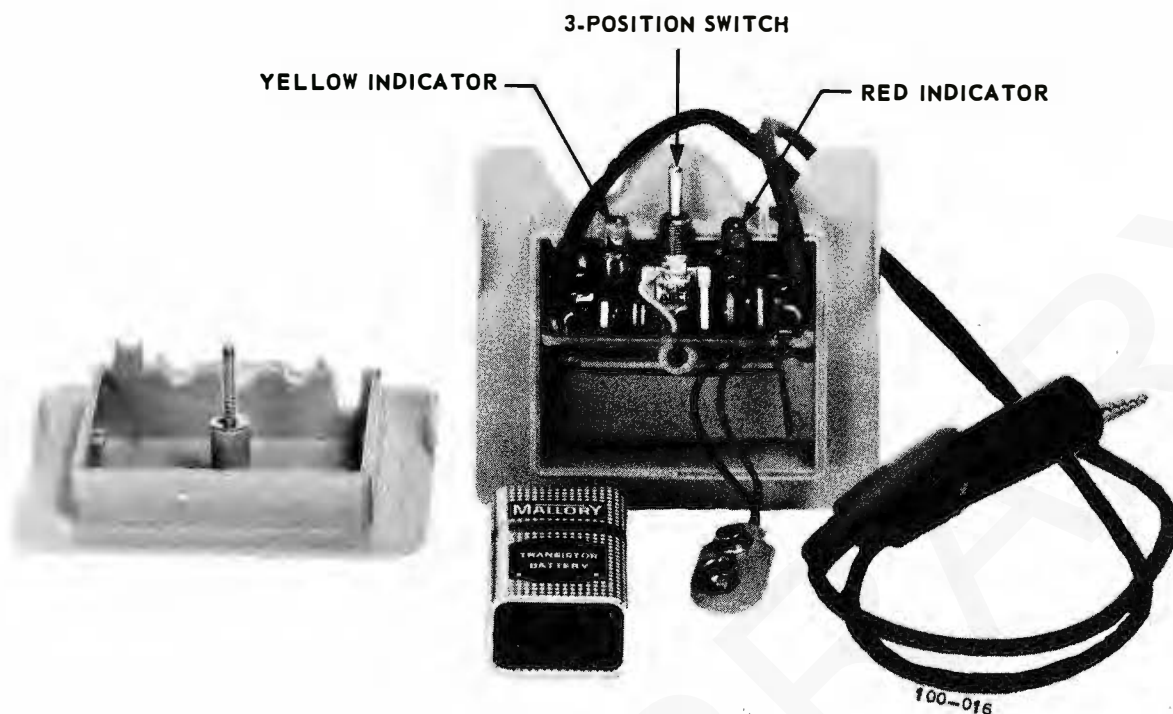


Fig. 2 — QGL7A Tone Generator (Open)

## 2. DESCRIPTION

2.01 The tone generator (Fig 2) consists of a pulse generator, voltage sensing circuit, two indicators, and a switch. All the components are housed in a case made of durable insulating material. Two test leads with alligator clips extend from the case for connecting to the desired test pairs. Space is provided within the case for one 9-volt transistor radio battery (not supplied).

2.02 The switch has three positions:

- Off (center position)
- Tone and continuity (towards the red indicator)
- Tip and ring, and line condition identification (towards the yellow indicator)

*Note:* Talk battery power may be supplied in any switch position, but the test set should be used in the “off” position (if no other function is necessary) to conserve battery life.

## 3. OPERATIONAL CHECKS

3.01 Before using the tone generator, perform the following checks:

- (1) Place a test handset across the leads of the tone generator. Move the switch towards the red indicator, and listen for tone. If no tone is heard, check the battery.
- (2) Move the switch towards the red indicator, and short the test leads. The red indicator should light brightly. If the red indicator does not light brightly, check the battery.
- (3) Move the switch towards the yellow indicator, and touch the BLACK lead to the switch. The yellow indicator should light brightly.

3.02 Before operating the tone generator in temperatures below  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ), it is advisable to install a fresh battery, and warm the tone generator to room temperature. A tone generator warmed to room temperature with a fresh battery will operate for at least 30 minutes in a temperature of  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ).

## 4. TEST METHODS AND CONNECTIONS

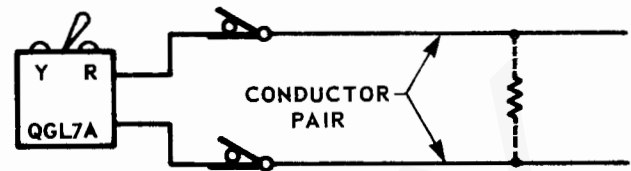
4.01 The paragraphs which follow give test connections and procedures for making the following tests:

- Testing For Shorted Conductors (Visual Method) (4.03)
- Testing For Shorted Conductors (Tone Method) (4.04)
- Testing For Continuity (Visual Method) (4.05)
- Testing For Continuity (Tone Method) (4.06)
- Tracing a Pair (4.07)
- Testing For Grounded Conductors (Visual Method) (4.08)
- Testing For Grounded Conductors (Tone Method) (4.09)
- Checking Tip and Ring Polarity (4.10)
- Line Condition Identification (4.11)
- Locating Concealed Wiring (4.12)
- Talk Power (4.13)
- Tracing and Talking (4.14)
- Tone On a Working Line (4.15).

4.02 **PREPARATION.** Before using the tone generator, always check its operation in accordance with 3.01.

**Caution:** Do not connect the tone generator across a noncurrent-limiting supply; e.g., directly across an office battery supply.

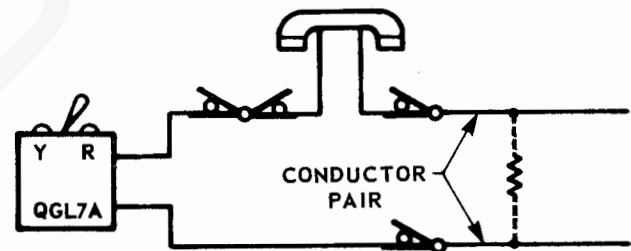
## 4.03 TEST FOR SHORTED CONDUCTORS (VISUAL METHOD).



- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect the tone generator across the conductor pair to be tested.
- (3) If the red indicator lights, the pair is shorted. If the red indicator does not light, the pair is not shorted.

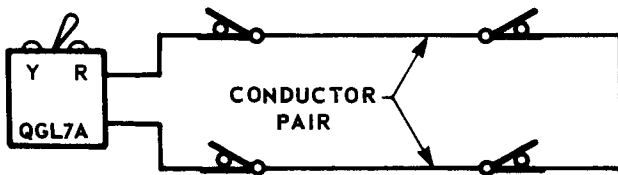
**Note:** For high resistance shorts, use the tone method in 4.04. The maximum reliable detection capability of the tone generator, using the visual method, is 3000 ohms.

## 4.04 TEST FOR SHORTED CONDUCTORS (TONE METHOD).



- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect a test handset in series with one lead of the tone generator and one conductor of the pair under test. Connect the other lead of the tone generator to the second conductor.
- (3) If the pair is shorted, a tone is heard in the handset. The level of the tone indicates if the short is high or low resistance. The red indicator lights if the short is less than 3000 ohms.

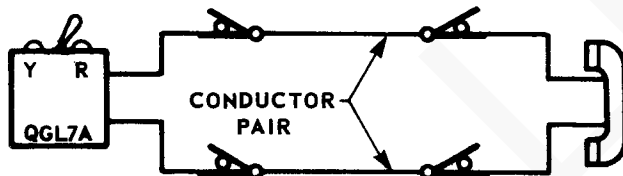
## 4.05 TESTING FOR CONTINUITY (VISUAL METHOD).



- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect the tone generator to the pair to be tested.
- (3) Connect a jumper across the other end of the pair being tested.
- (4) If the red indicator lights, the pair under test is good. If the red indicator does not light, one or both conductors are open.

*Note:* A shorted pair gives the same indication as a good pair (i.e., the red indicator lights). Test the pair for shorts before testing for continuity (see 4.03 or 4.04).

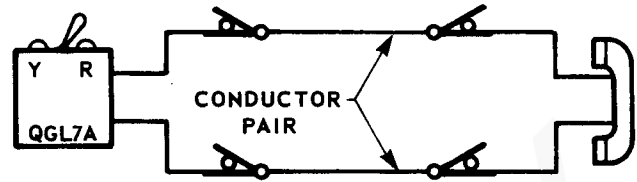
## 4.06 TESTING FOR CONTINUITY (TONE METHOD).



- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect the tone generator to the pair to be tested.
- (3) Connect a test handset across the other end of the pair.
- (4) If the pair is good, a tone is heard in the handset. If no tone is heard, one or both conductors are open.

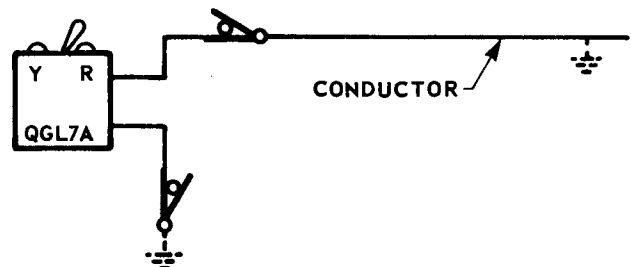
*Note:* A shorted pair also gives a no-tone indication. Test the pair for shorts before testing for continuity (see 4.03 or 4.04).

## 4.07 TRACING A PAIR.



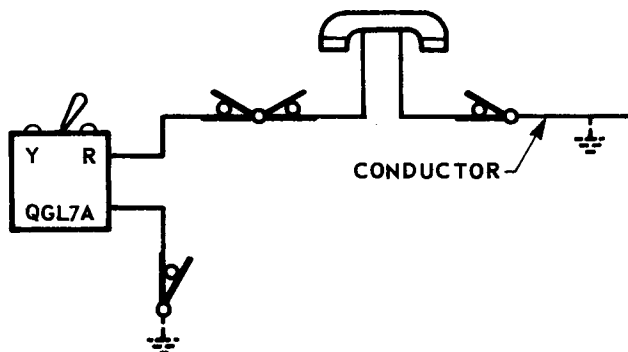
- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect the tone generator across the pair to be traced, and test for shorts (see 4.03 or 4.04).
- (3) At the remote location, connect a test handset across each pair until a tone is heard identifying the pair being traced.
- (4) If a tone cannot be located at the remote location, either,
  - (a) the pair being traced does not appear at that location; or
  - (b) one or both conductors of the pair are open, interchanged, or shorted together.

## 4.08 TESTING FOR GROUNDED CONDUCTORS (VISUAL METHOD).



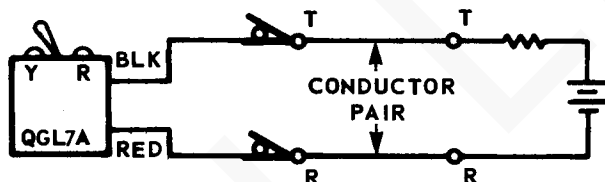
- (1) Move the tone generator switch towards the red indicator.
- (2) Connect one lead of the tone generator to the conductor to be tested.
- (3) Connect the other lead of the tone generator to a local ground.
- (4) If the conductor is grounded, the red indicator lights.

#### 4.09 TESTING FOR GROUNDED CONDUCTORS (TONE METHOD).



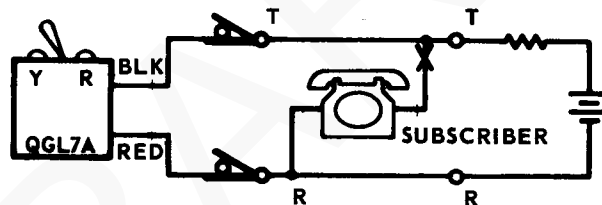
- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect one lead of the tone generator to a local ground.
- (3) Connect the other lead of the tone generator to one lead of a test handset.
- (4) Connect the free lead of the test handset to the conductor to be tested.
- (5) If the conductor is grounded, a tone is heard in the handset.

#### 4.10 CHECKING TIP AND RING POLARITY.



- (1) Move the switch on the tone generator towards the yellow indicator.
- (2) Connect the BLACK lead of the tone generator to the Tip, and the RED lead to the Ring, of the line to be tested.
- (3) If the T-R polarity is correct (i.e., T positive and R negative), the yellow indicator lights brightly.
- (4) If the yellow indicator does not light, the T and R connections are reversed.

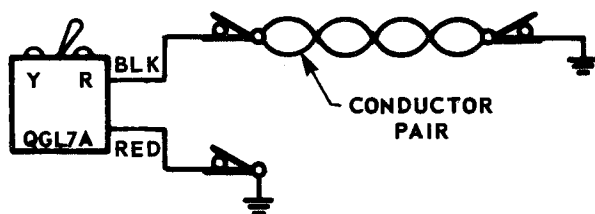
#### 4.11 LINE CONDITION IDENTIFICATION.



- (1) Move the switch on the tone generator towards the yellow indicator.
- (2) Connect the BLACK lead of the tone generator to the Tip, and the RED lead to the Ring, of the line being verified.
- (3) If the yellow indicator lights brightly, the line is not in use (ON-HOOK).
- (4) If the yellow indicator lights only dimly, the line is in use (OFF-HOOK).
- (5) If the yellow indicator flashes, there is a ringing voltage on the line.

**Note:** If the yellow indicator does not light at all, polarity reversal on the line is indicated.

## 4.12 LOCATING CONCEALED WIRING.



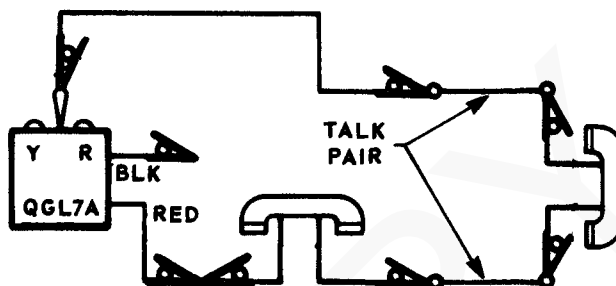
- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect RED lead of the tone generator to a local ground.

*Note:* The ground must not be physically close to the wiring being traced; do not use a conductor in the same cable.

- (3) Connect the BLACK lead of the tone generator to both conductors of the pair being traced.
- (4) At the remote end of the pair, connect both conductors to ground.
- (5) The red indicator on the tone generator must light. If the indicator does not light, the ground lead is open or high resistance. Choose another ground for the red lead of the tone generator.
- (6) Using an exploring coil and amplifier, trace the path of the concealed pair by detecting the null directly over the pair. A capacitive probe and amplifier may be used to identify pairs in a cable. However, this method can be used only when the probe can be actually moved over the pair being traced.

*Note:* An AM radio tuned off-station can be used in place of the exploring coil and amplifier. When the end of the radio antenna coil is at right angles to the pair being traced, a tone can be detected, with a null over the pair.

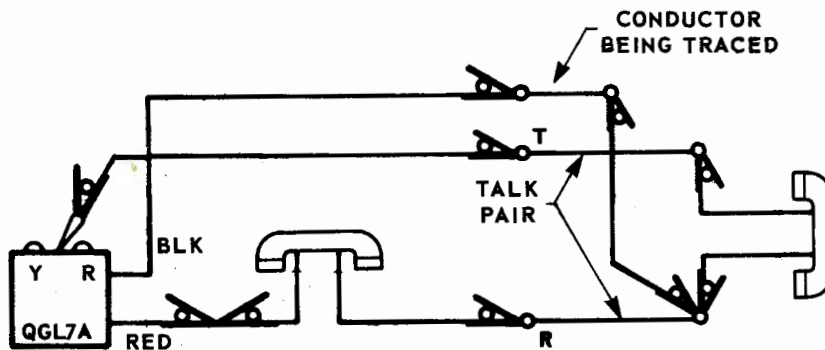
4.13 TALK POWER. The tone generator can be used to establish a talking path on a spare pair when a talk battery is not available.



- (1) Connect the RED lead of the tone generator to one lead of a test handset.
- (2) Connect the other lead of the test handset to one conductor of the pair being used for the talk circuit.
- (3) Connect a jumper between the toggle of the switch on the tone generator and the other conductor of the pair being used.
- (4) At the remote location, connect another test handset across the pair being used.
- (5) Communication between the two locations can now be effected.

*Note:* Talk power is supplied with the switch on the tone generator in any position. It is recommended that the switch be left in the center OFF position, unless another function is also required. Any other function described in this section can be performed at the same time as the tone generator is being used to supply talk power. To do so, use the BLACK lead, and a jumper as an extension of the RED lead.

## 4.14 TRACING AND TALKING.

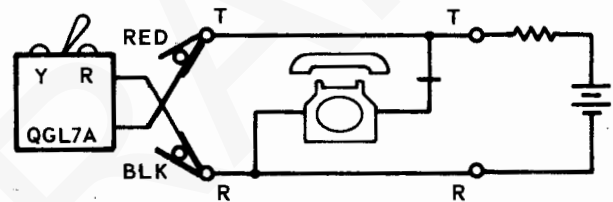


- (1) Connect the RED lead of the tone generator to one lead of a test handset.
- (2) Connect the other lead of the test handset to the Ring lead of the pair being used for the talk circuit.
- (3) Connect the toggle of the switch on the tone generator to the Tip lead of the talk pair.
- (4) Connect the BLACK lead of the tone generator to the conductor to be traced.
- (5) Move the switch on the tone generator towards the red indicator.
- (6) At the remote location, connect a second handset across the talk pair.
- (7) At the remote location, connect an auxiliary test lead to the Ring lead of the talk pair, and probe with the other end of the test lead for the conductor with the tone on it.

*Note:* When the test lead is in contact with the conductor to which the BLACK lead of the tone generator is connected, a tone is heard in both handsets, and the red indicator on the tone generator lights dimly.

- (8) Move the BLACK lead of the tone generator to the next conductor to be traced, and repeat (7) above. Continue until all conductors have been traced.

## 4.15 TONE ON A WORKING LINE.



- (1) Move the switch on the tone generator towards the red indicator.
- (2) Connect the RED lead of the tone generator to the Tip lead of the working line.
- (3) Connect the BLACK lead of the tone generator to the Ring lead of the working line.

*Note:* Using the tone generator in this mode busies the circuit on the CO lines. Also, if a Key Telephone set is placed ON-HOOK with the tone generator still connected, it will cause the Key Telephone System to go on hold.

## 5. MAINTENANCE

- 5.01 The QGL7A Tone Generator should be stored in a dry location when not in use. For extended periods of storage, remove the battery from the unit.
- 5.02 Replace weak or leaking batteries immediately.
 

*Note:* Battery voltage may be measured between the RED lead and the toggle switch.
- 5.03 Avoid dropping the tone generator.
- 5.04 If the tone generator is immersed in water, dry thoroughly before using.
- 5.05 The QGL7A Tone Generator is not repairable in the field.