

PAIR IDENTIFICATION USING HIGH FREQUENCY TONE EQUIPMENT  
INCLUDING PLANT SERVICE CENTER AND CENTRAL OFFICE RESPONSIBILITIES

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<b>1. GENERAL</b>		2.08 Take measurements on the splicer's telephone cable pair as requested. Enter the measurements in the opening-closing log.
1.01 This section covers procedures for the use of high frequency equipment by construction forces.		



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2.09 Notify the frame of the cable complement being identified and the transfer number.

2.10 Obtain a release on special circuits coded RT or RC when requested by the splicer.

### 3. CENTRAL OFFICE RESPONSIBILITIES

3.01 Manually identify special circuits listed RT (see 2.01) with the splicer. Place front tap shoes and the automatic tagger on the main distributing frame (MDF) as requested by the test desk.

3.02 Operate the guess box (verifier) on cable counts as requested by the assigner.

3.03 Place the control pair leads on a cable pair available at the splice as specified by the assigner.

NOTE: The assigned control pair must be a clear nonworking pair. The test board must check with the customer for approval before removing a working line from service for use as a control pair.

3.04 Complete the frame work for the transfer as soon as possible after notification by the test desk of the transfer completion. This work should be done on evening or night shifts, if possible, to avoid unnecessary customer inconvenience.

### 4. CONSTRUCTION RESPONSIBILITIES

4.01 Obtain opening and closing numbers from the test desk each day.

4.02 At the time the sheath is opened, request the test desk to have front tap shoes and the automatic tagger placed on the cable count to be identified. Be specific. Give the test desk the cable number, pair count, control pair, splicer's pair, and telephone number assignment.

4.03 Have the test desk take loop resistance and capacitance measurements on the splicer's telephone pair. These measurements should be entered with the opening number in the log.

4.04 When tagging operations are complete, notify the test desk.

4.05 When the transfer is completed in the field, notify the test desk.

## 5. MURPHY AUTOMATIC CABLE TAGGER

5.01 The Murphy automatic cable tagger consists of a central office unit and a field unit.

5.02 The field unit is a 15-kHz transmitter in a metal housing with two meters for "reading out" the pair numbers. The left meter is designated tens and the right meter is designated units. Included are an audio amplifier and probe jack for identifying the control pair of the central office unit. No maintenance other than battery replacement (one KS-6570) is required on the field unit.

5.03 The central office unit contains a motor driven rotary switch connected to the pairs at the main frame by means of cable shoes. A 15-kHz signal on the ring of any pair in the group being identified will cause the rotary switch to stop on the pair and "read" the pair number to the field unit.

5.04 Three types of cable shoes are provided for connecting to the main frame protectors (see Section 106-310-127):

(a) The B test connector is designed for use on C50, C52, E50, E52, 1268, and 1177 protector mountings.

(1) The Ace C50 front tap shoe clamps on C-50 protector mountings.

(b) The C test connector is designed for use on 300-type connectors.

(1) The Ace 300 front tap shoe clamps on 300-type connectors.

(c) The F test connector is designed for use on 444-type jacks and 301-type connectors.

5.05 The cable shoes are equipped with amphenol plugs for easy connection to standard cords of other test equipment.

(a) The Ace front tap shoes are equipped with amphenol connectors. The A25B connector cables are used to connect the front tap shoes to other test equipment.

- (b) The B, C, and F test connectors are equipped with two KS-19163-L1 plugs each. The P100A and P100B cords are used to connect two shoes together. Two XP50B cords (Kent Distributing House, Western Electric) are needed for each test connector to connect it to other test equipment. The XP50B cord is an A25B cable equipped at one end with a KS-19162-L3 plug. It can be ordered to the length needed.

5.06 The care and maintenance of the central office unit should be included in the Equipment Test List (ETL) as mandatory work (MW) as follows:

- (a) Inspect all cords and shoes quarterly.
- (b) Clean rotary switch face plate quarterly.

## 6. AT-8121 TEST SET MODIFIED TO 15-KHZ

6.01 The AT-8121 test set consists of two pieces of equipment with associated cords and probe:

- (a) AT-8121 transmitter
- (b) AT-8121 receiver

6.02 The modified AT-8121 transmitter sends a 15-kHz signal from a central office or cable terminal over cable pairs. It is 6-½ inches long, 5 inches deep, 2-¾ inches wide and weighs about 2 pounds.

6.03 The AT-8121-L3A is a transistorized receiver for the 2-kHz signal. It is 9 inches long, 5-½ inches deep, 4-¼ inches wide and weighs about 3 pounds. The receiver is used at the splice location. (See Section 634-200-520 for description, maintenance and replacement parts.)

## 7. IDENTIFYING CONDUCTORS – AUTOMATIC

7.01 At the central office main frame, place front tap shoes and the central office automatic tagger on the count to be identified.

- (a) Plug the extension cables into the front tap shoes.
- (b) Plug tie cables in sequence to the central office automatic tagger unit. Be sure tie cables are out of the working area and clear of ladder space.
- (c) Connect control pair leads from the automatic tagger pair on the cable side of the protector.

NOTE: The red wire of the control pair leads connects to ring side of the control pair. The white wire connects to the tip side. The black wire connects to frame ground.

- (d) Connect the tagger to a 110-volt AC power supply with the cord provided. Turn the AC line switch to ON. The meter on the tagger should read 12 volts. This reading indicates an output of 800 Hz audible tone on the control pair. When the splicer connects to the control pair, he trips the audible tone from the line. The meter will then read 15 volts.
- (e) Momentarily operate the start button on the tagger. The tagger should complete one search cycle. The voltage reading on the tagger should drop about three volts during the search cycle.
- (f) Check all cords on the tagger to be sure they are plugged in and are in sequence.
- (g) Close keys on the front tap shoes on all pairs except those designated RT or RC on the special service list or unless otherwise instructed by the test desk.

- (1) After the front tap shoes are connected to the automatic tagger, the Ace verifier (guess box) should be used to test the control pair and the rings of all cable pairs. The guess box should be calibrated to 100 with a short across the tip and ring terminals.

A verifier reading of about 200 indicates negative battery on the tip or ring. A reading of about 100 indicates ground on the tip or ring. An idle working line should read about 200 on the ring and 100 on the tip. A busy line will read between 125 to 165 on the ring and 110 to 140 on the tip. A busy tip party (carrying the MDF jumper) will read higher on the tip than on the ring.

- (a) Where junction boxes are used to connect the tagger to a central location, bridge the guess box on the tagger cables at an unused junction box.

EXAMPLE: The guess box uses junction box cables 1 and 2. The tagger uses junction box cables 9,

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10, 11, and 12. Patch cable connector 1 to 9 and patch 2 to 10 for the first 50 pairs; patch 1 to 11 and 2 to 12 for the last 50 pairs.

- (b) Where junction boxes are not used, connect each front tap shoe cable to a 3-way adapter bridging KS-19252-L3 (old number 20-3158). See Section 461-200-182. Connect the automatic tagger to the same adapter with short cables. The guess box should be plugged into the third plug of the adapter. This checks the continuity of the amphenol plugs, cable, and front tap shoes.

NOTE: When the cable splicer calls in for a control pair, tell him which cable pairs have open or grounded rings.

- (h) When requested by the test desk, remove the tagger from the count and store it in a designated place.

### 7.02 At the splice location:

- (a) Connect the receiver across binding posts marked PHONES on the field unit.
- (b) Connect ground to the G post.
- (c) Plug the probe into the probe jack. Throw the toggle switch to HI and adjust the CAL knob to 10 for maximum amplifier gain.
- (d) Call the central office for the control pair tone on pair No. 1 (calibrate pair), then pair No. 2 (control pair) when the Murphy automatic tagger is used. One control pair is used on other automatic taggers. Stay on the line until both pairs have been identified in the splice by the induction probe. Request the cable pair identity of each pair, then release the central office.
- (e) Connect the control pair, tip side, to the T post, and ring side to the R post in the field unit. The meters should swing to the right and stop at or near 0-0.

- (f) Adjust the balance on the meters to read exactly 0-0. This compensates for loop resistance between the splice and central office.
- (g) Remove the receiver and probe. Connect the 6-prong plug from the remote unit to the field unit. Press the start button on the remote unit. Meters will show a cycling action. If the meters do not cycle, the control pair is probably reversed.
- (h) Throw the switch on the remote unit to ON. Place the black and red cords into proper jacks on top of the remote unit. Clip the black cord to the tip side of the control pair and red cord to the ring side of control pair. The push buttons below the cord jacks will release tone from the cords without removing the clip from the cable pair. The set is now ready for calibration of the 15-kHz output.
- (i) Throw the toggle switch to LO and CAL knob to 2. Increase the output with each operation of the start button until a minimum setting is found that will cause the meters to stop on the known calibrate pair number. Note this setting. Increase the output until a minimum setting is found that will cause the meters to stop on pairs other than the known calibrate pair number.

NOTE: If the output is too low, the office machine cannot detect a tone and will not stop on a pair. If the output is too high, the office machine will recognize induction and will stop on several pairs. The left meter reads tens and the right meter reads units.

- (j) These two settings of the CAL knob are the range within which the tagger will select only one pair. Set the CAL knob about  $\frac{1}{4}$  the distance above the low point of this range.
- (k) When the meters have stopped on a pair number, pressing the red push button will release the tone and allow the meters to return to 0-0, home position.
- (l) Move the red lead to the ring side of an unidentified pair. Press start button.

- (m) Place the identified pair in the tag board. Should the tagger fail to identify a pair, set the pair aside and complete the balance of the group. These pairs may be defective, out of group, etc. The hundred pair reads 0-0. The start button will not start a cycle until the tone is released from this pair.
- (n) Random pairs set aside may be identified by probing for 15-kHz tone from the main frame, including the control pair tone. Also the 15-kHz output from the field unit may be detected on the MDF with the silent buzzer receiver on 15KC or by using the AT-8121 test set.
- (o) Some two and four party lines in panel and SxS offices have grounded rings when idle, and the tip party carries the main frame jumper. These pairs can be identified when lines are busy. To identify these pairs when idle, short the pair before applying the 15-kHz tone.

## 8. MURPHY SILENT BUZZER

8.01 The Murphy silent buzzer consists of two pieces of equipment:

- (a) SBT - transmitter
- (b) SBR - receiver

8.02 The SBT transmitter is a source of a 15-kHz unmodulated sine-wave signal and also an 800-Hz audible tone.

8.03 The SBR receiver is a transistorized receiver peaked at 15-kHz. It converts the 15-kHz signal to 1000 Hz. The LO TONE position has an audio gain of 80 dB at 1000 Hz.

8.04 The SBT-3 and SBR-3 are housed in 5-inch by 3-inch by 7-inch cases and are equipped with the necessary cords and probes.

8.05 The SBT-4 and SBR-4 are about 6-inches by 3-inches by 4-inches. The SBR-4 has a signal level meter. It will identify the tip or ring of a cable pair.

8.06 The SBT-3 holds the talk battery for talking between the SBR-3 and SBT-3. The SBT-4 holds the talk battery for talking between the SBT-4 and SBR-4. Models 3 and 4 are not interchangeable when the talking pair feature is used.

## 9. ESTABLISHING TALKING PAIR (MURPHY SBT-3 AND SBR-3) CO OR SPLICE TO SPLICE (SEE EXHIBIT 1)

9.01 At the CO or termination:

- (a) Connect a talk set across the good vacant pair to be used.
- (b) Connect the G post of the transmitter to the ring side of any other pair in the same count. The pair can be working.
- (c) Connect the probe jack to the ring side of the talking pair with the probe clip.
- (d) Turn the rotary switch on the transmitter to 15KC.
- (e) Wait for the splicer to identify the pair and establish a talk line. A tone will be heard on the CO talking set when the circuit is completed by the splicer.
- (f) Remove the tone from the talk pair by removing the probe clip.

9.02 At the splice:

- (a) Connect the G post of the receiver to ground.
- (b) Connect the talk set across the TLK SET posts.
- (c) Set the switch at 15KC.
- (d) Adjust the volume of the receiver to the highest gain (full clockwise rotation).
- (e) Pick up two pairs with the probe. The talk pair should have tone more nearly equal on the ring and tip.

NOTE: If a spread of tone is experienced, lower the volume gain on the receiver unit. If this fails, place the ground cord on a spare pair or open the talking pair away from the source of tone. Place the ground cord on the field side of the talk pair. Another method is to loop the ground cord around the splice on the side toward the tone source. Adjust the volume on the receiver to its best level.

- (f) Connect the talk pair to posts TKG of the receiver unit. Move one side of the talking set as shown by the arrow on the receiver unit. The central office will now hear the tone and remove the probe from the talk pair.

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**10. IDENTIFYING CONDUCTORS - MANUAL (MURPHY SBT-3 AND SBR-3)**

**10.01 Frame to splice:**

- (a) At the splice, connect the capacity probe to the pair to be identified. Separate the pair from the group.
- (b) At the termination, run the frame or terminal for the loudest tone. Adjust the gain.

**10.02 Splice to splice:**

- (a) Place the transmitter probe on the wire to be identified.
- (b) At the other splice, probe for tone with the receiver [see note 9.02 (e)].

**10.03 To use audible (low) tone:**

- (a) Switch both the SBT and SBR to the LO TONE position.
- (b) Place both ground cords directly to ground.
- (c) Monitor the pair to be identified.
- (d) If idle, place the tone on the line with the cord from LO TONE post on SBT.

**11. ESTABLISHING TALKING PAIR AND IDENTIFYING CONDUCTORS (SBT-4 AND SBR-4)**

**11.01** The following steps are performed at the central office or termination. [The numbers below refer to the circled numbers in Exhibit 3 (SBT-4).]

**STEP**

- 1 Pick out a spare pair in the count to be tested and connect it to the binding posts on the transmitter marked TKG PAIR.
- 2 Connect the talking set to the binding posts marked TKG SET on the transmitter.
- 3 Connect the G post on the transmitter to the central office ground [or to the ring side of another pair if the cable is long and loaded (see 11.05)].

4 Using the insulated alligator clip (TIP B) in the probe handle, attach the ring side of the pair selected in 1 above, and insert the plug end of the cord into the phone jack on the transmitter.

5 Turn the rotary switch to the position marked 15KC and wait for the splicer to pick up the pair in the field. the ½-inch meter on the transmitter will show approximately a ¾-scale reading indicating the set is putting out a 15-kHz signal.

6 When the splicer is heard in the phones, remove the probe tip from the pair and talk to the splicer.

7 When the splicer announces he is on a pair, run the pairs, starting at the first pair in the count each time, until the pair with the loudest tone is located. Give the splicer the pair number on the frame.

**11.02** The following steps are performed at the central office or termination. (The numbers below refer to the circled numbers in Exhibit 3 (SBR-4).]

**STEP**

- 1 Connect the talking set across the receiver binding posts 1 and 3 at left hand end of set.
- 2 Turn rotary switch to the 15KC position.
- 3 Connect ground to the G post (see 11.05).
- 4 Plug probe cord, equipped with TIP E (capacity probe) or TIP C (needle pick) into Jack on panel of receiver.
- 5 Probe through the cable with the capacity probe until the pair with the loudest signal is found. (The probe is inserted between the two conductors and the pair is slightly separated from the other pairs.)
- 6 Move the talking set lead from post 1 to post 2, and connect the pair just located to posts 1 and 2. The splicer should now be able to talk to the person at the central office end of the cable.
- 7 The splicer now inserts the capacity probe between the two conductors of a pair to be identified. The needle pick (TIP C) is used if it is necessary to make a metallic contact with the pair.
- 8 Hold the pair away from the rest of the group to keep stray signals from causing the wrong identification. Notify the helper that the splicer is on a pair.

**STEP**

NOTE: Induction noise on the talking pair may well be of sufficient signal strength for the helper to run the frame.

- 9 The helper runs the frame, always beginning at the first pair in the count being tested. When the pair with the loudest signal is found, the helper informs the splicer of the pair number. With both men on the same pair, the splicer should adjust the volume on the receiver so that the meter reads "45" (never off scale).

- 10 Battery test on transmitter: Press BATT TEST button on panel. A new battery will read "full scale" on the meter.

11.03 The squelch circuit (Exhibit 3 (SBR-4)) is used for eliminating background noise on the talking circuit.

- (a) The SQUELCH switch is left in the OFF position until the talking pair is picked up.
- (b) The SQUELCH may be turned ON once testing has begun to eliminate all background noise on the talking pair.
- (c) If the capacity probe is being used, it is usually best to have SQUELCH in OFF position.

11.04 After testing has started, both the splicer and the helper get on the same pair. The splicer adjusts the VOL knob until the level meter reads approximately "95" on the scale.

NOTE: A reading that is "off scale" does not mean a thing. Adjust so that maximum reading (when splicer and helper are on the same conductor) is approximately "95" on the meter.

11.05 Procedure for finding the best setup on difficult cases is as follows:

- (a) When it is difficult to tell one pair from another, as on long or loaded cables, try connecting the G post of the transmitter at the central office to another pair in the group being tested - and not to ground. This cancels out much of the cross talk signal on unwanted pairs. Be sure the other pair is in the same group, i.e., another space 25 pair group if PIC cable, or 100 pair group in paper cable.

- (b) When cutting in short sections, it is sometimes helpful to leave the receiver ground connection open, i.e., no lead on the G post.

- (c) If the transmitter and the receiver are close together, e.g., as in a manhole when bridging in sections, be sure the two cases are as far apart as possible. Also try using no ground on the receiver. Also, grounding the two cases is a help in some situations.

11.06 To use the LO TONE (for use where the high frequency, 15-kHz, is not suitable, on carrier circuits, or on sections of new cable not yet connected to equipment):

- (a) Set the rotary switch on both units to LO TONE.

NOTE: The LO TONE source at the transmitter is the LO TONE binding post and the G post. Use the separate cord, with the spade tip on one end and the transfer clip on the other, to connect to the LO TONE post and the cable conductor.

- (b) The low tone is now the same as the 15-kHz tone, except that if used on working lines the low tone can be heard by subscribers.
- (c) This same low tone source can be used with the Murphy speed tester for making rapid section tests of new cables.

11.07 With the set in the ON position, the battery is tested as follows:

- (a) Press the button.
- (b) The meter should read "80" or above.

NOTE: Never run the frame with the SBT in the LO TONE position.

## 12. IDENTIFYING CONDUCTORS (AT-8121 TEST SET)

12.01 Splice to frame:

- (a) At the splice, connect the probe of the receiver to the pair to be identified. Do not allow the probe to contact any other pairs.

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- (b) At the termination, run the frame or terminal with the red lead of the transmitter for the loudest tone.

### **12.02 Frame to splice:**

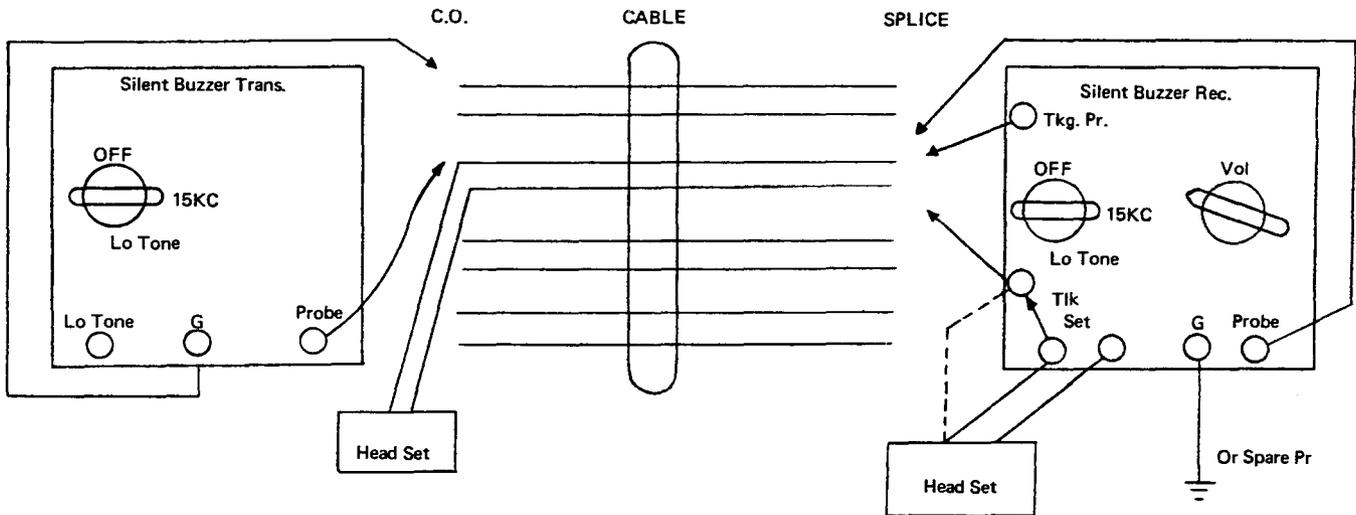
- (a) At the frame or terminal, connect the red lead of the transmitter to the pair to be identified.
- (b) At the splice, move the receiver probe through the splice until a warbled tone is heard. Adjust the volume control for a low level of tone. The pair with the loudest tone is the one desired.

12.03 Refer to Section 634-200-520 for additional information on the AT-8121 Test Set.

## **13. ESTABLISHING TALKING PAIR (AT-8121 TEST SET)**

13.01 For establishing talking pair from the frame to the splice, or frame a terminal to the splice, see Exhibit 2.

**MURPHY SILENT BUZZER (SBR-3 SBT-3)  
ESTABLISHING TALKING PAIR AND IDENTIFYING CABLE PAIRS**

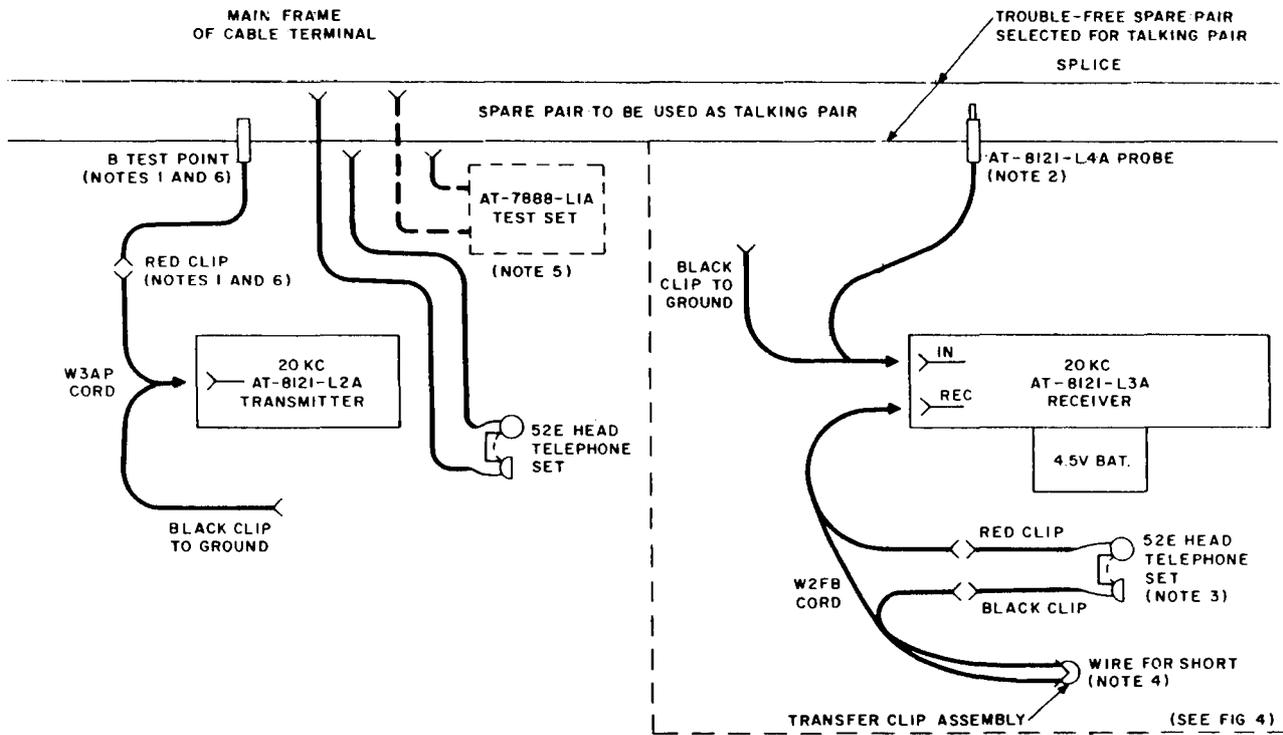


**CONNECT:**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Place head set across good vacant pair.</li> <li>2. Place cord from G post to ring side of any other pair in same cable. Can be working pair.</li> <li>3. Place probe cord clip to ring of talking pair.</li> <li>4. Turn switch to 15KC.</li> <li>5. Wait for splicer to come on talking pair, then remove tone from talking pair.</li> <li>6. To identify pairs, run termination with probe tip. Loudest tone heard is correct pair.</li> </ol> | <ol style="list-style-type: none"> <li>1. Place cord from G post to ground or ring side of spare pair.</li> <li>2. Place head set across TLK SET posts.</li> <li>3. Turn Switch to 15KC.</li> <li>4. Probe splice to locate talking pair. Adjust volume as required.</li> <li>5. Connect talking pair to TLK PR posts.</li> <li>6. Move one cord of talk set as shown by broken line on set. This provides talk battery.</li> <li>7. To identify pairs, move probe to unknown pair and have central office run frame with transmitter probe tip.</li> </ol> |
|---|---|

**EXHIBIT 1**

ESTABLISHING A TALKING PAIR USING A 121-TYPE PROTECTOR & A 300-TYPE CONNECTOR

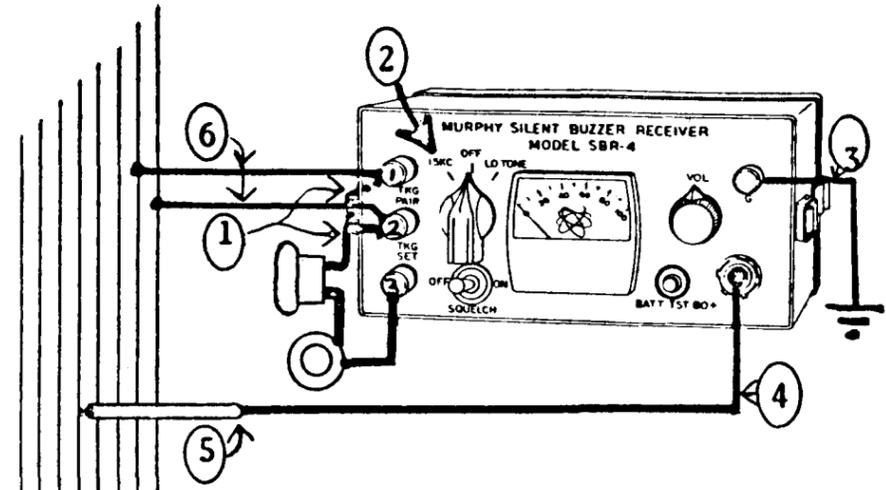


STEP

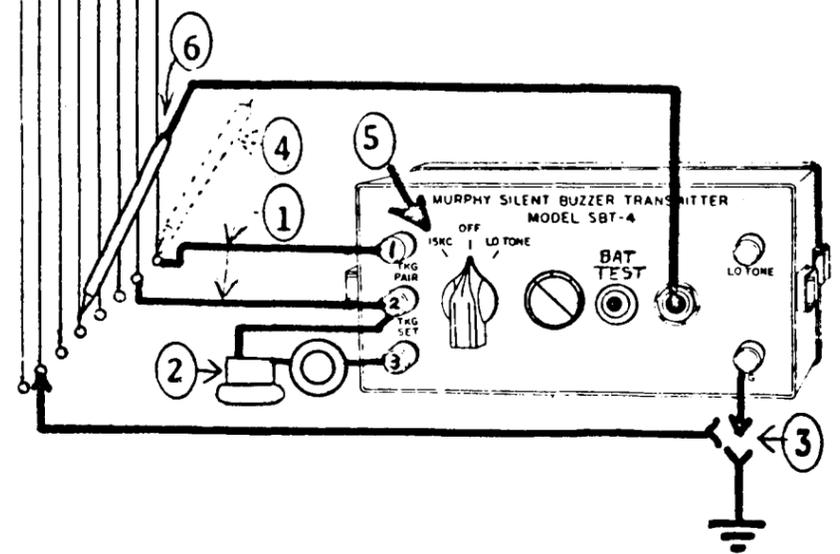
PROCEDURE

- 1 Connect the red clip directly to one side of the talking line. After the talking line is established, remove the red clip from the talking line and connect the clip to the D pair identifier.
- 2 Use the probe to identify the pair selected for the talking circuit.
- 3 After the pair has been identified, connect the 52E head telephone set to the 4.6-volt battery on the receiver.
- 4 Remove the wire used to short the transfer clip assembly. Connect the clip assembly to the tip and ring sides of the selected pair.
- 5 The AT-7000-L1A test set (speaker set) may be used across the talking line so the 52E head telephone set will not have to be worn while the pair is being identified. When the AT-8121-L4A probe is clamped to the pair at the splice location, tone will be heard through the speaker at the central office, indicating that the talking line is completed.
- 6 After establishing the talking line, remove the red clip or D test point thereby disconnecting the transmitter from the talking pair.

EXHIBIT 2



SPLICER IN THE FIELD (SBR-4)



HELPER IN CENTRAL OFFICE (SBT-4)

EXHIBIT 3 - MURPHY SILENT BUZZERS (15 KHZ)