COMMAND POST ALERTING NETWORK (COPAN)
JOINT CHIEFS OF STAFF ALERTING NETWORK (JCSAN)
TESTING AND MAINTENANCE OF TERMINAL SWITCH POINTS AND REMOTE COMMAND POSTS

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1. GENERAL

1.01 This section provides information for testing and maintaining the SC2 Selective Control System and associated equipment at terminal points and Remote Command Posts.

1.02 This section is reissued to generally up date the section as required.

1.03 The following abbreviations apply to this section:

MCP—Main Command Post

RCP—Remote Command Post

DO—Duty Officer

SC2—SC2 Selective Control System

CUG—Common User Group

2. FUNCTIONS

2.01 This system provides for:

(a) Receiving orders and inquiries from the MCP in the form of coded signals.

(b) Replying to the MCP when an order has been received and when an alert condition connection has been established.

(c) Restoring the private line circuit to its normal PBX switchboard termination.

(d) Transmission of CUG (pulse length type) codes to the MCP to initiate a Reverse Pre-emption call or to provide on-hook and off-hook supervision.

3. TESTING EQUIPMENT

3.01 ***At Terminal Switch Points:***

(a) Dial Test Set per SD-1G111-01

(b) Assorted length test clips

(c) Blocking and Insulating Tools per Section 069-020-801

(d) J94021A (21A) Transmission Measuring Set, or equivalent

(e) J64035A (35A or 35B) Transmission Measuring Set, or equivalent

(f) SD-64031-01 Vacuum Tube Test Set, or equivalent

(g) 5A Attenuator, or equivalent

(h) SD-65134-01 2B Signaling Test Set

(i) J68605M (5M), L1 or L3 Echo Suppressor Test Set

(j) 178F or 181B Induction Coil

(k) It would be desirable to use a Brush Pen Recorder ***or equivalent,*** where available, to observe codes transmitted by the MCP and the replies being transmitted to the MCP. This recorder may be connected to the line in accordance with the manufacturer's specifications.

3.02 ***At Control Office:***

(a) Pulse Length Code Test Set per SD-1G069-01 modified to send SC2 codes

(b) Single Frequency Signaling Circuit per SD-1G115-01

(c) 2600-Hz Signaling Circuit per SD-56292-01

(d) 2400-Hz Supply Unit per SD-98092-01

(e) Blocking and Insulating Tools per Section 069-020-801

(f) It would be desirable to use a Brush Pen Recorder ***or equivalent,*** where available, to observe codes transmitted to the terminal switch point and the replies received from the terminal switch point. This recorder may be connected to the line in accordance with the manufacturer's specifications.

4. TESTING VOLTAGES

4.01 All operation and timing tests shall be made with test voltages within the following limits:

	MINIMUM	MAXIMUM
Signaling Battery	−45V	−50V

5. REQUIREMENTS

5.01 Operational tests shall be made on all functions of the satellite SC2 selective control equipment and the associated switching equipment on initial installation or when existing equipment is modified or moved. These tests shall check to see that each function is performed in a manner specified in the circuit description. Local tests are outlined in the following paragraphs. If line facilities are available to the MCP or control office, tests outlined in Part 9 of this section or in Part 5 of Section 310-504-502 may be utilized.

5.02 The SC2 satellite equipment should be tested to ensure that all cross-connections for the assigned codes are correct.

5.03 Standard equipment units used on this circuit shall be tested and maintained in accordance with standard sections as follows:

(a) Ringer-oscillator units per associated sections in the 501- Division.

(b) Single frequency units per Section 179-316-501 or 179-316-502, depending on the test set provided with the installation.

(1) The transmitting portion of the single frequency signaling unit is not used and need not be tested. During tests the blocking tool in the HL relay must be removed. All tests covered in the section can be made except Test G. In place of this test, the electrical and mechanical requirement of the RG relay should be checked.

(2) Modifications shall be made on single frequency units per Note 106 or 111 of SD-1G133-01.

(c) Voice Operated Loss Control and Suppressor (VOLCAS) units shall be tested and maintained in accordance with Parts 10 through 15 of Section 310-504-500.

Note: VOLCAS units are only used at RCP in the PBX connection from the console.

6. TEST A—TERMINAL SWITCH POINT

STEP	ACTION	VERIFICATION
A. Preparation of Dial Test Set		
1	Connect battery and ground to either the BG jack, or −48V and GRD terminals, on the dial test set by means of a 3P7A cord or clip leads, respectively.	
2	Connect the LINE jack of the satellite signaling circuit to the GC jack of the dial test set by means of a 3P7A cord.	
3	Connect the EQPT jack of the satellite signaling circuit to the EM jack of the dial test set.	
4	On 1G007BE unit— Block Operated WT relay. ***Note 1:*** The above preparation steps will cause the L and P1 relays to be operated. The L relay operated from ground on the M lead in the signaling circuit. ***Note 2:*** Translation of pulse length codes to dial codes, for use in operating the J1G009A Dial Test Set, is shown in Table B of Section 310-435-302.	
B. Method		
	Note: Before starting the tests, the following steps are necessary to prevent pre-empting the PBX trunks.	
5	On J1G012FB unit (SD-1G133, Fig. 2)— Insulate 3M of the C relay.	
6	Insulate 4M of the C relay.	
7	Insulate 10M of the M relay.	
Transmission of Call Code (Example: Code 12: K1142R3)		
8	At dial test set— Operate the SEND key of the dial test set.	
9	Dial four digits (1142).	
10	Release SEND key of the dial test set.	

STEP	ACTION	VERIFICATION
11	Dial last digit of the code (3). ***Note:*** Experience indicates that operation of the dial test set must be performed at a fairly rapid speed to avoid the action of the time-out feature provided in the signaling circuit.	***Note:*** The J1G007BJ unit is located about the middle of the J1G012E bay. Facing the equipment, the left half of the unit represents the ***even*** circuit and the right half represents the odd circuit. On the ***even*** circuit of the J1G007BJ unit— Observe that the CL relay operated for approximately 2 seconds. M relay operated. On the J1G007BH unit— AR relay operated. On the dial test set— LP lamp lighted.
Transmission of Off-Hook Inquiry Code		
12	At dial test set— Transmit off-hook inquiry code.	On even circuit in J1G007BJ unit— INQ relay operated for approximately 2 seconds.
13	On J1G012FB unit— Apply ground to fixed contact 2 of the C relay.	
14	At dial test set— Retransmit off-hook inquiry code.	On even circuit in J1G007BJ unit— INQ relay operated for approximately 2 seconds. M relay (operated in Step 11) released. On dial test set— SP lamp lighted.
15	On J1G012FB unit— Remove ground from fixed contact 2 of the C relay.	
Transmission Of Disconnect Code		
16	At dial test set— Transmit Disconnect Code.	On odd circuit in J1G007BJ unit— TP relay operated for approximately 2 seconds. On J1G007BH unit— AR relay (operated in Step 11) remains operated. On odd circuit in J1G007BJ unit— M relay (released in Step 14) remains released. On dial test set— SP lamp (lighted in Step 14) remains lighted.
17	On J1G012FB unit— Remove insulating tools from 3M and 4M of C relay, and from 10M of M relay.	
18	On J1G007BE unit— Remove blocking tool from WT relay.	

STEP	ACTION	VERIFICATION
19	On dial test set (and connected equipment)— Remove all temporary battery, ground, and jack connections used during the testing period.	LP and SP lamps extinguished. L and P1 relays (operated in Note 1 of Step 4) released.
21		On J1G007BH unit— AR relay released.

7. TEST OF OVERALL SYSTEM

7.01 This part describes a series of tests that may be made from the serving test centers in the Washington Area to all terminal switch points. The Pulse Length Code Test Set in use with the Single Frequency Signaling Circuit and associated equipment is used to simulate the MCP functions of transmitting the codes to the terminal switch points and is used to receive the replies.

STEP	ACTION	VERIFICATION
	A. Preparation—Before the Line is Seized for Testing	
	Tests B and C	
1	At Main Command Post— On J1G012CC unit— Insulate 4B of BY relay (to disable the alarm circuit).	
2	At Terminal Switch Point— On J1G012FB unit— Insulate 3M of C relay.	
3	At the Serving Test Center— Connect T jack of Single Frequency Signaling Circuit to L jack of the Pulse Length Code Test Set.	
4	Connect S jack of Single Frequency Signaling Circuit to the line that is used to transmit pulses.	
5	Connect R jack of Single Frequency Signaling Circuit to the line that is used to receive replies.	
	Setting-up a Code Using the Pulse Length Code Test Set (Per SD-1G069-01)	
6	At the Serving Test Center— On Pulse Length Code Test Set— Turn SC2/CUG key to the type of code to be transmitted.	

STEP	ACTION	VERIFICATION
7	Set up the desired code on the A and B keys. ***Examples:*** For SC2 code 12, set A key to 1 and B key to 2. For SC2 code 10, set A key to 0 and B key to 10.	
8	To send code— Operate BCO key to ON.	

B. Method

Test B—Single Link Connection to a Terminal Switch Point

9	At the Serving Test Center— On Pulse Length Code Test Set— Set up Call Code.	
10	Operate BCO key to transmit Call Code.	Reply is returned (listen on the circuit, or observe that LP lamp lights on Pulse Length Code Test Set).
11	Set up Off-Hook Inquiry Code.	
12	Operate BCO key to transmit Off-Hook Inquiry Code.	No reply is expected.
13	At Terminal Switch Point— On J1G012FB unit— Connect ground to fixed contact 2 of C relay.	
14	At the Serving Test Center— On Pulse Length Code Test Set— Operate BCO key to retransmit Off-Hook Inquiry Code.	Reply is returned (listen on the circuit, or observe that LP lamp lights on Pulse Length Code Test Set).
15	At Terminal Switch Point— On J1G012FB unit— Remove ground from fixed contact 2 of C relay.	
16	On Pulse Length Code Test Set— Set up Disconnect Code.	
17	Operate BCO key to transmit Disconnect Code. ***Note:*** If no answer is received for a code to which a reply is expected, twenty seconds must elapse before repeating that code or sending another code.	Reply is returned (listen on the circuit, or observe that LP lamp lights on Pulse Length Code Test Set).
18	See 7.02 and 7.03.	

STEP	ACTION	VERIFICATION
	Test C—Double Link Connection to a Terminal Switch Point	
9	At the Serving Test Center— On Pulse Length Code Test Set— Set up Call Switch Code.	
10	Operate BCO key to transmit Call Switch Code.	Reply is returned (listen on the circuit, or observe that LP lamp lights on Pulse Length Code Test Set).
11	Perform Steps 6 through 8, and Steps 9 through 17 of Test B.	Same verification as in Steps 6 through 8, and Steps 9 through 17 of Test B.
12	At the Serving Test Center— On Pulse Length Code Test Set— Set up Disconnect Switch Code.	
13	Operate BCO key to transmit Disconnect Switch Code. ***Note:*** If no answer is received for a code to which a reply is expected, twenty seconds must elapse before repeating that code or sending another code.	Reply is returned (listen on the circuit, or observe that LP lamp lights on Pulse Length Code Test Set).
14	See 7.02 and 7.03.	

7.02 When tests to a particular station are completed, remove all blocking and insulating tools. Remove all temporary ground connections used during the testing period.

7.03 SC2 codes may be checked by the control office with the use of a Brush Pen Recorder ***or equivalent.*** The recorder is connected to the line in accordance with the manufacturer's instructions.

8. TEST D—TESTING OF CUG SENDER SD-1G145-01, FIG. 1 AND 3 (RCP ONLY)

STEP	ACTION	VERIFICATION
1	Block M1 relay nonoperated (Fig. H of SD-1G133-0132)	
2	Connect Brush recorder on M4 lead at winding of M1 relay to record dc pulse output of CUG code sender.	
3	Operate S relay (Fig. 3 of SD-1G145-014).	
4	Send codes according to local procedure.	
5	Record pulses on Brush recorder, ***or equivalent.*** ***Note:*** CUG codes used are: 10 and 11 for reverse pre-emption from RCP to MCP, and	Correct pulses are recorded.

STEP	ACTION	VERIFICATION

20 and 21 for on-hook codes from RCP to MCP. CUG codes are read approximately the same as SC2, except that the CUG codes are 3 long pulses out of eight. First five (2 long pulses out of five) are units digit (pulse is same as SC2); last 3 pulses are (1 long) for tenths digit (pulses 00, 10, and 20). Both CUG and SC2 are preceded by a 300-ms prepare pulse.

9. WIRE SPRING RELAYS

9.01 Wire spring relays are utilized extensively throughout the COPAN equipment. Reference should be made to the following sections if trouble is experienced with the wire spring relays.

SECTION	SUBJECT
040-502-101	AF, AG, AJ Types—Description
040-502-701	AF, AG, AJ Types—Requirements and Adjusting Procedures
040-502-801	AF, AG, AJ Types—Piece-Part Data and Replacemént Procedures
040-504-701	AK Type—Requirements and Adjusting Procedures
040-504-801	AK Type—Piece-Part Data and Replacement Procedures

10. RESIDENCE LINES—TRANSMISSION LINEUP

10.01 Residence lines will be lined up on initial installation. No routine lineup is required, but residence lines should be lined up whenever line trouble is cleared or when cable routings are changed. All JCSAN locations are Phase VI, using the 306 SS, and are lined up per Section 480-713-500.

10.02 It is assumed that a complete lineup of the DO J bay has been completed, per 4.04 of Section 310-504-502, before attempting to line up residence lines.

10.03 Refer to the drawing issued by the Customer Service Engineer for that particular location for equipment designations and layout.

10.04 It will be necessary to use a 178F or a 181B induction coil in making transmission tests from the residence line telephone set. This is necessary to match the 600-ohm impedance of the transmission measuring set to the 50-ohm impedance at the transmitter of the handset. Detailed information covering tests using this coil may be found in Section 310-405-500.

10.05 ***Procedure***

(1) Remove the transmitter unit from the handset of the residence line telephone set.

(2) Connect terminals 7 and 8 of a 178F or 181B coil to the two spring connectors in the handset using clip leads. (See Fig. 1.)

(3) Adjust the 1000-Hz tone source to a reading of 1.7 dB more than the required transmission level at the transmitter, as follows.

At Phase V Locations (COPAN):

Required level +0.5 dBm plus 1.7 dB for the coil loss.

Adjust sending tone to +2.2 dBm.

(4) Connect the 1000-Hz tone source to terminals 1 and 6 of the 178F or 181B coil and place a strap between terminals 2 and 5. (See Fig. 1.)

(5) Block operated the L0-L3 relay (DO J bay) associated with the residence line under test.

(6) Measure at the F AMP OUT (DO J bay). Measurement should be 0 dBm with the proper 89-type resistor in the 1C pad socket associated with the receiving line from the residence location.

(7) Remove blocking tool from L0-L3 relay blocked operated in Step (5).

(8) Block operated the H relay and the A0-A3 relay (DO J bay) associated with the residence line under test.

(9) Measure at the C jack (DO J bay). Measurement should be −16.0 dBm.

(10) Remove blocking tools from H and A0-A3 relays blocked operated in Step (8).

(11) Disconnect the 178F or 181B coil from the residence line handset and the tone source. Replace the transmitter unit in the handset.

(12) Remove the receiver unit from the residence telephone handset and disconnect the two leads connected to it.

(13) Connect a transmission measuring set to the two leads disconnected from the receiver unit in Step (12). (See Fig. 2.)

(14) Send 1000-Hz tone at the E AMP IN (DO J bay). Adjust sending level to −16 dBm.

(15) Block operated the L0-L3 relay associated with the residence line under test.

(16) Measure at the residence line telephone as set up in Step (13). Measurement should be −16 dBm with the proper 89-type resistor in the 1C pad socket associated with the line transmitting to the residence telephone.

(17) Remove blocking tool from the L0-L3 relay operated in Step (15).

(18) Remove the 1000-Hz tone from the E AMP IN.

(19) Block operated the H relay and the A0-A3 relay associated with the residence line under test.

(20) Send 1000-Hz tone at a level of 0 dBm in the D jack (DO J bay).

(21) Measure at the residence telephone set as in Step (16). Measurement should be the same as in Step (16). If not, check the 89-type resistor in the D 1C pad socket (DO J bay). Required pad value is 0 dB.

(22) Remove blocking tool from the H and A0-A3 relays operated in Step (19).

(23) Remove the tone source from the D jack.

(24) Remove transmission measuring set from the receiver leads in the residence telephone handset.

(25) Reconnect and replace the receiver unit in the residence line telephone handset.

(26) Repeat Steps (1) through (25) for additional residence lines.

11. LINEUP TO DUTY OFFICER CONSOLE

11.01 A lineup to the duty officer console will be made on initial lineup. No routine lineup is required but a lineup should be made whenever there are changes, modifications, or moves involving the console.

11.02 It is assumed that a complete lineup of the DO J bay, per 4.04 of Section 310-504-502, has been completed before making this lineup.

11.03 Refer to the drawing issued by the Customer Service Engineer for that particular location for equipment designations and layout.

11.04 It will be necessary to use a 178F or a 181B induction coil to make the transmitting tests from the handset of the duty officer console. (See 10.04.)

11.05 ***Procedure***

(1) Remove the transmitter unit from the handset on the duty officer console.

(2) Connect terminals 7 and 8 of 178F or 181B coil to the two spring connectors in the handset using clip leads. (See Fig. 1.)

(3) Adjust the 1000-Hz tone source to 1.7 dB more than the required level at transmitter of the handset, as follows: Required level +5.0 dBm plus 1.7 dB for the coil loss. Adjust tone level to +6.7 dBm.

(4) Connect the 1000-Hz tone source to terminals 1 and 6 of the 178F or the 181B coil and place a strap between terminals 2 and 5. (See Fig. 1.)

Note: It will be necessary to operate the push-to-talk button on the handset when sending tone.

(5) Operate the DO key and the REG LINE (to MCP) key on the DO console. Handset is off-hook.

(6) Measure at the E AMP OUT (DO J bay). Measurement should be +8.0 dBm. (Check to see that there is a 4.5-dB 89-type resistor in the B IC pad socket—DO J bay.)

(7) Measure at the B AMP OUT (DO J bay). This level is locally specified. Measurement should be the same as obtained when lining up the DO J bay. Refer to Section 310-504-502, 4.04, Step (16), or to the drawing issued by the Customer Service Engineer for that location.

(8) Disconnect the 178F or the 181B induction coil from the DO handset and the tone source. Replace the transmitter in the DO handset.

(9) Remove the receiver unit from the DO handset and disconnect the two leads from it.

(10) Connect a transmission measuring set to the two leads which were disconnected from the receiver unit in Step (9). (See Fig. 2.)

(11) Send 1000-Hz tone at the F AMP IN (DO J bay). Adjust the sending level to −24.0 dBm.

(12) Measure at the DO handset. Measurement should be −16.0 dBm. (Check to see that there is a 0-dB 89-type resistor in the A IC pad socket, DO J bay.)

(13) Remove 1000-Hz tone from the F AMP IN.

(14) Send 1000-Hz tone at the A AMP IN (DO J bay). Adjust level of tone at TMS to read −0.4 dBm at A AMP OUT.

DO NOT ADJUST GAIN OF AMPLIFIER.

(15) Measurement at DO handset will be the same as measured in Step (12).

(16) Remove the 1000-Hz tone from the A AMP IN.

(17) Remove the transmission measuring set from the receiver leads in the DO handset.

(18) Reconnect the leads to the receiver unit and replace in the DO handset.

12. MAINTENANCE AND TESTING REFERENCES

SECTION	SUBJECT
040-231-701	209-Type Relay—Requirements and Adjustments
040-231-801	209-Type Relay—Piece-Part Data
100-633-101	Vacuum Tube Test Set
103-427-100	1R Tube Test Set
179-316-501	Single Frequency Signaling
179-316-502	Single Frequency Signaling
310-405-500	Multistation—Tests and Adjustments
310-435-302	SC2 Satellite Station Maintenance
310-435-303	SC2 Circuit Maintenance
332-432-100	VOLCAS Unit
982-305-100	SC2 Selective Control System

SCHEMATIC DRAWING	SUBJECT
SD-1G058-01	SC2 Satellite Station
SD-1G060-01	Signaling Circuit
SD-1G061-01	Signaling Circuit
SD-1G133-01	Terminal and Intermediate Switching (COPAN)

SD-1G135-01	PBX Terminating Circuit	SD-64366-01	VOLCAS Unit
SD-1G145-01	CUG Signaling Circuit	SD-64419-01	Ringer-Oscillator Circuit
SD-1G158-01	Line and Duty Officer Telephone Set Circuit (COPAN) RCP	SD-98090-01	Single Frequency Signaling Unit
SD-59031-01	Echo Suppressor	SD-98124-01	Single Frequency Signaling Unit

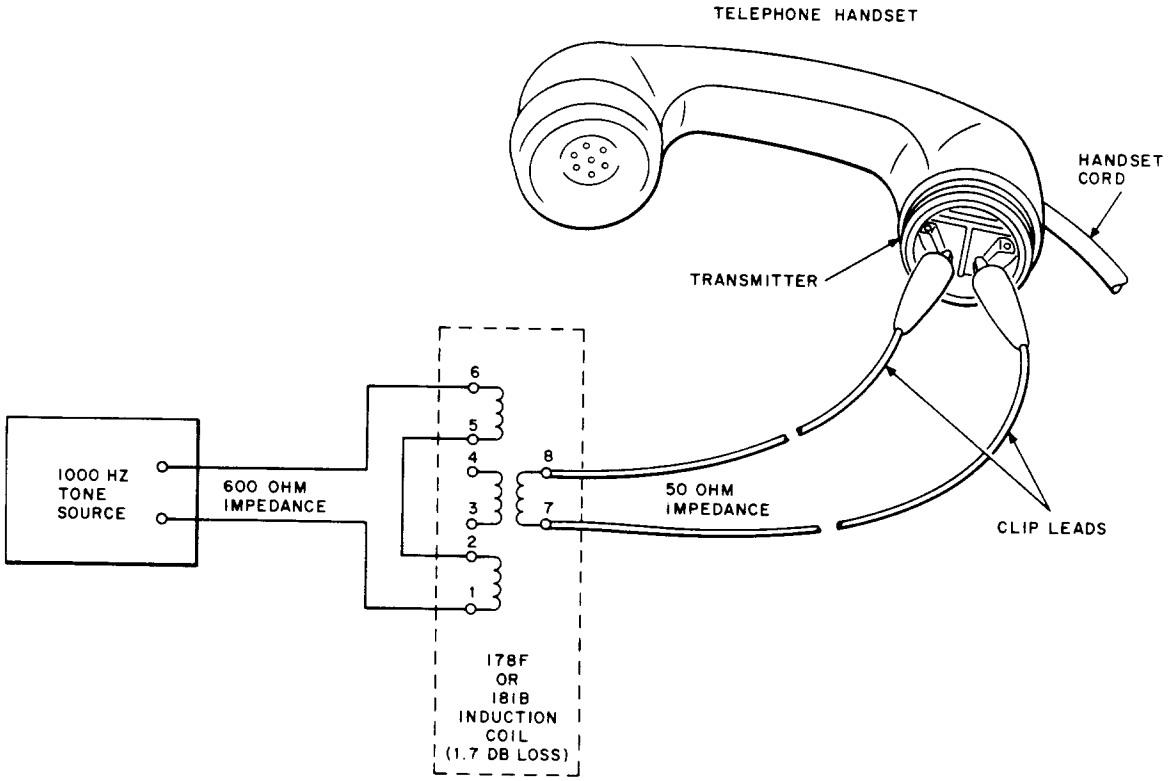

Fig. 1—Connections for Sending Tone of a Telephone Handset Transmitter

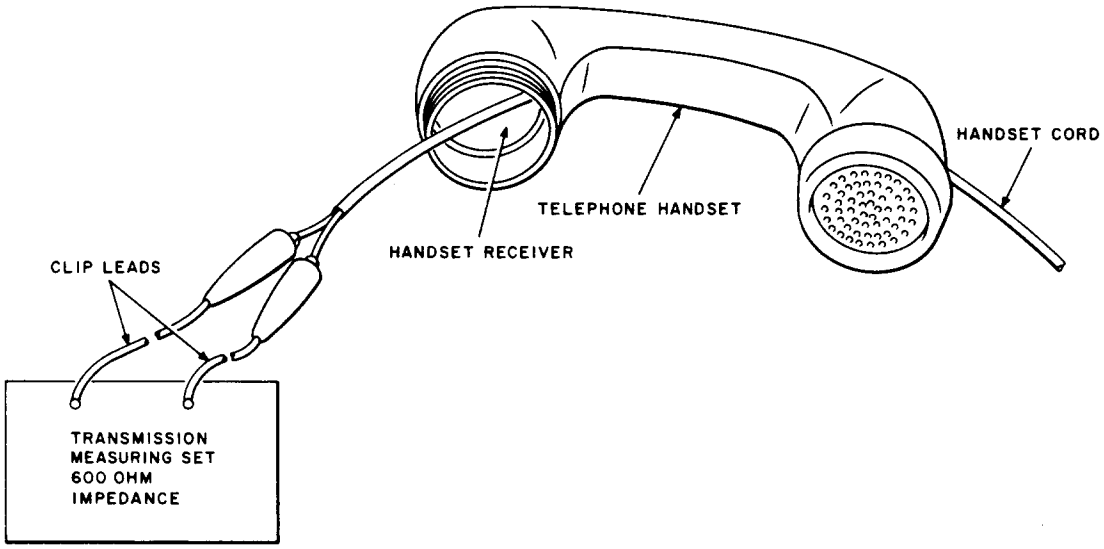

Fig. 2—Connections for Measuring Tone at a Telephone Handset Receiver