

NOISE MEASUREMENTS ON 2-WIRE SUBSCRIBER LOOPS METHODS AND REQUIREMENTS—AT SXS CENTRAL OFFICES

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1. GENERAL

1.01 This section describes the techniques for making 2-wire subscriber loop noise measurements at SXS central offices. These techniques may be used in trouble-locating or in making measurements for the subscriber loop noise survey.

1.02 This section is reissued to provide information for 3A and 3B noise measuring sets (NMS). Where the text and test apparatus list specify the use of a cord, if different cords are to be used for each NMS, the cord applicable to the 3C NMS is listed first, followed by a slash and the cord applicable to the 3A or 3B NMS. This reissue does not affect Equipment Test Lists.

1.03 Measurements are made to on-hook stations using the 3-type noise measuring set from the central office at test locations given in Part 3. To ensure that the noise on the subscriber loop is all that is measured, the test locations are chosen so that central office battery noise is not a factor. All test locations must be in the same building as the frame termination of the subscriber loop being measured. Assistance at the station end of the loop is not required.

1.04 Measurements may be made at any central office location listed in Part 3 under Test Procedures. The test location selected will depend on test equipment and test appearance availability. Loops bridged at the central office must be tested individually. This must be done regardless of whether the loops have been equipped with bridge lifters. For noise trouble investigation, measure each pair at the main distributing frame (MDF). This will automatically open the other pair. If the measurements are being made for a noise survey, bridged loops without bridge lifters need not be separated; just dial and measure in the normal manner. Loops with bridge lifters must be tested at the MDF. Such loops may be tested individually if the heat coils of each loop are removed.

1.05 If these measurements are being made to locate trouble, the form shown in Fig. 3 may be reproduced locally and the appropriate part used as a data sheet for recording the results. If these measurements are being made for the subscriber loop noise survey, refer to Section 301-320-500 for the procedure on recording results.

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2. TEST APPARATUS

APPARATUS	NOTES
(A) APPARATUS REQUIRED AT ALL LOCATIONS	
3C Noise Measuring Set (NMS), or equivalent, equipped with 497A network (or equivalent)	See Section 103-611-101 for 3C NMS and Section 103-611-100 for 3A or 3B NMS.
(B) ADDITIONAL APPARATUS REQUIRED AT THE FOLLOWING LOCATIONS	
(1) NO. 14 TEST DESK OR EQUIVALENT	
2AB AUXILIARY TRANSMISSION MEASURING SET	
3P7B/3P17A Cord	Used to connect 2AB to NMS.
3P7B Cord	Used to connect 2AB to test trunk.
SPECIAL JACK ARRANGEMENT SIMILAR TO FIG. 1	
3P7B/3P17A Cord	Used to connect jack arrangement to NMS.
3P7B Cord	Used to connect jack arrangement to test trunk.
(2) TEST DISTRIBUTOR	
2W16A/2W24A Cord	Used to connect NMS to terminals on remote test distributor trunk.
2P30B/2P12A Cord	Used to connect NMS to test jack of test distributor.
(3) TEST CONNECTOR	
Special cord made up per Fig. 4 of this section	Used to connect NMS and 1011Q or 1014A handset to test connector.
DC Voltmeter	Used to monitor loop under test for busy
(4) MAIN OR INTERMEDIATE DISTRIBUTING FRAME	
4W7A Cord	For use with 444-type jacks.
1011Q OR 1014A HANDSET	Used to monitor loop for busy.
2W37A Cord	For use with the 1014A or 1011Q handset.
SPECIAL JACK ARRANGEMENT SIMILAR TO FIG. 2	
W4BR Cord	Used to connect special jack arrangement (Fig. 2) to cable pair at MDF 302-type protector mounting.
4W6A Cord	Used to connect special jack arrangement (Fig. 2) to cable pair at MDF C-type protector mounting.
3P17B/3P14B Cord	Used to connect input of NMS to special jack arrangement (Fig. 2).

3. TEST PROCEDURES

A. Equipment Modifications for Testing

3.01 Special modifications may be required for specific test procedures at specific test locations. Select the procedure and location depending on available equipment. Modifications which may be required include the following:

- (a) Special jack arrangement (SJA) similar to Fig. 1. This arrangement can be bay-mounted or portable.
- (b) Special jack arrangement similar to Fig. 2 jack box.

B. Calibration, Setup, and Reading the Noise Measuring Set

3.02 Procedure:

- (a) Calibrate the NMS as described in Section 103-611-101. (See Section 103-611-100 for the 3A and 3B NMS.)
- (b) Set DBRN switch to 85 to provide protection for the meter.
- (c) Set FUNCTION switch to N_M 600/900. (On 3A or 3B NMS, set switch to N_M -900.)
- (d) Set DAMP switch to NORMAL.
- (e) Insert 497A weighting network for C-MESSAGE.
- (f) Connect GND terminal of NMS to frame or the central office ground as appropriate. (See note in 3.05.)

3.03 Adjust the DBRN switch in a counterclockwise direction until a suitable deflection on the indicating meter is obtained. The most accurate readings will be obtained when the meter reads between +2 and +9. Since noise readings generally vary over a range of several dB, the following procedure is recommended when observing the meter of the NMS to establish a reading. Observe the meter for 10 to 30 seconds to establish the point where the needle appears most of the time, disregarding the highest occasional peaks.

3.04 For those loops having noise measurements greater than 10 dBnc, listen to the noise

on the loop with the monitoring headphone and note the character of noise in descriptive terms, such as:

Crosstalk
Tone
Teletype impulses
Data impulses
Hum
Static
Frying
Hissing
Singing.

C. Procedures at No. 14 Test Desk or Equivalent

3.05 There are a number of methods for making noise measurements on 2-wire subscriber loops from a No. 14 test desk. Any of these methods accomplishes two things:

- (a) The dialing of the selected telephone number from the No. 14 test desk primary (PRI) cord and position dial circuit;
- (b) The provision of sleeve continuity from the test desk PRI cord to the test distributor trunk.

Note: When using 3C NMS, it may be necessary to remove the sliding strap between the GRD and S binding posts when sleeve conditions require that the sleeve of the NMS be isolated from the connected circuitry.

3.06 Either of the two methods described in 3.07 or 3.08 may be used.

3.07 Procedure Using 2AB Auxiliary Transmission Measuring Set:

- (a) Calibrate and set up the NMS as described in 3.02.
- (b) Using a 3P7B/3P17A cord or equivalent, insert one plug into the IN jack of the

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NMS and insert the other plug into the TMS jack of the 2AB set. Set the TEST switch of the 2AB to REC 900Ω. The 2-DB PAD key of the 2AB should be in the OUT position.

- (c) Insert the test desk PRI cord into the 310 DIAL jack of the 2AB.
- (d) Insert one plug of a 3P7B cord or equivalent into the 310 MEAS jack of the 2AB. Insert the other plug into the test jack of the test desk trunk, and operate the 2AB DIAL-SLV key to DIAL.
- (e) Operate the test desk PRI cord DIAL key, and dial the number of the loop to be tested.
- (f) Restore the DIAL key to normal and monitor the line for conversation, intercept tone, or trouble indication.
- (g) If the line is idle, restore the DIAL-SLV key of the 2AB to normal, and adjust the DBRN switch of the NMS for reading between +2 and +9 on the NMS meter.
- (h) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting of the NMS. Add 0.5 dB to the result for 2AB loss.
- (i) Check the results against the requirements given in Part 4 of this section to see whether any further action is required.
- (j) When the testing is complete, release the loop by pushing the release button or by operating the test desk IN key.
- (k) Repeat Steps (e) through (j) for the remainder of the loops to be measured.

3.08 Procedure Using a Special Jack Arrangement

Similar to That Shown in Fig. 1: This arrangement may be bay-mounted or portable, or any similar arrangement having the same electrical configuration may be used.

- (a) Calibrate and set up the NMS as described in 3.02.
- (b) Using a 3P7B/3P17A cord or equivalent, insert one plug into the IN jack of the

NMS, and insert the other plug into the NMS jack of the SJA.

- (c) Insert the PRI cord plug of the test desk into the PRI jack of the SJA.
- (d) Operate the DIAL-MEAS key of the SJA to DIAL.
- (e) Operate the test desk PRI cord DIAL key to DIAL.
- (f) Using a 3P7B cord or equivalent, insert one end into the line jack of the SJA and the other end into the test trunk jack.
- (g) When the supervisory lamp is extinguished, dial the telephone number of the loop to be measured.

Note: If the supervisory lamp lights before dialing is complete, the test connector or trunk is busy. If the supervisory lamp lights after dialing is complete, the loop is busy.

- (h) Restore the test desk DIAL key to normal.
- (i) Operate the DIAL-MEAS key of the SJA to MEAS.
- (j) Adjust the DBRN switch of the NMS to obtain a reading between +2 and +9 on the meter of the NMS.
- (k) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting on the NMS.
- (l) Check the result against the requirements given in Part 4 of this section to see whether any further action is required.
- (m) When the testing is complete, release the loop by pushing the release button or by operating the test desk IN key.
- (n) Repeat Steps (d), (e), and (g) through (m) for the remaining loops to be measured.

D. Procedure for Making Subscriber Loop Noise Measurements From a No. 3 Test Cabinet in an SXS Office Using Test Trunk Per SD-96225-01

3.09 No special test equipment or test jack arrangements will be required.

3.10 Test Procedure:

- (a) Calibrate and set up the NMS as described in 3.02.
- (b) Patch the test distributor L and T jacks to the jacks of the test distributor trunk using a No. 4P18A cord. The voltmeter on the test cabinet will indicate some on-scale value of current.
- (c) Operate the TD key to the DIAL position and dial the line number of the loop to be tested. Determine whether the subscriber line is busy by observing the voltmeter of the test cabinet or by operating the DIAL-MON key to MON. Either the voltmeter will indicate a short or a busy tone will be heard if the line is busy.
- (d) Operate the HOLD key associated with the test distributor on the No. 3 test cabinet.
- (e) Remove the No. 4P18A cord plug from the test distributor jacks.
- (f) Using a 2P30B/2P12A cord, insert the 347 plug into the T (lower) jacks of the test distributor used, and insert the 310/241 plug into the IN jack of the NMS.
- (g) Adjust the DBRN switch of the NMS to obtain a reading between +2 and +9 on the scale of the meter.
- (h) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting on the NMS.
- (i) Check the results against Part 4 to see whether any further action is required.
- (j) When the testing is complete, release the loop by restoring the TD and HOLD keys associated with the test distributor trunk jack.

- (k) Repeat Steps (b) through (j) for the remaining loops to be tested.

E. Procedure for Making Subscriber Loop Noise Measurements at SXS Test Distributors

3.11 Procedure at SXS Test Distributor Similar to SD-32007 Without Option Z:

- (a) Calibrate the NMS as specified in 3.02. Set the FUNCTION switch to CAL to protect the meter during dialing. Obtain a release on the remote test distributor trunk and remove heat coils.
- (b) Connect a voltmeter to the IN binding posts of the NMS with the positive lead connected to the left-hand binding post.
- (c) Using a 2W16A/2W24A cord or equivalent, insert the plug into the IN jacks of the NMS.
- (d) Connect the white lead to terminal 3 and the red lead to terminal 4. The terminals are unnumbered, have an unusual arrangement, and should be identified from a drawing if there is any doubt.
- (e) Using a 1011Q or 1014A handset equipped with a 2W37A cord, connect the handset to the test jack on the front of the test distributor.
- (f) Operate the TALK-MON key on the handset to TALK, and dial the appropriate digits of the telephone number of the loop to be tested.
- (g) When the dialing is complete, a deflection of the voltmeter indicates that the loop is busy.
- (h) If there is no call in progress, operate the FUNCTION switch of the NMS to N_M 600/900 and the DBRN switch to obtain a reading between +2 and +9 on the scale of the meter.
- (i) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting on the NMS.
- (j) Check results against Part 4 to see whether any further action is required.

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(k) When testing is complete, release the loop by disconnecting the 1011Q or 1014A handset.

(l) Repeat Steps (a) through (k) for the remaining loops to be tested. On completion of all testing, reconnect and restore the remote test distributor trunk to service.

F. Procedure for Making Subscriber Loop Noise Measurements at SXS Test Connectors

3.12 Procedure at SXS Test Connector Similar to SD-30243-01:

- (a) Calibrate the NMS as specified in 3.02. Set the FUNCTION switch to CAL to protect the meter movement during dialing.
- (b) Connect a voltmeter to the IN binding posts on the NMS, with the positive lead connected to the left-hand binding post. Use a dc voltage scale greater than 50 volts.
- (c) Using the special cord (to be made up locally as per Fig. 4 of this section), insert the ♦310/241♦ plug into the IN jack of the NMS.
- (d) Insert the 240C plug into the test jack of the test connector.
- (e) Patch the 471A jack of the cord to the 346A plug of the 1011Q or 1014A handset.
- (f) Operate the TALK-MON key of the 1011Q or 1014A handset to the TALK position and dial the last two digits of the telephone number of the loop under test.
- (g) When the dialing is completed, a deflection of the voltmeter indicates that the loop is busy.
- (h) If there is no call in progress, operate the FUNCTION switch of the NMS to NM 600/900 ♦(to NM-900 on 3A or 3B NMS)♦ and adjust the DBRN switch to obtain a reading between +2 and +9 on the scale of the meter.
- (i) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting on the NMS.

(j) Check the results against Part 4 to see whether any further action is required.

(k) When testing is complete, operate the TALK-MON switch of the 1011Q or 1014A handset to MON to release the connection.

(l) Repeat Steps (a) through (k) for the remaining loops to be tested.

G. Procedures at Main and Intermediate Distributing Frames

3.13 Where the following procedures outline the use of the 4W6A, 4W7A, and 4W11A test cords, it will be necessary to provide a jack box per Fig. 2 of this section to adapt the cords for connection to the NMS.

3.14 Procedure at an MDF Equipped with C-Type Protector Mountings:

- (a) Calibrate and set up the NMS as described in 3.02.
- (b) Using a 1011Q or 1014A handset equipped with a 2W37A cord, and with the TALK-MON switch in the MON position, connect to the office side cross-punchings of the loop to be tested and monitor the loop.
- (c) If the loop is idle, operate the TALK-MON switch to TALK. This will hold the loop for the time required to make the noise measurement.
- (d) Remove the heat coils from the loop to be tested.
- (e) Using a 4W6A cord, insert the 252A and 252B plugs in place of the heat coils.
- (f) Insert the 289B plug of this cord into the MDF test cord jack (Fig. 2 jack box).
- (g) Insert one end of a ♦3P17B/3P14B♦ cord into the NMS jack of the Fig. 2 jack box and the other end into the IN jack of the NMS. If patch cords are used, the line equipment is held busy by the jack termination; therefore, the handset can be removed. If alligator clips are used, the handset must remain connected and in the TALK condition for the duration of the tests.

- (h) Adjust the DBRN switch of the NMS to obtain a reading between +2 and +9 on the scale of the NMS meter.
- (i) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting on the NMS.
- (j) Check the result against the requirements given in Part 4 of this section to see whether any further action is required.
- (k) When testing is complete, remove the test cords, replace the heat coils, and release the loop by removing the 1011-type handset connection.
- (l) Repeat Steps (b) through (k) for other loops to be tested.

3.15 Procedure at an MDF Using a 300-Type Connector:

Note: The 300-type connector supersedes a similar arrangement, coded the 121-type protector. All references in this section to the 300-type connector also apply to the 121-type protector.

- (a) Calibrate and set up the NMS as described in 3.02.
- (b) Using a 1011Q or 1014A handset equipped with a 2W37A cord, and with the TALK-MON switch in the MON position, connect to the office side cross-punchings of the loop to be tested and monitor the loop.
- (c) If the loop is idle, operate the TALK-MON switch to TALK. This will hold the loop for the time required to make the noise measurement.
- (d) Remove the protector units.
- (e) Using a 4W11A cord, insert the 412A and 412B plugs in place of the protector units.
- (f) Insert the 289B plug of this cord into the MDF test cord jack (Fig. 2 jack box).
- (g) Insert one end of a 3P17B/3P14B cord into the NMS jack of the Fig. 2 jack box

and the other end into the IN jack of the NMS. If patch cords are used, the line equipment is held busy by the jack termination; therefore, the handset can be removed. If alligator clips are used, the handset must remain connected and in the TALK condition for the duration of the tests.

- (h) Adjust the DBRN switch of the NMS to obtain a reading between +2 and +9 on the scale of the NMS meter.
- (i) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting of the NMS.
- (j) Check the result against the requirements given in Part 4 of this section to see whether any further action is required.
- (k) When testing is complete, remove the test cords, replace the protector units, and release the loop by disconnecting the 1011-type handset.
- (l) Repeat Steps (b) through (k) for the other loops to be tested.

3.16 Procedure at an MDF Equipped With 444-Type Jacks, Such as the 301-Type Connector:

- (a) Calibrate and set up the NMS as described in 3.02.
- (b) Using a 1011Q or 1014A handset equipped with a 2W37A cord, and with the TALK-MON switch in the MON position, connect to the office side cross-punchings of the loop to be tested and monitor the loop.
- (c) If the loop is idle, operate the TALK-MON switch to TALK. This will hold the loop for the time required to make the noise measurement.
- (d) Using a 4W7A cord, insert the 301-type plug into the 444-type jack of the loop to be tested.
- (e) Insert the 289B plug of this cord into the MDF test cord jack (Fig. 2 jack box).

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- (f) Insert one end of a 3P17B/3P14B cord into the NMS jack of the Fig. 2 jack box and the other end into the IN jack of the NMS. If patch cords are used, the line equipment is held busy by the jack termination; therefore, the handset can be removed. If alligator clips are used, the handset must remain connected and in the TALK condition for the duration of the tests.
- (g) Adjust the DBRN switch of the NMS to obtain a reading between +2 and +9 on the scale of the NMS meter.
- (h) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting of the NMS.
- (i) Check the result against the requirements given in Part 4 of this section to see whether any further action is required.
- (j) When testing is complete, remove the test cord and release the loop by disconnecting the 1011Q or 1014A handset.
- (k) Repeat Steps (b) through (j) for the other loops to be tested.

3.17 Procedure at an MDF Equipped With 302-Type Protector Mountings:

- (a) Calibrate and set up the NMS as described in 3.02.
- (b) Using a 1014A or 1011Q handset equipped with a 2W37A cord and with the TALK-MON switch in the MON position, connect the clips to the cross-connect punching of the loop to be tested at the MDF.
- (c) At the protector frame, if the loop is idle, remove the protector unit from the cable pair. Using a W4BR cord, insert the 463A plug into the connector and the 464A plug into the MDF TEST CORD jack of the SJA (Fig. 2).
- (d) Remove the handset at the MDF.
- (e) Using a 3P17B/3P14B cord, insert one end into the NMS jack of the SJA. Insert

the other end of this cord into the IN jack of the NMS.

- (f) Adjust the DBRN switch of the NMS to obtain a reading between +2 and +9 on the scale of the NMS meter.
- (g) Record the character of noise and the on-hook noise measurement, which is the total of the meter reading plus the DBRN switch setting on the NMS.
- (h) Check the result against the requirement given in Part 4 of this section to see whether any further action is required.
- (i) When the testing is complete, remove all cords at the protector frame and replace the protector unit in the mounting. Check to be sure that the protector unit is fully inserted and not in the detent position. Remove the handset at the MDF if it was not removed in Step (d).
- (j) Repeat Steps (b) through (i) for additional loops to be measured.

4. REQUIREMENTS

NMS READING IN dBrnc	ACTION TO BE INITIATED
10 or less	OK—no further action required.
11 to 20	Check for possible trouble and/or refer to supervisor for review.
Greater than 20	Make measurements at station per Section 331-850-501 for possible trouble and/or refer to supervisor immediately for appropriate action to be initiated. If the measurements are being made for a subscriber loop noise survey, refer to Section 301-320-500 for the procedure for recording results. For analysis of survey results see Section 301-302-500.

5. REPORTS

5.01 The form shown in Fig. 3, entitled "3-Type Noise Measurements on Subscriber Loops," may be used as a data sheet and may be reproduced locally as required.

5.02 The results of the measurements should be forwarded through lines of organization for analysis and appropriate action.

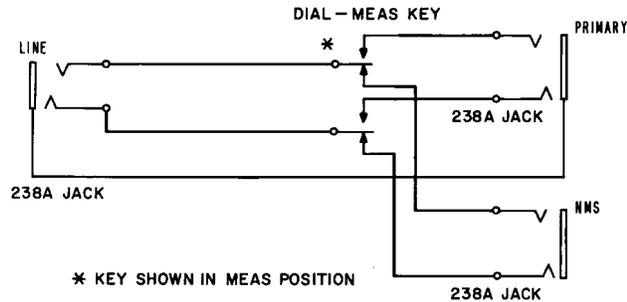
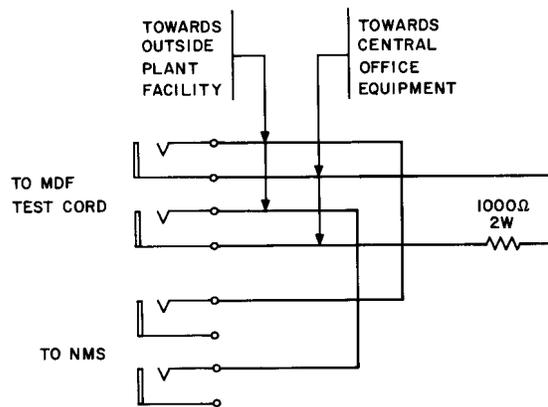


Fig. 1—Special Jack Arrangements



NOTE:
THIS JACK ARRANGEMENT IS USED TO ISOLATE THE NMS SLEEVE GROUND FROM THE MDF TEST CORD, TO PROVIDE A TERMINATION TOWARDS THE CENTRAL OFFICE, AND TO HOLD THE LINE BUSY ON INCOMING CALLS WHILE THE TEST IS MADE.

Fig. 2—223-Type Jacks in a 270A-Type Mounting

3-TYPE NOISE MEASUREMENTS ON SUBSCRIBER LOOPS

Cable No. _____ Pair No. _____ B.P. _____
 Terminal Loc. _____
 Telephone No. _____ Panel & Jack
 or Dial Equiv. _____
 Customer Name _____
 Address _____ Zone Code _____
 Class of Service _____ Type of Station Set _____

Noise Measurement at Central Office

Test Location _____
 3-Type NMS Reading Initial Final
 To ON-Hook Station _____ dBrc _____ dBrc
 To OFF-Hook Station _____ dBrc _____ dBrc
 Character Of Noise
 Crosstalk Tone Static Hissing
 Impulses Hum Frying Singing
 Corrective Action Initiated _____
 Date _____ Time _____ Measured by _____

Noise Measurement at Station

Test Location _____
 3-Type NMS Reading Initial Final
 1000-Cycle Check _____ dBrc _____ dBrc
 Noise Metallic _____ dBrc _____ dBrc
 Noise-to-Ground
 C-Message Weighting _____ dBrc _____ dBrc
 3kHz Flat Weighting _____ dBrc 3kHz _____ dBrc 3kHz
 Character Of Noise
 Crosstalk Tone Static Hissing
 Impulses Hum Frying Singing
 Corrective Action Initiated _____
 Date _____ Time _____ Measured by _____

Fig. 3—Form for Noise Measurements on Subscriber Loops

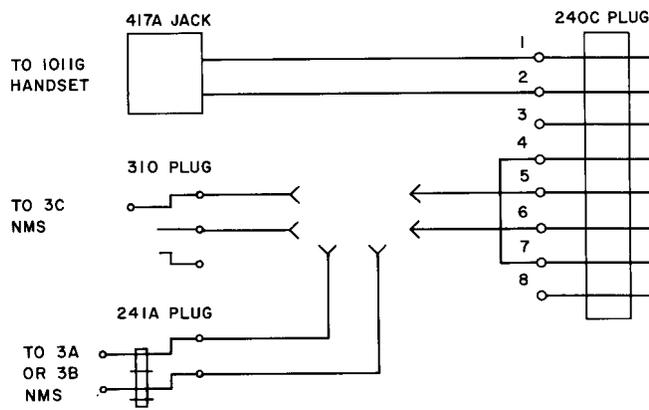


Fig. 4—Test Connector Cord