

CORD AND POSITION CIRCUITS
TELETYPEWRITER SWITCHBOARDS NOS. 3A AND 3C

1. GENERAL

- 1.01 This section describes tests of cord and position circuits used with teletypewriter switchboards 3A and 3C.
- 1.02 This section is revised to delete test procedures for the No. 3 teletypewriter switchboards now covered in Section A281.240; to revise transmission tests of the operator's teletypewriter; and to add new procedures for making cord- and position-circuit operation tests.
- 1.03 The tests covered are:
- (A) Cord-circuit Bias Test. *TTB*
 - (B) Cord- and Position-circuit Operation Tests using Operator's Intertoll Trunk Training Circuit or Two Spare Intertoll Trunk Circuits. (Fig. 1)
 - (C) Cord- and Position-circuit Operation Test using the Testing and 2-way Trunk Circuit. (Fig. 2)
 - (D) Distortion Tolerance Test of Operator's Teletypewriter. (Fig. 3)
 - (E) Test of Lock-Out and Noninterfering Feature on the Answering Cord.
 - (F) Cord- and Position-circuit Busy Test.
 - (G) Position Out-of-order Test.
 - (H) Position Practice-cord Test.
 - (I) Noninterfering Test of Cord-circuit Typing Keys. (Fig. 4)
- 1.04 Tests (B) and (C) provide alternative arrangements for making cord- and position-circuit operation tests. Test (B) can be made entirely at the switchboard position by one man. Test (C) will require two men, one at the switchboard and one at the test or service board.
- 1.05 Tests (A), (C) and (D) should be coordinated with the test-room testing

procedures at the telegraph test or service board as covered in BSP E35.209. Since two men will be required for these tests, it will be desirable to establish telephone communication between the test or service board and the switchboard.

2. APPARATUS

Tests (A), (B), (C), and (D)

- 2.01 Testing and 2-way Trunk Circuit
SD-70029-01 (3A Switchboard to Test-board)
SD-70387-01 (3C Switchboard to Test-board)
SD-70581-01 (3A or 3C Switchboard to 2 or 9B Service Boards)

Test (B)

- 2.02 Two intertoll trunk relay circuits or operator's intertoll trunk training circuit (SD-70475-01).

Tests (G) and (H)

- 2.03 P3E cord equipped with No. 310 plugs. (3P7A cord.) Required only when out-of-order or practice circuits are jack-ended. These cords are normally provided as part of the switchboard equipment.

3. METHOD

(A) Cord-circuit Bias Test

3.01 As requested by the test or service-board attendant, insert the calling and answering cords of the cord circuit under test in the CALL-TST and TRK jacks, respectively, of the testing and 2-way trunk circuit. Measurement of the bias is made at the test or service board as outlined in BSP E35.209. Failure to meet the requirement is probably caused by the polar relays in the cord-circuit repeater.

(B) Cord- and Position-circuit Operation Test Using Operator's Toll Trunk Training Circuit or Two Spare Intertoll Trunk Circuits (Fig. 1)

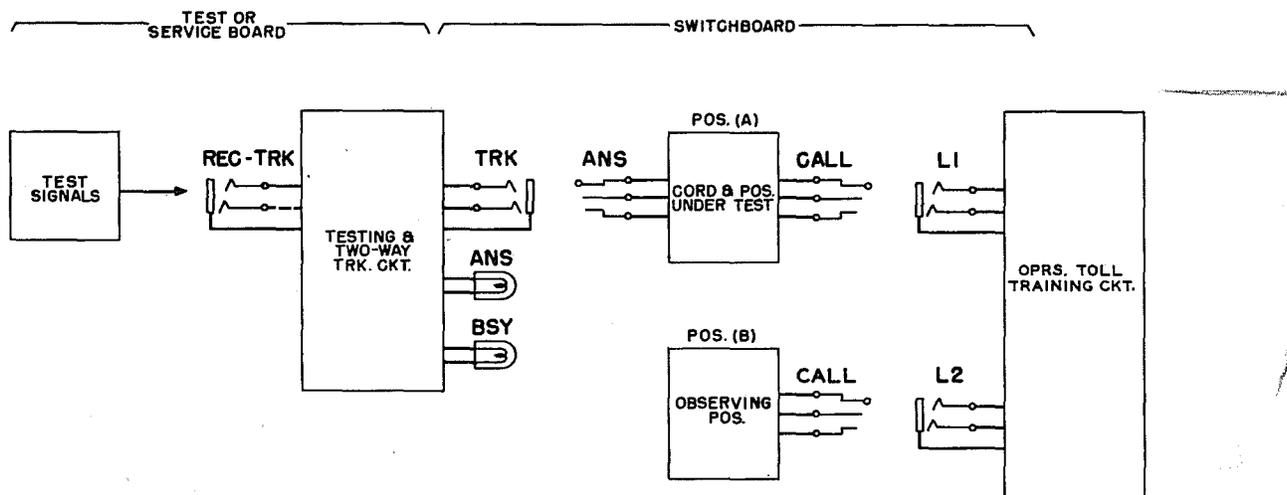


FIG. 1 - Cord and Position Ckt. Operation Test (Test B)

3.02 The operator's toll training circuit (SD-70475-01) consists of a dummy intertoll trunk with two multiple-jack appearances to simulate both ends of an intertoll trunk. If this circuit is not available, an equivalent circuit can be obtained by having the telegraph test or service board connect the line sides of two spare (or turned down) intertoll-trunk-relay circuits together in such a manner that signals transmitted from the L-1 jack will be repeated to the L-2 jack and vice versa.

3.03 If the operator's toll trunk training circuit is used, operate the OPR-TR key.

Note: Position (A) designates the cord circuit and position under test. Position (B) designates the observing position, which should be adjacent to position (A).

3.04 Arrange with the telegraph test or service board to patch a source of test signals to the REC-TRK jack of the testing and 2-way trunk circuit as illustrated on Fig. 1.

3.05 The ANS and BSY lamps associated with the testing and 2-way trunk should light.

Typing Tests

3.06 At Position (A): Insert the plug of the ANS cord into the TRK jack. The ANS lamp should be extinguished and the BSY lamp should remain lighted.

3.07 Operate the typing key to the HOME position. The home teletypewriter should respond to the test signals being sent from the test or service board.

3.08 Operate the typing key to the TEAM position. The team teletypewriter should respond to the test signals.

3.09 Restore the typing key to the HOME position. The home teletypewriter should again respond to the test signals.

3.10 Insert the plug of the CALL cord into the L-1 jack.

3.11 At Position (B): Insert the CALL plug of a cord circuit into the L-2 jack and operate the typing key to the HOME position. The home teletypewriter in position (B) should respond to the test signals.

Splitting Key Test (Calling Cord)

3.12 At Position (A): Operate the splitting key to the CALL position. The teletypewriters in positions (A) and (B) should run closed. The teletypewriter in position (B) should respond to typing from position (A).

3.13 Restore splitting key to normal and remove the ANS cord from the TRK jack. The teletypewriters in positions (A) and (B) should run closed.

Subscriber's Ringing Test (Calling Cord)

3.14 At Position (A): Operate the RING key for approximately three seconds. The teletypewriter should run closed while the RING key is held operated.

3.15 At Position (B): The teletypewriter should type a repeated character (usually "F" or 1/4) as long as the RING key is held operated.

Note: The function of this key is to introduce 20-cycle ringing

current over the tip conductor of the cord circuit and is for the purpose of ringing the station bell on all types of subscriber's lines. For the purpose of these test procedures the teletypewriter is used to test the feature.

Toll Ring Test (Calling Cord)

- 3.16 At Position (A): Operate the TOLL RING key for approximately 3 seconds. The teletypewriter should run closed and should respond to typing from its keyboard while the TOLL RING key is held operated.
- 3.17 At Position (B): The teletypewriter should run open momentarily then run closed and should not respond to typing from its keyboard as long as the TOLL RING key is held operated.

Recall Test (Calling Cord)

- 3.18 At Position (B): Restore the typing key to normal.
- 3.19 At Position (A): Operate the RECALL key momentarily. At the end of seven seconds the cord supervisory lamp in position (B) should flash. Restore the typing key in position (A) to normal.
- 3.20 At Position (B): Operate the typing key to the HOME position. The cord supervisory lamp should be extinguished. Operate the RECALL key momentarily.
- 3.21 At Position (A): The cord supervisory lamp should flash at the end of seven seconds. Operate the typing key to the HOME position. The supervisory lamp should be extinguished.

Disconnect Test (Calling Cord)

- 3.22 At Position (A): Operate the DISC key momentarily then restore typing key to normal. The DISC-GUARD lamp should light steadily for 10 seconds and then be extinguished. Following this the cord-supervisory lamps in positions (A) and (B) should light steadily.
- 3.23 Remove the CALL cord from the L-1 jack. The supervisory lamp should be extinguished.
- 3.24 At Position (B): Remove, then reinsert the plug of the CALL cord in the L-2 jack. The supervisory lamp should be extinguished.

Splitting Key Test (Answering Cord)

- 3.25 At Position (A): Insert the plug of the CALL cord into the TRK jack and the plug of the ANS cord into the L-1 jack. Operate the typing key to the HOME position. The teletypewriters in positions (A) and (B) should respond to the test signals.

- 3.26 Operate the splitting key to the ANS position. The teletypewriters in positions (A) and (B) should run closed. The teletypewriter in position (B) should respond to typing from position (A).
- 3.27 Restore the splitting key to normal and remove the CALL cord from the TRK jack. The teletypewriters in positions (A) and (B) should run closed.

Subscriber's Ringing Test (Answering Cord)

- 3.28 At Position (A): Operate the SUB RING ANS key for approximately three seconds. The teletypewriter should run closed while the RING key is operated. Restore the typing key to normal.
- 3.29 At Position (B): The teletypewriter should type repeated characters (usually "F" or 1/4) as long as the SUB RING ANS key is held operated.

Recall Test (Answering Cord)

- 3.30 At Position (B): Operate the RECALL key momentarily.
- 3.31 At Position (A): At the end of seven seconds the cord supervisory lamp should flash. Operate the typing key to the HOME position, then restore. The supervisory lamp should be extinguished.

Disconnect Test (Answering Cord)

- 3.32 At Position (B): Operate the DISC key momentarily then restore the typing key to normal. The DISC GUARD lamp in position (B) should light steadily for 10 seconds and then be extinguished. Following this the cord-supervisory lamps in positions (A) and (B) should light steadily.
- 3.33 Remove the CALL cord from the L-2 jack. The supervisory lamp should be extinguished.
- 3.34 At Position (A): Remove the ANS cord from the L-1 jack. The supervisory lamp should be extinguished.
- 3.35 Arrange with the test or service-board attendant to remove the test signals from the REC TRK jack of the testing and 2-way trunk circuit. Restore all typing and position keys to normal. All lamps should be extinguished.
- 3.36 If the operator's toll-trunk training circuit was used, restore the OPR-TR key.

(C) Cord- and Position-circuit Operation Test Using the Testing and 2-way Trunk Circuit (Fig. 2)

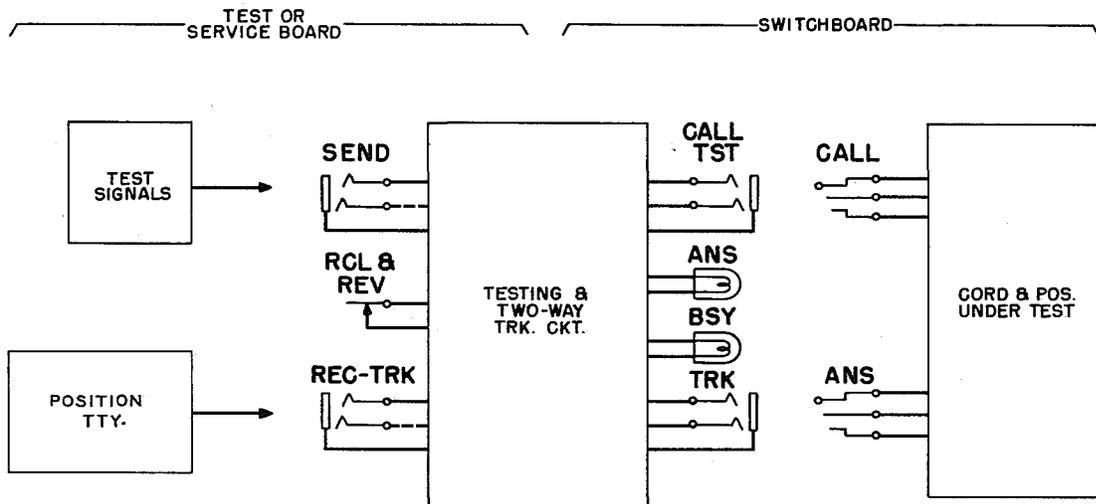


FIG. 2 - Cord and Position Ckt. Operation Test (Test C)

Note: This testing method will require two men, one at the switchboard and one at the telegraph test or service board. The test procedures should be directed by the man at the switchboard and the man at the test or service board should be requested to observe the monitoring teletypewriter for various operating functions.

3.37 Arrange with the test or service board to connect the position teletypewriter and test signals to the testing and 2-way trunk circuit as illustrated on Fig. 2. The ANS and BSY lamps should light at the switchboard.

Typing Tests

3.38 Insert the plug of the CALL cord into the CALL-TST jack and the plug of the ANS cord into the TRK jack of the testing and 2-way trunk circuit. The ANS lamp should be extinguished.

3.39 Operate the typing key to the HOME position. The teletypewriter should respond to test signals from the test or service board.

3.40 Operate the typing key to the TEAM position. The team teletypewriter should respond to the test signals. Restore the typing key to the HOME position. The home teletypewriter should again respond to the test signals.

Splitting Key Test (Answering Cord)

3.41 Operate the splitting key to the ANS position. The switchboard and monitoring teletypewriters should run closed. Type on the switchboard teletypewriter and

the monitoring teletypewriter should respond. Restore the splitting key to normal. Both teletypewriters should again respond to the test signals.

Subscriber's Ringing Test (Answering Cord)

3.42 Remove the CALL cord from the CALL-TST jack. The switchboard teletypewriter should run closed. Operate the SUB RING ANS key for approximately three seconds. The monitoring teletypewriter should type repeated characters (usually "F" or 1/4), as long as the SUB RING ANS key is held operated. The switchboard teletypewriter should run closed while the RING key is operated.

Splitting Key Test (Calling Cord)

3.43 Remove the ANS cord from the TRK jack. Insert the plug of the ANS cord into the CALL-TST and plug of the CALL cord into the TRK jack. The switchboard and monitoring teletypewriters should respond to the test signals.

3.44 Operate the splitting key to the CALL position. The switchboard and monitoring teletypewriters should run closed. Type on the switchboard teletypewriter, and the monitoring teletypewriter should respond. Restore the splitting key to normal. Both teletypewriters should again respond to the test signals.

Subscriber's Ringing Test (Calling Cord)

3.45 Remove the ANS cord from the CALL-TST jack. Operate the RING key for approximately three seconds. The monitoring teletypewriter should type repeated characters (usually "F" or 1/4) as long as the RING key is held operated. The switchboard teletypewriter should run closed while the RING key is operated.

Toll-Ring Test (Calling Cord)

3.46 Operate the TOLL RING key for approximately three seconds. The switchboard teletypewriter should run closed and the monitoring teletypewriter should run open during the ringing interval.

Recall Test (Calling Cord)

3.47 Momentarily operate the RECALL key. The monitoring teletypewriter should run open for approximately seven seconds. The switchboard teletypewriter should run closed during this 7-second interval.

Disconnect Test (Calling Cord)

3.48 Momentarily operate the DISC key. The position DISC GUARD lamp should light and at the end of 10 seconds should be extinguished. The monitoring teletypewriter should run open and the switchboard teletypewriter should run closed during this 10-second interval.

Recall Test (From Test or Service Board)

3.49 Restore the typing key to normal at the switchboard and insert the plug

of the ANS cord into the CALL-TST jack. Arrange with the test or service board attendant to remove the source of test signals from the SEND jack and then to momentarily operate and restore the RCL-REV key, associated with the testing and 2-way trunk circuit. Both supervisory lamps associated with the cord circuit should flash. Operate the typing key momentarily to the HOME position and both lamps should be extinguished.

Disconnect Test (From Test or Service Board)

3.50 Arrange with the test or service-board attendant to remove the monitoring teletypewriter cord from the REC-TRK jack. Both supervisory lamps associated with the cord circuit should light steadily.

3.51 Remove both cords from the testing and 2-way trunk circuit and both lamps should be extinguished. The BSY lamp should also be extinguished.

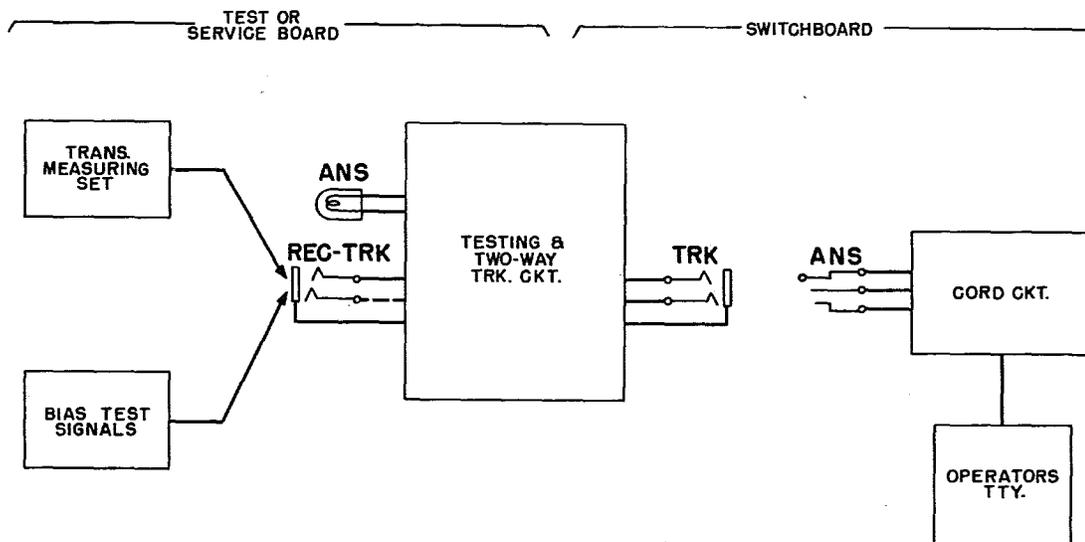
(D) Distortion-Tolerance Test on Operator's Teletypewriter (Fig. 3)

FIG. 3 - Distortion Tolerance Test of Operators TTY. (Test D)

3.52 The operator's teletypewriter should meet the "Local Test" requirements as outlined in Section P30.002. Insert the plug of the ANS cord associated with the operator's teletypewriter under test to the TRK jack of the testing and 2-way trunk circuit as illustrated in Fig. 3.

Sending-Tolerance Test

3.53 Operate the typing key associated with the cord circuit under test and send test signals from the switchboard teletype-

writer keyboard. Arrange with the test or service-board attendant to measure the percent distortion in the received signals by connecting the transmission measuring set to the REC-TRK jack.

Receiving Tolerance Test

3.54 Arrange with the test or service-board attendant to connect test signals with the proper type and per cent bias to the REC-TRK jack. Make orientation readings on the switchboard teletypewriter.

Upon completion arrange with the test or service-board attendant to remove all patches. At the switchboard remove the ANS cord from the TRK jack and restore all keys to normal.

(E) Test of Lock-Out and Noninterfering Feature on Answering Cord

Note: On some 3A switchboards of early manufacture the lock-out feature was provided on the answering cords. On 3A switchboards, of later manufacture and on all 3C switchboards, the noninterfering feature was provided.

Preparation

3.55 Arrange with the test or service-board attendant to patch a source of test signals to the REC-TRK jack of the testing and 2-way trunk circuit. The ANS and BSY lamps should light.

3.56 At the Position Adjacent to That Under Test: Insert the plug of an ANS cord into the TRK jack. The ANS lamp should be extinguished and the BSY lamp should remain lighted. Operate the typing key to the HOME position. The teletypewriter in this position should respond to the test signals. This cord circuit is referred to as the "First Cord".

3.57 At the Position Under Test: Insert the plug of the ANS cord of the cord circuit to be tested in a multiple-jack appearance of the TRK jack and operate the typing key to the HOME position. This cord circuit is referred to as the "Interfering Cord".

Note: Proceed as in 3.58 to 3.60 or as in 3.61 to 3.63, depending on which feature is provided.

Tests When Lock Out Feature Is Provided

3.58 The BT lamp associated with the interfering position should light. Both the interfering and first cord teletypewriters should run closed.

3.59 Remove the interfering cord from TRK multiple jack. The BT lamp should be extinguished and the first cord teletypewriter should again respond to the test signals.

3.60 Restore the typing keys to normal, remove first cord from TRK jack and request test or service-board attendant to remove the source of test signals from the REC-TRK jack. The BSY lamp should be extinguished.

Tests When Noninterfering Feature On Answering Cord Is Provided

3.61 The BT lamp associated with the interfering position should light. The

interfering teletypewriter should run closed but the first cord teletypewriter should continue to respond to the test signals and without errors in the copy.

3.62 Remove the interfering cord from the TRK multiple jack. The BT lamp should be extinguished and the first cord teletypewriter should continue to respond to the test signals and without errors in the copy.

3.63 Restore typing keys to normal, remove first cord from TRK jack and request the test or service-board attendant to remove the source of test signals from the REC-TRK jack. The BSY lamp should be extinguished.

(F) Cord and Position-Circuit Busy Test

3.64 Insert the plug of an idle cord circuit into the jack of an idle subscriber's-line circuit.

3.65 Operate the typing key of the cord to be tested to the HOME position and touch the plug tip of the CALL cord to the sleeve of the jack at a multiple appearance of the subscriber's line. The home position BT lamp should light as long as the plug tip is in contact with the jack sleeve. Restore the typing key to normal.

3.66 Operate the typing key to the TEAM position and touch the tip of the CALL cord to the sleeve of the jack at a multiple appearance of the subscriber's line. The team position BT lamp should light as long as the plug tip is in contact with the jack sleeve. Restore the typing key to normal.

3.67 Repeat 3.65 using the ANS cord of the cord circuit under test.

3.68 Remove the cord from the jack of the idle subscriber's line circuit.

(G) Position Out-of-order Test

3.69 Plug or patch an out-of-order circuit to the jack of an idle subscriber's line circuit.

3.70 Operate the typing key of the cord circuit to be tested to the HOME position and touch the tip of the CALL cord plug to the sleeve of the jack at a multiple appearance of the subscriber's line. The position BT lamp should light and the buzzer should also respond as long as the plug tip is in contact with the jack sleeve. Restore the typing key to normal.

3.71 Remove the out-of-order circuit from the jack of the idle subscriber's line circuit.

(H) Position Practice-Cord Test

3.72 Insert the plug of a practice circuit into the jack of an idle subscriber's line circuit.

3.73 Operate the typing key of the cord circuit to be tested to the HOME position and touch the tip of the calling-cord plug to the sleeve of the line jack at a multiple appearance of the subscriber's line. The buzzer should operate as long as the plug tip is in contact with the jack sleeve. Restore the typing key to normal.

(I) Noninterfering Test of Cord Circuit Typing Keys

Note: This test procedure is to check the "non-click" adjustment of the typing keys as referred to on the

SD drawings covering the cord-circuit equipment.

3.74 This test is made by operating the typing keys to the HOME or TEAM position and then restoring by gently pushing the key lever until it is unlocked and will return unaided to its normal position. Failure to meet this test will be indicated by a short "break" on observing the teletypewriter. These short breaks will occur if the momentum of the key lever, when released, is sufficient to over-travel the normal position and momentarily open normally-closed contacts in the opposite position.

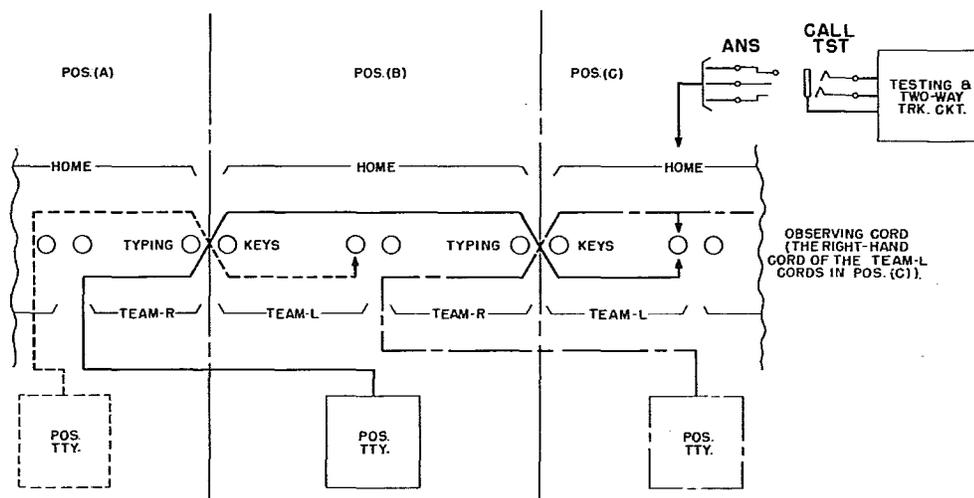


FIG. 4 - Non-Interfering Test of Cord Ckt. Typing Keys (Test I)

3.75 Referring to Fig. 4, at position (C), insert the ANS plug of the observing cord circuit into the CALL-TST jack of the testing and two-way trunk circuit or into an idle intertoll-trunk circuit LINE jack. Operate the typing key of this cord circuit to the TEAM position. The teletypewriter at position (B) will be the observing teletypewriter for tests covered in 3.76. This teletypewriter should run closed and respond to typing from its keyboard.

Note: This provides a closed termination for the observing teletypewriter. The supervisory lamp associated with this cord may light but should be ignored for the purpose of these tests.

3.76 Operate and then release the typing keys as detailed below and in the manner covered in 3.74. The observing teletypewriter in position (B) should run closed and not respond to short breaks as the typing keys are operated and released.

(a) At position (A), operate each TEAM-R typing key in turn to the HOME position and then release.

(b) At position (B), operate each TEAM-R and TEAM-L typing key in turn to the TEAM position and then release.

(c) At position (C), operate each TEAM-L typing key in turn (except the one associated with the observing cord) to the HOME position and then release.

3.77 Operate the typing key associated with the observing cord to the HOME position. The teletypewriter associated with position (C) will be the observing teletypewriter for tests covered in 3.78. This teletypewriter should run closed and respond to typing from its keyboard.

3.78 Operate and then release the keys as detailed below and in the manner covered in 3.74. The observing teletypewriter in position (C) should run closed and not respond to short breaks when the typing keys are operated and released.

(a) At position (B), operate each TEAM-R typing key in turn to the HOME position and then release.

(b) At position (C), operate each TEAM-L typing key in turn (except the one associated with the observing cord) to the TEAM position and then release.

3.79 Restore all typing keys to normal.
Remove the observing cord from the
CALL-TEST jack or from the intertoll trunk
LINE jack.

4. REPORTS

4.01 The required record of these tests
should be entered on the proper form.

Bell Telephone Laboratories, Inc.