

19A TESTBOARD OPERATIONAL TESTS

| | CONTENTS | PAGE |
|----|---|-----------|
| 1. | GENERAL | 1 |
| 2. | REMOVING CIRCUITS FROM SERVICE . . | 1 |
| | A. Busy Test on a Network Trunk | 1 |
| | B. Seizing a Network Trunk | 2 |
| | C. LUNK Circuits, SD-27535-01 and SD-27744-01 | 2 |
| | D. Seizing a Station Line | 2 |
| | E. Lockout on a Network Trunk or LUNK Circuit | 3 |
| 3. | PULSING AND RINGING | 4 |
| | A. Keypulsing on a Network Trunk | 4 |
| | B. Keypulsing and Dial Pulsing on LUNK Circuits | 6 |
| | C. Keypulsing, Dial Pulsing, and Ringing on a Station Line | 6 |
| | D. Preemption and Priority | 9 |
| 4. | TRANSMISSION AND NOISE MEASURING SYSTEM, SD-95900-01 | 11 |
| | A. Transmission Loss Measurements | 11 |
| | B. Noise Measurements | 14 |
| | C. Crosstalk Measurements | 16 |
| 5. | FREQUENCY RESPONSE AND ENVELOPE DELAY MEASUREMENTS | 16 |
| 6. | ACCESS TESTS | 16 |

1. GENERAL

1.01 This section describes procedures for making operational tests on network trunks and station lines (subscriber or access) at the 19A testboard and associated circuit patch bay.

1.02 This section has been reissued to include testing information on features and functions added to the testboard, when required. Added testing information is given on:

- Multilevel preemption of a network trunk or station line equipped to recognize multilevel preemption.

- Preemption of a station line toward the station.
- Priority ringing on a station line toward the station.
- Frequency response and envelope delay measurements at the testboard.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The drawings in this section are included for the purpose of illustrating the text. For exact wiring information, refer to the drawings that cover the specific circuit involved.

1.04 Every precaution to avoid causing trouble on single frequency signaling systems should be taken while performing the tests covered in this section. Section 660-401-010 covers precautions to be taken while testing.

2. REMOVING CIRCUITS FROM SERVICE

2.01 The 4-wire trunk TST and SIG jacks permit transmission and signaling tests to be made directly at the associated trunk circuit. Jack circuits are designed for busy tests, seizure, make busy, and lockout. Similar functions are provided on station lines accessible from TST or LP TST jacks, except that lockout is not provided at LP TST jacks.

A. Busy Test on a Network Trunk

2.02 Busy trunks have ground on the lower sleeve of the TST jack. When the tip of the lower (XMT) plug of the testboard TST cord is touched to the lower sleeve of the TST jack, a busy test click is produced in the position telephone receiver. If no click is heard, the testboard TST cord may be connected to the trunk TST jack.

B. Seizing a Network Trunk

2.03 Seizure of a network trunk is made following the busy test described in 2.02. When a network trunk becomes busy during the interval

between the busy test and the operation to seize the trunk, the busy test guard circuit will prevent seizure and will put the telephone circuit in a monitoring condition.

| STEP | PROCEDURE |
|------|---|
| 1 | <p>Seizing a Network Trunk (Outgoing)</p> <p>With a TST cord connected to the TST jack of the trunk, operate the TALK-MON key to TALK.</p> |
| 2 | <p>Operate the SEIZE key.</p> <p><i>Note:</i> When the cord supervisory lamp is lighted, a distant sender is connected and ready to receive pulsing. Refer to the pulsing procedures. The trunk will be held until the TST cord is removed.</p> |

C. LUNK Circuits SD-27535-01 and SD-27744-01

The DM jack is bridged across the circuit at the 19A testboard.

2.04 Busy tests and seizures on LUNK circuits provided with TST jacks are performed in the same manner as at network trunk TST jacks.

2.06 The LOOP and DM jacks are not wired with sleeve leads. Before a TST cord is inserted into a DM jack, the DM key and TALK-MON key associated with the TST cord should be operated. This connects the ring of the receiving jack, through a relay, to the position voltmeter. If the line is busy, the voltmeter will indicate a potential. If the line is idle, the voltmeter will indicate 0.

D. Seizing a Station Line

Station Line with LOOP and DM Jacks

2.05 The jacks for a 4-wire station line circuit may have a LOOP and a 600-ohm DM (drop monitor) jack appearance. The LOOP jack is in series with the station line between the transmission facility and the line circuit at the line link frame.

Note: The station line LOOP jack is in series between the station and the line link frame. Insertion of a cord into the LOOP jack will open the circuit.

| STEP | PROCEDURE |
|------|--|
| 1 | <p>Seizure of a Station Line or Spare Line Link Circuit at the DM Jack, Testing Toward Line Link Equipment</p> <p>Operate the DM key. Operate the TALK-MON key to TALK.</p> |
| 2 | <p>Insert a testboard TST cord into the DM jack.</p> |
| 3 | <p>Operate the SEIZE key.</p> |
| 4 | <p>When dial tone is received, the incoming register is ready to receive pulses. Refer to the pulsing procedures. To restore the circuit to service, disconnect the TST cord.</p> |

Auxiliary Line Circuit, SD-27738-01

2.07 To remove the line from service for testing purposes, connect a TST cord to the auxiliary line LP TST jack, operate the TALK-MON key to TALK, and depress the LINE MB key. If the line is to be removed from service for other than testing purposes, insert a 371B sleeve shorting plug into the LP TST jack.

E. Lockout on a Network Trunk or LUNK Circuit

2.08 An idle or busy network trunk or LUNK may be locked out, removing the circuit from service, and then restored to service from the testboard, using the following procedures.

| STEP | PROCEDURE |
|---|--|
| <p align="center">Lockout on an Idle Network Trunk or LUNK</p> | |
| <p><i>Note:</i> This procedure makes the trunk busy to outgoing traffic only. A 2-way trunk must be removed from service at the distant office also to prevent its being used for incoming calls.</p> | |
| 1 | With the TALK-MON key operated to TALK, insert a TST cord into the trunk TST jack. |
| 2 | Operate the LO key. The LO lamp, associated with the trunk, should be lighted and remain lighted when the TST cord is disconnected. |
| 3 | Attach a 19-type shield over the LO lamp, as required by local instructions. |
| 4 | Open the E and M leads at the circuit patch bay signaling jacks, using circuit opening plugs. |
| 5 | To restore the trunk to service, remove the plugs from the signaling jacks and, with the TST cord inserted into the trunk TST jack, operate the RST key. The trunk should be restored to service in a similar manner at the distant end. |

| STEP | PROCEDURE |
|---|--|
| <p align="center">Lockout on a Busy Network Trunk or LUNK</p> | |
| <p><i>Note:</i> This procedure makes the trunk busy to outgoing traffic only. A 2-way trunk must be removed from service at the distant office also to prevent its being used for incoming calls.</p> | |
| 1 | With the TALK-MON key operated to TALK, insert a TST cord into the network trunk TST jack. |
| 2 | Operate the ANS key, if required. If the busy status was originated at the testboard, it is not necessary to operate the ANS key. |
| 3 | Operate the LO key. The LO lamp associated with the trunk should be lighted and remain lighted when the TST cord is disconnected. |
| 4 | When the circuit becomes idle, open the E and M leads at the circuit patch bay signaling jacks, using circuit opening plugs. |
| 5 | Attach a 19-type shield over the LO lamp, as required by local instructions. |
| 6 | To restore the trunk to service, remove the plugs from the signaling jacks and, with the TST cord inserted in the trunk TST jack, operate the RST key. The trunk should be restored to service in a similar manner at the distant end. |

Use of Lockout Tests To Identify a Trunk Seized Outgoing

2.09 A network trunk which has been seized outgoing by an incoming trunk, a station line,

or by an operator originating line or tandem trunk may be identified at the testboard using the following lockout procedures.

| STEP | PROCEDURE |
|--|--|
| <p>Identifying a Network Trunk Seized Outgoing, through the Links, by an Incoming Trunk (Across Office)</p> | |
| 1 | Insert a TST cord into the trunk TST jack of the <i>incoming</i> trunk. |
| 2 | Operate the TALK-MON key to TALK. |
| 3 | Operate the LO key to lockout the <i>outgoing</i> trunk which is identified at the testboard by the lighted LO lamp associated with the trunk. |
| 4 | To restore the trunk to service, operate the RST key. |

| STEP | PROCEDURE |
|--|---|
| <p>Identifying a Network Trunk Seized Outgoing through the Links by a Station Line or by an Operator Originating Line or Tandem Trunk (Across Office)</p> | |
| 1 | Insert a TST cord into the drop monitor (DM) jack of the station line or of an operator originating line, or tandem trunk. |
| 2 | Operate the DM key. If the line is busy, a potential will show on the voltmeter. If the line is idle, the voltmeter will indicate 0. |
| 3 | If the line is idle, operate the LO key. A lockup path is provided through the line link and trunk link frames. The LO lamp associated with the outgoing trunk, is lighted, identifying the trunk. The station line is released from the voltmeter circuit and connected to the position telephone circuit. |
| 4 | With the TST cord connected to the TST jack of the locked-out circuit, restore the trunk to service by operating the RST key. |

3. PULSING AND RINGING

3.01 Dial pulsing and keypulsing are provided for signaling on network trunks and station lines. Table A shows the assignment of frequencies used in 4x4 and 2/6 keypulsing. Additional information may be required, as listed in Table B. The priority

digit, or other information digits required, is pulsed ahead of the other digits.

A. Keypulsing on a Network Trunk

3.02 Perform the proper network pulsing procedure after the busy test has been made and the trunk has been seized.

| STEP | PROCEDURE |
|---|--|
| 2/6 (MF) Pulsing on a Network Trunk at the Testboard | |
| 1 | Perform a busy test and seize the trunk. |
| 2 | Operate the MF TST key. TST, MF, and S lamps are lighted to indicate that the distant receiver is ready to receive pulses. |
| 3 | When all digits have been pulsed, depress the ST key to release the keyset and complete the call. |

| STEP | PROCEDURE |
|--|---|
| 2/6 (MF) Pulsing on a Network Trunk Toward the Line (Distant Office) from the Circuit Patch Bay | |
| 1 | Insert the TST cord (large profile) into the L XMT/L RCV jacks and operate the TALK-MON key to TALK. |
| 2 | Operate the CKT PTCH L key. |
| 3 | Insert the SIG T cord into the SIG L/D jacks. Both the L and D lamps are lighted if the circuit is idle. |
| 4 | Operate the TEST-MON key (signaling test circuit) to TEST. |
| 5 | Operate the TWD D key to ON HK. |
| 6 | Operate the TWD L key to OFF HK. |
| 7 | When the L lamp, associated with SIG T cord is extinguished momentarily, the distant terminal is ready to receive pulses. |
| 8 | After all digits have been pulsed, depress the ST key to release the keyset and to complete the call. |

| STEP | PROCEDURE |
|--|--|
| 2/6 (MF) Pulsing Toward the Drop (Trunk Link Frame) on a Network Trunk from the Circuit Patch Bay | |
| 1 | Insert the TST cord (large profile) into the D XMT/D RCV jacks and operate the TALK-MON key to TALK. |
| 2 | Operate the CKT PTCH D key. |
| 3 | Operate the TWD L key to ON HK. |
| 4 | Operate the TWD D key to OFF HK. |
| 5 | When the D lamp is extinguished momentarily, the drop is ready to receive pulses. Pulse the desired digits and operate the ST key to release the keyset and complete the call. |

B. Keypulsing and Dial Pulsing on LUNK Circuits

are provided with test (TST) jacks similar to the test jack provided for a network trunk.

3.03 LUNK circuits, SD-27744-01 or SD-27535-01,

| STEP | PROCEDURE |
|--|--|
| 4x4 Keypulsing on a 2-Way Trunk, SD-27744-01 (LUNK) or SD-27535-01 (LUNK) | |
| 1 | Make a busy test at the trunk TST jack and seize the trunk using a TST cord. |
| 2 | Operate the 4X4 TST key. Keypad 4X4 and TST lamps are lighted. |
| 3 | When the cord supervisory lamp is lighted, pulse the required digits. |
| 4 | When pulsing is completed, depress the ST key to release the keypad and complete the call. |

| STEP | PROCEDURE |
|--|--|
| Dial Pulsing on a 2-Way Trunk, SD-27744-01 (LUNK) or SD-27535-01 (LUNK) | |
| 1 | Make a busy test at the trunk TST jack and seize the trunk using a TST cord. When a register has been connected, dial tone is received. The cord supervisory lamp is extinguished. |
| 2 | Depress the DP TST key. DP and TST lamps are lighted. |
| 3 | Dial the desired digits and operate the ST key to release the dial and complete the call. |

C. Keypulsing, Dial Pulsing, and Ringing on a Station Line

Procedures are given for multi-frequency pulsing toward the line link frame, ringing toward the station, and dial pulsing in either direction.

3.04 Pulse or ring on a station line, as required, using the following procedures.

| STEP | PROCEDURE |
|--|--|
| 4x4 Keypulsing on a Station Line (Having LOOP and DM Jacks) Toward the Line Link Frame from the Testboard | |
| 1 | Operate the DM key. |
| 2 | Operate the TALK-MON key to TALK. |
| 3 | Insert the TST cord into the DM jack of the line under test. |

| STEP | PROCEDURE |
|------|--|
| 4 | Operate the SEIZE key. |
| 5 | Operate the 4X4 TST key. |
| 6 | When 4X4, S, and the cord supervisory lamps are lighted, key the desired digits. Depress the ST key to release the keyset and complete the call. |

| STEP | PROCEDURE |
|---|--|
| Dial Pulsing on a Station Line Toward the Line Link Frame from the Testboard | |
| 1 | Operate the DM key. |
| 2 | Operate the TALK-MON key to TALK. |
| 3 | Insert the TST cord into the DM jack of the line under test. |
| 4 | Operate the SEIZE key. When dial tone is received, the register is ready to receive pulses. The cord supervisory lamp is extinguished. |
| 5 | Operate the DP TST key to connect the position dial to the TST cord. Dial the desired digits and depress the ST key. The supervisory lamp is lighted. When the call is answered, the supervisory lamp is extinguished. |
| 6 | To restore the station line to service, disconnect the TST cord. |

| STEP | PROCEDURE |
|--|--|
| Dial Pulsing on a Station Line Toward the Station at the Testboard TST Jack | |
| 1 | Insert a TST cord into the TST jack of the line. |
| 2 | Operate the TALK-MON key to TALK. The cord supervisory lamp is lighted. |
| 3 | Operate the SEIZE key. |
| 4 | Operate the DP TST key to connect the position dial to the TST cord. Dial the desired digits and depress the ST key. When the called number answers, the supervisory lamp is extinguished. |

SECTION 666-201-500

| STEP | PROCEDURE |
|--|--|
| <p align="center">Ringling on a Station Line at the Testboard LOOP Jack</p> | |
| 1 | Connect the first TST cord (large profile plug) into the LOOP jack of the line under test. |
| 2 | Operate the TALK key associated with the TST cord. |
| 3 | Operate the LP key. |
| 4 | Operate the RING TST key to ring the station. |
| 5 | To restore the station line to service, disconnect the TST cord. |

| STEP | PROCEDURE |
|--|--|
| <p align="center">Ringling on a Station Line at the Testboard LP TST Jack</p> | |
| 1 | Insert a TST cord into the LP TST jack. |
| 2 | Operate the TALK-MON key to TALK. |
| 3 | Operate the LP key to ring the station. |
| 4 | If required to rering the station, depress the RING TST key. |
| 5 | To restore the station line to service, disconnect the TST cord. |

| STEP | PROCEDURE |
|---|--|
| <p align="center">Dialing Toward the Drop (Line Link Frame) from the Circuit Patch Bay</p> | |
| 1 | Insert the TST cord (large profile) into the D XMT/D RCV jacks at the circuit patch bay. Operate the TALK-MON key to TALK. |

| STEP | PROCEDURE |
|------|---|
| 2 | Operate the CKT PTCH D key. Insert the SIG T cord into the SIG L/D jacks of the line under test. Operate the TEST-MON key (signaling test circuit) to TEST. Operate the TWD D key to OFF HK. Operate the dial key to DIAL DROP. |
| 3 | After dialing the desired digits, restore the dial key to normal. The D lamp is extinguished when the call is answered. |
| 4 | To release the line, restore the TWD D and TEST-MON keys to normal and disconnect the cords. |

| STEP | PROCEDURE |
|--|---|
| Dial Pulsing Toward the Line (Station) from the Circuit Patch Bay | |
| 1 | Insert the TST cord (large profile) into the L XMT/L RCV jacks at the circuit patch bay. Operate the TALK-MON key to TALK. |
| 2 | Operate the CKT PTCH L key. Insert the SIG T cord into the SIG L/D jacks of the line under test. Operate the TEST-MON key (signaling test circuit) to TEST. Operate the TWD L key to OFF HK. Operate the dial key to DIAL LINE. |
| 3 | Start and stop dial signals can be observed on the L lamp. Dial the desired digits and restore the dial key to normal. When the station answers, the L lamp is extinguished. |
| 4 | To release the line, restore the TWD L and TEST-MON keys to normal and disconnect the cords. |

D. Preemption and Priority

Multilevel Preemption

3.05 The 19A testboard may be equipped to test the ability of the switching network to preempt existing calls on the network, on a multilevel priority basis. To test this feature, it is necessary to originate one call, in the normal manner, to a station or test line which can be held while a second call (the priority call) is originated to the same station or test line. The second call is originated through the local switches over a line, terminating at the testboard, which is similar to an operator originating line with sleeve supervision. Two such lines are required to test the ability to preempt a lower priority call with a higher priority call.

3.06 In multifrequency (4x4) keypulsing, the priority digit is pulsed ahead of other digits. Four levels of priority, from lowest to highest preempting ability, are as follows: priority (P1); immediate (P2); flash (P3); and flash override (P4).

Preemption on a Station Line toward the Station

3.07 When provided, a line preemption key associated with the signaling test circuit may be used to preempt on a station line toward the station, either for reuse or nonreuse of the line. The station line must be equipped to recognize the timed preemption signals.

| STEP | PROCEDURE |
|---|---|
| Preemption on a Station Line Toward the Station from the Circuit Patch Bay | |
| 1 | Connect a TST cord to the TST or LP TST jack. |
| 2 | Connect the SIG T cord to the SIG L/D jacks of the line under test. |
| 3 | Operate the TEST-MON key (signaling test circuit) to TEST. |
| 4 | Operate the TWD D key to ON HK. |
| 5 | Operate the TWD L key to OFF HK. |
| 6 | If reuse of the line is intended, operate the preemption key to PRMT REUSE. Operate the TALK-MON key to TALK. After preemption, an off-hook signal remains on the line. If the line will not be reused, operate the preemption key to PRMT NONREUSE. After preemption, an on-hook signal remains on the line. |

Priority Ringing on a Station Line to the Station

- 3.08** The distinctive ringing sequence produced informs the customer that a priority call is waiting. The ringing sequence is maintained until the call is answered.

| STEP | PROCEDURE |
|---|--|
| Priority Ringing on a Station Line Toward the Station from the Circuit Patch Bay | |
| 1 | Connect a TST cord to the TST or LP TST jack of the line under test. Operate the TALK-MON key to TALK. |
| 2 | Connect the SIG T cord to the SIG L/D jacks of the line under test. |
| 3 | Operate the TEST-MON key (signaling test circuit) to TEST. |
| 4 | Operate the TWD D key to ON HK. |
| 5 | Operate the TWD L key to OFF HK. |
| 6 | Depress the PRIOR RING key, momentarily. Meet the answering party on the talking circuit. |
| 7 | Disconnect cords and restore keys to their normal positions. |

**4. TRANSMISSION AND NOISE MEASURING SYSTEM
SD-95900-01**

A. Transmission Loss Measurements

4.01 The transmission measuring system provides automatic compensation for office wiring and equipment loss when transmission measurements are being made.

4.02 The complete trunk is divided into three readily measured segments by the voice frequency patch bays at each end of the transmission facility, as shown in Fig. 1. In the process of establishing a trunk, voice frequency signals are sent between these patch bays over the facility. Adjustments in the equipment associated with the facility are made so that when -16 dbm is applied to the input (transmit side), +7 dbm is obtained at the output (receive side). Other transmission parameters, including noise and frequency response, are checked against the requirements applying to the particular facility involved.

4.03 The end segments of the trunk are tested separately by measurements between the patch bays and the testboards. The loss at 1000 cps is adjusted to within ±0.13 db of the loss required to establish the correct levels at the carrier facility (outgoing) and at the switches (incoming). Combining the tolerances on the three segments on

an rms basis and allowing little drift of the transmission facility, the loss of the overall trunk should be within ±0.5 db of the desired loss at 1000 cps when completely assembled.

Calibration of the Transmission Measuring Circuit

4.04 Before making any measurements at the 19A testboard, the output at the milliwatt (1000/0/600) jack should be checked, using a 22A milliwatt reference meter or equivalent, in accordance with Section 103-335-512. Periodic measurements at this outlet should be made in accordance with the schedule given in Section 103-335-300.

4.05 The calibration of the transmission measuring system is checked at 0 dbm by operating the CAL key and observing the meter reading. If adjustment is required, see Section 666-400-501.

4.06 If measurements are to be made with a variable frequency (VF) oscillator, the OSC jack is patched to the VF IN jack. The oscillator output is checked by operating the CAL key while observing the transmission measuring circuit meter. The oscillator output should be checked in this manner after each change of frequency.

4.07 Figure 2 shows a measuring arrangement for testing trunks in the outgoing direction.

| STEP | PROCEDURE |
|---|---|
| Transmission Measurements on Network Trunks (Outgoing 2-Way Manual Test) | |
| 1 | Seize an idle trunk to be tested by inserting the TST cord into the trunk TST jack and operating the SEIZE key. Operate the TALK-MON key to TALK. When the cord supervisory lamp is lighted, pulse the distant code 101. After all digits have been keyed, complete the call by depressing the ST key. Arrange with the distant testboard attendant for making the tests desired. |
| 2 | Insert the CONN cord into the TST MEAS jack with the TST-101 key operated to TST. <i>Note:</i> The TALK-MON key should be either in the normal or MON position during all transmission measurements. |
| 3 | To send test power to the distant testboard, operate the SEND-RCV key to SEND. |
| 4 | To receive test power from the distant testboard, operate the SEND-RCV key to RCV and observe the meter of the transmission measuring system. Read the loss of the trunk in the far-to-near direction on the meter. |

SECTION 666-201-500

| STEP | PROCEDURE |
|------|--|
| 5 | If a transmission frequency run is to be made toward the distant testboard, patch the OSC jack to the VF IN jack. Operate the CAL key and adjust the oscillator output to read 0 dbm on the meter. Restore the CAL key to the normal position. |
| 6 | Operate the SEND-RCV key to SEND. |
| 7 | Repeat Step 5 for each frequency transmitted. |
| 8 | To restore the trunk to service, disconnect the cords and restore keys to their normal positions. |

| STEP | PROCEDURE |
|--|--|
| One-Way, Far-to-Near Measurements on Network Trunks to Code 102 | |
| 1 | Seize an idle trunk to be tested by inserting the TST cord into the trunk TST jack with the SEIZE key operated. Operate the TALK-MON key to TALK. Insert the CONN cord, associated with the TST cord, into the TST MEAS jack. |
| 2 | Operate the TST-101 key to TST. |
| 3 | Operate the SEND-RCV key to RCV. |
| 4 | When the cord supervisory lamp is lighted, pulse the distant code 102. When 1000-cycle tone is received, restore the TALK-MON key to either the normal or MON position. Read the loss of the trunk in the far-to-near direction on the meter of the transmission measuring system. |

| STEP | PROCEDURE |
|---|--|
| Transmission Measurements on Network Trunks (Incoming) Using Code 101 Trunks | |
| 1 | A request for measurement on an incoming trunk will be received from a distant testboard over one of the code 101 trunks. The call is answered using a CONN cord. When it is determined that a transmission measurement is desired, the TST cord is inserted into the 101 MEAS jack and the TST-101 key is operated to 101. The TALK-MON key is restored to either the normal or MON position. |
| 2 | To send test power toward the distant testboard, operate the SEND-RCV key to SEND. |
| 3 | To receive test power from the distant testboard, operate the SEND-RCV key to RCV. Read the AML of the trunk in the far-to-near direction on the meter of the transmission measuring system. |
| 4 | If a transmission frequency run is to be made toward the distant testboard, patch the OSC jack to the VF IN jack. Operate the CAL key and adjust the oscillator output to read 0 dbm on the meter. Restore the CAL key to the normal position. |

| STEP | PROCEDURE |
|------|---|
| 5 | Operate the SEND-RCV key to SEND. Repeat Step 4 for each frequency transmitted. |
| 6 | To restore the trunk to service, disconnect the cords and restore the keys to their normal positions. |

Transmission Measurements on Station Lines

4.08 Station Lines Having LOOP and DM Jacks: Care should be exercised to confirm that a busy condition does not exist on the line before initiating a test. If a test cord is connected to the LOOP jack of a busy line, the connection is interrupted.

4.09 Take the line out of service by routing the calls for the station to intercept. Accomplish this by patching the line DM jack to an INTCPT jack and terminate the LOOP jack. If two or more lines are on a hunting basis, the intercept feature is not feasible; the line should be made busy at the No. 5 crossbar equipment.

4.10 Station Lines Having TST or LP TST Jacks: Monitor the line and, when it is idle, seize the line, as described in 2.04 through 2.07.

4.11 A 21A transmission measuring set and either a 2AB auxiliary test set or TTS4 (Northeast) test set, or equivalent, are generally used at the

station. Measurements are made at the following test points:

- PBX — At line appearance through cord circuit and 2AB auxiliary test set, if used
- 4-Wire Telephone (Receiver on-hook) — Refer to Section 310-200-503 for the equipment and connections required for the type of line circuit to be tested
- Data Station — At demarcation strip at customer's equipment

4.12 The request for a measurement may originate either at the 19A testboard or at the station. If the test originates at the testboard, arrange to have assistance at the station during the test. If the request originates at the station over the DDD network or other path, arrangements are made to meet on the desired line.

| STEP | PROCEDURE |
|--|--|
| Testing Toward the Distant Station | |
| 1 | Determine that the line is idle. Monitor or make a busy test, as required. |
| 2 | Seize the line, using the appropriate procedure. |
| 3 | A TST cord is connected to the line testing jack; connect the associated CONN cord to the SUB MEAS jack. |
| The TST-101 key should remain in the normal position and the cord TALK-MON key should remain in either the normal or MON position during transmission measurements. | |

| STEP | PROCEDURE |
|---|--|
| 4 | At the station, connect the transmission measuring equipment at test points specified in Section 310-200-503. |
| 5 | At the testboard, operate the SEND-RCV key to SEND. Measurement is made at the station. |
| 6 | Operate the SEND-RCV key to RCV. When test power is received from the station, read the transmission loss on the transmission measuring system meter. The reading includes the 2-db loss of the pad in the receiving branch of the transmission measuring circuit. |
| Testing Toward the Line Link Frame (Station Line with LOOP and DM Jacks) | |
| 7 | When testing line link equipment, patch a spare line link appearance to the line being tested. This ensures service for the station during the testing period. Patch the LOOP jack to a spare LLF jack. |
| 8 | With the DM key operated and the cord TALK-MON key operated to TALK, insert a TST cord into the station line DM jack. |
| 9 | Operate the SEIZE key to close a shunt on the receiving and transmitting pairs. When dial tone is received from the link equipment, the register is ready to receive pulses. Refer to the pulsing procedures. |
| 10 | When tests are concluded, restore the station line to the regular line link equipment by removing the patch between the LOOP and spare LLF jack. |

B. Noise Measurements

- 4.13 The noise measuring circuits of the SD-95900-01 transmission and noise measuring system should be calibrated in accordance with the following procedure.

| STEP | PROCEDURE |
|---|--|
| Calibration of the Noise Measuring Circuit | |
| Note: The milliwatt supply used to supply calibrating power to the noise measuring system may not be provided with an outlet for its own calibration. If not, the leads from the milliwatt supply circuit should be disconnected from the calibrating pad circuit at the bay containing the 1W amplifier-rectifier. The level is then measured on these leads with a 22A milliwatt reference meter or equivalent, and adjusted to 0 ± 0.03 dbm. The milliwatt machine, if used can be started in this case, if it is not already running, by operation of the CAL NOISE key which is located in the same bay. If a calibrating jack is provided, the measurement is made as described in Section 103-335-512. After the milliwatt level has been adjusted and the leads are reconnected, proceed as follows: | |
| 1 | Operate the CAL NOISE key to apply one milliwatt through the calibration pads to the noise measuring system. |

| STEP | PROCEDURE |
|------|--|
| 2 | Inspect the 1W amplifier-rectifier to see that relays A, C, and D are <i>not</i> operated. |
| 3 | With the A5 and A10 keys in their normal positions, a meter reading of 15 db on the A scale should be indicated. |
| 4 | Operation of the A5 and A10 keys, in turn, should cause the meter reading to drop 5 ± 0.2 db and 10 ± 0.2 db respectively. |
| 5 | If the requirements are not met, make any necessary adjustments in the 1W amplifier-rectifier. Adjust the SENS ADJ potentiometer on the 1W amplifier-rectifier to meet the requirements in Step 3. Adjust the SCALE ADJ potentiometer to meet the requirements in Step 4. If either potentiometer is readjusted, repeat Steps 3 and 4 until the requirements for both are met. |
| 6 | Restore the CAL NOISE key to the normal position. |

| STEP | PROCEDURE |
|------|---|
| | <p data-bbox="380 957 846 989">Noise Measurements on Network Trunks</p> <p data-bbox="269 1020 1528 1115">1 Seize the trunk to be tested, or answer the code 101 trunk, in the same manner as for a transmission measurement. Insert the connecting cord into the TST MEAS or 101 MEAS jack and operate the TST-101 key to TST or 101, as appropriate.</p> <p data-bbox="269 1146 1528 1272">2 Pulse the digits 100 if a code 100 test line is provided at the far end. If the test is being made between testboards, pulse 101 and ask the distant testboard attendant to connect the trunk to a test termination or to the noise measuring equipment. Noise tests may be made simultaneously at each end, if desired.</p> <p data-bbox="269 1304 1528 1335">3 Operate the SEND-RCV key to RCV, and operate the TALK-MON key to the MON position.</p> <p data-bbox="269 1367 1016 1398">4 Operate the NM key and observe the meter reading.</p> <p data-bbox="380 1430 1528 1493"><i>Note:</i> If the test requirement is not met, monitor the circuit, using the telephone set, and record a description of the noise heard.</p> <p data-bbox="269 1524 1495 1556">5 To restore the trunk to service, disconnect cords and restore keys to their normal positions.</p> |

| STEP | PROCEDURE |
|------|--|
| | <p data-bbox="380 1734 813 1766">Noise Measurements on Station Lines</p> <p data-bbox="269 1797 1528 1860">1 At the station, terminate the station line into 600 ohms at one of the locations to be tested as listed in 4.11.</p> |

| STEP | PROCEDURE |
|------|--|
| 2 | At the 19A testboard, insert the first TST cord into the LOOP jack. Insert the CONN cord into the SUB MEAS jack. Leave the TST-101 key in the normal position. |
| 3 | Operate the SEND-RCV key to RCV and operate the TALK-MON key to the MON position. |
| 4 | Operate the NM key and observe the meter reading. |
| | <i>Note:</i> If the test requirement is not met, monitor the circuit, using the telephone set, and record a description of the noise heard. |
| 5 | To restore the station line to service, disconnect cords and restore keys to their normal positions. |

C. Crosstalk Measurements

4.14 Crosstalk volume measurements may be made at the 19A testboard in the same manner as noise measurements.

4.15 When measuring crosstalk volume, an appreciable part of the reading on the meter may be contributed by noise on the circuit under test. Allowance for this may be made by making a measurement when crosstalk is absent (as determined by monitoring) and subtracting the noise reading from the measurement made with both noise and crosstalk present, and applying the necessary corrections as shown in Section 660-403-501.

5. FREQUENCY RESPONSE AND ENVELOPE DELAY MEASUREMENTS

5.01 Frequency response and envelope delay measurements on network trunks and station lines may be made at the 19A testboard when the 25A voiceband gain and delay measuring set is provided. The input circuit of the SD-95900-01 transmission and noise measuring system is arranged so that measurements may be made at the same MEAS jack used for a transmission measurement.

5.02 With a patch cord connected between the LINE jack of the 25A set and the 25A IN jack, and the SEND-RCV key in the normal position; connection is made between the 25A IN jack

and the MEAS jack when the key, associated with the MEAS jack, is operated. Use a testboard test cord pair to connect the circuit under test to the MEAS jack in the same manner as for transmission loss measurements. If the SEND-RCV key is operated to either position, the connection between the MEAS jack and the 25A IN jack is opened and the MEAS jack is connected to the transmission and noise measuring circuits.

5.03 Operating instructions for the 25A voiceband gain and delay measuring set are given in Section 103-115-100.

5.04 Intraoffice measurements, made to determine what portion of measured amplitude and delay distortion is contributed by office wiring and testboard circuits, are described in Section 666-201-501.

6. ACCESS TESTS

6.01 To ensure full use of network trunks and station lines operating as a group in each circuit classification, periodic tests should be made. Routine intervals for these tests should be scheduled by the control offices. Scheduled tests should be set up during light load periods agreed to by the subscriber.

| STEP | PROCEDURE |
|---|--|
| <p align="center"><i>Access Tests on Network Trunks within a Group</i></p> | |
| 1 | Lock out all but one trunk in the group to be tested. |
| 2 | Insert the SIG T cord in the SIG L/D jacks (at the circuit patch bay) associated with the trunk not locked out in Step 1. Operate the TEST-MON key to MON. |
| 3 | Select a spare line link appearance at the 19A testboard. Operate the TALK and DM keys. Insert the TST cord into the DM jack and operate the SEIZE key. Pulse forward the 101 code for the distant office. (In the SCAN network for example, when Rockdale testboard calls the testboard at Monrovia, the digits required are 231, 3101.) Depress the ST key after all digits are keyed. The SIG D lamp should be extinguished. When the distant testboard answers, the SIG L lamp is extinguished. If trouble is indicated, take corrective action to restore the trunk to service. |
| 4 | Lock out the trunk tested and release one of the other trunks in the group. |
| 5 | Repeat Steps 1 through 4 until all trunks in the group have been tested. |
| 6 | To restore all network trunks to service, disconnect the cords and restore all keys to their normal positions. |
| <p align="center"><i>Access Tests on Station Lines within a Group</i></p> | |
| 7 | In the group to be tested, make all lines busy except one. Use 351A plugs at the line link appearances to make the lines busy. |
| 8 | Insert the SIG T cord into the SIG L/D jacks (at the circuit patch bay) of the line selected in Step 1. Operate the TEST-MON key to MON. |
| 9 | Select a spare line link appearance at the 19A testboard. Operate the TALK and DM keys. Insert the TST cord into the DM jack. Operate the SEIZE key. |
| 10 | Pulse forward the code for the line selected in Step 1. To complete the call, operate the ST key. The SIG D lamp should be extinguished. When the subscriber answers, the SIG L lamp is extinguished. |
| 11 | Make the line busy at the line link appearance using a 351A plug and release the one made busy in Step 1. |
| 12 | Repeat Steps 7 through 11 until all lines in the group are tested. |
| 13 | Restore all lines to service by removing the 351A plugs at the line link appearances. |

TABLE A
ASSIGNMENT OF FREQUENCIES USED IN PULSING

| SIGNAL | 2/6 (MF) PULSING | | 4X4 PULSING | | REMARKS |
|--|------------------|---------------|--------------|--------------|---|
| | KEY | FREQUENCIES | KEY | FREQUENCIES | |
| Area Code — Office Code — Thousands, Hundreds, Tens, and Units Digits | 0 | 1300 and 1500 | 0 | 941 and 1336 | |
| | 1 | 700 and 900 | 1 | 697 and 1209 | |
| | 2 | 700 and 1100 | 2 | 697 and 1336 | |
| | 3 | 900 and 1100 | 3 | 697 and 1477 | |
| | 4 | 700 and 1300 | 4 | 770 and 1209 | |
| | 5 | 900 and 1300 | 5 | 770 and 1336 | |
| | 6 | 1100 and 1300 | 6 | 770 and 1477 | |
| | 7 | 700 and 1500 | 7 | 852 and 1209 | |
| | 8 | 900 and 1500 | 8 | 852 and 1336 | |
| 9 | 1100 and 1500 | 9 | 852 and 1477 | | |
| KP (Key Pulse) | — | 1100 and 1700 | — | — | Sent automatically after (MF) key opr |
| ST Start-End of Keying | ST | 1500 and 1700 | ST | — | Releases key set ckt |
| AR Spillover Into Bell System Network Indicates Priority With Camp-on | AR | 1300 and 1700 | — | — | Sent after KP when testing trk to Bell System Network |
| P (Priority) | — | — | P | 941 and 1209 | Sent ahead of numerical digits when testing sub line |
| SG Special Grade Trk | — | — | SG | 941 and 1477 | |
| M1 (Spare) | M1 | 700 and 1700 | — | — | Provided for testing multi-level preemption. Precedes numerical digits |
| M2 (Spare) | M2 | 900 and 1700 | — | — | |
| M3 (Spare) | M3 | 1300 and 1700 | — | — | |
| P1 (Priority) | — | — | P1 | 941 and 1633 | |
| P2 (Immediate) | — | — | P2 | 852 and 1633 | |
| P3 (Flash) | — | — | P3 | 770 and 1633 | |
| P4 (Flash override) | — | — | P4 | 697 and 1633 | |
| TO (SPARE) | — | — | TO | 941 and 1204 | |
| * (SPARE) | — | — | * | 941 and 1477 | |

TABLE B

INFORMATION DIGITS — PULSED AFTER KP ON 2/6 & INITIALLY ON 4X4 OR DIAL PULSING

| INFORMATION TO REGISTER OR SENDER | 2/6 (MF) PULSING BETWEEN SENDERS | 4X4 PULSING 5D SWBD OR DIAL PULSE STA SET | 4X4 STA SETS | REMARKS |
|-----------------------------------|----------------------------------|---|-----------------|-------------------------------------|
| Nothing | 1 | 11 | No key opr | |
| Priority | 2 | 12 | (P) | |
| Priority and Spillover | 3 | — | — | |
| Special Grade | 4 | 14 | (SG) | |
| Priority and Special Grade | 5 | 15 | (P) & (SG) | Either (P) or (SG) may be opr first |
| Spillover | 6 | 13 | (P) key 2 times | |
| Crossover | 7 | — | — | |
| May Cancel | — | 10 | — | Used on 2W Conn |
| AR (Spillover) | Auto. from SDR | — | — | Marker control only in service |

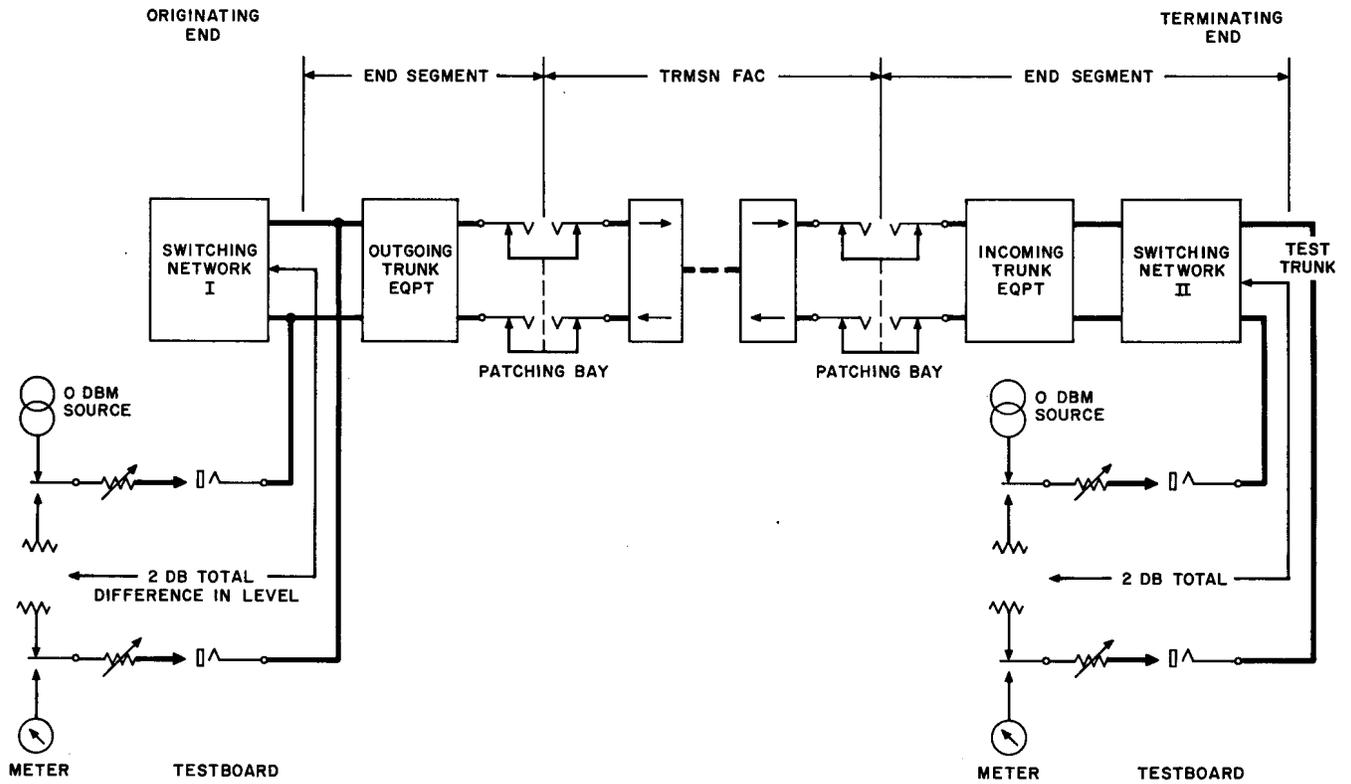


Fig. 1 — Simplified Diagram of Overall Trunk with Testboard Access

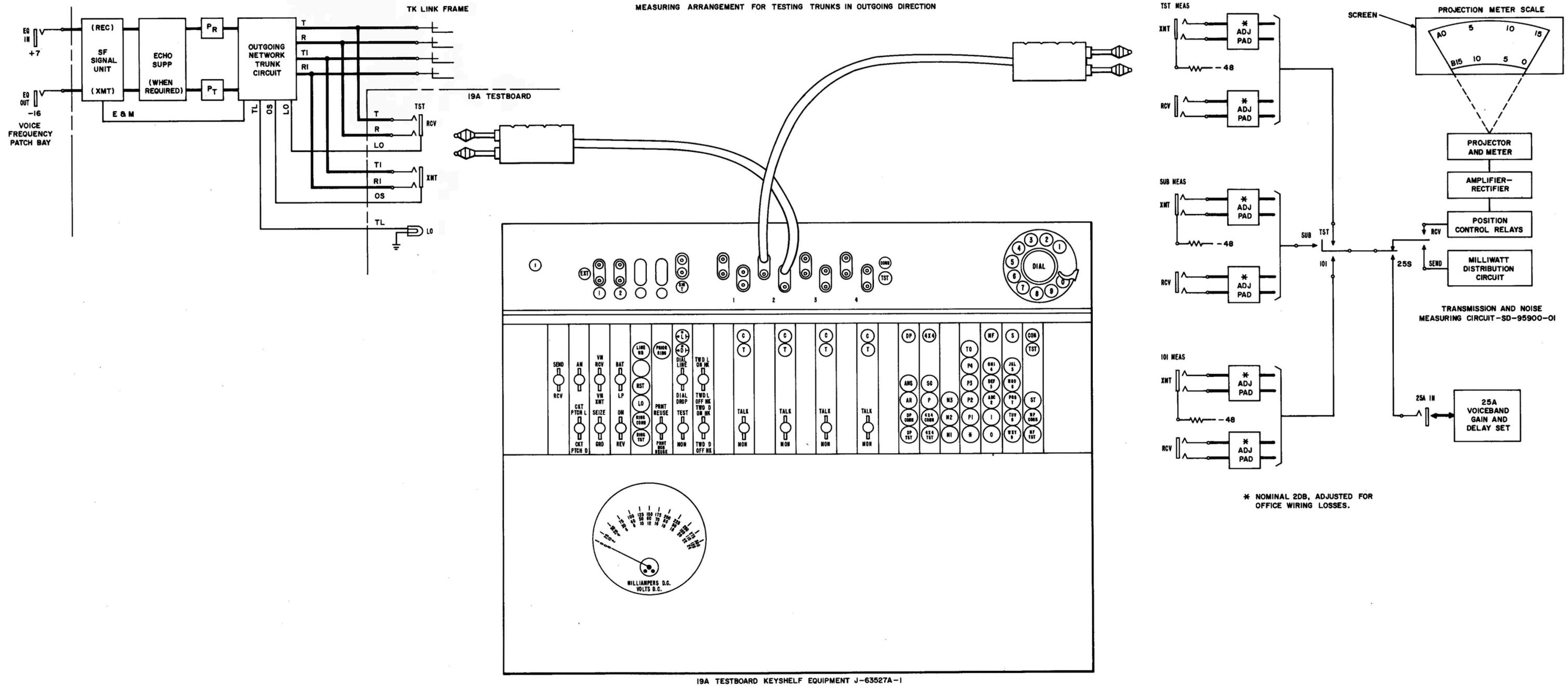


Fig. 2 — 19A Testboard Keyshef Equipment J-63527A-1