19A TESTBOARD

GENERAL DESCRIPTION

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1. GENERAL

1.01 This section provides general information on the equipment arrangements and features of the 19A testboard and the associated circuit patch bay.

1.02 This section has been reissued to include descriptions of equipment and functional changes which have been made in the testboard, the associated circuit patch bay, equipment bay, and the connecting circuits. Added features include multilevel preemption (4x4 MF pulsing) on network trunks and station lines, priority ringing on station lines, and provision for making 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 19A testboard and circuit patch bay are used in the 4-wire No. 5 crossbar switching system for making overall tests of the network trunks, LUNK's, and station lines (access lines and subscriber lines) in switched services networks in order to facilitate the location of troubles and to expedite the restoration of service when there has been an interruption. A description of switched services networks is provided in Section 310-200-100.

1.04 The test position is comprised of a lower unit which has testing and control equipment and an upper unit with a jack field containing the network trunk and LUNK jacks (test jacks and lockout lamps), station line jacks (test jacks with lockout lamps or loop and drop monitor jacks), and miscellaneous other jacks. Circuits in this board are arranged on a 4-wire basis necessitating the use of twin jacks in the jack field and twin plugs on the cords which connect to these jacks.

1.05 The adjacent circuit patch bay includes:

(a) Circuit patching jacks (6-wire) to permit testing and patching transmission and signal leads of station lines.

(b) Circuit patching jacks (7-wire) to permit testing and patching transmission, signal, and echo suppressor control leads of network trunks.

(c) Miscellaneous jacks for battery supply, test pads, night alarms, order wires, and transmission loss and noise measurements.

1.06 The testing facilities available provide for monitoring and talking on a network trunk, LUNK, or station line and for making 1000-cycle and variable-frequency transmission measurements, frequency response and envelope delay measurements, signaling, noise, priority, preemption, and other miscellaneous tests that help to determine the trouble which exists on a circuit so that the necessary action may be taken to restore service.

1.07 Since the facilities maintained from the 19A testboard may carry special data signals, it is of utmost importance that there be no transmission impairment caused by testboard activity.

1.08 One 19A testboard with one circuit patch bay will accommodate 180 four-wire network trunks and 150 four-wire station lines. Spare line link frame appearances are grouped with station loop jacks. The operator originating line circuits and operator tandem trunks are terminated in DM jacks. Space in the jack field is provided for a KS-19260 oscillator. The ratio of trunks to station lines and the percentage of station lines using carrier facilities will vary widely from office to office. Figure 1 shows a typical arrangement for 180 trunks and 150 station lines. An optional arrangement of the testboard is provided for locations testing only network trunks and will accommodate test jacks and lockout lamps for up to 250 trunks. No loop or drop monitor jacks are provided.

1.09 One bay, similar to the circuit patch bay, may be installed and associated with the testboard for mounting test apparatus or for mounting normally portable test equipment such as frequency meters, noise measuring sets, data signal generators, gain and delay sets, or other desired test equipment.

1.10 The equipment and circuit drawings included in this section are for the purpose of illustrating the text only. They may or may not agree in detail with a particular installation. When the exact wiring or equipment information is needed for any installation, reference should be made to the drawings for the installation involved.

2. TESTBOARD EQUIPMENT BAY — JACK CIRCUITS

2.01 The jack circuits for the testboard equipment bay provide the jacks, lamps, and other miscellaneous items associated with 4-wire network trunks, LUNK's, and station lines. Other jacks are provided in miscellaneous jack panels on the testboard and circuit patch bays (as shown in SD-68330-01, SD-95900-01, and SD-95101-01).

2.02 Network trunks and LUNK's are provided with test jacks and lockout lamps. The test jacks permit transmission and signaling tests to be made through the associated trunk circuit. Lead LO from the sleeve of the RCV jack connects to the trunk and provides means for restoring the trunk circuit to service after it has been removed from service by the lockout feature. Lamp LO is lighted whenever the trunk circuit is removed from service. Figure 2 of this section shows a typical arrangement for testing and patching network trunks which, optionally, may be associated with an emergency transfer circuit. Test jacks and lockout lamps associated with a 2-way trunk having a detectable preempt feature are shown in Fig. 3.

2.03 Line jacks for each 4-wire station line circuit have a LOOP jack and a 600-ohm drop monitor (DM) jack appearance at the testboard. The LOOP jack is in series with the subscriber line between the transmission facility and the line circuit at the line link frame in station loop operations. The DM jack is bridged across the circuit at the 19A testboard. Tests on station lines are made from these jacks. Figure 4 of this section shows patch and monitor jacks for a line with loop supervision. Figure 5 of this section shows test and patch jacks for an emergency station line circuit with DX supervision. Figure 6 shows test jacks and lockout lamp for a line with the preemption feature.

2.04 For station loops, the LOOP jack connects directly to the cable conductors. However, for stations having E & M lead signaling circuits, connection is made to the auxiliary line circuit which converts E & M lead signaling to loop signaling. Figure 7 shows a typical arrangement for testing and patching station lines and access lines.

2.05 A 2-way line circuit (as shown in SD-27535-01) is provided from the 4-wire line link and trunk link frames, arranged for direct inward dialing to a distant PBX and to route calls from the PBX to an originating register. This circuit, known as a LUNK (derived from a combination of the words line and trunk) provides:

(a) Incoming calls using the line link frame (LLF) and an originating register.

(b) Outgoing calls using the trunk link frame (TLF) and a dial pulse sender with E & M lead supervision. Figure 8 of this section shows a 2-way trunk with LLF and TLF connections. (LOOP and DM jacks at the 19A testboard are optional.) Figure 9 of this section shows a typical arrangement of LUNK operation.

3. TESTBOARD EQUIPMENT BAY — MISCELLANEOUS JACK CIRCUITS AND PLUGS

A. Plugs

3.01 No. 322A plugs are provided to insert into the out-of-service (OS) jack at the 19A testboard when a network trunk is removed from service. The OS jack is provided only for network trunks arranged for emergency transfer and are connected when the trunk is in manual operation. Figure 2 shows the OS jack arrangement at the 19A testboard.

3.02 No. 338A plugs are used for opening LOOP and LLF jacks when a station line is patched to a spare LLF or trouble intercept (INTCPT) jack to prevent interference from the patched equipment. Figure 10 shows a typical LOOP and LLF jack arrangement at the 19A testboard.

3.03 No. 371B sleeve shorting plugs are provided to insert into the loop test (LP TST) jack of a station line with the preempt feature to remove the line from service.

B. Cord Extension Jacks

3.04 Two cords are provided in each testboard position and are jack-ended at nonadjacent testboards to permit assistance testing from nonadjacent positions. Extension cord circuits should not be used for transmission measurements, because excessive wiring losses may be introduced.

C. Four-Wire Operator Originating Line or Operator Tandem Trunk Jacks

3.05 The 4-wire operator originating line circuits and operator tandem trunks are jack-ended in the testboard to permit seizing the operator appearance for locking out and identifying network trunks. Calls will not be originated from the testboard on these trunk circuits.

D. Spare Auxiliary Line Jacks

3.06 Two drop monitor (DM) jacks are furnished with each spare auxiliary line circuit. One DM jack is used for establishing a 4-wire patch to the DM jack of the replaced equipment. The second DM jack is used for regular monitoring purposes. A 338A opening plug should be inserted into the LOOP jack of the replaced equipment to prevent interference from the patched equipment.

E. Spare Line Link Frame Appearance Jacks

3.07 The spare line link frame (LLF) jack may be wired so that any calls to it will go to intercept. When a station line is patched to a spare LLF jack, the intercept condition is removed and the station will receive calls over the spare LLF jack.

F. Trouble Intercept Jacks

3.08 Trouble intercept (INTCPT) jacks are provided so that calls for a station may be routed on a patch basis to intercept at the 5D switchboard. (This feature is not feasible when two or more lines are on a hunting basis.) Figure 10 shows a patching arrangement for spare LLF and INTCPT jacks.

G. Switchboard Test Trunk Jacks

3.09 These jacks are provided so that circuits appearing at the switchboard may be patched to the trunks to permit testing from the testboard.

3.10 Loop test (LP TST) jacks with lockout (LO) lamps are provided for testing station lines through an auxiliary line circuit with the preempt feature. Busy testing, seizure, make-busy, and lockout functions are provided.

3.11 A receiver off-hook tone (ROH T) jack is provided with automatically timed tone access. Tone is applied to a line connected to this jack for the timed period. When the period times out, a lamp associated with the tone jack is lighted indicating that tone is removed.

4. CIRCUIT PATCH BAY

A. Six-Wire Circuit Patching Jacks

4.01 These jacks provide testing and patching facilities of the transmission and signaling leads for lines and trunks requiring E & M lead signaling.

B. One-Wire Circuit Patching Jacks

4.02 A seventh wire (in addition to the 6-wire circuit described in 4.01) is provided for network trunks making the echo suppressor control lead available so that it can be tested toward the line or drop side when required.

5. CIRCUIT PATCH BAY — MISCELLANEOUS JACK CIRCUITS

A. Battery Supply Jacks for 2B Signaling Test Set

5.01 These jacks are provided to apply ground over the tip and 48-volt battery over the sleeve of the A jack. The 130-volt battery is supplied over the tip and 24 volts over the sleeve of the B jack.

B. Interbay Patching Jacks

5.02 Jacks wired between nonadjacent patch bays may be provided to permit extending circuits to each nonadjacent patch bay location for patching and testing.

C. Plug Converting Jack Circuit

5.03 Plug converting jacks are provided to permit interconnection between jacks at test or patch positions with patching or position cords. The majority of jacks in the patching bay are for 238-type (310-type) plugs. Those at the test position are for 92-type (309-type) plugs.

D. Spare 1C Pad Jacks

5.04 A jack-ended appearance of a spare 1C pad is provided so that 89-type resistors may be interchanged for miscellaneous testing.

E. Single-Frequency Signaling Jacks

5.05 Single-frequency signal test (SF TST) jacks, LINE and DROP, provide means to maintain an off-hook condition toward the line or drop during functional or transmission tests. By patching the LINE and DROP test jacks to the SIG L/D jacks associated with the circuit under test at the circuit patch bay, a ground is placed on the E lead toward the drop and the continuity of the M lead is maintained holding the connection throughout the test. Figure 2 shows the SF TST jacks.

5.06 LOS test jacks provide means to disable the signaling equipment when a test is being made on a trunk and it is not desired to hold the switches on the drop side of the signaling unit. By patching from the LOS jack to the SIG L jack associated with the trunk to be disabled, battery will be applied to the M lead toward the line, thereby removing signaling tone. This patch also opens the E lead toward the drop to prevent seizure of switching equipment by line signals during the tests.

5.07 SF TONE TST jacks are used to sectionalize intermittent troubles by monitoring to detect the presence or absence of tone between the signaling units and the line facilities. The SF TONE TST jacks at the VF patch bay should be patched to the monitoring jacks of the circuit to be tested. At the testboard, connect the SF TONE TST jacks to either the XMT or RCV jack of the circuit under test and condition the circuit for on-hook or off-hook signals to check the corresponding tones from the SF unit.

F. Strap Jack Circuit

5.08 A three-branch arrangement is provided where bridging of 4-wire circuits may be required. Jacks are designated A, B, and C.

G. Test Battery (48V) Jacks

5.09 These jacks provide 48-volt power and ground, when required, for miscellaneous purposes.

6. TESTBOARD EQUIPMENT BAY — COMMUNICATION CIRCUITS

A. Four-Wire Circuits

6.01 These jacks are provided with sleeve supervision for terminating 4-wire tie lines and 101 trunks.

B. Two-Wire Circuits (Other Than SS1 Order Wire)

6.02 These jacks are provided for interoffice and intraoffice communication circuits with a termination on the RCV jack. Transmission and signaling are done on a 2-wire basis with sleeve supervision.

C. Communications Jack (2-Wire)

6.03 Two-wire jacks are provided to extend a 2-wire communication circuit from the testboard to other locations such as the VF patch bay or link frames for assistance in testing or patching.

D. Answering Lamp

6.04 These circuits are provided for those communication circuits requiring an incoming signal. The lamp is associated with the proper communication jack and is extinguished when answer is made at the testboard.

E. SS1 Order-Wire Circuit

6.05 SS1 order-wire circuit appearances (SS1 OW jacks) are provided where interoffice communications are required. The RCV jack is terminated. Transmission and signaling are done on a 2-wire basis with sleeve supervision. The sleeve lead is not multipled to other test positions.

7. TRANSMISSION AND NOISE MEASURING SYSTEM SD-95900-01

7.01 Figure 11 of this section shows a simplified arrangement of the transmission and noise measuring circuits provided at 19A testboards for making transmission and noise measurements.

7.02 Jacks designated TST-MEAS, 101 MEAS, and SUB-MEAS are provided in the miscellaneous jack panel for use in associating the measuring circuits with network trunks and station lines. The TST-MEAS jack is used for meas-

urements originating at the TST jack of a network trunk or LUNK circuit. The 101-MEAS jack is used for measurements on incoming network trunks over 101 trunks. The SUB-MEAS jack is used for measurements on station lines. A SEND-RCV key, located in the keyshelf, is operated to SEND or RCV depending upon whether it is desired to send test power or to measure received test power. This key must be in the normal position when frequency response or envelope delay measurements are made at the 25A IN jack.

7.03 Separate test pads are used when making transmission measurements. These pads are adjustable so that office wiring and equipment losses between the testboard and the outgoing switches can be compensated as follows:

(a) ***Testing Outgoing Network Trunks:*** The pad losses in the TST-MEAS branch of the measuring circuit are adjusted, as required, to establish the —2 dbm transmission level point at the TLF when transmitting from the 0-dbm transmission level point at the testboard.

(b) ***Testing Incoming Network Trunks:*** The pad losses in the 101-MEAS branch of the measuring circuit are adjusted, as required, to establish a 2-db loss between the LLF and the input to the measuring circuits.

Losses in the SUB-MEAS branch of the measuring circuit are adjusted to compensate for the loss between the DROP MON or TST jacks and the line link appearance of station lines.

7.04 The office wiring and equipment losses involved, therefore, are included as part of the test pad loss. The objective in making adjustment of these pads is to place the testboard exactly 2 db from the —2 TLP at the outgoing switches for measuring trunks regardless of the end originating the measurement. Section 310-280-300 outlines the test procedure for measuring office wiring and equipment losses to determine pad values for the transmission measuring circuits.

7.05 The equipment provides for sending 1000-cycle test power at the correct level and for measuring received 1000-cycle or variable-frequency test power down to —35 dbm. To obtain a meter deflection within a suitable measuring range, preferably 0 to 10 for greater accuracy, sensitivity control keys are provided.

7.06 A calibration circuit arrangement provides for checking the calibration of the measuring circuit at 0 dbm by the operation of the CAL key.

7.07 A KS-19260 oscillator terminating in the OSC jack provides the source of testing power for variable-frequency sending measurements. The oscillator output is checked by operation of the CAL key. To send variable-frequency test power to a distant testboard, the oscillator is patched to the VF IN jack. The cord in the VF IN jack connects the oscillator to the sending path of the transmission measuring system. Each time the frequency is changed the oscillator should be calibrated by operating the CAL key associated with the transmission measuring system and adjusting the oscillator output. The CAL key is then restored to normal and the SEND-RCV key is operated to SEND position.

7.08 A jack designated 1000/0/600 is provided for checking the level of 1000-cycle test power supplied to the testboard position. No adjustment of this level should be made unless it is checked with a 22A milliwatt reference meter or equivalent. The 1000/0/600 jack can also be used for checking portable test equipment or for any other purpose where test power of 1000 cycles at 600 ohms and 0 dbm is required.

7.09 The input circuit of the SD-95900-01 transmission and noise measuring system is arranged so that frequency response and envelope delay measurements may be made at the same MEAS jack that is used for transmission and noise measurements. With the SEND-RCV key in the normal position and a patching cord connected to the 25A IN jack, the 25A IN jack is connected to a MEAS jack when the MEAS key, associated with the MEAS jack, is operated. The 25A IN jack is patched to the input of the 25A voiceband gain and delay set. If the SEND-RCV key is operated to either the SEND or RCV position, the connection from the MEAS jack to the 25A IN jack is opened and the MEAS jack is connected to the transmission and noise measuring circuits.

8. TESTING TRUNKS

A. Code 101 Trunk Circuits

8.01 The 101 trunk circuit for use with the testboard is designed as an incoming trunk to the testboard from a 4-wire line link frame in a No. 5 crossbar office in the same building. This trunk makes use of bridged impedance instead of a repeating coil to provide a low transmission loss of about 0.2 db and is essentially flat over the voice frequency range. The circuit is reached by an attendant in a distant office via a network trunk and is used for communication and for transmission loss and noise measurements. The circuit is arranged to signal the attendant by lighting a trunk lamp when it has been seized by the crossbar equipment.

9. SPECIAL SIGNALS

A. Spillover Into DDD Network

9.01 Spillover calls from the 4-wire No. 5 crossbar private network to a No. 4-type switching office (if provided) will necessitate transmitting information that the call has priority with camp-on. This will be required when testing a network trunk to the DDD network and can be accomplished by operating the AR key. (The AR key should be operated, after the MF key is operated, to send a KP signal.) This feature is operative only if the No. 4-type office is equipped for the priority feature.

B. Priority and Multilevel Preemption

9.02 When testing station lines it may be necessary to check the ability of the station to obtain priority. This is done by operating the P key before the numerical digits are keyed.

9.03 A priority-ringing (PRIOR RING) key is provided for testing the ability to reach a station over a station line on a priority basis.

9.04 Keys are provided in the MF keyset permitting transmission of 4x4 pulsing signals indicating four levels of priority when making a call on network trunks or station lines equipped to recognize multilevel preemption. The keys and priorities indicated are: P1 (priority), P2 (immediate), P3 (flash), and P4 (flash override).

Note: Keys designated TO and * are spare 4x4 keys which are parallel with the P and SG keys at this time. Keys designated M1, M2, and M3 are designed to be precedence keys in the 2/6 pulsing circuit but are spares at this time.

C. Special Grade Trunk

9.05 When testing lines specially treated for data transmission, it may be necessary to indicate that the trunk to be used is of a special grade. This is done by operating the SG key before the numerical digits are keyed.

10. TESTBOARD EQUIPMENT BAY — LOWER UNIT

10.01 A plan of the lower unit keyshelf provided in the testboard equipment bay is shown in Fig. 12 of this section.

10.02 The lower unit contains a position circuit and cord circuits which are plug-ended on the keyshelf. These circuits are used to make busy tests and to remove trunks and lines from service. These circuits, when associated with other test and measuring circuits, are used for making signaling tests and for transmission and noise measurements.

A. Test Cord Circuits

10.03 Four pairs of cords designated 1, 2, 3, and 4 are provided for testing the operational and transmission features of network trunks, LUNK's, and station lines. Each cord pair, consisting of one TST cord and one CONN cord, is provided with keys and associated supervisory lamps.

10.04 The TST cords are used for testing station lines through the DM or TST jacks and network trunks and LUNK's through the TST jacks. The first TST cord in each position is equipped with a large plug (310 profile) for use with station LOOP jacks in the testboard and with jacks in the circuit patch bay.

10.05 The CONN cords are used with test and communication trunks to the 5D switchboard, to answer calls on 101-type trunks, with 2-wire plant communication trunks having sleeve circuits and for connecting to transmission meas-

uring equipment. Some of the arrangements provided by the test cord circuits are:

(a) For connecting jack-ended trunks and/or lines together.

(b) For connecting jack-ended trunks or LUNK's to the position and telephone circuit for talking, monitoring, ringing, signaling, dialing, or keypulsing.

(c) For seizing trunks or LUNK's for outgoing calls and holding the trunks until the cord is taken down.

(d) For answering incoming calls and receiving supervision from a trunk either directly or by way of the position circuit.

(e) For connecting network trunks, LUNK's and station lines to the transmission and noise measuring circuit or other test equipment.

(f) For connecting one cord at a time to the position circuit under control of the TALK key.

(g) For talking and listening on more than one cord, if the TALK key of one cord and the MON key of the other cord are operated.

(h) For holding the connection in the position circuit if the TALK key is restored while dialing or keypulsing.

B. Position and Telephone Circuit

10.06 The position and telephone circuit for the testboard, when connected to a cord circuit by means of the cord TALK-MON key, provides for talking or monitoring and for performing various tests on circuits appearing on jacks at the testboard. The position and telephone circuit arrangements provide for:

(a) Audible busy tests on network trunks, No. 5D-type switchboard trunks, and testboard communication trunks. For making busy tests on station lines by means of a high-resistance voltmeter (since loop and drop monitor jacks have no sleeve leads).

(b) Seizing trunks outgoing while indicating incoming supervision and making the trunk busy outgoing.

(c) Dial pulsing with the position dial on the test position or MF keypulsing using either 2/6 MF or 4x4 MF tone. Both dial pulsing and keypulsing on either TST or CONN cords.

(d) Performing lockout operations on idle and busy network trunks and network trunks seized outgoing through the links by an incoming network trunk.

(e) Identifying a network trunk seized outgoing through the links of a station line or operator originating line. For restoring a locked-out trunk to service from the test position.

(f) A timed ringing signal for network trunks and means for ringing on a station line.

(g) The use of a high-impedance monitoring circuit.

(h) Making tests at the adjacent circuit patch bay.

(i) A voltmeter circuit for checking for grounds, foreign potentials, or shorts on either pair of tip and ring conductors of trunks or station lines.

(j) The use of the position dial with the signaling test circuit (with neon lamp indicators) or with the SS1 order-wire circuit.

(k) Indicating the ability to obtain priority and special grade on station line tests.

(l) Pulsing signals indicating four levels of priority on network trunks and station lines equipped to recognize multilevel preemption.

(m) Making a station line busy for the purpose of performing tests.

C. Cord Extension Cords

10.07 Two EXT cords are provided in each testboard position (designated EXT 1 and EXT 2) which are jack-ended at nonadjacent test-

boards to permit assistance testing from nonadjacent positions.

10.08 Extension cords should not be used for transmission measurements, because additional wiring losses may be introduced by their use.

D. Voltmeter and Milliammeter Circuit

10.09 The volt-milliammeter and associated keys are provided to detect grounded T or R conductors, shorted T or R conductors, or foreign potentials on T or R conductors of either the transmitting or receiving pair of the test cord in addition to making busy tests on subscriber lines.

10.10 The milliammeter may be connected in series with the test cord by operating the AM key.

10.11 Chart A is a voltmeter test chart with the testboard key positions for locating various fault conditions.

E. Neon Lamp Signaling Test Circuit

10.12 This circuit provides means for monitoring and testing signaling circuits having sending M leads and receiving E leads. The test circuit provides the following features:

(a) A SIG T cord to test toward the line and toward the drop.

(b) Line (L) and drop (D) neon lamps are provided as indicators for observing start and stop dial signals and off-hook and on-hook conditions. Because of their high speed of action, these lamps will also indicate hits which may occur in the circuit under test. The L neon lamp is always associated with the E lead from the line equipment; the D neon lamp is always associated with the M lead from the drop equipment.

(c) A MON-TEST key allows for monitoring the signaling circuits without removing them from service. For testing, it splits the signaling circuits to permit sectionalizing tests.

(d) The TWD L and TWD D keys select the test condition and apply the desired holding condition in the opposite direction.

(e) The position dial circuit may be used with the SIG T cord, when required, by operating the key to DIAL LINE or DIAL DROP for dialing in the desired direction.

(f) The PRIOR RING key, in association with this circuit, permits the testboard attendant to produce a distinctive signal to a station to indicate that a priority call is being made.

(g) A preemption key (PRMT REUSE/PRMT NONREUSE), in association with this circuit, permits the testboard attendant to preempt a line, leaving an off-hook condition for immediate reuse of the line or leaving an on-hook condition if no immediate reuse is intended.

11. EMERGENCY TRANSFER CIRCUIT

11.01 Manual-type trunks and lines may be furnished for use during an overload or some other emergency condition to bypass the 4-wire No. 5 crossbar system to permit operation from the switchboard on a manual basis. A TRFR key and lamp and an ACO (nonlocking) key and lamp are located in the testboard equipment bay.

A. Emergency Transfer Operation

11.02 When the TRFR key is operated, a buzzer and office alarm will operate, but these are silenced upon operation of the nonlocking ACO key. To guard against false operation of the TRFR key, actual transfer does not take place until the ACO key is operated. Operation of these two keys will transfer a prearranged number of trunks and lines from automatic to manual operation at the 5D switchboard.

11.03 During the time the emergency transfer is in effect TRFR and ACO lamps at the testboard will remain lighted.

B. Removal of Emergency Transfer

11.04 With the TRFR key restored, the operation of the ACO key will silence the alarm, extinguish lamps TRFR and ACO, and restore the circuits to automatic operation.

11.05 The nontransferred automatic circuits may still function as long as the 4-wire No. 5 crossbar system is operational.

CHART A

VOLTMETER TEST CHART

	TESTBOARD KEYS (X = OPERATED)							
	TALK NOTE 1	VM XMT	VM RCV	BAT	LP	REV	GRD	AM NOTE 2
GRD ON RCV TIP			X			X		
GRD ON RCV RING			X					
GRD ON XMT TIP		X				X		
GRD ON XMT RING		X						
FOREIGN POT. ON RCV TIP			X	X		X		
FOREIGN POT. ON RCV RING			X	X				
FOREIGN POT. ON XMT TIP		X		X		X		
FOREIGN POT. ON XMT RING		X		X				
SHORTED RCV TIP & RING			X				X	
SHORTED XMT TIP & RING		X					X	

Note 1: For all tests the TALK-MON key associated with the test cord used shall be operated to TALK.

Note 2: The milliammeter may be connected in series by operating the AM key for any fault condition.

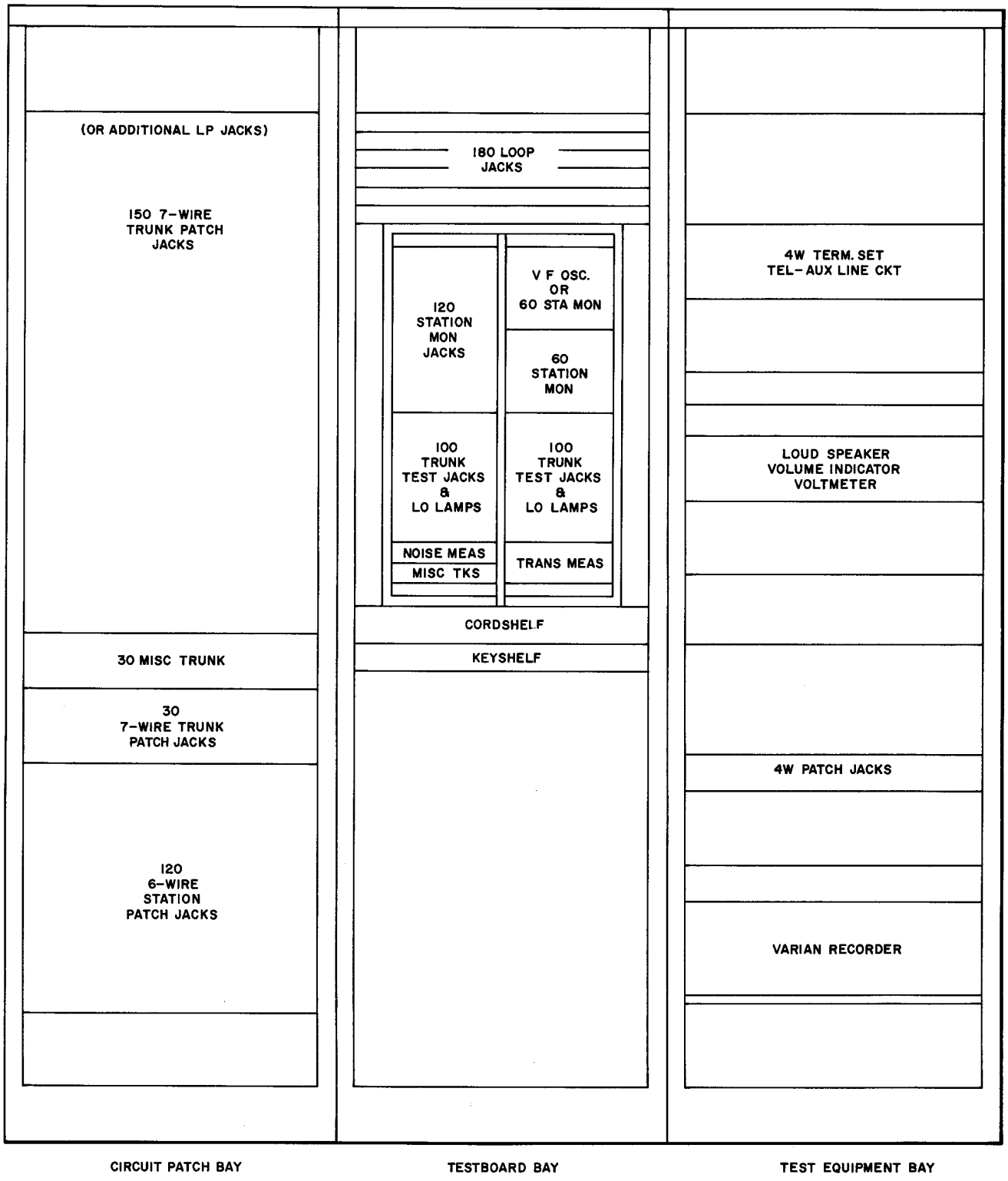

Fig. 1 — Typical Arrangement for 180 Trunks and 150 Stations

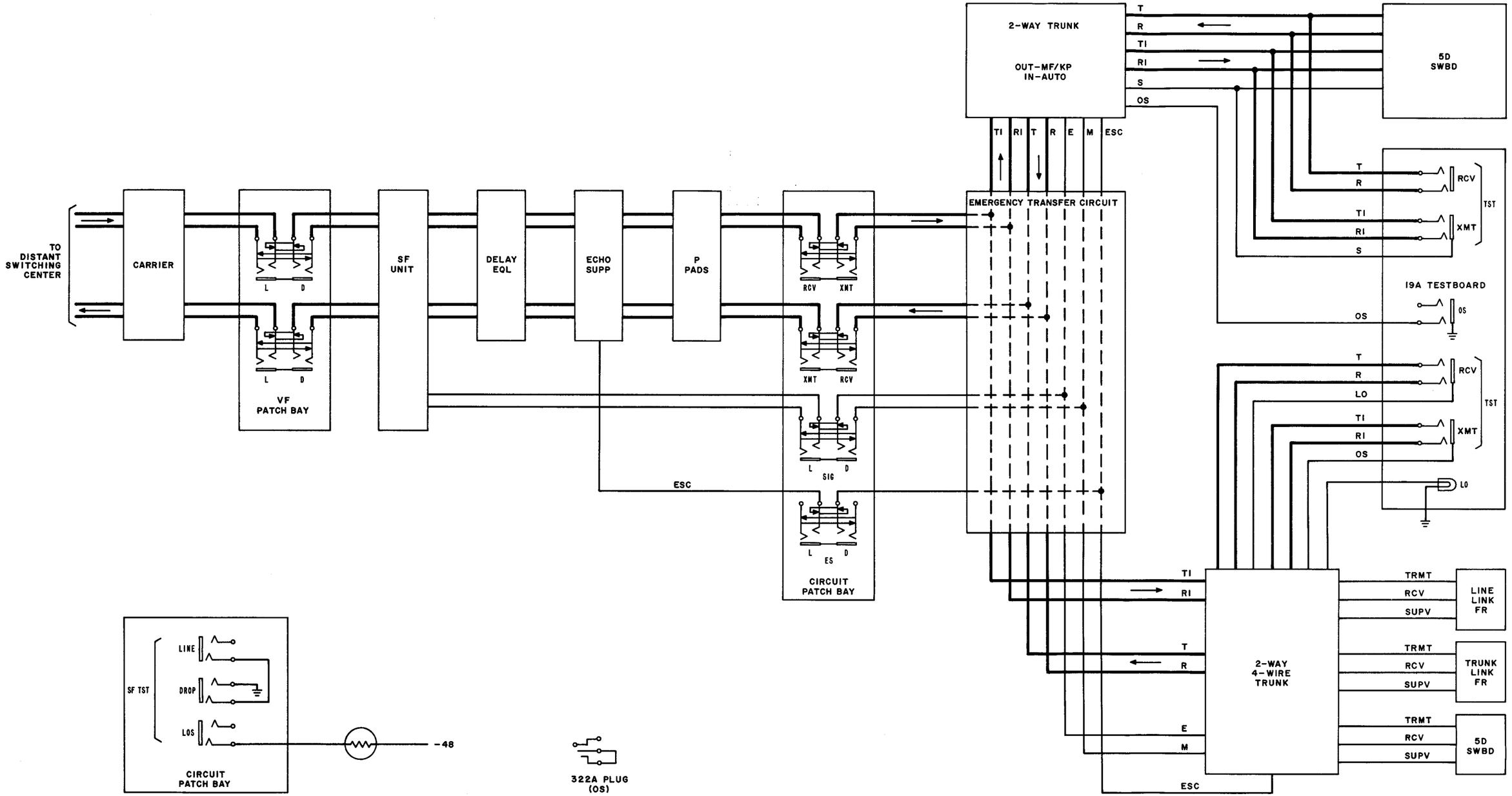

Fig. 2 — Typical Arrangement for Test and Patch Jacks — Network Trunk Circuit

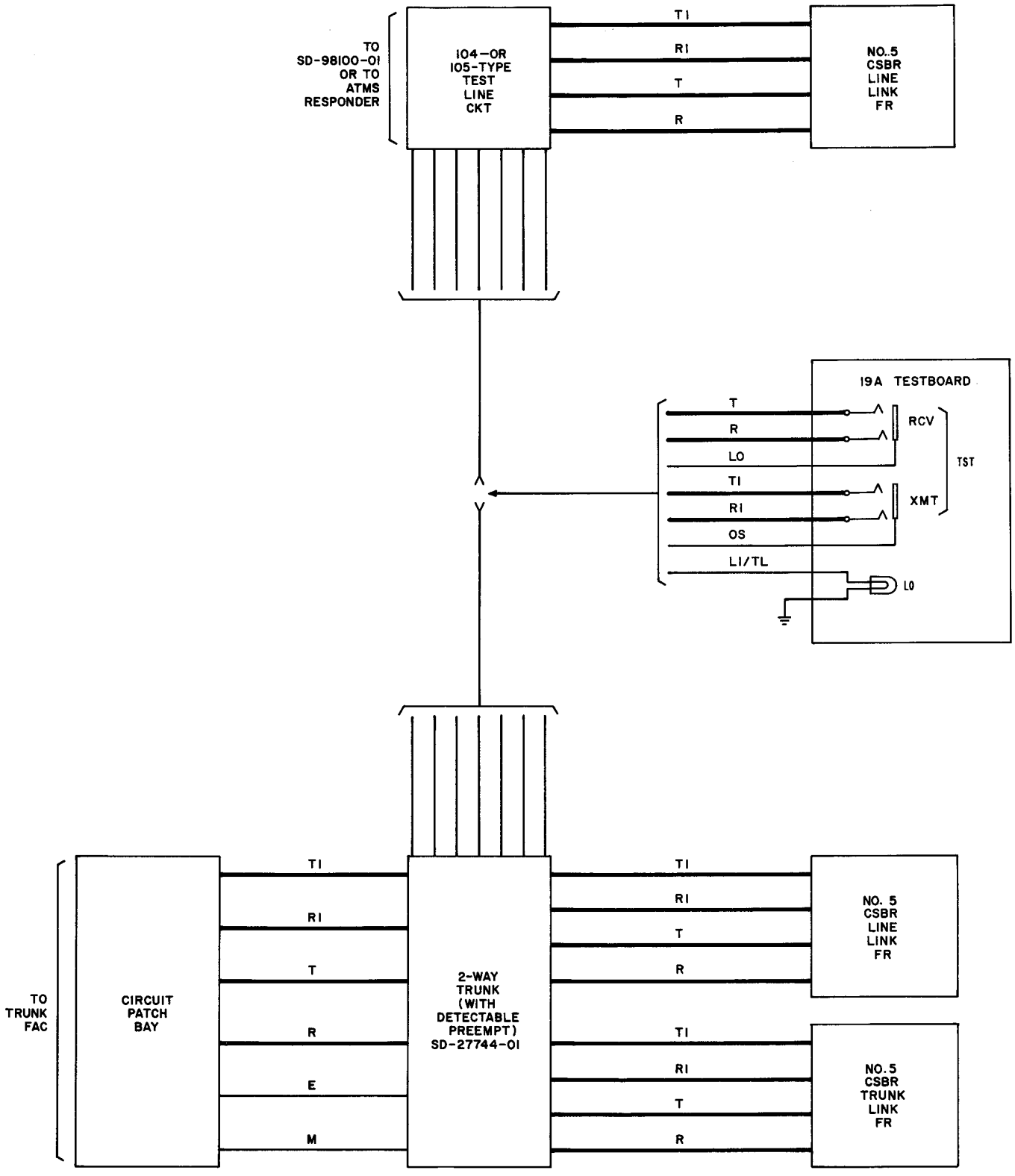

Fig. 3 — Typical Arrangement for Test and Lockout — 2-Way Trunk with Detectable Preempt or for 104- or 105-Type Test Line Circuit

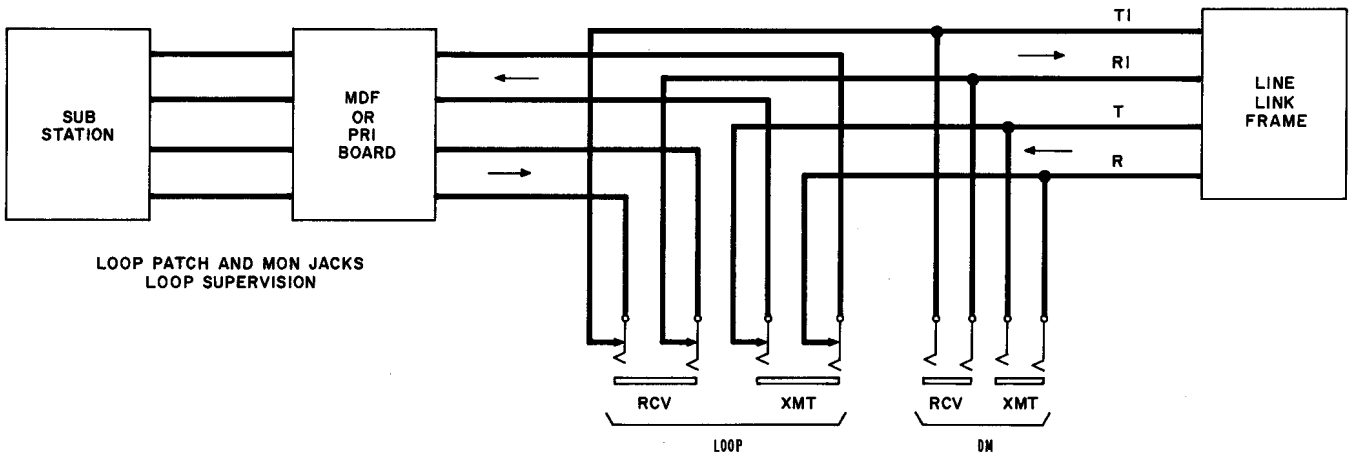

Fig. 4 — Patch and Monitor Jacks

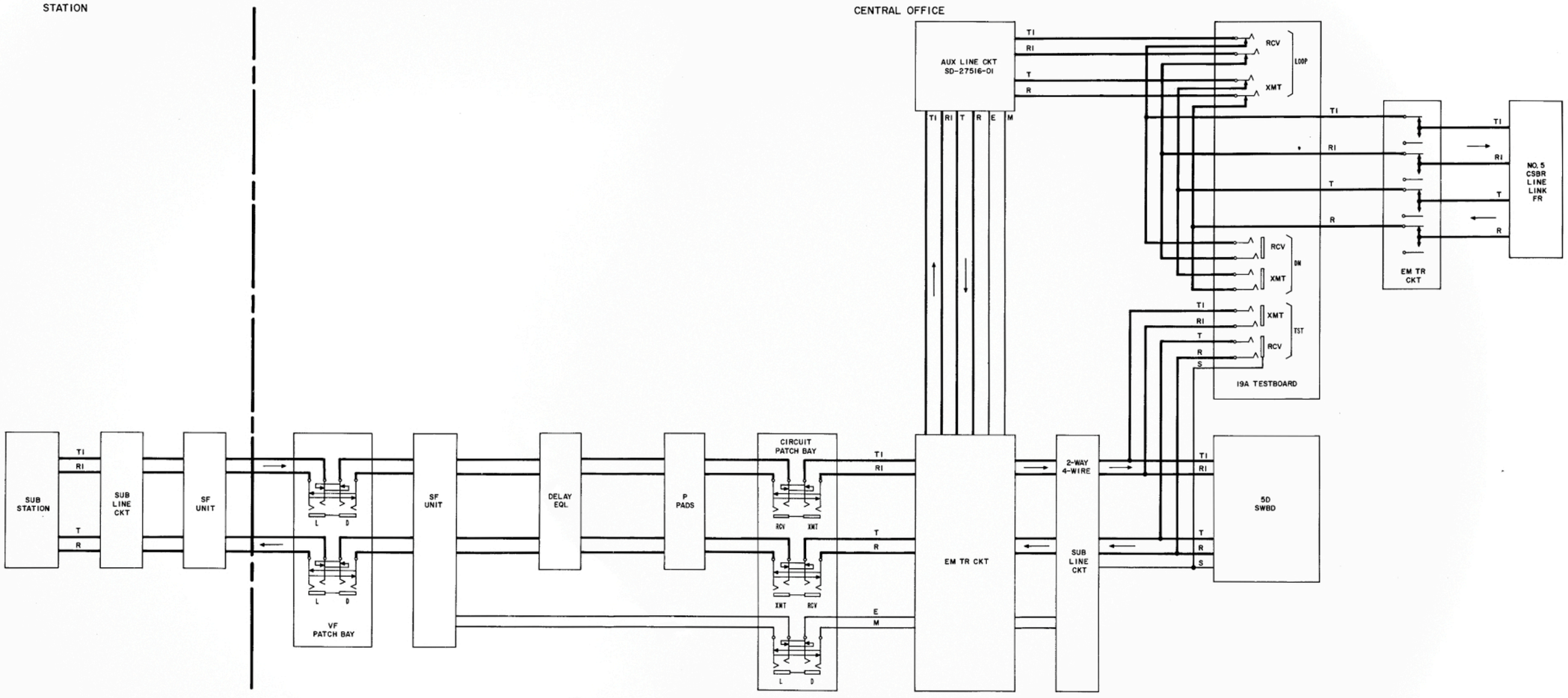

Fig. 5 — Typical Arrangement for Test and Patch — Emergency Subscriber Lines Circuit

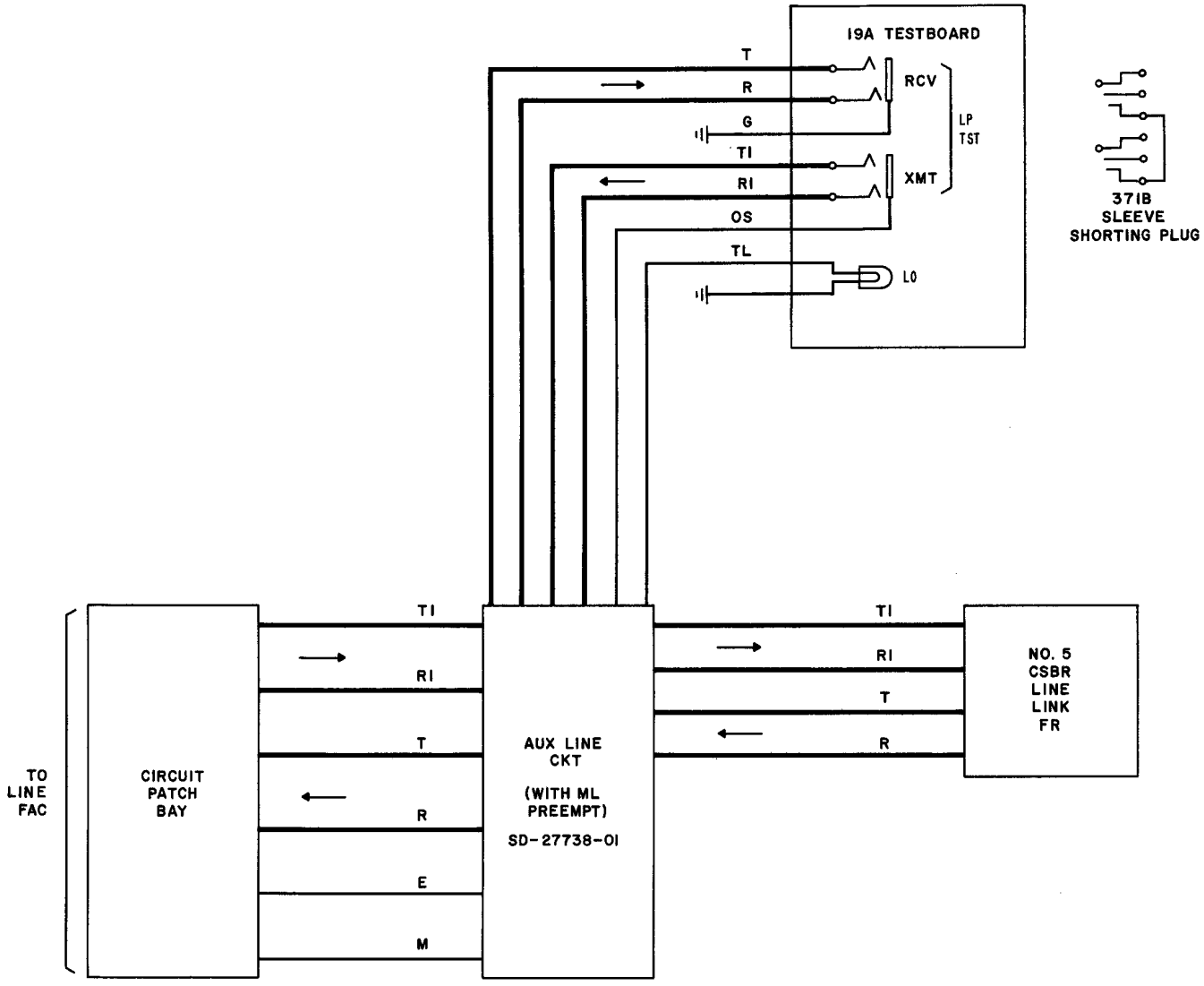

Fig. 6 — Typical Arrangement for Loop Test and Lockout — Auxiliary Line Circuit with Multilevel Preempt

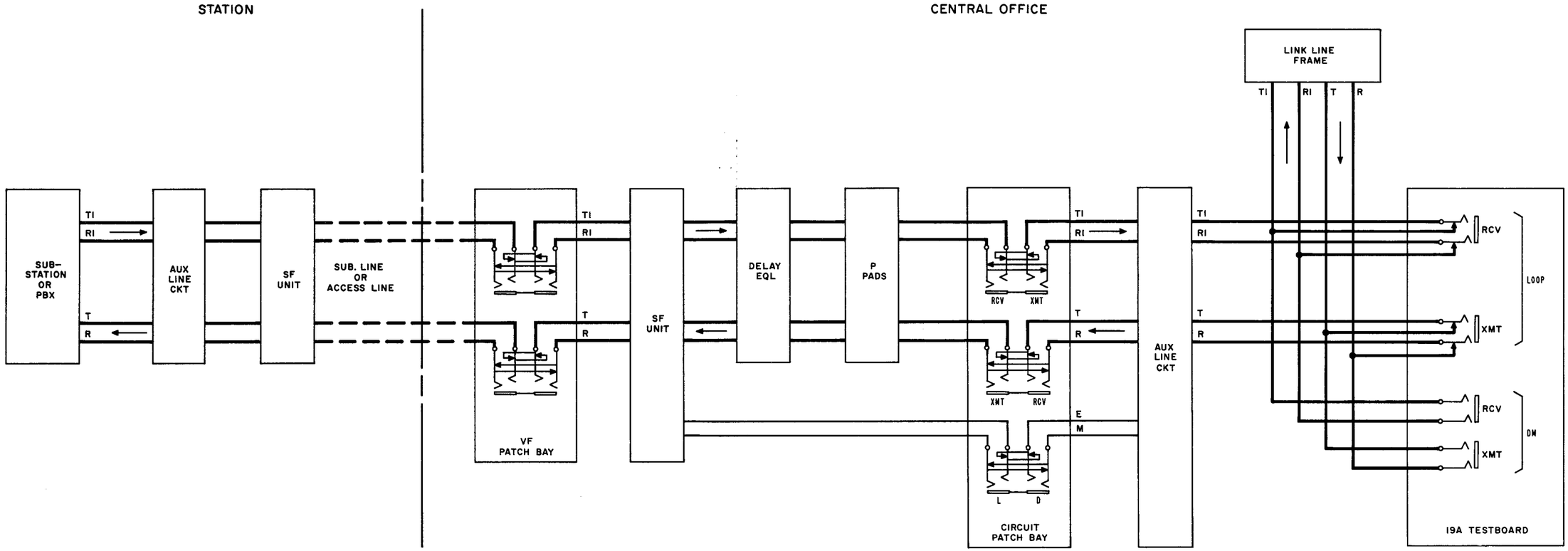

Fig. 7 — Typical Arrangement for Test and Patch — Subscriber Lines and Access Lines

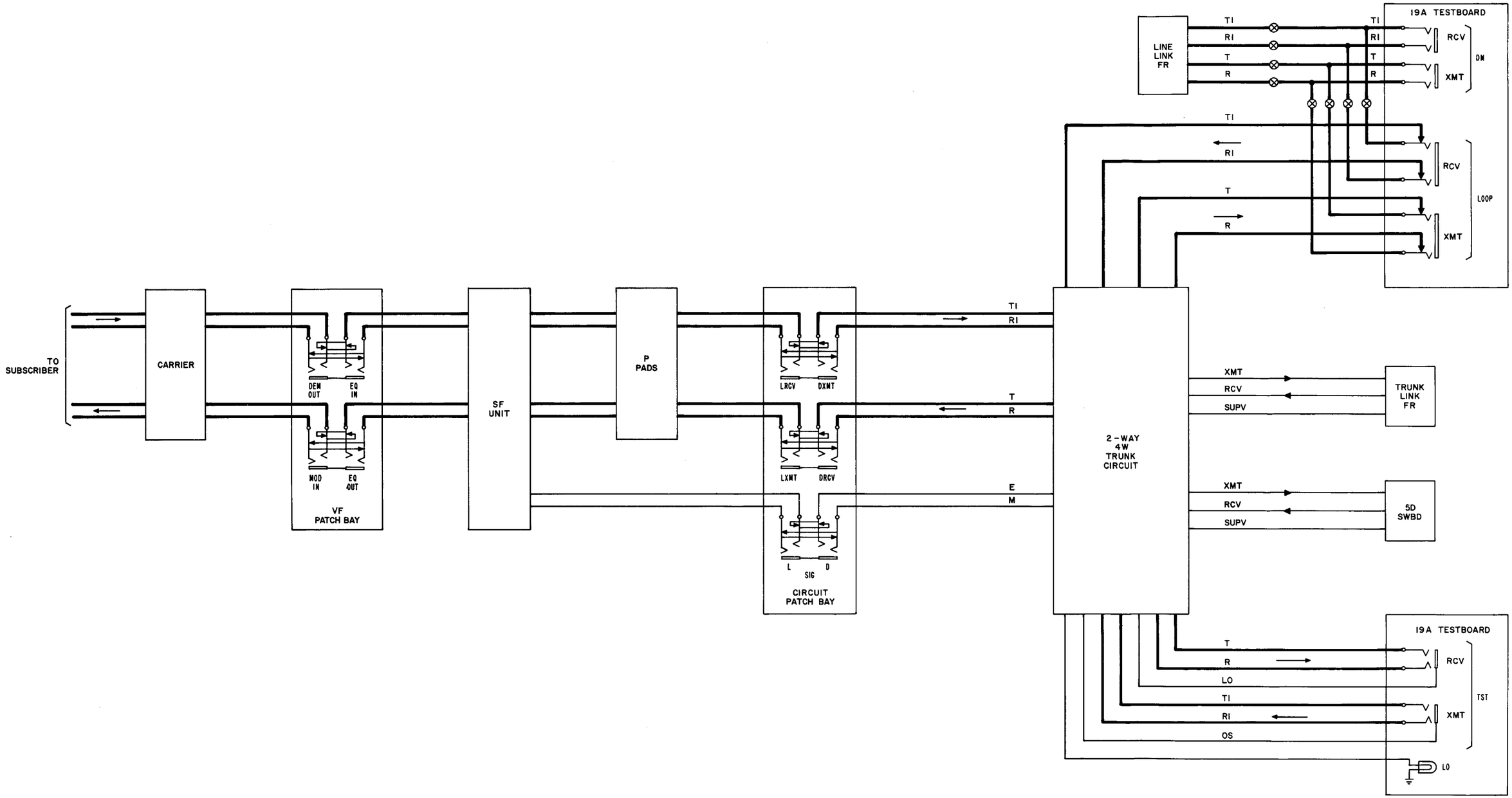

Fig. 8 — Test and Patch Jacks Subscriber Line (LUNK)

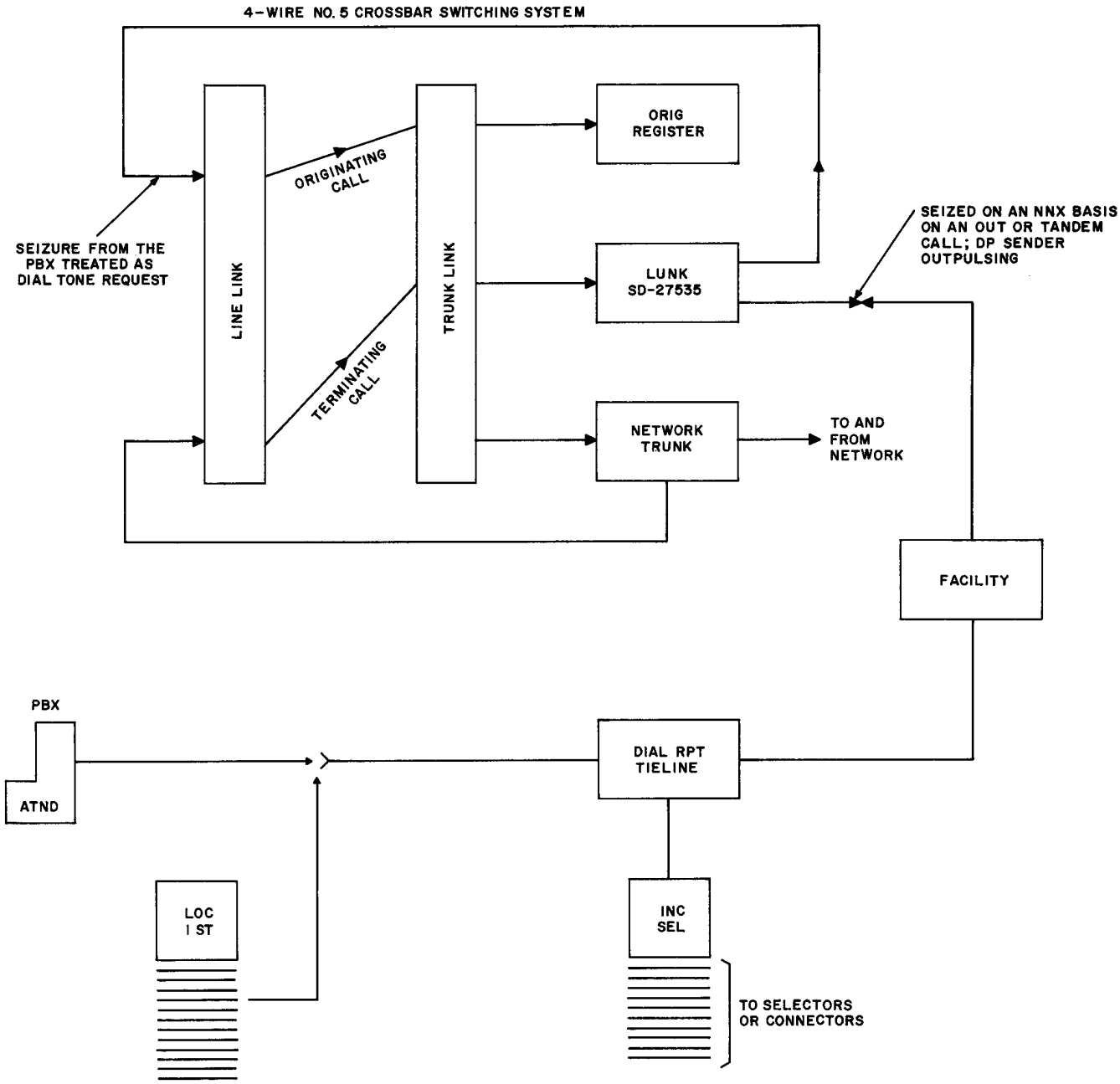

Fig. 9 — Typical Arrangement of LUNK Operation

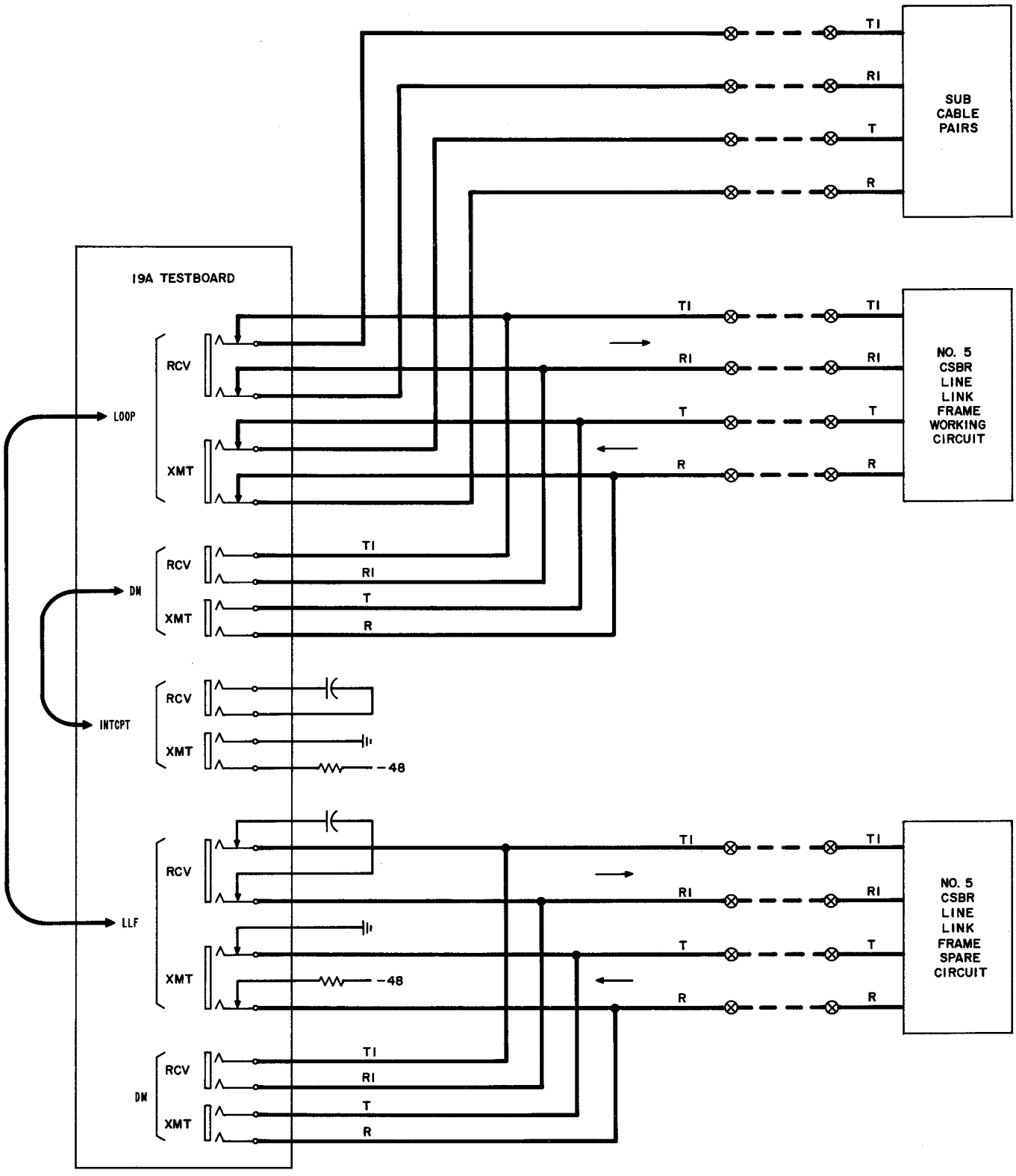

Fig. 10 — Typical Arrangement for Spare Line Equipment and Intercept Patch

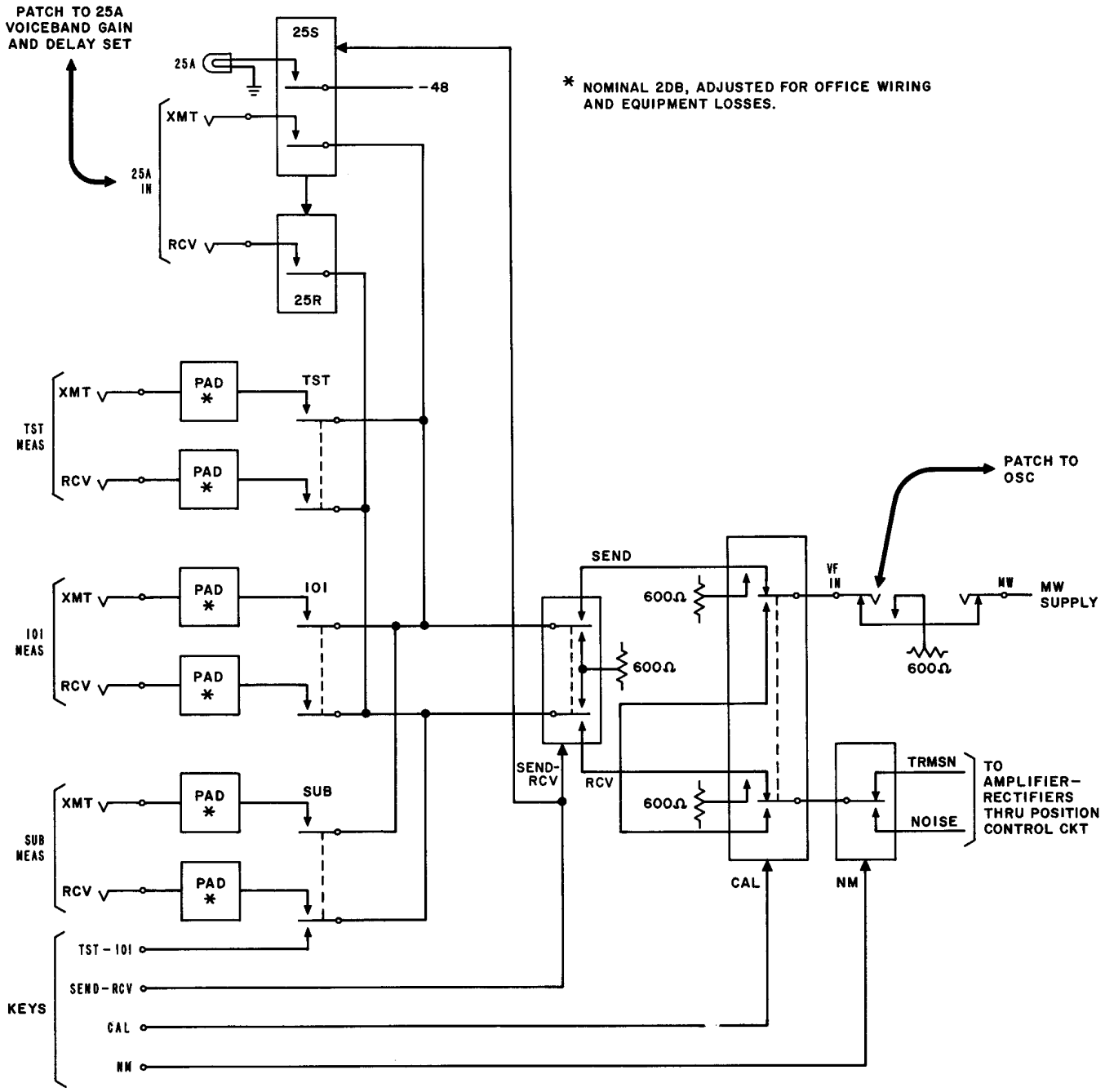

Fig. 11 — Simplified Diagram of Transmission and Noise Measuring Circuits per SD-95900-01 — 19A Testboard (single line per pair)

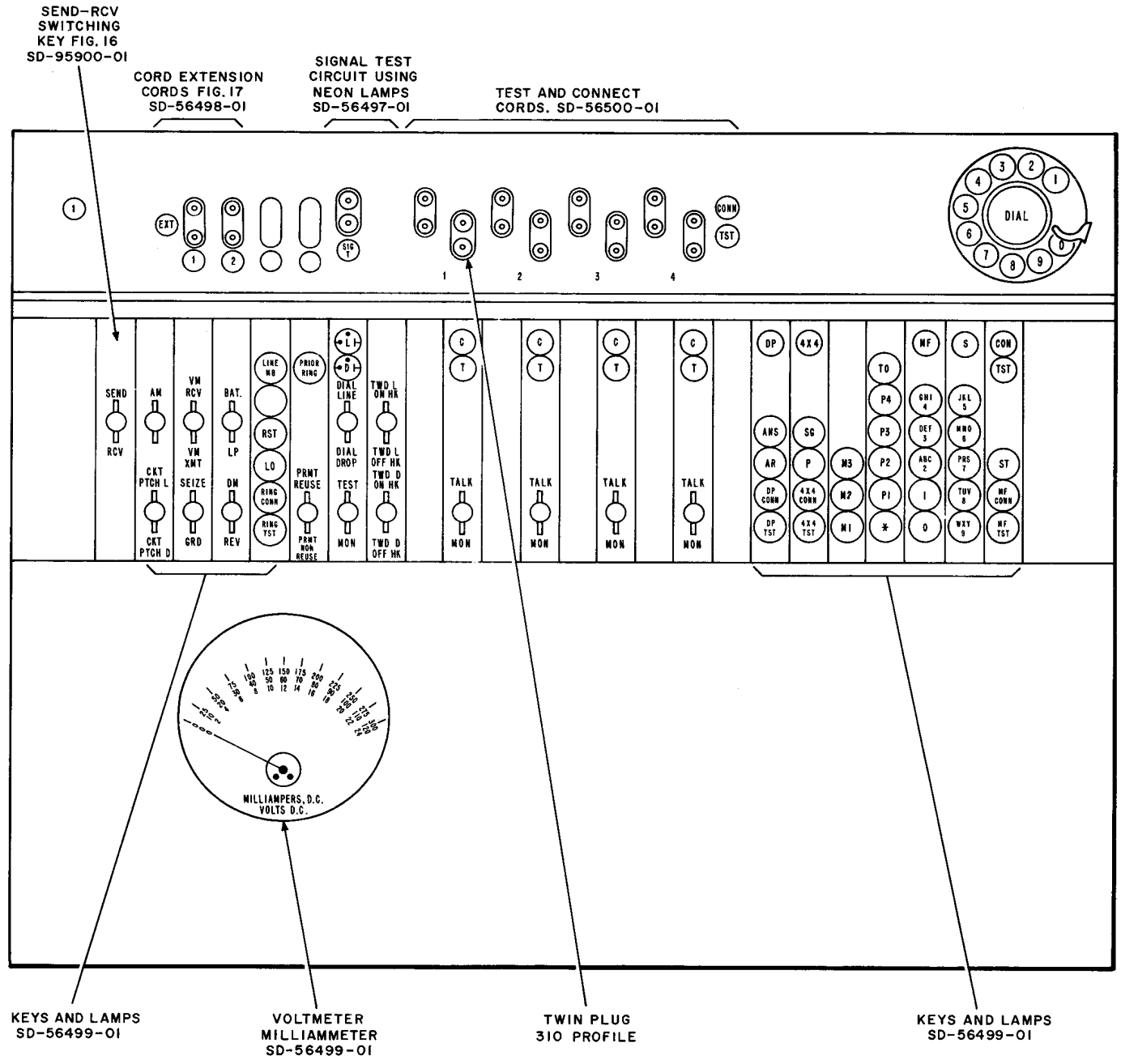

Fig. 12 — 19A Testboard Keyshelf Equipment