

21A TESTBOARD
OPERATIONAL TESTS

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1. GENERAL

1.01 This section describes procedures for making operational tests from a 21A testboard as used in a 4-wire, No. 1 electronic switching

system (ESS) provided for switched services networks (SSN).

1.02 Automatic routine testing of network trunks connecting to the ESS is accomplished by the automatic transmission measuring system (ATMS). A test failure is alarmed at the 21A testboard and an information printout is made at a teletypewriter bay. Manual testing is initiated from the testboard.

1.03 The testboard and an auxiliary testing bay contain equipment for making transmission loss measurements, impulse and message-type noise measurements, voiceband gain and delay tests, and signaling and supervisory tests. By means of test trunks, the testboard may be associated with 904-type data test bays or a 10C telegraph testboard for data or telegraph operational checks, as required.

1.04 All operational tests on network trunks and subscriber lines are performed through the switching system. Access to the communication paths of trunks and lines connecting to the ESS is obtained via access circuits provided in the testboard. Direct access to E and M signaling leads of network trunks and lines is provided at testboard jacks associated with the particular trunk or line.

1.05 Progress and error information in conducting operational tests through the ESS is provided by the P & E lamp. The P & E lamp, when lighted momentarily following a signaled request from the testboard, indicates that the request has been acted upon by the ESS central control. If incorrect digits are pulsed while keying address information, the P & E lamp is flashed at 120 ipm. When central control is unable to complete a requested function, the P & E lamp is flashed at 60 ipm. If the inability to perform the requested function is temporary, the P & E lamp is extinguished after a few seconds.

1.06 An access circuit off-normal (OFF NOR) warning lamp is lighted when a test cord is connected to the access circuit jack or when any

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key, associated with the access circuit, is in any position other than its normal (unoperated) position.

1.07 Testing is performed on a 4-wire basis. The testing cords are terminated by plugs fitting twin jacks. These plugs have one knurled edge which is the upper edge when the cord is properly inserted into a twin jack.

1.08 The following associated sections provide additional information on the 21A testboard:

310-282-100 General Description

310-282-300 Measurement and Adjustment of Transmission Test Trunks

310-282-500 Measurement of Office Losses

1.09 Transmission losses in access circuits and 101 test trunks should be measured and adjusted in accordance with Section 310-282-300 before using the circuits for making transmission tests.

2. OPERATIONAL TESTS ON NETWORK TRUNKS

2.01 The progression of a network trunk test, or series of tests, may take several courses depending on the type and status of the trunk being tested and on what optional functions are to be performed. A simplified progression of a network trunk test is shown in Chart A. The test procedure contains several options to be chosen when keying address information and when releasing and re-seizing the trunk in order to repeat a test to a test line or to perform a test on another test line over the same trunk. In order to make the test procedure easier to follow, these options are described in 2.04 and 2.05 which are separate from the main test procedure. Use these paragraphs for selecting and performing the options when referenced in the main test procedure.

2.02 Use the following procedure to check trunk status, to remove a trunk from service, or to restore a trunk to service.

STEP	PROCEDURE
1	Connect a telephone set to the TEL jack.
2	Connect testboard TST cord to an access circuit (ACC) jack. The access circuit OFF NOR lamp is lighted.
3	Operate TALK-MON key, associated with the connected TST cord, to the TALK position.
4	Operate the access circuit LINE-TRUNK key to the TRUNK position. Note 1.
5	Operate the access circuit RLS-TEST key to the TEST position. When CUT THRU lamp is lighted, dial tone is received.
6	Depress keyset 4X4 TST key, momentarily. Keyset TST lamp and 4X4 lamp are lighted.
7	When keyset S lamp is lighted, pulse network trunk number using keyset keys.
8	Operate OUT PULSE-NO PULSE key as follows: Normal — Status being checked only, no connection desired. OUT PULSE — Connection to out pulse trunk is desired. NO PULSE — Connection to no pulse trunk is desired.
9	Release keyset; depress ST key, momentarily.

STEP	PROCEDURE
10	Observe status indicated by the lamp display.
11	To remove the trunk from service, assign a maintenance-busy status; operate the access circuit RMB-MTCE BUSY key to the MTCE BUSY position, momentarily. To restore the trunk to service, remove the previously made maintenance-busy status; operate the access circuit RMB-MTCE BUSY key to the RMB position, momentarily. Note 2. If, when a trunk is made maintenance busy, the number of maintenance-busy trunks exceeds a predetermined allowable number, the access circuit GROUP BUSY lamp is flashed. Depress the GROUP BUSY key, momentarily, to extinguish the lamp. Note 3.
12	Restore all testboard keys to their normal positions.
13	<p>Disconnect the TST cord. The OFF NOR lamp is extinguished.</p> <p>Note 1: If an error in operation of an access circuit or keyset key is made at any time before a complete network trunk number is pulsed, momentarily operate the access circuit RLS-TEST key to the RLS position, restore it to the TEST position, and restart the test procedure from Step 4.</p> <p>Note 2: The trunk status need not be changed. The status in which the trunk was found may be assigned but an assignment must be made in order to clear the ESS register.</p> <p>Note 3: When too many trunks in a group are made maintenance busy, a printout is produced which identifies the busy trunks. When the number of maintenance-busy trunks is reduced to the allowable number, another printout is produced, stating this fact.</p>

2.03 Use the following procedure to perform a network trunk test. The lettered steps are optional.

STEP	PROCEDURE
	<p>Connection to ESS</p> <p>1 Connect a telephone set to the TEL jack.</p> <p>2 Connect a testboard TST cord to an ACC jack. The access circuit OFF NOR lamp is lighted.</p> <p>3 Operate the TALK-MON key, associated with the connected TST cord, to the TALK position.</p> <p>4 Operate the access circuit LINE-TRUNK key to the TRUNK position.</p> <p>5 Operate the access circuit RLS-TEST key to the TEST position. When cut through to the ESS is obtained, the access circuit CUT THRU lamp is lighted. When a touch-tone receiver is connected, dial tone is received.</p>

STEP	PROCEDURE
	<p>Pulsing Address Information</p>
6	Connect keyset by depressing the 4X4 TST key, momentarily. Keyset TST lamp and 4X4 lamp are lighted. When the S lamp is lighted, proceed to Step 7.
7	Choose a pulsing option from 2.04 and pulse address information using keyset keys. Note 1.
	<p>Register Check</p>
8a	To produce a printout of digits registered by the ESS, operate the TRACE-REG LSTG key to REG LSTG, momentarily.
	<p>Determine Trunk Status</p>
9	If a status check has not already been required by the pulsing option chosen, observe the access circuit status lamp display to determine the course of the test. If checking status only, clear the ESS register and disconnect (Steps 16 through 18). If a test is to be performed, proceed to Step 10 or to Step 13, as determined by the status display.
	<p>IDLE or MTCE BUSY Lamp is Lighted (or Both)</p>
10	Remove the trunk from service, when required; operate the RMB-MTCE BUSY key to the MTCE BUSY position, momentarily. When a new status is assigned, a printout is produced giving the status. Note 2.
11	Proceed with trunk test. Refer to sections applicable to the type of test being made. For information on auxiliary test equipment, refer to sections listed in Part 9. Refer to Part 8, if applicable.
	<p>Release and Reseizure</p>
12	During tests, it may be necessary to release a trunk temporarily and reseize it, either to repeat a test or to test to a different test line. Choose the correct option from 2.05 and perform the accompanying procedure. On completion of tests, proceed to Step 16.
	<p>TEST BUSY or SERV BUSY Lamp is Lighted</p>
13	If desired, wait for the trunk to become idle (busy lamp is extinguished and the IDLE lamp is lighted) and return to Step 10. The functions described below may be performed, optionally, on the busy trunk. If it is not desired to wait for the trunk to become idle, clear the ESS register and disconnect (Steps 16 through 18).
	<p>Monitor</p>
14b	To request a monitoring connection to a test-busy or to a service-busy trunk, operate the TALK-MON key, associated with the connected TST cord, to the MON position. The access circuit MON lamp is lighted. If no monitoring connection is available, busy tone is received. If required, the attendant can talk on the monitored circuit by restoring the TALK-MON key to the TALK position.
	<p>Caution: This must not be done when the monitored circuit is passing data.</p>

STEP	PROCEDURE
15c	<p>Trace</p> <p>A printout may be produced by momentarily operating the access circuit TRACE key. The printout identifies the equipment which terminates the busy circuit.</p>
16	<p>Disconnect</p> <p>A status assignment is required before disconnecting, whether or not the trunk was removed from service. The assignment is required to clear the ESS register. To restore a trunk to service, operate the RMB-MTCE BUSY key to the RMB position, momentarily. To leave a trunk out of service, operate the RMB-MTCE BUSY key to the MTCE BUSY position, momentarily.</p>
17	Restore all testboard keys to their normal positions.
18	<p>Disconnect the testboard TST cord. The access circuit OFF NOR lamp is extinguished.</p> <p>Note 1: If an invalid pulse combination is keyed, the access circuit P & E lamp is flashed. Operate RLS-TEST key to RLS, momentarily, and restore to the TEST position. Repeat pulsing procedure.</p> <p>Note 2: If, in making a trunk maintenance busy, a predetermined allowable number of trunks in a group is exceeded, the GROUP BUSY lamp is flashed. Also, see Note 3 of trunk status check procedure (2.02).</p>

2.04 Pulsing Options: The correct pulsing procedure is determined from the following options.

STEP	PROCEDURE
	<p>Option A: To check trunk status without completing a call to the distant end</p>
1a	Leave the OUT PULSE-NO PULSE key in the normal position.
2a	Pulse trunk number (4x4).
3a	Observe the status lamp display.
4a	Make a status assignment and disconnect. Note 1.
	<p>Option B: To request completion of a call to the distant end on a no pulse trunk without waiting for a status lamp display</p>
1b	Operate the OUT PULSE-NO PULSE key to the NO PULSE position.
2b	Pulse trunk number (4x4).
3b	Release keyset; depress ST key. Notes 2, 3, and 4.

STEP	PROCEDURE
	<p>Option C: To check status of a no pulse trunk, then, to request completion of a call to the distant end</p>
1c	Leave the OUT PULSE-NO PULSE key in the normal position.
2c	Pulse trunk number (4x4).
3c	Observe the status lamp display. Note 4.
4c	If the trunk is idle, operate the NO PULSE key.
5c	Release keyset; depress ST key. Note 3.
	<p>Option D: To request completion of a call to the distant end on an out pulse trunk without waiting for a status lamp display</p>
1d	Operate the OUT PULSE-NO PULSE key to the OUT PULSE position.
2d	Pulse trunk number and test line code (4x4).
3d	Release keyset; depress ST key. Notes 2, 3 and 4.
	<p>Option E: To check status of an outpulse trunk, then to request completion of a call to the distant end</p>
1e	Leave the OUT PULSE-NO PULSE key in the normal position.
2e	Pulse trunk number (4x4).
3e	Observe the status lamp display. Note 4.
4e	If the trunk is idle, operate the OUT PULSE-NO PULSE key to the OUT PULSE position.
5e	Pulse test line code (4x4).
6e	Release keyset; depress ST key. Notes 2 and 3.
	<p>Note 1: No connection is made to the network trunk but a status assignment (maintenance busy made or maintenance busy removed) must be given in order to clear the ESS register.</p>
	<p>Note 2: If a connection to the trunk is obtained but the call cannot be completed at the distant end, busy tone is received. If the call is completed to the distant end, the access circuit SUPV lamp is lighted.</p>
	<p>Note 3: When the procedure applicable to the chosen pulsing option has been completed, return to Register Check or to Step 9 of the network trunk test procedure (2.03).</p>
	<p>Note 4: If the network trunk is found test busy or service busy, proceed to Step 13 of the network trunk test procedure (2.03).</p>

2.05 Manual Repeat Options, Network Trunk

Tests: When it is found necessary to repeat a test on a network trunk to the same far-end test line, the trunk over which the test was made can be released and reseized without repeating the pulsing procedure, if the previously pulsed digits have been

retained in the ESS register. The digits are stored in the register unless a status assignment (maintenance busy made or maintenance busy removed) has been made since the trunk number was pulsed. The options described below apply. If the register has been cleared by a status assignment, a new call must be initiated.

STEP	PROCEDURE
	<p>Option A: The ESS Register has been cleared.</p>
1a	Operate the RLS-TEST key to RLS momentarily, and return to TEST position.
2a	Proceed with network trunk test (2.03) from Step 5. Refer to Notes.
	<p>Option B: Reconnecting to the same out pulse trunk and test line, all digits stored</p>
1b	Operate the RLS-TEST key to RLS, momentarily, and return to TEST position. Both the trunk and test line are reconnected, when idle. Repeat test, as required. Refer to Notes.
	<p>Option C: Reconnecting to the same out pulse trunk and either connecting to a new test line or, reconnecting to the same test line when the OUT PULSE key has been restored to normal</p>
1c	Operate the RLS-TEST key to RLS.
2c	Operate the OUT PULSE-NO PULSE key to normal position (if it is not already normal) then, return it to the OUT PULSE position.
3c	Restore the RLS-TEST key to the TEST position.
4c	When dial tone is received, pulse the test line code.
5c	Release keyset; depress ST key, momentarily.
6c	Proceed with test. Refer to notes.
	<p>Option D: Reconnecting to a no pulse trunk</p>
1d	Operate the RLS-TEST key to the RLS position.
2d	Leave the OUT PULSE-NO PULSE key in (or return it to) the NO PULSE position.
3d	Restore the RLS-TEST key to the TEST position.
4d	Proceed with the test. Refer to notes.

STEP	PROCEDURE
	<p>Note 1: If connection to a far-end line is completed, the access circuit SUPV lamp is lighted. If the far-end test line is found busy, busy tone is received.</p> <p>Note 2: If a disconnect is made while a trunk is in the release state, the access circuit REG lamp is flashed as a warning that the access circuit is still active and the ESS register is not cleared.</p> <p>Note 3: If, during the release and reseizure procedures, the trunk or far-end test line is found test busy or service busy, the indication and treatment is the same as when either is found busy on an initial call. Refer to the network trunk test procedure (2.03).</p>

3. OPERATIONAL TESTS ON SUBSCRIBER LINES

3.01 Use the following procedure to check line status, to remove a line from service, or to restore a line to service. Lettered step is optional.

STEP	PROCEDURE
1	Connect a telephone set to the TEL jack.
2	Connect a testboard TST cord to an access circuit (ACC) jack. The access circuit OFF NOR lamp is lighted.
3	Operate the TALK-MON key, associated with the connected TST cord, to the TALK position.
4	Operate the access circuit LINE-TRUNK key to the LINE position. Note 1.
5	Operate the access circuit RLS-TEST key to the TEST position. When cut through is made to the ESS, the access circuit CUT THRU lamp is lighted.
6	Depress the keyset 4X4 TST key, momentarily. Keyset TST lamp and 4X4 lamp are lighted.
7	When the keyset S lamp is lighted, pulse line number using the keyset keys.
8	Release keyset; depress ST key, momentarily.
9a	If the called line does not have automatic ringing, initiate ringing by operating the access circuit RING key, momentarily.
10	Observe the status display. Lamps indicating the line status (idle, maintenance-busy, test-busy, or service-busy) and class of service (voice, PBX, or data) offered by the line, are lighted.
11	To remove the line from service (assign a maintenance-busy status), operate the access circuit RMB-MTCE BUSY key to the MTCE BUSY position, momentarily. To restore the line to service (remove the previously made maintenance-busy status), operate the access circuit RMB-MTCE BUSY key to the RMB position, momentarily. Note 2.

STEP	PROCEDURE
12	Restore all testboard keys to their normal positions.
13	<p>Disconnect the TST cord. The OFF NOR lamp is extinguished.</p> <p>Note 1: If an error in operation of an access circuit or keyset key is made at any time before a complete line number is pulsed, momentarily operate the access circuit RLS-TEST key to the RLS position, restore to the TEST position, and restart the test procedure from Step 4.</p> <p>Note 2: It is not necessary to change the line status. The status, in which the line was found, may be assigned but an assignment must be made in order to clear the ESS register.</p>

3.02 Use the following procedure to perform tests on a subscriber line. It is assumed that the line has previously been removed from service (3.01) or, that removal from service is not required. Lettered steps are optional.

STEP	PROCEDURE
1	Perform Steps 1 through 5 of the line status check procedure (3.01).
2a	When the line, on which the test is being made, should not be preempted by central control, operate the access circuit CANC PRMT key, momentarily. The CP lamp is lighted. Note 1.
3	Perform Steps 6 through 10 of the line status check procedure (3.01).
	IDLE or MTCE BUSY Lamp is Lighted
4	<p>Proceed with the test. If the repetition of a test is desired or if it is necessary to release and reseat the line for any reason, operate the RLS-TEST key to the RLS position, momentarily, and restore it to the TEST position. The previously pulsed line digits are stored in the ESS register if no status assignment (maintenance-busy status made or maintenance-busy status removed) has been made since the line number was pulsed. Reconnection to the line is obtained without pulsing, if the line is idle. If the line does not have automatic ringing, reoperate the RING key, momentarily. When the line is found test busy or service busy upon attempt to reseat the line, the procedure is the same as when the line is found in this status on an initial call. Notes 2 and 3. Upon completion of the test, proceed to Step 8.</p> <p>TEST BUSY or SERV BUSY Lamp is Lighted</p>
5	If desired, wait for the line to become idle (busy lamp is extinguished and the IDLE lamp is lighted) and return to Step 4. The functions described below may be performed, optionally, on the busy line. If it is not desired to wait for the line to become idle, clear the ESS register and disconnect (Steps 8 through 10).

STEP	PROCEDURE
6b	<p>Monitor</p> <p>To request a monitoring connection to a test-busy or service-busy line, operate the TALK-MON key, associated with the connected TST cord, to the MON position. The access circuit MON lamp is lighted. If no monitoring connection is available, busy tone is received. If required, the attendant can talk on the monitored circuit by restoring the TALK-MON key to the TALK position.</p> <p><i>Caution: This must not be done when the monitored circuit is passing data.</i></p>
7c	<p>Trace</p> <p>A printout may be produced by momentarily operating the access circuit TRACE-REG LSTG key to the TRACE position. The printout identifies the equipment which terminates the busy circuit.</p>
	<p>Disconnect</p>
8	<p>A status assignment is required before disconnecting, whether or not the line was removed from service. The assignment is required to clear the ESS register. To restore a line to service, operate the RMB-MTCE BUSY key to the RMB position, momentarily. To leave a line out of service, operate the RMB-MTCE BUSY key to the MTCE BUSY position, momentarily.</p>
9	<p>Restore all testboard keys to normal.</p>
10	<p>Disconnect the testboard TST cord. The access circuit OFF NOR lamp is extinguished.</p> <p><i>Note 1:</i> The cancel preempt function may not be available, initially.</p> <p><i>Note 2:</i> If a disconnection is made while the line is released, the access circuit REG lamp is flashed as a warning that the ESS register is not cleared.</p> <p><i>Note 3:</i> When a line is released by operating the RLS key, the cancel preempt condition, if previously established, is released and the CP lamp is extinguished.</p>

4. OPERATIONAL TESTS ON CONCENTRATOR TRUNKS

Removal from Service and Restoration to Service of a Concentrator Trunk

4.01 The procedures for removing a concentrator trunk from service and restoring it to service differ from those applicable to a network trunk or a subscriber line. MB (make-busy) jacks, connecting to the concentrator trunks, are located at each testboard position for this purpose. A make-busy plug is inserted into the MB jack to remove the trunk from service, and removed when the trunk is restored to service.

4.02 When a test is to be made on a concentrator trunk which has been removed from service, the test should be made at the position where the trunk was removed from service. This is required because of the necessity to remove the MB plug, momentarily, while a connection to the trunk is obtained; the ESS central control will not make a connection to the concentrator trunk while it tests busy.

4.03 Use the following procedure to perform a test on a concentrator trunk. Lettered steps are optional.

STEP	PROCEDURE
	<p>Connection to ESS</p> <p>1 Connect a telephone set to the TEL jack.</p> <p>2 Connect a testboard TST cord to an ACC jack. The access circuit OFF NOR lamp is lighted.</p> <p>3 Operate the TALK-MON key, associated with the connected TST cord, to the TALK position.</p> <p>4 Operate the access circuit CONC key. Note 1.</p> <p>5 Operate the access circuit RLS-TEST key to the TEST position. When cut through to the ESS is obtained, the access circuit CUT THRU lamp is lighted. When a touch-tone receiver is connected, dial tone is received.</p>
	<p>Pulsing Address Information</p> <p>6 Connect the keyset by depressing the 4X4 TST key, momentarily. The keyset TST lamp and 4X4 lamp are lighted. When the S lamp is lighted, proceed to Step 7.</p> <p>7 Pulse concentrator number and trunk number using the keyset keys.</p> <p>8 If the trunk was removed from service by means of a make-busy plug, temporarily remove the plug before depressing the keyset ST key to release the keyset. The operation of the ST key must immediately follow the removal of the make-busy plug in order to prevent the trunk being seized by another circuit.</p> <p>9 Reinsert make-busy plug into MB jack, if previously removed.</p>
	<p>Determine Trunk and Test Terminal Status</p> <p>10 Observe status lamps. The indicated status is that of the test terminal through which concentrator tests must be made. If the IDLE lamp is lighted, proceed to Step 11. If the TEST BUSY lamp is lighted, proceed to Step 16.</p>
	<p>IDLE Lamp is Lighted</p> <p>11 If both the test terminal and the desired trunk are idle, connection will be made to the trunk. Proceed with test. Refer to Sections applicable to the type of test being made. For information on auxiliary test equipment, refer to sections listed in Part 9. Refer to Part 8, if applicable. If the test terminal is idle but the desired trunk is found busy, busy tone is received; a new call must be initiated.</p>
	<p>Release and Reseizure</p> <p>12a During tests, it may be necessary to release a trunk temporarily and reseize it, either to repeat a test or to perform an additional test. This may be accomplished without repeating the pulsing procedure, as follows:</p>

STEP	PROCEDURE
13a	Operate the access circuit RLS-TEST key to RLS. Note 2.
14a	If a make-busy plug was inserted into the trunk MB jack, remove the plug temporarily and immediately restore the RLS-TEST key to the TEST position. If both the trunk and test terminal are idle, reconnection is made. If either the trunk or test terminal is found busy when the attempt to reseat the trunk is made, the procedure is the same as when found in this status on an initial call.
15a	Reinsert the make-busy plug in the trunk MB jack, if previously removed.
	TEST BUSY Lamp is Lighted
16	If desired, wait for the test terminal to become idle (busy lamp is extinguished and IDLE lamp is lighted) and return to Step 11. The functions described below may be performed, optionally, while the test terminal is busy. If it is not desired to wait for the test terminal to become idle, clear the ESS register and disconnect. Proceed to Step 19.
	Monitor
17b	To request a monitoring connection to the busy test terminal, operate the TALK-MON key, associated with the connected TST cord, to the MON position. The access circuit MON lamp is lighted. If no monitoring connection is available, busy tone is received.
	Trace
18c	A printout may be produced by momentarily operating the access circuit TRACE-REG LSTG key to the TRACE position. The printout identifies the position which is connected to the test terminal.
	Disconnect
19	Although the access circuit RMB-MTCE BUSY key is not used to remove or restore a concentrator trunk to service, the key must be operated, before disconnecting, in order to clear the ESS register. Operate the key to the RMB position, momentarily.
20	Restore all testboard keys to their normal positions.
21	Disconnect the testboard TST cord. The OFF NOR lamp is extinguished.
	Note 1: For an interim period, the CONC key will have no function. The test terminal to which concentrator trunk tests are made will be assigned a line number. If this condition applies, operate the TRUNK-LINE key to the LINE position instead.
	Note 2: If a disconnect is made during the release periods, the access circuit REG lamp is flashed as a warning that the ESS register is not cleared.

5. OPERATIONAL TESTS ON 101 TEST TRUNKS AND SERVICE CIRCUITS

5.01 Connections to code 101 test trunks and test and communication trunks not connecting to the ESS are made at the testboard with a CON cord. Either dial pulsing or MF keypulsing may be done on the CON cord by proper operation of keyset control keys.

A. Busy Test on Multiplied Trunks

5.02 Before connecting a testboard CON cord to a No. 5 switchboard trunk or similar trunk, the status of the trunk should be checked by making the following busy test.

STEP	PROCEDURE
1	Operate the TALK-MON key, associated with the CON cord to be used, to TALK position.
2	While monitoring with a telephone headset, touch the tip of the lower (T) jack of the CON cord to the sleeve of the lower (T) plug of the trunk jack to be connected.
3	If the trunk is busy, BT (busy test) relay is operated and an audible click is heard at the moment of contact. If no click is heard, the CON cord may be connected.

B. Keypulsing (2/6) on a CON Cord

5.03 The following procedure is used for MF (2/6) keypulsing on a CON cord.

STEP	PROCEDURE
1	With a CON cord connected to the trunk jack and the associated TALK-MON key in the TALK position, cord C lamp should be extinguished. Depress keyset MF CON key momentarily. CON lamp and MF lamp are lighted.
2	When S lamp is lighted, proceed by keypulsing digits required to reach the desired station.
3	On completion of pulsing, depress ST key momentarily to release keyset. CON lamp, MF lamp, and S lamp are extinguished. The talking circuit is established .

C. Dial Pulsing on a CON Cord

5.04 Trunks over which dial pulsing is done on a CON cord must be arranged for repeated dialing. The following procedure applies.

STEP	PROCEDURE
	<i>Note:</i> See 5.05 for dialing on an SS1 order wire.
1	With a CON cord connected to a trunk jack and the associated TALK-MON key in the TALK position, cord C lamp should be extinguished. Depress keyset DP CON key momentarily. CON lamp and DP lamp are lighted.
2	Dial the digits required to reach desired station using the rotary dial.
3	On completion of dialing, momentarily depress ST key to release dial and establish talking circuit.

D. Dial Pulsing on an SS1 Order Wire

5.05 When a CON cord is connected to an SS1 order-wire jack to originate a call, the position dial will be automatically connected to the circuit for a sufficient time to permit dialing. A lighted DP lamp indicates that the dial is connected. Dial the digits required to reach the desired station. After the timed interval, the dial is automatically disconnected, the DP lamp is extinguished, and the talking circuit is established.

E. Incoming Calls on Code 101 Test Trunks

5.06 An incoming call on a code 101 test trunk is indicated by the lighting of the answering lamp, associated with the trunk jack, and by operation of the night alarm, if connected. The call is answered by connecting a testboard CON cord to the 101 trunk jack. The answering lamp is extinguished and the night alarm, if operated, is silenced. To recall the distant attendant, when distant end is still connected but TALK-MON key is returned to normal position, momentarily depress the RING CON key. A recall from the distant end, when the near end is still connected but TALK-MON key is returned to normal position, is indicated by the cord supervisory lamp flashing at 120 ipm. If the distant end disconnects while the near end is still connected, steady illumination of the cord supervisory lamp signals the near end to disconnect.

6. OPERATIONAL TESTS ON MULTIADDRESS/BROADCAST BRIDGES

6.01 Routine tests of the ESS multiaddress/broadcast bridge circuits are accomplished on an automatic basis by the ATMS. More comprehensive manual testing, however, may be assigned to the 21A testboard either on a routine basis or under trouble conditions. Network numbers are assigned permitting access to be made to any bridge and port.

6.02 *Removing a Bridge or Output Port from Service:* A multiaddress/broadcast bridge or bridge output port may be removed from service for maintenance purposes in the same manner that a network trunk is removed from service. An entire bridge is made maintenance busy when this status is assigned to an input port. When a maintenance-busy status assignment is made to an output port of a bridge, only that port is removed from service (unless the input port is also made busy). In establishing connections to bridge ports, follow access and pulsing procedures used in making connections to network trunks. A maintenance-busy condition is removed, in the same manner as it is on a network trunk. Observe proper ESS register clearing procedure.

A. Transmission Measurements

6.03 Each testboard-to-testboard measurement through the bridge includes 4-db loss in the measuring circuit (2 db, in each connection, from the testboard to the switch appearance of the port). Lettered steps are optional in these measurement procedures.

Measurements Between Input and Output Ports

STEP	PROCEDURE
	<p data-bbox="386 390 678 415">Input Port to Output Port</p> <p data-bbox="277 468 1539 558">1 Establish connection to desired bridge input port, performing access and pulsing procedures. Pulse input port network number. When connection is made, return TALK-MON key, associated with connected TST cord, to normal position.</p> <p data-bbox="277 611 1539 701">2 Using another TST cord and access circuit, establish connection to bridge output port. Pulse output port network number. When connection is made, return TALK-MON key, associated with second TST cord connected, to normal position.</p> <p data-bbox="277 753 776 779">3 Patch OSC jack to VF IN jack.</p> <p data-bbox="277 831 607 856">4 Operate CAL key.</p> <p data-bbox="277 909 1133 934">5 Adjust oscillator output to 1000 cycles, at a level of -7 dbm.</p> <p data-bbox="277 987 1040 1012">6 Disconnect patch between OSC jack and VF IN jack.</p> <p data-bbox="277 1064 1539 1125">7 Connect testboard CON cord, associated with TST cord connected to input port (Step 1), to OSC jack.</p> <p data-bbox="277 1178 1539 1239">8 Connect testboard CON cord, associated with TST cord connected to output port (Step 2), to MEAS jack.</p> <p data-bbox="277 1291 716 1316">9 Operate keyshelf RCV key.</p> <p data-bbox="277 1369 821 1394">10 Meter should read $-11, \pm 0.5$ dbm.</p> <p data-bbox="386 1461 678 1486">Output Port to Input Port</p> <p data-bbox="277 1539 1539 1629">11 Interchange CON cord connections to OSC and MEAS jacks. Meter should again read $-11, \pm 0.5$ dbm. This reading applies to measurement from any output port to the input port of the same bridge.</p> <p data-bbox="277 1682 932 1707">12 Disconnect cords and restore keys to normal.</p> <p data-bbox="277 1759 1539 1820">13 Release the bridge to service by removing the maintenance-busy status or proceed with the following test.</p>

Isolation Between Output Ports

STEP	PROCEDURE
	<p>Note: Although the input port is not used in these measurements, a connection must be established to the input port of the bridge under test and the entire bridge must be removed from service during measurements, since the measurements would interfere with normal use of the bridge.</p>
1	Using an access circuit connected by a TST cord, establish a connection through the ESS to the input port of the bridge under test. Remove the bridge from service by assigning a maintenance-busy status. Disconnect the TST cord.
2	Using two access circuits connected by two TST cords, establish connections through the ESS to two output ports to be tested. When connections are made, TALK-MON key, associated with each TST cord is returned to normal position.
3	Patch OSC jack to VF IN jack.
4	Operate CAL key.
5	Adjust oscillator output to 1000 cycles at a level of -7 dbm.
6	Disconnect patch between OSC jack and VF IN jack.
	<p>Isolation Between Forward Paths</p>
7a	Connect the CON cord associated with the first TST cord to OSC jack.
8a	Connect the CON cord associated with the second TST cord to the MEAS jack; connect in reversed attitude (knurled edge down).
9a	If the two output ports are in the <i>same</i> group (1 to 10 or 11 to 19), the measured level should not be higher than -31 dbm. If the two output ports are in <i>different</i> groups, the loss should appear to be infinite. If the level is below the measuring range of the SD-95900-01 measuring system, isolation between ports is satisfactory.
	<p>Isolation Between Reverse Paths</p>
7b	Connect one of TST cords being used to the OSC jack; connect in reverse attitude (knurled edge down).
8b	Connect second TST cord being used to the MEAS jack.
9b	The signal level measured between two output ports of the same group (1 to 10 or 11 to 19) should be below -41.1 dbm and the level between two output ports of different groups should be infinite. If the level is below the measuring range of the SD-95900-01 measuring system, however, isolation between ports in either case is satisfactory.

B. Sensitivity and Response Measurements

6.04 Sensitivity: The reverse path of each output port group contains an amplitude-sensitive transmission switch. The sensitivity of the

switch determines what level of signal is required from a conferee's line, connected to an output port, to transmit to the call originator's line connected to the input port. The entire bridge should be made busy for sensitivity and response time tests.

Sensitivity Test

STEP	PROCEDURE
1	Establish connection to the bridge input port by performing access and pulsing procedures. Pulse input port network number. Return TALK-MON key, associated with connected TST cord, to normal position.
2	Using another access circuit, establish connection to an output port in the group associated with the switch being tested. Pulse the output port network number. Return TALK-MON key, associated with second TST cord connected, to normal position.
3	Operate TALK-MON key, associated with first TST cord connected (step 1), to the MON position.
4	Connect CON cord, associated with second TST cord connected (Step 2), to OSC jack.
5	Connect telephone set to TEL SET jack and monitor.
6	Set oscillator frequency to 1000 cycles. Set output level to -35 dbm using the SD-95900-01 transmission measuring system. Increase oscillator output level until the switch is operated, as indicated by audible tone on monitor telephone.
7	The switch should be operated at an oscillator output of -32 ± 2 dbm. Check oscillator level using the SD-95900-01 transmission measuring system.

6.05 Response Time: This test is to be added when equipment details are available.

7.02 Proper operation of the keys associated with the SIG T cord provides on-hook and off-hook signals in either direction on E and M leads. These signals are indicated on the line (L) and drop (D) lamps on the test circuit panel. These lamps will also indicate hits on the line or trunk under test. The L lamp is associated with the E lead from the line equipment. The D lamp is associated with the M lead from the drop equipment. During the idle condition of a circuit with on-hook signals from each direction, both lamps are lighted (SIG T cord connected). An off-hook signal from either direction causes the lamp associated with that direction to be extinguished.

7. SIGNALING AND ALARM FUNCTIONS**A. Signaling Tests on E and M Leads**

7.01 The neon lamp signaling test circuit is provided for testing and monitoring on signaling leads of network trunks, concentrator or switch-board trunks, or subscriber or network line circuits equipped with E and M leads. If tests are confined to E and M leads, access through the ESS is not required. However, except for monitoring, the trunk or circuit should be taken out of service before tests are made.

7.03 Dial pulse signals may be transmitted over E and M leads in either direction by using the position dial according to the following procedure.

Signaling Toward Distant End

STEP	PROCEDURE
	<p><i>Note:</i> If use of the transmission path of the circuit to be tested is required in conjunction with the signaling tests, establish a connection to the trunk or line through the ESS by the access procedure described in 2.05. Remove the trunk from service for testing.</p>
1	Connect testboard SIG T cord to SIG L/D jacks of circuit under test.
2	Operate MON-TEST key on signaling test panel to MON. If both the L lamp and the D lamp are lighted indicating an idle circuit, operate the MON-TEST key to TEST.
3	Operate the TWD D key to ON HK.
4	Operate the TWD L key to OFF HK.
5	Operate the DIAL key to LINE.
6	If L lamp is lighted, dial the desired station number and restore DIAL key to normal position. When the called end makes an answering connection, the L lamp is extinguished.

Signaling Toward the Home Office

STEP	PROCEDURE
1	Connect testboard SIG T cord to SIG L/D jacks of circuit under test.
2	Operate MON-TEST key on signaling test panel to MON. If both the L lamp and the D lamp are lighted indicating an idle circuit, operate the MON-TEST key to TEST.
3	Operate the TWD L key to ON HK.
4	Operate the TWD D key to OFF HK.
5	Operate the DIAL key to DROP.
6	If the D lamp is lighted, dial the desired station number and restore DIAL key to normal position. When an answering connection is made, the D lamp is extinguished.

B. Retirement of a Permanent Signal

7.04 When a permanent signal exists on a subscriber line, the ESS office attempts to clear the condition automatically. If the attempt fails, the circuit is seized and connected via a permanent signal trunk to the testboard. If a large number of simultaneous permanent signals occur in an ESS office, the affected lines are placed in a permanent

signal queue circuit while awaiting seizure by the permanent signal trunk. If the number of lines having permanent signals rises above a predetermined number, this condition is alarmed at the testboard. The PSA lamp is flashed until the quantity of permanent signal lines is reduced to the predetermined number. A permanent signal alarm is serviced by the following procedure.

STEP	PROCEDURE
1	Seizure of a line having a permanent signal is indicated at the testboard by the sounding of a buzzer and the lighting of the PS lamp. If the permanent signal is retired before action is taken, the buzzer is silenced, the PS lamp is extinguished, and the circuit returns to normal.
2	The permanent signal alarm is answered by connecting a CON cord to the PS jack. The answering connection silences the buzzer and extinguishes the PS lamp. Should the permanent signal condition be retired after the answering connection is made but before further action is taken, the cord supervisory lamp is lighted as a disconnect signal.
3	Attempt to retire the permanent signal condition, when it is caused by an off-hook condition at the station end, by patching the receiver off-hook tone trunk (ROH T jack) to the permanent signal trunk. If this does not restore the line to the on-hook condition, a teletype printout will be obtained at the auxiliary teletypewriter bay upon disconnecting from PS jack. Whether the condition is caused by a malfunction of the line equipment or by an off-hook condition at the station must be determined and appropriate action taken.

7.05 When the line, on which a permanent signal has been detected, is connected through a concentrator at a distant location, determination can usually be made as to whether the malfunction

originates in the connecting concentrator trunk or beyond the distant concentrator. With a testboard CON cord connected to the PS jack, proceed as follows:

STEP	PROCEDURE
1	Make the connecting concentrator trunk maintenance busy by the procedure described in 4.01 or by operation of controls at the concentrator control unit. Identity of the trunk is determined by tracing through the switch to the concentrator.
2	At the concentrator control unit, operate control keys to make the subscriber line high and dry, thereby releasing the line connection to the concentrator trunk but holding the trunk. The testboard access circuit SUPV lamp should be lighted.
3	At the concentrator control unit, operate control keys to reconnect the subscriber line. Since the original connecting trunk is busy, connection through another trunk is made. If the testboard access circuit SUPV lamp is now extinguished, it is probable that the malfunction originates beyond the distant concentrator and personnel at the distant end must clear the trouble. If the access circuit SUPV lamp remains lighted, it is probable that the original connecting trunk is faulty and should be tested.
4	When the malfunction originates beyond the distant concentrator, the subscriber line is usually returned to the permanent signal queue by disconnecting the testboard TST cord. If, however, it is desirable to return the connecting concentrator trunk to service, assign a maintenance-busy status to the line before disconnecting the TST cord. The line remains in the permanent signal queue until the malfunction is cleared.

C. Single-Frequency Tone Tests

7.06 The presence or absence of signaling tone between the single-frequency signaling units and the line facilities may be monitored from the

testboard by the following procedure. Each trunk or line to be tested should be removed from service prior to making the test. Restore the trunk or line to service when the test is completed. Use applicable procedure in Part 2, 3, or 4.

STEP	PROCEDURE
1	At repeater patch bay or VF channel patch bay, patch () TEST TRK jacks to MON jacks associated with either the MOD IN (transmit) or DEMOD OUT (receive) jacks of the circuit under test, as appropriate to test.
2	At testboard, connect a position CON cord to () TST TRK jack and operate the associated TALK-MON key to MON.
3	Connect testboard SIG T cord to SIG L/D jacks of circuit under test.
4	Condition circuit alternately to on-hook and off-hook condition as described in 7.03 for signaling toward the distant end. Monitor presence of tone in on-hook condition and absence of tone if in off-hook condition.

D. Teletypewriter Circuit Controls and Alarms

7.07 The ESS produces a teletypewriter alarm at the testboard by connecting leads B1 and B2, of the alarmed teletypewriter circuit, at the signal distributor applique. A buzzer is sounded and TTY A ACO lamp and TTY B ACO lamp (if both machines are in service) are lighted. An auxiliary alarm, when provided, is sounded. Operation of the TTY A ACO and/or TTY B ACO key, as appropriate, silences the buzzer (if leads B1 and B2 are now disconnected) and release of the key extinguishes the () ACO lamp(s). The auxiliary alarm, if provided, is also released.

7.08 Two teletypewriters (A and B) are connected and operate in series when both machines are in service. Either machine may be removed from service by operating the TTY A OS or TTY B OS key, as appropriate. An out-of-service lamp (OS A or OS B) is lighted at each end of the circuit. Return of the out-of-service key to its normal position, extinguishes the lighted out-of-service lamp and returns the machine to service.

8. TESTING FACILITIES

A. Transmission Measuring Circuit, SD-95900-01

8.01 Only the transmission measuring portion of the SD-95900-01 transmission and noise measuring system is provided in a 21A testboard used with the 4-wire ESS. Measurements of message circuit-type noise are made using the 3-type noise measuring set and impulse noise is measured using the 6-type impulse counter. Test pads which are sometimes located in the measuring circuits of the SD-95900-01 system are, in this application, located in test access circuits and in code 101 test trunks connecting the testboard to the switching network. These pads must be adjusted by procedures described in Section 310-282-300 before making transmission or noise measurements.

Keys, Lamps, and Jacks

8.02 The MEAS jack provides access to the SD-95900-01 measuring circuit for both sending and receiving operations.

- 8.03 The 1000-0-600 jack provides access to a source of 1-milliwatt, 1000-cycle, test tone at 600 ohms for the purpose of checking the accuracy of the test power to the testboard.
- 8.04 The OSC jack provides access to the output of a KS-19260 L1 oscillator, when provided. The oscillator is used as a source of test tone when variable-frequency transmission tests are made.
- 8.05 The VF IN jack is provided to patch the variable-frequency oscillator to the measuring circuit.
- 8.06 The CAL key, when operated, applies a 1-milliwatt calibrating tone to the measuring circuit for calibrating this circuit. When the oscillator is connected to the VF IN jack, the output of the oscillator is applied to the measuring circuit for calibrating the oscillator.
- 8.07 The MS- key, when operated, transfers the measuring circuit from the primary meter to an auxiliary meter.
- 8.08 The A, B+10, and B+20 keys are meter sensitivity keys. Levels below 0 dbm are measured on the meter B scale using the B+10 or B+20 key, when required, to extend the measuring range of the meter. Levels above 0 dbm are measured on the meter A scale with the A key operated.
- 8.09 The FLT key, when operated, inserts a filter into the measuring circuits when making measurements on circuits connecting to open-wire

lines. The filter should not be used when making measurements of frequencies under 1000 cycles.

- 8.10 Separate SEND and RCV keys are provided on the testboard keyshelf. Test tone is transmitted by operating the SEND key. The receiving circuit is connected by operating the RCV key. Since separate keys are provided, tone may be simultaneously transmitted and received on a 4-wire circuit connected to the MEAS jack, except when testing trunks equipped with echo suppressors.
- 8.11 The FLT lamp, when lighted, indicates that the measuring filter described in 8.09 is inserted into the measuring circuit.
- 8.12 The MB lamp, when lighted, indicates that the measuring meter is in use.
- 8.13 The TMB lamp, when lighted, indicates that the transmission measuring circuit is in use.

Calibration of Transmission Measuring Circuit

- 8.14 The 1-milliwatt supply at the testboard is checked at the 1000-0-600 jack, using a 22A milliwatt reference meter. Refer to Section 103-335-500 and related sections. The 1-milliwatt supply is *never* checked using the SD-95900-01 measuring circuit. The 1-milliwatt supply is used to calibrate the measuring circuit by the following procedure.

STEP	PROCEDURE
1	<p>Note: The 1-milliwatt supply should be checked before making any adjustments to this circuit.</p> <p>When more than one meter is associated with the measuring circuit, begin the calibration by first calibrating the meter which is normally read from the testboard. Then, calibrate other meters used. Set the MC or MA resistor, associated with the meter being calibrated, to its midrange position.</p>
2	Operate the CAL key. The MB lamp and TMB lamp are lighted.
3	The meter reading should be 0 ± 0.05 db on B scale. If this requirement is not met, adjust the 1U amplifier-rectifier CAL potentiometer to obtain a reading of exactly 0.

STEP	PROCEDURE
4	<p>Operate the A key. The meter reading should be 0 ± 0.05 db on the A scale. If this requirement is not met, adjust the 1U amplifier-rectifier S potentiometer to obtain a reading of exactly 0. If an adjustment is made in this step, repeat Steps 3 and 4 in sequence until the requirements of both steps are met.</p> <p>Note: None of the auxiliary meters should be adjusted unless the meter normally read from the testboard has been checked and meets the requirements of Steps 3 and 4.</p>
5	<p>Calibrate the remaining meters by adjusting their respective MC or MA potentiometers to obtain a meter reading of exactly 0. If any MC or MA potentiometer has insufficient range to obtain correct reading, reset <i>first</i> the MC or MA potentiometer above or below its original setting, as required, and repeat the calibration adjustment from the beginning.</p>

Transmission Measurements

8.15 Transmission measurements may be made from the 21A testboard after access and pulsing procedures have been completed and the trunk or line has been removed from service, when required. Manual one-way or 2-way transmission measurements may be made to a distant testboard with the assistance of an attendant at the distant testboard.

8.16 Semiautomatic, one-way (far-to-near) transmission measurements may be made, without far-end assistance, to a distant code 102 (milliwatt) test line, when provided at the far end.

8.17 Semiautomatic, two-way transmission measurements may be made on a trunk, without far-end assistance, when a code 106 (combined

milliwatt and loop-back) test line is provided at the far end. This test line cannot be used on trunks using echo suppressors.

8.18 A code 105 test line, when provided at the far end, permits access to a responder in an automatic transmission measuring system. This test line is used when testing from the automatic transmission measuring system (ATMS).

8.19 Testboard cord connections, for making transmission measurements on network trunks are shown in Fig. 1. Incoming tests are made to the testboard via a 101 test trunk. A testboard CON cord is connected to the 101 trunk jack; the associated TST cord is connected to the measuring system MEAS jack.

8.20 In the following transmission measurement procedure, the lettered steps are optional.

STEP	PROCEDURE
1	<p>Operate the CAL key. The measuring circuit meter indication should be $0, \pm 0.05$ db. If this requirement is not met, perform the calibration procedure described in 8.14.</p> <p>Outgoing or Loop-Back Measurement</p> <p>2a <i>Manual test:</i> Establish connection through ESS to distant end by performing access procedure and pulsing trunk number followed by code 101. TALK-MON key, associated with connected TST cord, is in the TALK position. When distant end answers, arrange verbally for desired test. TALK-MON key is returned to normal position while test is made.</p>

STEP	PROCEDURE
3a	<p>Semiautomatic test: Measurements are made without assistance from distant end, to coded test lines listed in 8.21. Establish connection by performing access procedure. The trunk number and test line code are pulsed.</p> <p>Incoming Manual Test</p>
4b	<p>An incoming call is indicated by the lighting of the answer lamp, associated with the incoming 101 trunk jack. Answer the call by connecting a testboard CON cord to a 101 trunk jack. The answer lamp is extinguished. With the associated TALK-MON key in TALK position, arrange for desired test.</p>
5	<p>Connect the second cord, of the cord pair being used, to MEAS jack. This is a CON cord if Step 2a was performed and a TST cord if Step 4b was performed.</p> <p>To Send 1000-Cycle Test Tone</p>
6c	<p>Operate keyshelf SEND key. Distant end will make measurement, except on loop-back arrangement.</p> <p>To Receive Test Tone</p>
7d	<p>Operate the keyshelf RCV key. Read indication on measuring circuit meter. On loop-back test, send and receive tone simultaneously. A far-to-near loss is first indicated followed by a near-to-far plus far-to-near loss indication. Subtract first loss from second loss to obtain the near-to-far loss. See 8.08.</p> <p>Note: Simultaneous sending and receiving is not possible on trunks using echo suppressors.</p> <p>To Send Variable-Frequency Test Tone</p>
8e	<p>Normally, the KS-19260 oscillator is connected onto the measuring system for tone transmission. Patch OSC jack to VF IN jack. Set oscillator output level as required by operation of the CAL key. Operate the keyshelf SEND key to transmit tone.</p>

B. Auxiliary Test Equipment

8.21 Auxiliary test equipment; including a 3-type noise measuring set, a 6-type impulse counter, and a 25A voiceband gain and delay set; are mounted in the auxiliary testing bay. Input (IN) and monitor (MON) jacks provide access to the 3B and 6E sets. The 25A DEL jack provides access to the 25A set. Jacks appear at the testboard and at the two auxiliary bays. A busy lamp is lighted when a plug is inserted into an input jack connecting to either the 3B or 6E set. Refer to applicable sections for the operating procedures for each set.

C. Coded Test Lines

8.22 Coded test facilities provided are shown in the following list. Calls to facilities coded 100, 101, 102 and 106 can not be preempted at the originating end.

- Code 100 — Balance termination used in noise measurements
- Code 101 — Incoming test trunk for manual tests
- Code 102 — Test line sending 1-milliwatt test tone for far-to-near transmission measurement

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Code 105 — Test line providing access to responder of far-end automatic transmission measuring system (ATMS). ATMS director is required at near end.

Code 106 — Combination 1-milliwatt test tone and loop-back arrangement for 2-way transmission measurements on one trunk, except when trunk is equipped with echo suppressors.

9. REFERENCES

9.01 Detailed information on 21A testboard circuits, used in performing the procedures described in this section, can be found in the following circuit descriptions:

CD-56497-01 Signaling Test Circuit

CD-56543-01 Jack Circuits

CD-56544-01 Position Circuit

CD-56545-01 Access Circuit

CD-56546-01 101 Trunk Circuit

CD-56547-01 Cord Circuit

CD-95900-01 Transmission Measuring Circuit

CD-6G004-01 Permanent Signal Trunk

9.02 Information on auxiliary testing equipment supplied with the 21A testboard can be found in the following sections:

103-115-100 25A Voiceband Gain and Delay Measuring Set

103-222-100 22A Milliwatt Reference Meter

103-611-100 3A Noise Measuring Set

103-620-100 6A Impulse Counter

CHART A**SIMPLIFIED NETWORK TRUNK TEST**

1. Obtain a connection to ESS (Steps 1 through 5, network trunk test, **2.03**).
 - a. Connect TST cord to ACC jack.
 - b. Signal ESS that a network trunk test is intended.
 - c. Request cut through from testboard to ESS.
2. Pulse address information (Steps 6 and 7, network trunk test, **2.03**).
 - a. Connect keyset.
 - b. Pulse trunk number and line code, as required.
 - c. Release keyset.
3. Determine trunk status (Step 9, network trunk test, **2.03**).
 - a. Observe the status lamp display.
 - b. Determine course of the test. If the trunk is test busy or service busy, proceed to 4. If trunk is idle, proceed to 5.
4. Proceed with test on test-busy or service-busy trunk.
 - a. Wait for trunk to become idle and proceed to 5 or, proceed to 4b.
 - b. Monitor on busy trunk, optionally.
 - c. Make equipment trace, optionally.
 - d. Clear ESS register and disconnect.
5. Proceed with test on idle or maintenance-busy trunk
 - a. Remove trunk from service, when required.
 - b. Perform test. Release and reseize trunk for test repeat, when necessary.
 - c. Make status assignment to trunk (restoring trunk to service, when required).
 - d. Disconnect.

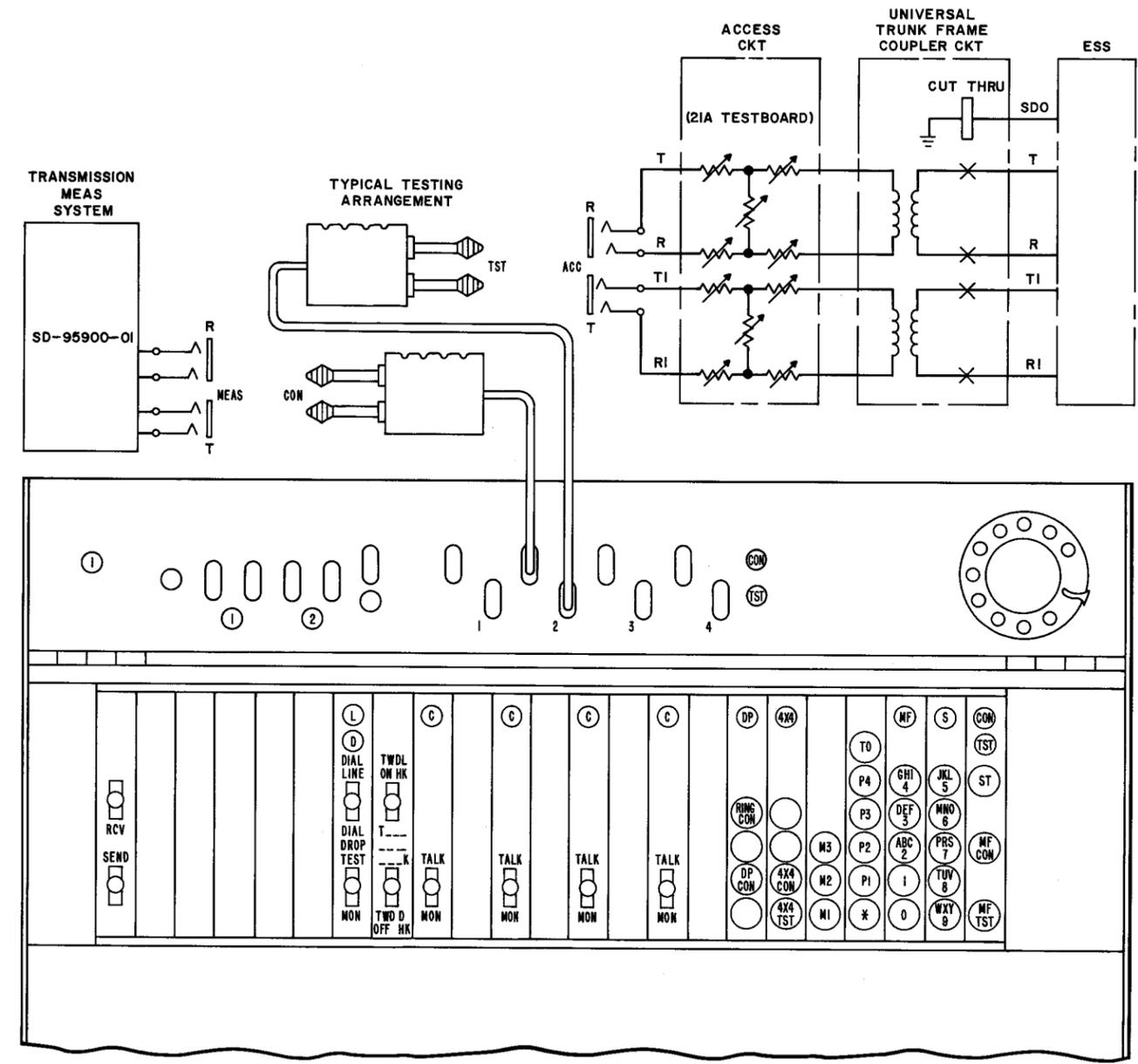


Fig. 1 — 21A Testboard Keyshelf with Typical Arrangement for Testing on a Network Trunk