REMOTE TESTING FEATURES

NO. 14 LOCAL TEST DESK AND NO. 16 LOCAL TEST DESK

SD-99309-01 AND SD-99310-01

NEAR-END TESTS

1. GENERAL

1.01 This section describes procedures for testing the basic features used to provide remote testing of subscriber lines in a distant office from a local test desk (LTD).

1.02 This section replaces Section 201-828-302 which is canceled. This issue affects the Equipment Test List.

1.03 The following tests are covered.

1.04 The procedures are all performed at the local test desk and remote testing circuit frame.

1.05 Remote testing utilizes the conversion of dc states to ac signals for transmission over facilities such as carrier, repeater, etc, which provide any required degree of amplification. At the local test desk location (near-end), key operations are converted to signals made up of three frequencies which are transmitted to the remote office (far-end).

There they are converted back to dc states to control the remote circuitry. Dial pulses are treated similarly. In addition a pilot tone, which prevents release of test connection if the test cord is removed from the jack, and a disconnect signal are transmitted to the remote office.

1.06 At the remote office, dc currents equivalent to those normally flowing in the meter at the desk are used to control a variable oscillator. Current flow between 0 and 1.2 milliamperes generates a corresponding frequency range of 1100 Hz through 1600 Hz. This signal is transmitted to the near end where it is reconverted to direct current to activate the desk meter. Additionally, a tone signal which indicates the switchhook state of a called line and, when required, a signal which indicates a test connection to an extended range (unigauge) line are sent to the near-end.

1.07 In the dedicated mode, the test path is hard-wired and is continuous from the test desk jack or key to the remote testing circuit at the far-end (Section 201-828-501).

1.08 In the nondedicated mode, the test path is routed through a switching network in order to provide access to trunk groups between the local and remote offices. This mode requires an additional circuit, the far-end test trunk or line circuit (Section 201-828-501). The far-end test trunk or line circuit is assigned a two-party line terminal in the remote office and can be reached by calling either of the two-party line numbers assigned to it. Thus, local test desk A could be assigned the tip party number and desk B could be assigned the ring party number. A call from test desk A to the assigned tip party number would be completed through the local and remote switching networks to the far-end test trunk or line circuit. The call would then be returned to the near-end trunk in the test desk position by a dialing feature of the far-end trunk. Similar action would take place on a call from test desk B to the assigned ring party number.

1.09 Descriptive information and operational procedures using remote testing features at the No. 14 LTD or at the No. 16 LTD are covered in the 662 division.

1.10 ***Lettered Steps:*** A letter a, b, c, etc, added to a step number in Part 4 of this section indicates an action which may or may not be required, depending on local conditions. The condition under which a lettered step or series of steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

2.01 The apparatus required for each test is shown in Table A. A more descriptive name and additional information on each item are covered in the paragraph indicated by the number in parentheses. Calibration and operating procedures for each set may be found in the section listed with each test set. Determine the test equipment to be correctly calibrated.

2.02 J64072A (72A) Frequency Meter (Section 103-425-100).

2.03 J24753A Test Set for Timing Tests (Section 100-130-101).

2.04 Model 400-D Hewlett Packard vacuum tube voltmeter (VTVM) (Section 100-526-101).

2.05 KS-14510 L1 volt-ohm-milliammeter (VOM) (Section 100-520-101).

2.06 52-type headset equipped with 310 plug.

2.07 Patching cord, P3K, 6 feet long, equipped with two 310 plugs (3P15A cord).

2.08 Patching cord, P3N, 6 feet long, equipped with one 310 plug and one 241A plug (3P17B cord).

2.09 Testing cord, P2AA, 3 feet long, equipped with one 241A plug and two 120 cord tips (2W3A cord).

2.10 Testing cord, 893, 6 feet long, equipped with two 360A tools (1W13B cord).

2.11 KS-6278 connecting clip.

2.12 639A relay contact connector.

2.13 651C relay contact connector holder.

TABLE A

APPARATUS	TESTS										
	B	C	D	E	F	G	H	I	J	K	M
72A Meter (2.02)		1	1	1					1	1	1
Test Set for Timing Tests (2.03)	1										
400-D VTVM (2.04)			1	1							1
KS-14510 L1 VOM (2.05)					1						
52-Type Headset (2.06)						1	1				
Patching Cord (2.07)	2										
Patching Cord (2.08)		1	1	1							
Testing Cord (2.09)									1	1	1
Testing Cord (2.10)		1	1		1						
Connecting Clip (2.11)					2						
Contact Connector (2.12)		2	2								
Connector Holder (2.13)		1	1								

3. PREPARATION

STEP	ACTION	VERIFICATION
Tests A Through F and J Through M		
1	Restore all test desk keys to normal.	
2	Request that operator make no operations at desk position.	

4. METHOD

A. PTM Timer

3	Block PC1 relay operated.	PTM relay operates 50-70 seconds later.
4	Remove block from PC1 relay.	

STEP	ACTION	VERIFICATION
B. TMR Timer		
3	Using 3P15A cord, connect −48 volts and ground to 48V jack of test set for timing test.	
4	At test set— Operate BAT key.	
5	Set MCF switch at NOR, REC switch at GRD-OC, and MILSEC switch at 0-100.	
6	Adjust ADJ-0 knob for zero indication.	
7	Hold TST key operated at CAL, and adjust CAL knob for indication of 50.	
8	Release TST key.	
9	Using 3P15A cord, connect TMR jack at SD-99310-01, to TST1 jack of test set.	
10	At test set— Operate TST key to OPR, and observe indication.	Indication of 54-56.
11a	If verification of Step 10 is not observed, release TST key and adjust TMR potentiometer in SD-99310-01.	
12a	Repeat Steps 10 and 11a until proper indication is observed.	Same as Step 10.
13	Remove all cords.	
C. Multitone Oscillator		
3	Set selector of 72A meter at MEAS.	
4	At SD-99310-01— Using a 3P17B cord, connect 72A meter to CAL jack.	
5	Using 1W13B cord, 651C holder, and two 639A connectors, short circuit contacts 12B and 12F of TM relay.	
6	Release all ST relays.	
7	Block relays PC and TM operated.	
8	Block relays TM1 and PTM unoperated.	

STEP	ACTION	VERIFICATION
9a	If at No. 14 LTD— Connect primary cord into remote TST jack.	
10b	If at No.16 LTD— Operate the incoming trunk key associated with remote testing and the PR1(C) key.	
11	At SD-99310-01— Check that ST16 relay is released and perform operations outlined in Table B.	Frequency indications as listed in Table B.
12a	If frequency indications are not within ± 4 Hz of values given, adjust the respective transformer or inductor listed in Table B. ***Note:*** Since one adjustment affects more than one frequency, all frequencies listed in Table B having the same adjustment transformer or inductor must be checked when any one is adjusted.	Same as Step 10.
13	Remove all short circuits and remove blocks from all relays.	
D. Amplifiers		
3	Set 72A meter at 1100 Hz and turn OSC OUT control to extreme counterclockwise position.	
4	At SD-99310-01— Using the 3P17B cord, connect OSC OUT jack of the 72A meter to the CAL jack of circuit.	
5	Using 1W13B cord, 651C holder, and two 639A connectors, short circuit contacts 12B and 12F of TM relay.	
6	Connect 400-type VTVM to LEV pin jack and ground.	
7	Adjust OSC OUT control of 72A meter.	0.094V rms indication on VTVM (ungrounded) (−22 dBm, 900 ohms).
8	Block PC relay operated.	
9	Connect VOM ungrounded across test points (TP) 1 and 2 per SD-99310-01 (Terminals 5 and 11 front) of Amp 1.	VOM indicates 2 $\pm$0.1V rms.
10a	If VOM indication is incorrect, adjust potentiometer R6 of AMP 2 for correction.	Same as Step 9.

STEP **ACTION** **VERIFICATION**

TABLE B

SHORT CIRCUIT CAPACITORS	BLOCK OPERATED RELAY	FREQUENCY Hz	ADJUST TRANS-FORMERS AND INDUCTORS
CB, CC	—	600	TA
CB, CC	ST2	697	LA
CB, CC	ST5	770	LA
CB, CC	ST8	852	LA
CB, CC	ST11	941	LA
CA, CC	—	1098	TB
CA, CC	ST1	1209	LB
CA, CC	ST6	1336	LB
CA, CC	ST3	1477	LB
CA, CC	ST4	1633	LB
CA, CB	—	1950	TC
CA, CB	ST1 & RL1	2050	LC
CA, CB	ST15	2150	LC
CA, CB	ST15 & RL15	2250	LC

11 Disconnect meters, release all operated relays, and remove short on TM relay.

E. Detector

3 Set 72A meter at 1100 Hz and turn OSC OUT control to extreme counterclockwise position.

4 At SD-99310-01—
Using the 3P17B cord, connect OSC OUT jack of meter to CA1 jack.

5 Using 1W13B cord, 651C holder, and two 639A connectors, short circuit contacts 12B and 12F of TM relay.

STEP	ACTION	VERIFICATION
6	At SD-95612-01 or SD-1C379-01— Block RT1 relay operated.	
7	At desk position— Adjust zero potentiometer.	Desk meter indicates 0 ma.
8	At 72A meter— Set meter for 1517 Hz output.	
9	At desk position— Adjust zero potentiometer.	Desk meter indicates 1 ma or 100 on the 120 scale.
10	Repeat adjustments until 0 ma and 1 ma indications are observed.	
11	Disconnect meter; remove short from TM relay.	
F. Lockout Circuits		
3	At SD-99310-01— Block L01 relay nonoperated.	
4	Block PC1 relay operated.	
5	Using 1W13B cord and two KS-6278 clips, ground terminal 58 (ST1) of terminal strip on unit.	ST1 relay operated.
6	Remove block from L01 relay.	L01 relay operated. ST1 relay released.
7	Remove ground lead from terminal 58 (ST1).	RL, ST1 relays operated momentarily. L01 relay released.
8	Repeat test (Steps 5 through 11) using data in Table C.	
9	Remove block from PC1 relay.	
G. Supervision		
1a	If at No.14 LTD— Connect primary cord to T jack associated with remote testing.	BSY lamp flashes (if nondedicated). At SD-99310-01— SL and SL1 relays momentarily operated. At SD-95612-01— RT and RT1 relays operated.
2b	If a No. 16 LTD— Operate PRI KEY	BSY lamp flashes (if nondedicated). At SD-99310-01— SL and SL1 relays momentarily operated.

STEP	ACTION	VERIFICATION
		At SD-95612-01— RT and RT1 relays operated.
3	At SD-99309-01— Momentarily operate S relay.	At SD-99310-01— S relay momentarily operated.
4	At SD-99309-01— Block S relay operated.	
5	At SD-99310-01— Operate DL relay.	At desk position— P lamp lighted.
6	At SD-99310-01— Release DL relay.	At desk position— P lamp extinguished.
7	At SD-99310-01— Operate RC relay.	At desk position— P lamp lighted.
8	At SD-99310-01— Release RC relay.	At desk position— P lamp lighted.
9	At SD-99310-01— Operate H relay.	At desk position— P lamp lighted.
10	At SD-99310-01— Release H relay.	At desk position— P lamp extinguished.
11	At SD-99310-01— Operate PR relay.	At desk position— P lamp lighted.
12	At SD-99310-01— Release PR relay.	At desk position— P lamp extinguished.
13	At SD-99309-01— Release S relay.	
14	Repeat Steps 5 through 12.	At desk position— P lamp extinguished in Steps 5 through12.
15a	If at No. 14 LTD— Remove primary cord from T jack and Momentarily operate DISC key.	
16b	If at No. 16 LTD— Momentarily operate DIS key.	

H. Dialing

1	At SD-99310-01— Connect 52-type head set equipped with 310 plug to CAL jack.	

TABLE C

LOCKOUT SEL. CIRCUIT NO.	STEP 5	STEP 6		STEP 7	
	PLACE GROUND ON TERMINAL	REMOVE BLOCK FROM RELAY	RELAY ACTION	REMOVE GROUND FROM TERMINAL	RELAY ACTION
ST2	48	L02	L02 operates. ST2 releases.	48	RL, ST2 operate momentarily. L02 releases.
ST3	38	L03	L03 operates. ST3 releases.	38	RL, ST3 operate momentarily. L03 releases.
ST4	28	L04	L04 operates. ST4 releases.	28	RL, ST4 operate momentarily. L04 releases.
ST5	18	L05	L05 operates. ST5 releases.	18	RL, ST5 operate momentarily. L05 releases.
ST6	57	L06	L06 operates. ST6 releases.	57	RL, ST6 operate momentarily. L06 releases.
ST7	47	L07	L07 operates. ST7 releases.	47	RL, ST7 operate momentarily. L07 release.
ST8	37	L08	L08 operates. ST8 releases.	37	RL, ST8 operate momentarily. L08 releases.
ST9	27	L09	L09 operates. ST9 releases.	27	RL, ST9 operate momentarily. L09 releases.
ST10	17	L010	L010 operates. ST10 releases.	17	RL, ST10 operate momentarily. L010 releases.
ST11	58	L011	L011 operates. ST11 releases.	58	RL, ST11 operate momentarily. L011 release.
ST12	48	L012	L012 operates. ST12 releases.	48	RL, ST12 operate momentarily L012 releases.
ST13	38	L013	L013 operates. ST13 releases.	38	RL, ST13 operate momentarily. L013 releases.
ST14	28	L014	L014 operates. ST14 releases.	28	RL, ST14 operate momentarily. L014 releases.
ST15	18	L015	L015 operates ST15 releases.	18	RL, ST15 operate momentarily. L015 releases.
ST16	57	L016	L016 operates. ST16 releases.	57	RL, ST16 operate momentarily. L016 releases.

Note: Lockout circuits above number 16 shall be numbered sequentially and assigned as required for additional test features desired by the telephone company.

STEP	ACTION	VERIFICATION
2	Block S relay operated.	
3a	If at No. 14 LTD— Connect primary cord into T jack associated with remote testing.	At SD-99310-01— SL and SL1 relays operated momentarily. At SD-95612-01— RT and RT1 relays operated.
4b	If at No. 16 LTD— Operate INC key associated with remote testing and operate PRI (C) key.	At SD-99310-01— SL and SL1 relays operated momentarily. At SD-1C379-01— RT and RT1 relays operated.
5	At desk position— Operate DIAL key.	P lamp lighted. At SD-99310-01— DL relay operated. Tone present at headset.
6	At desk position— Dial the number 2.	At headset— Two interruptions in tone.
7	At desk position— Release DIAL key.	Tone disappeared at headset. P lamp extinguished.
8	At SD-99310-01— Remove block from S relay.	
9a	If at No. 14 LTD— Remove primary cord from T jack and momentarily operate DISC key.	
10b	If at No. 16 LTD— Momentarily operate DIS key.	

I. Keys Operating Relays

1a	If a No. 14 LTD— Connect primary cord to T jack associated with remote testing.	BSY lamp flashes (if nondedicated). At SD-99310-01— SL and SL1 relays operated momentarily.
2b	If at No. 16 LTD— Operate INC key associated with remote testing and operate the PRI (C) key.	BSY lamp flashes (nondedicated). At SD-99310-01— SL and SL1 relays operated momentarily.
3	At desk position— Connect 52 type headset to TEL jack.	
4	At SD-99310-01— Short contacts 10 break and 10 fixed of TM relay.	
5	Short contacts 8 break and 8 fixed of TM relay.	

STEP	ACTION	VERIFICATION
6	Block TM relay operated.	
7	At desk position— Operate T key.	Multifrequency tone heard at headset.
8	Release T key.	Tone disappeared at headset.
9	Operate M key.	Multifrequency tone heard at headset.
10	Release TM relay.	Tone disappeared at headset.
11	Release M key.	
12	Remove shorts from TM relay.	
13	Operate RCCI key.	AT SD-99310-01— RC relay operated.
14	At desk position— Release RCCI key.	At SD-99310-01— RC relay released.
15	At desk position— Operate TT key.	TTB lamp lighted. At SD-99310-01— TT relay operated.
16	At desk position— Release TT key.	TTB lamp extinguished. At SD-99310-01— TT relay released.
17	At desk position— Operate PS-RLS key.	At SD-99310-01— PR relay operated.
18	At desk position— Release PS-RLS key.	At SD-99310-01— PR relay released.
19	At desk position— Momentarily operate H key.	At SD-99310-01— H relay operated. At SD-95612-01— SR1 relay operated. At desk position— H lamp flashes approximately 60 seconds and then lighted steadily.
20	At desk position— Reoperate H key. At SD-99310-01— Operate S relay .	H lamp lighted steadily.
21	At desk position— Remove headset.	

STEP	ACTION	VERIFICATION
22a	If at No. 14 LTD— Remove primary cord from T jack and momentarily operate DISC key.	
23b	If at No. 16 LTD— Operate DIS key.	
J. Plug-out Oscillator		
3	Set 72A meter at MEAS (allow 15 minutes warmup time).	
4	At SD-99309-01— Using a 2W3A cord, connect 72A meter to terminals 44 and 54 of unit terminal strip (A).	
5	Block relay PD operated.	
6	Block relays TC and D unoperated.	
7	Perform the operations outlined in Table D.	Frequency indications as listed in Table D.
8a	If frequency indications are not within ± 4 Hz of values given, adjust respective transformer and inductor listed in Table D.	Same as Step 7.
9	Remove blocks from all relays, disconnect 72A meter, and remove shorts from all capacitors.	
K. Disconnect Oscillator		
3	Set 72A meter to MEAS (allow 15 minutes warmup time).	
4	At SD-99309-01— Using a 2W3A cord, connect 72A meter to	

TABLE D

SHORT CIRCUIT CAPACITOR	NORMAL FREQUENCY (Hz)	ADJUST TRANSFORMER	FINE TONE WITH INDUCTOR
CB, CC	941	TA	LA
CA, CC	1633	TB	LB
CA, CB	2250	TC	LC

STEP	ACTION	VERIFICATION
	terminals 44 and 54 of unit terminal strip (A).	
5	Block relay D operated.	
6	Block relay TC nonoperated.	
7	Perform operations outlined in Table E.	Frequency indications as listed in Table E.
8a	If frequency indications are not with $\pm$4 Hz of values given, adjust respective transformer and inductor listed in Table E.	Same as Step 7.
9	Remove blocks from all relays, disconnect 72A meter, and remove shorts from all capacitors.	

L. Pilot Tone Timer

3	AT SD-99309-01— Block H relay operated.	50-70 seconds later P relay will operate.
4	Remove block from H relay and manually operate D relay.	P relay released.

M. Plug Out Supervision

3	At SD-99309-01— Remove all cross connections of the T and R leads going to the far end office.	
4	Release S relay.	
5	At 72A meter— Turn the HORIZ GAIN knob of 72A meter to extreme counterclockwise position and set frequency at 1017 Hz.	

TABLE E

SHORT CIRCUIT CAPACITOR	NORMAL FREQUENCY (Hz)	ADJUST TRANSFORMER	FINE TONE WITH INDUCTOR
CB1, CC1	941	TA1	LA1
CA1, CC1	1477	TB1	LB1
CA1, CB1	2250	TC1	LC1

STEP	ACTION	VERIFICATION
6	Connect VTVM across OSC OUT jack of 72A meter.	
7	At SD-99309-01— Using a 2W3A cord, connect OSC OUT jack of 72A meter to terminals 44 and 54 (T and R leads) of terminal strip (A).	
8	Block SL relay operated.	S relay operated.
9	Adjust HORIZ GAIN until VTVM indicates −34 dBm.	S relay released.
10	Adjust HORIZ GAIN until VTVM indicates −22 dBm.	S relay operated
11	Vary frequency of 72A meter from 1000 Hz to 1045 Hz.	S relay remains operated.
12	Adjust frequency of 72A meter to 980 Hz and to 1060 Hz.	S relays released at each frequency.
13	Remove all meter leads and blocks from relays.	
N. Establish Connection (Nondedicated)		
1a	If at No. 14 LTD— Insert the headset and operate the outgoing trunk key.	Lamp associated with outgoing trunk key lighted. Tone heard at headset.
2a	Dial number assigned to far-end circuit (SD-99308-01).	Ringing heard at headset. At SD-99308-01 dialed— Automatic dialer will dial back to SD-99309-01 under test. At desk position— SUPV lamp flashes at 60 ipm. At SD-99309-01— SL and TR relays operated.
3a	At desk position— Insert primary test cord into T jack associated with remote testing.	SUPV lamp extinguished. BSY lamp lighted. Voltmeter indicates 100 volts. At SD-99309-01— RT relay momentarily operated. TC, H, PD, PO, and P relays operated. TR relay released. At SD-95612-01— RT and RT1 relays operated.
4b	If at No. 16 LTD— Insert headset and operate talk trunk key.	Associated lamp of talk trunk key lighted. Dial tone heard at headset.

STEP	ACTION	VERIFICATION
5b	Dial number assigned to far-end circuit (SD-99308-01).	Ringing heard at headset. At SD-99308-01 dialed— Automatic dialer will dial back to SD-99309-01 under test. At desk position— SUPV lamp flashes at 60 ipm. At SD-99309-01— SL and TR relays operated.
6b	At desk position— Operate INC key associated with remote testing and operate PRI(C) key.	BUSY lamp lighted. INC and PRI(C) keys lighted steadily. Voltmeter indicates 100 volts.
7a	If at No. 14 LTD— Disconnect primary test cord and momentarily operate DISC key.	BSY lamp extinguished. At SD-99309-01— D, D1 relays operated momentarily. TC, H, SL, PD, PO relays released.
8b	If at No. 16 LTD— Operate DIS key associated with INC key.	BUSY lamp extinguished. At SD-99309-01— D, D1 relays operated momentarily. TC, H, SL, PD, PO, relays released.
O. Establish Connection (Dedicated)		
1a	If at No. 14 LTD— Connect primary cord into T jack.	BSY lamp lighted. At SD-99309-0— RT relay operated momentarily. TC, H, SL, PD, PO relays operated.
2b	If at No. 16 LTD— Operate outgoing test trunk key.	BY lamp lighted. At SD-99309-01— RT relay operated momentarily. TC, H, SL, PD, PO relays operated.
3a	If at No. 14 LTD— Remove primary cord from T jack and momentarily operate DISC key.	BSY lamp extinguished. At SD-99309-01— D, D1 relays operated momentarily. TC, H, SL, PD, PO relays released.
4b	If at No. 16 LTD— Operate DIS key.	BY lamp extinguished. At SD-99309-01— D, D1 relays operated momentarily. TC, H, SL, PD, PO relays released.