

**REMOTE TESTING FEATURES SD-99308-01, SD-99311-01,  
SD-97557-01, AND SD-97558-01  
NO. 14 LOCAL TEST DESK AND  
NO. 16 LOCAL TEST DESK  
FAR-END AND EXTENDED REMOTE TESTS FROM FAR-END**

<b>1. GENERAL</b>		<b>PAGE</b>
<p><b>1.01</b> 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).</p>	<p>the ability of the far-end trunk or line circuit to detect an incoming call and its ability to dial back to the originator of the call. . . . .</p>	7
<p><b>1.02</b> The section is reissued for the following reasons.</p> <ul style="list-style-type: none"> <li>● To revise title to include SD-97557-01, and SD-97558-01 extended remote test trunk control circuit and far-end test trunk for incoming remote testing, respectively.</li> <li>● To add Tests Z, AA, and AB.</li> <li>● To add Table D and reletter Table E.</li> <li>● To revise Tests B, E, H, L, S, T, and W.</li> <li>● To change title of Test W.</li> <li>● To generally update the section.</li> </ul>	<p><b>C. Operation of Dialer:</b> This test checks the ability of the dialer to release and reset after completion of dialing. . . . .</p> <p><b>D. Completion of Call Back:</b> This tests checks the ability of the far-end trunk or line circuit to complete the call back to the LTD and establish a transmission test path. . . . .</p> <p><b>E. Trouble Disconnect:</b> This test checks the disconnect feature of the far-end trunk or line circuit in the event that the initial connection is disconnected inadvertently or due to a malfunction. . . . .</p> <p><b>F. No Tone Disconnect:</b> This test checks the ability of the far-end trunk or line circuit to disconnect in the event no tone is received from the near-end to reset the timer to prevent a disconnect. . . . .</p>	9
<p>Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted. This reissue affects the Equipment Test List.</p>	<p><b>G. Disconnect:</b> This test checks the disconnecting of the far-end circuits upon completion of testing. . . . .</p> <p><b>H. Seizure by No. 14 LTD or No. 16 LTD and Register Relay Verification:</b> This test checks the ability of the far-end remote test circuit SD-99311-01 to</p>	10
<p><b>1.03</b> The following tests are covered.</p>	<p><b>A. Seizure and Automatic Answer:</b> This test checks the ability of the far-end trunk or line circuit SD-99308-01 to detect ringing upon seizure and to return an automatic answer. . . . .</p> <p><b>B. Dial Tone Detector and Dialing by 42A Dialer:</b> This test checks</p>	4
	<b>PAGE</b>	

	PAGE		PAGE
be seized by the LTD and verifies the operation of the register relays. . . . .	11	connection for foreign potential on the tip and ring conductors on a subscriber line. . . . .	19
<b>I. Establishing Test Connection to Subscriber Line With Regular Incoming Test Trunk (Non No-test) Dial Pulse Terminating Equipment:</b> This test checks the ability of the far-end remote test circuit to establish a test connection to a subscriber line with regular incoming test trunk dial pulse terminating equipment. . . . .	15	<b>O. Testing for Line Capacity on an Established Connection:</b> This test checks the ability of the far-end remote test circuit to test on an established connection for line capacity on a subscriber line. . . . .	19
<b>J. Establishing Test Connection to Subscriber Line With Regular Incoming Test Trunk (Non No-test) MF Terminating Equipment:</b> This test checks the ability of the far-end remote test circuit to establish a test connection to a subscriber line with regular incoming test trunk multifrequency (MF) terminating equipment. . . . .	16	<b>P. Testing Subscriber Line Relay on an Established Connection:</b> This test checks the ability of the far-end remote test circuit to test subscriber line relay on an established connection. . . . .	20
<b>K. Establishing Test Connection to Subscriber Line With MDF Test Trunk:</b> This test checks the ability of the far-end remote test circuit to establish a test connection to a subscriber line with main distributing frame (MDF) test trunk. . . . .	16	<b>Q. Testing Subscriber Line With Relay-Type Subsets on an Established Connection:</b> This test checks the ability of the far-end remote test circuit to test subscriber line with relay-type subsets on an established connection. . . . .	20
<b>L. Establishing Test Connection to Subscriber Line With Test Trunk and Selector Circuit:</b> This test checks the ability of the far-end remote test circuit to establish a test connection to a subscriber line with test trunk and selector circuit. . . . .	17	<b>R. Testing Subscriber Line With Tube-Type Subsets on an Established Connection:</b> This test checks the ability of the far-end remote test circuit to test subscriber line with tube-type subsets on an established connection. . . . .	22
<b>M. Testing for Short-Circuited and Grounded Conductors on an Established Connection:</b> This test checks the ability of the far-end remote test circuit to test on an established connection for short-circuited or grounded conductors on a subscriber line. . . . .	18	<b>S. Testing Ringing Control on an Established Connection:</b> This test checks the ability of the far-end remote test circuit to apply superimposed ringing current to a subscriber line on an established connection. . . . .	28
<b>N. Testing for Foreign Potential on Tip and Ring Conductors on an Established Connection:</b> This test checks the ability of the far-end remote test circuit to test on an established		<b>T. Timing:</b> This test checks the ability of the far-end remote test circuit to receive order codes produced from dialing. The test also gives procedures for adjustments. . . . .	28
		<b>U. Hybrid Amplifier:</b> This test checks the output of the hybrid amplifier and provides procedures for adjustment. . . . .	29
		<b>V. Current Control and Supervisory Oscillator:</b> This test checks the	

	PAGE	
output of the current control and supervisory oscillator and provides procedures for adjustment. . . . .	30	prevents release of the test connection if the test cord is removed from the jack, and a disconnect signal are transmitted to the remote office.
<b>W. Monitoring Amplifier and 2-Way Amplifier Adjustment:</b> This test checks the output of the monitoring amplifier and 2-way amplifier and provides procedures for adjustment. . . . .	31	<b>1.06</b> At the remote office, dc currents, which are 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.
<b>X. AMP Amplifier and SO Oscillator:</b> This test checks the output of the AMP amplifier and the SO oscillator and provides procedures for adjustment. . . . .	32	<b>1.07</b> In the dedicated mode, the test path is hard-wired and is continuous from the test desk jack or key to the far-end remote testing circuit SD-99311-01.
<b>Y. Coin Relays:</b> This test checks the ability of the far-end remote test circuit to check coin relays. . . . .	35	<b>1.08</b> In the non-dedicated 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 the use of the far-end test trunk or line circuit SD-99308-01. 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 test trunk or line circuit SD-99309-01 in the test desk location 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.
<b>Z. Extended Remote Testing (Option ZQ):</b> This test checks the ability of the far-end remote test circuit SD-99311-01 to control up to 10 extended remote testing circuits. . . . .	38	<b>1.09</b> Descriptive information and operational procedures using remote testing features at the No. 14 LTD and at the No. 16 LTD are in the 662 division.
<b>AA. Night Test Coverage (Option M):</b> This test checks that a test center can control the transfer of far-end remote testing facilities to a centralized night test center. . . . .		<b>1.10 Lettered Steps:</b> A letter, a, b, c, etc., added to a step number in Part 3 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 a series
<b>AB. Incoming Remote Test Call (Option N):</b> This test checks that a field craftsman or frameman associated with a far-end remote testing office can direct an assistance call to the local test desk via the remote testing facilities. . . . .		
<b>1.04</b> The procedures are all performed at the remote testing circuit frame, except for tests AA and AB.		
<b>1.05</b> 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		

**SECTION 201-828-501**

of lettered 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. The testing equipment should be known to be correctly calibrated.

- 2.02** J64072A (72A) frequency meter (Section 103-425-100).
- 2.03** J94738A remote testing test set (Section 801-205-172).
- 2.04** J24753A timing test set (Section 100-130-501).
- 2.05** 8-Digit dial pulse receiving test set.
- 2.06** 509 receiver, 15D headband, two 360A tools, and a 518B tool, assembled together with a W2CJ cord (67C test set).
- 2.07** Model 400D Hewlett Packard vacuum tube volt meter (VTVM) (Section 100-526-101).
- 2.08** KS-14510 L1 volt-ohm-milliammeter (VOM) (Section 100-520-101).

- 2.09** 1014A handset.
- 2.10** Patching cord, P3N, 6 feet long, equipped with one 241A plug and one 310 plug (3P17B cord).
- 2.11** Patching cord, P2B, 6 feet long, equipped with two 310 plugs (2P4C cord).
- 2.12** Testing cord, 893, 6 feet long, equipped with two 360A tools (1W13B cord).
- 2.13** Testing cord, W3M cord, 6 feet long, equipped with one 310 plug, one 360A tool, one 360B tool, and one 360C tool (3W4A cord).
- 2.14** 310 plug.
- 2.15** 258-type plug, dummy plug.
- 2.16** 600-ohm resistor.
- 2.17** 900-ohm resistor.
- 2.18** 651 relay contact connector holder.
- 2.19** 639A relay contact connector.
- 2.20** KS-6278 connecting clip.
- 2.21** 411C tool.
- 2.22** 624B tool.
- 2.23** Blocking and insulating tools as required. Use tools and apply as covered in Section 096-020-801.

**3. METHOD**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
-------------	---------------	---------------------

**A. Seizure and Automatic Answer**

- |    |   |   |
|----|---|---|
| 1  | At SD-99308-01—<br>Insulate 12M of SD relay.                                    |   |
| 2  | Block TM1 and DT relays nonoperated.  |   |
| 3a | If tip lead is used—<br>Momentarily apply -48 volts to L terminal of RTT relay. | RTT relay locked operated.<br>CH and TR2 relays operated. |

TABLE A

APPARATUS	TESTS																													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB		
72A Meter (2.02)													1	1						1			1	1						
Remote Testing Test Set (2.03)								1													1						1			
Timing Test Set (2.04)																					1									
8-Digit Dial Pulse Receiving Test Set (2.05)		1																										1	1	
67C Test Set (2.06)			1															1										1		
400-Type VTVM (2.07)								1													1	1		1	1		1			
KS-14510 VOM (2.08)	1					1												1	1	1			1			1	1			
Handset (2.09)								1			1					1				1	1						1			
3P17B Cord (2.10)													1	1									1	1						
2P4C Cord (2.11)								1													1						1			
1W13B Cord (2.12)	1			1									1	1							1									
3W4A Cord (2.13)		2						1													1						1	1	2	
310 Plug (2.14)																														
258-Type Plug (2.15)								1				1	1	1	1	1						2	1							
600-Ohm Resistor (2.16)																						1								
900-Ohm Resistor (2.17)																						1		1	1					
651 Relay Contact Connector Holder (2.18)			1																			1	1							
639A Relay Contact Connector (2.19)			2																			1								
KS-6278 Clip (2.20)	1	1		1											1							1								
411C Tool (2.21)	1	1		1											1															
624B Tool (2.22)		4						1														2						2	2	4
Blocking and Insulating Tools (2.23)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	

STEP	ACTION	VERIFICATION
4b	If ring lead is used— Momentarily apply -48 volts to L terminal of RTR relay.	RTR relay locked operated. CH and TR1 relays operated.
5	Remove block and operate TM1 relay.	All relays released. Circuit returned to normal.
6	Block TM1 relay nonoperated.	
7	Remove block from DT relay.	
8a	If tip lead is used— Momentarily apply -48 volts to L terminal of RTT relay.	RTT, CH, and TR2 relays operated. Approximately 6 seconds later— DT and SD relays operated. At SD-99311-01— Approximately 6 seconds later— E and ON relays operated. After dialing is completed— All relays except CH relay released.
9b	If ring lead is used— Momentarily apply -48 volts to L terminal of RTR relay.	RTR, CH, and TR1 relays operated. Approximately 6 seconds later— DT and SD relays operated. At SD-99311-01— Approximately 6 seconds later— E and ON relays operated.
10	Connect KS-14510 L1 VOM to terminals 17 and 46 at terminal strip (A).	At VOM— -48 volt indication.
11	Remove insulation from 12 make of SD relay, block from TM1 relay, and VOM connections.	
12	If CH relay does not release— Momentarily operate TM1 relay.	Circuit returned to normal.

#### B. Dial Tone Detector and Dialing by 42A Dialer

(When dial digit pulse receiver test set is not provided)

1	Request LTD operator to receive call and make observation.	
2	At SD-99308-01— Block TM1 relay nonoperated.	
3a	If tip lead is used— Momentarily apply -48 volts to L terminal of RTT relay.	When at No. 14 LTD— SUPV lamp associated with incoming remote test trunk flashes at 60 ipm. When at No. 16 LTD— SP lamp associated with incoming remote testing trunk flashes at 60 ipm.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
4b	If ring lead is used— Momentarily apply -48 volts to L terminal of RTR relay.	When at No. 14 LTD— SUPV lamp associated with incoming remote testing trunk flashes at 60 ipm. When at No. 16 LTD— SUPV lamp associated with incoming remote testing trunk flashes at 60 ipm.
5	At LTD— Operate DISC key.	
6	At SD-99308-01— Remove block from TM1 relay.	Circuit returned to normal.
<b>(When dial digit pulse receiver test set is provided)</b>		
7	Notify tester not to use dialer.	
8	Using 3W4A cord equipped with two 624B tools on white and black leads— At SD-99308-01— Connect 624B tools to 6M and 12M of SD relay.	
9	Connect other end of 3W4A cord to PLS IN jack of dial digit pulse receiver test set.	
10	Using another 3W4A cord— Connect -48 volts (white) and ground (red) to the B/G jack on test set.	
11	Turn test set on.	
12	Operate TR ACT-OFF-TR SIM switch to TR SIM.	
13	Operate 7 DIGIT-8 DIGIT switch to appropriate position.	
14	Depress RESET button.	All registers on test set indicated "O."
15a	If tip lead is used— At SD-99308-01— Momentarily apply -48 volts to L terminal of RTT relay.	42A dialer in SD-99308-01 starts dialing the number assigned to No. 14 or No. 16 LTD.
16b	If ring lead is used— At SD-99308-01— Momentarily apply -48 volts to L terminal of RTR relay.	42A dialer in SD-99308-01 starts dialing the number assigned to No. 14 or No. 16 LTD.
17	After completion of dialing— Compare number displayed on dial digit pulse	Number recorded on dial digit pulse receiving test set is identical number assigned to No.

STEP	ACTION	VERIFICATION
	receiver test set with the number assigned to No. 14 or No. 16 LTD.	14 or No. 16 LTD.
18	Disconnect test set.	
<b>C. Operation of Dialer</b>		
1	Request operator receive call and make observation.	
2	At SD-99308-01— Block TM1 relay nonoperated.	
3	Using a 651 relay contact connector holder and two 639A relay contact connectors, connect the 67C test set to 6 make and 12 make of SD relay.	
4	Operate RTT relay.	Dial pulses heard at test set for approximately 60 seconds.
5	Release RTT relay.	
6	Operate RTR relay.	Dial pulses heard at test set for approximately 60 seconds.
7	Release RTR relay.	
8	Remove block and operate TM1 relay.	
9	Remove all test equipment.	Circuit returned to normal.
<b>D. Completion of Call Back</b>		
1	At SD-99308-01— Block TM1 relay nonoperated.	
2	At SD-99311-01— Momentarily operate ON relay.	ON relay locked operated.
3	At SD-99308-01— Momentarily operate ANS relay.	ANS relay locked operated.
4	Request LTD operator call this test trunk.	Neither RTT nor RTR relay operates. Busy tone heard by operator.
5	At SD-99311-01— Momentarily operate DIS relay.	Circuit returned to normal.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
<b>E. Trouble Disconnect</b>		
1	At SD-99308-01— Block SD relay nonoperated.	
2	At SD-99311-01— Momentarily operate ON relay.	ON relay locked operated.
3	At SD-99308-01— Operate RTT relay.	RTT relay locked operated. Approximately 100 seconds after dialing completed— RTT relay released. At SD-99311-01— ON relay released.
4	At SD-99311-01— Momentarily operate ON relay.	ON relay locked operated.
5	At SD-99308-01— Operate RTR relay.	RTR relay locked operated. Approximately 100 seconds after dialing completed— RTR relay released. At SD-99311-01— ON relay released.
6	At SD-99308-01— Remove block from SD relay.	
7	Block NC1 relay operated.	In approximately 8 seconds— TM1 relay operated.
8	Remove block from NC1 relay.	
<b>F. No Tone Disconnect</b>		
1	At SD-99308-01— Insulate 12M of SD relay.	
2	At SD-99311-01— Momentarily operate ON relay.	ON relay locked operated.
3	At SD-99308-01— Operate ANS relay.	ANS relay locked operated.
4	Block RST relay operated.	
5	Connect VOM to 2L of TM1 relay and ground.	VOM indicates approximately 500 ohms.
6	Remove insulation from 12M of SD relay and remove block from RST relay.	
7	Momentarily operate DIS relay.	Circuits returned to normal.

STEP	ACTION	VERIFICATION
<b>G. Disconnect</b>		
1	At SD-99308-01— Insulate 12M of SD relay.	
2	At SD-99311-01— Momentarily operate ON relay.	ON relay locked operated.
3	At SD-99308-01— Block TM1 relay nonoperated.	
4	Operate DIS relay.	At SD-99311-01— ON relay released.
5	Remove insulator from 12M of SD relay and remove block from TM1 relay.	Circuit returned to normal.
<b>H. Seizure by No. 14 LTD or No. 16 LTD and Register Relay Verification</b>		
1	At SD-99308-01— Insulate 12M of SD relay.	
2	At SD-99311-01— Block DIS relay nonoperated.	
3	At SD-99308-01— Operate RTT or RTR relay.	TR2 or TR1 and CH relays operated. Approximately 6 seconds later— SD and DT relays operate. At SD-99311-01— E relay operated. ON relay operated. After dialing is completed— E relay released. Ground present at terminal 46. -48 volts present at terminal 17.
<b>Register Relay Verification</b>		
4	At remote testing signal generator test set— Connect OUT jack of test set to HYL jack of SD-99311-01 using 2P4C cord.	
5	Using 3W4A cord equipped with two 624B tools— Connect -48 volts and ground to B/G jack.	
6	Connect VTVM to OUT T and OUT R binding posts on remote testing signal generator test set.	

**SECTION 201-828-501**

STEP	ACTION	VERIFICATION
7	At remote testing signal generator test set— Set switch A to 1, switch B and switch C to OFF.	
8	Operate OUT switch to STDY position.	
9	Adjust LEV potentiometer on test set to obtain -20 dBm on VTVM.	
10	Operate OUT switch to OFF position.	
11	Disconnect VTVM from OUT T and OUT R binding posts on remote testing signal generator test set.	
12	At SD-99311-01— Momentarily operate E relay.	ON relay locked operated.
13	At remote testing signal generator test set— Set switch A and B to 5, and switch C to 3.	
14	Operate OUT switch to PULSE position.	At SD-99311-01— ON1 and ON2 relays locked operated.
15	Insert 258-type plug into TJ1 jack.	
	<i>Note:</i> Perform Steps 16 and 17 simultaneously.	
16	At remote testing signal generator test set— Set A, B, and C switches on test set to corresponding position numbers given in Table B under OPERATE CODE column.	Relays corresponding to setting in Table B operated.
17	Change switch C to corresponding position numbers under RESTORE CODE in Table C; reoperate OUT switch to PULSE position to send restore order.	Corresponding register release relay listed in Table C released.
18	Restore OUT switch to OFF position when all relays have been verified.	
19	Remove 258-type plug from TJ1 jack.	
20	At SD-99311-01— Block DIS relay nonoperated.	
21	Remove block from DIS relay and momentarily operate it.	Circuit returned to normal.
22	Remove blocks from all relays and remove all test equipment.	

TABLE B

R TERMINAL AND LEAD NO.	OPERATE CODE			REG. RELAY	ADDITIONAL RELAYS THAT OPERATE WITH REG. RELAY	CTD KEYS
	A-	B-	C-			
1	A1	B1	C1			
2	A1	B2	C1			
3	A1	B3	C1	TD	D	TD
4	A1	B4	C1			
5	A1	B5	C1	TS DP	DP1, DS1, DL, DL1 GT, GT1, NP CT (SD-97558-01)	TTS DIAL
6	A2	B1	C1	CT		CT
7	A2	B2	C1	RG		RG
8	A2	B3	C1	ROH	ROHD, SO, ROH2	H
9	A2	B4	C1	F		FEMF
10	A2	B5	C1	MA		24MA
11	A3	B1	C1	60V		60V
12	A3	B2	C1	MDF		MDF
13	A3	B3	C1	IN	NP	IN
14	A3	B4	C1			
15	A3	B5	C1	VR		VM REV
16	A4	B1	C1	-T	TRG, RC	-T
17	A4	B2	C1	-R	RC	-R
18	A4	B3	C1			
19	A4	B4	C1			
20	A4	B5	C1	G		G
21	A5	B1	C1	M	TKM	M
22	A5	B2	C1	RVM	RV	REV
23	A5	B3	C1	3WO		3WO
24	A5	B4	C1	KP	TKM, SO	KP
25	A5	B5	C1	TK	TKM	
51	A1	B1	C3	NT		NT
52	A1	B2	C3	TT		TT
53	A1	B3	C3	SRT		SRT
54	A1	B4	C3	+T	RC, TRG	+T
55	A1	B5	C3	+R	RC	+R
56	A2	B1	C3			
57	A2	B2	C3	CC	CN	CC
58	A2	B3	C3	CR	CN	CR
59	A2	B4	C3	+STA	STA	+STA
60	A2	B5	C3	-STA	STA	-STA
61	A3	B1	C3			
62	A3	B2	C3			
63	A3	B3	C3			
64	A3	B4	C3			
65	A3	B5	C3	TF		NC
66	A4	B1	C3			
67	A4	B2	C3	REX	REXS	
68	A4	B3	C3			
69	A4	B4	C3			
70	A4	B5	C3	ERT		ERT
71	A5	B1	C3			
72	A5	B2	C3	RCCI		RCCI
73	A5	B3	C3	PR		PSRLS
74	A5	B4	C3	LRP		LRP
75	A5	B5	C3	ANS/ST		

TABLE C

R TERMINAL AND LEAD NO.	RESTORE CODE			REG. RELAY	ADDITIONAL RELAYS THAT OPERATE WITH REG. RELAY	LTD KEY
	A-	B-	C-			
26	A1	B1	C2			
27	A1	B2	C2	TDR		TD
28	A1	B3	C2			
29	A1	B4	C2	TSR	D	TTS
30	A1	B5	C2			
31	A2	B1	C2	CTR		CT
32	A2	B2	C2	RGR		RG
33	A2	B3	C2	ROHR		H
34	A2	B4	C2	FR		FEMF
35	A2	B5	C2	MAR		24MA
36	A3	B1	C2	60R		60V
37	A3	B2	C2	MDFR		MDFR
38	A3	B3	C2	INR		IN
39	A3	B4	C2			
40	A3	B5	C2	VRR		VM REV
41	A4	B1	C2	-TR, -RR		-T
42	A4	B2	C2	-RR		-R
43	A4	B3	C2			
44	A4	B4	C2	GR		G
45	A4	B5	C2			
46	A5	B1	C2	MR		M
47	A5	B2	C2	RVMR	RVR	REV
48	A5	B3	C2	3WOR		3WO
49	A5	B4	C2	KPR		KP
50	A5	B5	C2	TKR		T
76	A1	B1	C4	NTR	D	NT
77	A1	B2	C4	TTR		TT
78	A1	B3	C4	SRTR		SSRT
79	A1	B4	C4	+TR, -RR		+T
80	A1	B5	C4	+RR, -RR		+R
81	A2	B1	C4			
82	A2	B2	C4	CCR		CC
83	A2	B3	C4	CRR		CR
84	A2	B4	C4	+STAR		+STA
85	A2	B5	C4	-STAR		-STA
86	A3	B1	C4			
87	A3	B2	C4			
88	A3	B3	C4			
89	A3	B4	C4	TFR		NC
90	A3	B5	C4			
91	A4	B1	C4	REXR		
92	A4	B2	C4			
93	A4	B3	C4			
94	A4	B4	C4	ERTR		ERT
95	A4	B5	C4			
96	A5	B1	C4	RCCIR, RCRM		RCCI
97	A5	B2	C4	PRR		PS RLS
98	A5	B3	C4	LRPR		LRP
99	A5	B4	C4	DIS	D	DIS
100	A5	B5	C4	STR		

STEP	ACTION	VERIFICATION
<b>I. Establishing Test Connection to Subscriber Line With Regular Incoming Test Trunk (Non No-test) Dial Pulse Terminating Equipment</b>		
1	Block TM1 relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
	<i>Note:</i> In a No. 1 crossbar office the subscriber line to be tested may be in the extra number series. In such a case, before the DP relay is operated, the RV relay must be operated.	
3a	At SD-99311-01— If subscriber line is in extra number series— Operate RV relay.	
4	Block operated DP relay.	When in a No. 1 crossbar office— XN relay operated. When in any office— DP1 relay operated. DL, NP, DS, DS1, and DL1 relays operated. SO relay momentarily operated.
<b>Dialing</b>		
5	Connect 1014A handset between 1L of DP relay and ground.	
6	Dial a number on the handset.	DP, DP1, and LP relays follow dial pulsing.
<b>End of Dialing</b>		
7	Dialing is completed.	DL, DL1, DS, DS1, DP, DP1, and LP relays released.
8	Release DP relay and RV relay (if operated).	DP1 relay released. XN relay released (if provided). DL1 relay released.
9	Remove block from TM1 relay.	
<b>Disconnect</b>		
10	Momentarily operate DIS relay.	ON relay released. ON1 relay released. ON2 relay released. D relay momentarily operated. Circuit returned to normal.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
<b>J. Establishing Test Connection to Subscriber Line With Regular Incoming Test Trunk (Non No-Test) MF Terminating Equipment</b>		
1	Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
	<i>Note:</i> In a No. 1 crossbar office the subscriber line to be tested may be in the extra number series. In such a case, before the DP relay is operated, the RV relay must be operated.	
3	Operate RV relay (if applicable).	
4	Operate KP relay.	SO relay momentarily operated. KP1 and TKM relays operated. XN relay operated.
5	Operate RVR relay.	RV relay released. XN relay released.
6	Operate KPR relay.	KP relay released. KP1 relay released. TKM relay released.
7	Remove block and momentarily operate DIS relay.	Circuit returned to normal.
<b>K. Establishing Test Connection to Subscriber Line With MDF Test Trunk</b>		
1	Block DIS relay nonoperated.	
2	Momentarily operate E and ST relay.	ON, ON1, and ON2 relays locked operated.
3	Operate MDF relay.	
4	Connect a patch cord between the MDF test trunk jack (associated with this remote testing circuit) and line conductors to be tested.	
5	Operate IN relay.	NP relay operated.
6	Momentarily operate INR relay.	IN relay released. NP relay released.
7	Operate 3WO relay.	3WO relay locked operated.
8	Momentarily operate 3WOR relay.	3WO relay released.
9	Momentarily operate MDFR relay.	MDF relay released.

STEP	ACTION	VERIFICATION
10	Remove block and operate DIS relay.	Circuit returned to normal.
<b>L. Establishing Test Connection to Subscriber Line With Test Trunk and Selector Circuit</b>		
1	At SD-99311-01— Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
3	Insert 258-type plug into HYL jack.	
4	Momentarily operate TK and TS relays.	TK and TS relays locked operated.
5	Block SO relay operated.	
6	Connect 1014A handset to TJ1 jack.	Supervisory tone (1017Hz) heard in handset.
7	Remove 1014A handset from TJ1 jack.	
8	Remove block from S0 relay.	
9	Momentarily operate TSR relay.	TK and TS relays released. D relay momentarily operated.
10	Remove 258-type plug from HYL jack.	
11	Remove block from DIS relay.	
12	Operate DIS relay.	Circuit returned to normal.
<b>M. Testing for Short-Circuited and Grounded Conductors on an Established Connection</b>		
1	At SD-99311-01— Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
3	Using 3P17B cord, connect 600 input of 72A meter to HYL jack and set meter to MEASURE.	
4	Insert 258-type plug into TJ1 jack.	
5	Apply ground to terminal 2 of TJ1 jack.	At 72A meter— Indication of approximately 1517 Hz.
6	At SD-99311-01— Operate RV relay.	At 72A meter— Indication of approximately 1100 Hz.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
7	At SD-99311-01— Apply short across terminals 2 and 4 of TJ1 jack.	At 72A meter— Indication of approximately 1517 Hz.
8	At SD-99311-01— Operate RVR relay.	RV relay released.
9	Remove short from terminals 2 and 4 of TJ1 jack.	
10	Remove ground from terminal 2 of TJ1 jack.	
11	Remove test equipment.	
12	Remove block and momentarily operate DIS relay.	Circuit returned to normal.
 <b>N. Testing for Foreign Potential on Tip and Ring Conductors on an Established Connection</b>		
1	At SD-99311-01— Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
3	Using 3P17B cord, connect 600 INPUT of 72A meter to HYL jack and set meter to MEASURE.	
4	Insert 258-type plug into TJ1 jack.	
5	Operate F relay.	
6	Apply -48 volts to terminal 2 of TJ1 jack.	At 72A meter— Indication greater than 1100 Hz observed.
7	At SD-99311-01— Remove -48 volts and apply +20 volts to terminal 2 of TJ1 jack.	At 72A meter— Indication less than 1100 Hz observed.
8	At SD-99311-01— Operate VR relay.	At 72A meter— Indication greater than 1100 Hz observed.
9	At SD-99311-01— Remove +20 volts from terminal 2 of TJ1 jack.	
10	Operate VRR relay.	VR relay released.
11	Operate FR relay.	F relay released.

STEP	ACTION	VERIFICATION
12	Disconnect 72A meter, remove test equipment, remove block, and momentarily operate DIS relay.	Circuit returned to normal.
<b>O. Testing for Line Capacity on an Established Connection</b>		
1	Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
3	Insert 258-type plug into TJ1 jack.	
4	Operate G relay.	Ground present at terminal 4 of TJ1 jack.
5	Operate GR relay.	G relay released.
6a	If remote test circuit is using non-dedicated facilities— Operate RCCI relay.	-48 volts present on terminal 2 of TJ1 jack. -48 volts present at terminal 8 of CCO oscillator.
7a	Operate TKM relay.	Ground through approximately 200 ohms resistance present at terminal 4 of TJ1 jack.
8b	If range extension for unigauge in No. 5 crossbar office or No. 2 ESS office is used— Operate RCCI and REX relays.	-72 volts present on terminal 2 of TJ1 jack. -72 volts present at terminal 8 of CCO oscillator.
9b	Operate TKM relay.	Ground present at terminal 4 of TJ1 jack.
10b	Operate RCCIR relay.	RCCI relay released.
11b	Operate REXR relay.	REX relay released.
12	Remove 258-type plug, remove block, and momentarily operate DIS relay.	Circuit returned to normal.
<b>P. Testing Subscriber Line Relay on an Established Connection</b>		
1	Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
<b>Noncoin or Dial-Tone-First Subset</b>		
3	Operate TK relay.	TK relay locked operated. TKM relay operated.
4	Connect 1014A handset to HYL jack.	No tone at handset.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
5	Operate TKR relay.	TK and TKM relays released. Tone present at handset.
<b>Coin Prepay Subset</b>		
6	Operate 3WO relay.	3WO relay locked operated.
7	Operate LRP relay.	LRP relay locked operated.
8	Insert 258-type plug into TJ1 jack.	Observe 1500 ohms resistance ground at terminal 4 of TJ1 jack.
9	Operate LRPR, TKR, and 3WOR relays.	LRP, TK, and 3WO relays released.
10	Remove test equipment, remove block, and momentarily operate DIS relay.	Circuit returned to normal.

**Q. Testing Subscriber Lines With Relay-Type Subsets on an Established Connection**

1	Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	ON, ON1, and ON2 relays locked operated.
3	Connect 67C test set across terminals 2 and 4 of TJ1 jack.	
4	Operate SRT relay.	Ring heard at headset.
5	Connect VOM to terminal 7 of CCO oscillator and ground.	
6	Operate MA relay.	20 volts indicated on VOM.
7	Disconnect VOM from CCO and ground and connect across terminal 8 of CCO oscillator and terminal 2 of TJ1 jack.	Approximately 935 ohms indicated at VOM.
8	Momentarily operate SRTR relay.	SRT relay released.
9	Momentarily operate MAR relay.	MA relay released.
10	Remove test equipment, remove block, and momentarily operate DIS relay.	Circuit returned to normal.

**R. Testing Subscriber Line With Tube-Type Subsets on an Established Connection**

1	Block DIS relay nonoperated.	
2	Momentarily operate E and ST relays.	

STEP	ACTION	VERIFICATION
3a	If test is performed on tip side of line— Operate RV relay.	RV relay locked operated.
4	Operate +STA relay.	+STA relay locked operated. STA relay operated.
5	Set VOM selector for 300 DC volts and connect to terminal 2 of TJ1 jack and ground.	VOM indicates +116 volts.
6	Disconnect VOM from ground.	
7	Remove 116V fuse.	
8	Set VOM selector to OHMS X 1000 and connect to terminal 34 of terminal strip E on unit and terminal 2 of TJ1 jack.	VOM indicates approximately 8000 ohms.
9	Disconnect VOM from terminal strip.	
10	Remount the 116V fuse.	
11	Operate +STAR relay.	+STA relay released. STA relay released.
12	Operate –STA relay.	–STA relay locked operated. STA relay operated.
13	Set VOM selector for 300 VOLTS DC and connect to terminal 2 of TJ1 jack and ground.	VOM indicates –116 volts.
14	Disconnect VOM from ground.	
15	Remove 116V fuse.	
16	Set VOM selector to OHMS X 1000 and connect to terminal 24 of terminal strip E on unit and terminal 2 of TJ1 jack.	VOM indicates approximately 8000 ohms.
17	Disconnect VOM from terminal strip.	
18	Remount the 116V fuse.	
19	Operate –STAR relay.	–STA relay released. STA relay released.
<b>Testing Tip Side of Line</b>		
20a	If test is performed on tip side of line— Operate RVR relay.	RV relay released.
21	Remove block and momentarily operate DIS relay.	Circuit returned to normal.

SECTION 201-828-501

- | STEP   | ACTION  | VERIFICATION                             |
|--|---|--|
| <b>5. Testing Ringing Control on an Established Connection</b> |   |  |
| 1  | At SD-99311-01—<br>Block DIS relay nonoperated.   |  |
| 2  | Momentarily operate E and ST relays.  | ON, ON1, and ON2 relays locked operated. |
| 3  | Using 1014A handset with TALK MON switch to TALK and ON OFF switch to OFF—<br>Connect handset across terminals 2 and 4 of TJ1 jack. |  |
| 4  | Perform tests in Table D.   |  |

**Note:** Offices with semi-selective ringing will have -T and -R ringing only.

TABLE D

1	2	3	4	5	6	7
MOMENTARILY OPERATE RELAY	OBSERVE RELAYS - LOCK OPERATED	LISTEN FOR RINGING ON TJ1 JACK	(*) OBSERVE THE VOLTAGE IN COLUMN 3 IS	TURN HAND SET CORD SWITCH	OBSERVE RELAYS RELEASE	TURN HAND SET CORD SWITCH
+T	+T, TRG, RC	TERMINAL 4	+	ON	+T, TRG, RC	OFF
-T	-T, TRG, RC	TERMINAL 4	-	ON	-T, TRG, RC	OFF
+R	+R, RC	TERMINAL 2	+	ON	+R, RC	OFF
-R	-R, RC	TERMINAL 2	-	ON	-R, RC	OFF

(\*) The needle of the voltmeter may vibrate due to the ringing supply. The average value of the voltage is approximately 48 volts. Don't let the meter vibrate very long.

- |    |   |  |
|----|---|--|
| 5a | If testing No. 5 Crossbar with unigauge—<br>At SD-99311-01—<br>Block operated LL relay.   |  |
| 6a | Momentarily operate -R relay.   | -R and RC relays locked operated.                                    |
| 7a | Using KS-14510 VOM—<br>Observe a voltage on terminal 2 of TJ1 jack which oscillates with an average value of approximately -72 volts. | VOM indicates an average value of approximately -72 volts.           |
| 8a | Operate handset cord switch ON.   | TP and TB relays momentarily operated.<br>-R and RC relays released. |

STEP	ACTION	VERIFICATION
9a	Operate handset cord switch OFF.	
10a	Remove block from LL relay.	
11a	Momentarily operate REX relay.	REX and REXS relays locked operated.
12a	Momentarily operate -T relay.	-T, RC, and TRG relays locked operated.
13a	Using KS-14510 VOM— Observe a voltage on terminal 4 of TJ1 jack which oscillates with an average value of approximately -72 volts.	VOM indicates an average value of approximately -72 volts.
14a	Operate handset cord switch ON.	TP relay momentarily operated. -T, RC, and TRG relays released.
15a	Momentarily operate REXR relay.	REX, and REXS relays released.
16a	Operate handset cord switch OFF.	
17b	If testing No. 2 ESS with unigauge— At SD-99311-01— Block operated LL relay.	LL1 and RT relays locked operated.
18b	Momentarily operate -R relay.	-R and RC relays locked operated.
19b	Using KS-14510 VOM— Observe a voltage on terminal 2 of TJ1 jack which oscillates with an average value of approximately -72 volts.	VOM indicates an average value of approximately -72 volts.
20b	Operate handset cord switch ON.	TP and TB relays momentarily operated. RT, -R, and RC relays released.
21b	Remove block from LL relay.	
22b	Operate handset cord switch OFF.	LL1 relay released.
23b	Momentarily operate REX relay.	REX, REXS, REX1, and RT relays locked operated.
24b	Momentarily operate -T relay.	-T, RC, and TRG relays locked operated.
25b	Using KS-14510 VOM— Observe a voltage on terminal 4 of TJ1 jack which oscillates with an average value of approximately -72 volts.	VOM indicates an average value of approximately -72 volts.
26b	Operate handset cord switch ON.	TB relay momentarily operated. RT, -T, RC, and TRG relays released.
27b	Momentarily operate REXR relay.	REX, REXS, and REX1 relays released.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
28b	Operate handset cord switch OFF.	
29c	If N option is provided— Block TB relay operated.	
30	Connect 72A frequency meter 600 input to T and R conductors of HYL jack.	72A frequency meter measures approximately 970 CPS.
31	Operate handset cord switch ON.	
32	Operate MON TALK switch of handset to TALK.	
33	At SD-99311-01— Momentarily operate RG relay.	
34	Operate +T relay.	Ringling present in handset.
35	Momentarily operate RGR relay.	Ringling absent in handset.
36	Disconnect handset from TJ1 jack and 72A meter from HYL jack.	

**T. Timing**

- 1 At remote testing signal generator test set—  
Connect OUT jack of test set to HYL jack  
of SD-99311-01 using 2P4C cord.
- 2 Using 3W4A cord equipped with two 624B  
tools—  
Connect -48 volts and ground to B/G jack.
- 3 Connect VTVM to OUT T and OUT R binding  
posts on remote testing signal generator test  
set.
- 4 At remote testing signal generator test set—  
Set switch A to 1, switch B and switch C to  
OFF.
- 5 Operate OUT switch to STDY position.
- 6 Adjust LEV potentiometer on test set to  
obtain -20 dBm on VTVM.
- 7 Operate OUT switch to OFF position.
- 8 Disconnect VTVM from OUT T and OUT R  
binding posts on remote testing signal generator  
test set.

STEP	ACTION	VERIFICATION
9	At SD-99311-01— Block DIS relay nonoperated.	
10	Momentarily operate E relay.	ON relay locked operated.
11	At SD-99311-01— Adjust ADJ potentiometer for -34 volts at -34V test point using VOM.	-34 volts present at -34V test point.
<b>Dialing</b>		
12	Connect -48 volts and ground to 48V jack of timing test set.	
13	At timing test set— Operate BAT key.	
14	Set MCF switch at NOR, REC switch at OC-GRD, MIL SEC switch at 0-500.	
15	Adjust ADJ-0 knob for zero indication on test set meter.	
16	Hold TST key operated to CAL and adjust CAL knob for 50 division indication on test set meter.	
17	Connect 1014A handset to DIAL jack of remote testing test set.	
18	Operate MON-TALK switch to TALK.	
19	At SD-99311-01— Using a 651D relay contact connector holder, 639A contact connector, KS-6278 connecting clip, and a 1W13B cord, connect terminal 12B of LP relay to ground.	
20	Using a 639A contact connector, connect terminal 12 of LP relay to TST1 jack of timing test set with white (W) lead of test cord.	
21	At test set— Set switch A to position 1, switch B to position 5, and switch C to position 1.	
22	Operate OUT switch of test set to STDY position.	A1, C1, DP, DP1, DS1, DL, DL1, GT, GT1, and NP relays operated.
23	Operate TST key to OPR.	

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
24	At 1014A handset— Dial zero.	At timing test set— 59-61 division indication.
25a	If verification of Step 24 is not obtained— At SD-99311-01— Adjust DTM potentiometer and repeat Steps 23 and 24 until verification is obtained.	
26	Operate OUT switch of test set to OFF position.	
27	At SD-99311-01— Remove ground from 12B of LP relay.	
28	Remove (W) lead of test cord from 12F of LP relay.	
29	Momentarily operate D relay.	

***TMR Timer***

30	At timing test set— Set MIL-SEC switch at 0-5000.	
31	Adjust ADJ-0 knob for zero indication on test set meter.	
32	Hold TST key operated to CAL and adjust CAL knob for 50 division indication on test set meter.	
33	At SD-99311-01— Remove block from DIS relay.	
34	Connect terminal 6B of D relay to ground and terminal 6 to TST1 jack of timing test set with W lead.	
35	Connect test lead from terminal 9F of DP1 relay to terminal 1U of DIS relay.	
36	Block DL1 relay nonoperated.	
37	At timing test set— Operate TST key.	
38	At SD-99311-01— Momentarily operate DP relay.	At timing test set— 10-15 division indication.
39b	If verification of Step 38 is not obtained— Check related circuitry.	

STEP	ACTION	VERIFICATION
40	Remove test lead from 9F of DP1 relay and from 1U of DIS relay.	
41	At timing test set— Release TST key.	
42	Operate TST key.	
43	At SD-99311-01— Momentarily operate ERTR relay.	At timing test set— 10-15 division indication.
44	At SD-99311-01— Disconnect connection to 6 and 6B of D relay.	
45	Remove block from DL1 relay.	
46	At timing test set— Set REC switch to GRD/48V OR OC.	
47	Adjust ADJ-0 knob for zero indication on test set meter.	
48	Hold operated TST key to CAL.	
49	Adjust CAL knob for 50 indication on test set meter.	
50	Release TST key.	
51	Connect test lead from 3M of ROH relay to 10F of ROHD relay.	
52	Connect terminal 10B of ROHD relay to TST1 jack of timing test set with W lead.	
53	At timing test set— Operate TST key.	
54	At SD-99311-01— Operate ROH relay.	ROHD relay operated. At timing test set— 10-15 division indication.
55	At SD-99311-01— Remove test lead from 3M of ROH relay and 10F of ROHD relay.	
56	Remove all test connections to and from timing test set.	

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
<b><i>TF Timer</i></b>		
57	At SD-99311-01— Block TF relay operated.	Approximately 6 seconds after TF relay operated— TF1 relay operated.
58c	If verification of Step 57 is not obtained— Check TF timer.	
59	At SD-99311-01— Remove block from TF relay.	

**U. Hybrid Amplifier**

1	Insert 258-type plug into HYL jack.	
2	Connect 900-ohm resistor across terminals 2 and 4 of HYL jack.	
3	Insert 258-type plug into HYD jack.	
4	Connect 600-ohm resistor across terminals 2 and 4 of HYD jack.	
5	Connect VTVM across terminals 2 and 4 of HYD jack.	
6	Block ON and SO relays operated.	
7	Adjust H potentiometer.	Minimum power indication at VTVM.
8	Disconnect all test equipment, remove 258-type plugs, and remove blocks from relays.	Circuit returned to normal.

**V. Current Control and Supervisory Oscillator**

1	Block ON and ON1 relays operated.	
2	Using 3P17B cord, connect 72A meter to HYL jack.	
3	Insert 258-type plug into TJ1 jack.	
4	Set VOM setting to OHMS X 10,000 and connect (+) lead to contact 3F of CR relay and (—) lead to terminal 8 of CCO oscillator.	VOM indicates approximately 100K ohms.
5	Disconnect VOM, set selector to 300 volts DC and connect to 3F of CR relay and ground.	
6	Block VR relay operated.	VOM indicates 99-101 volts. 72A meter indicates 1517 Hz.

STEP	ACTION	VERIFICATION
7a	If 72A meter indication verification of Step 6 is not observed— Adjust SENS potentiometer.	VOM indicates 99-101 volts. 72A meter indicates 1517 Hz.
8	Release VR relay.	72A meter indicates 1100 Hz.
9b	If verification of Step 8 is not observed— Adjust ZERO potentiometer.	72A meter indicates 1100 Hz.
10	Repeat Steps 6 through 9b until verifications are met.	
11	Operate SO relay.	72A meter indicates 1016-1018 Hz.
12c	If verification of Step 11 is not obtained— Adjust T1 transformer.	72A meter indicates 1016-1018 Hz.
13	Remove blocks from relays, remove 258-type plug from TJ1 jacks, and disconnect all test equipment.	Circuit returned to normal.

#### W. Monitoring Amplifier and 2-Way Amplifier Adjustment

1	Connect VTVM to HYL jack with 900 ohms connected across its input.	
2	Operate ON, ON1, ON2, and TK relays.	
3	Set 72A meter at 1517 Hz and turn OSC OUT knob to extreme counterclockwise position.	
4	Using 3P17B cord, connect OSC OUT jack of 72A meter to TJ1 jack of SD-99311-01.	
5	Rotate OSC OUT knob of 72A meter gradually clockwise for $-4.2$ dBm (when calibrated for $600\Omega$ ) or $-6$ dBm (when calibrated for $900\Omega$ ) indication on VTVM.	
6	At SD-99311-01— Operate M relay.	When calibrated for $600\Omega$ — $-4.2$ dBm indicated at VTVM. When calibrated for $900\Omega$ — $-6$ dBm indicated at VTVM.
7a	If verification of Step 6 is not obtained— Adjust M amplifier.	Same as Step 6.
8b	If 2-way amplifier is provided— At SD-99311-01— Release M relay.	

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
9b	Operate REX relay.	
10b	Adjust AMP1 amplifier until $-4.2$ dBm is obtained on VTVM.	When calibrated for $600\Omega$ — $-4.2$ dBm indicated at VTVM. When calibrated for $900\Omega$ — $-6$ dBm indicated at VTVM.
11b	At SD-99311-01— Release REX relay.	
12b	Disconnect VTVM and 72A meter from HYL jack and TJ1 jack respectively.	
13b	Reconnect VTVM and 72A meter to TJ1 jack and HYL jack respectively.	
14b	At SD-99311-01— Operate REX relay.	
15b	Adjust AMP2 amplifier until $-4.2$ dBm is obtained on VTVM.	When calibrated for $600\Omega$ — $-4.2$ dBm indicated at VTVM. When calibrated for $900\Omega$ — $-6$ dBm indicated at VTVM.
16b	Repeat Steps 10b through 15b until both amplifiers read $-4.2$ dBm.	Same as Steps 10b through 15b.
17	At SD-99311-01— Release ON, ON1, ON2, TK, and REX relays.	
18	Disconnect 72A meter and VTVM.	
<b>X. AMP Amplifier and SO Oscillator</b>		
1	Connect VTVM and $900\Omega$ resistor across input to HYL jack.	
2	Operate ON, ON1, and VR relays.	When calibrated for $600\Omega$ — VTVM indicates $-4.2$ dBm. When calibrated for $900\Omega$ — VTVM indicates $-6$ dBm.
3a	If verification of Step 2 is not observed— Adjust AMP amplifier.	Same as Step 2.
4	Block SO relay operated.	When calibrated for $600\Omega$ — VTVM indicates $-4.2$ dBm. When calibrated for $900\Omega$ — VTVM indicates $-6$ dBm.
5b	If verification of Step 4 is not observed— Adjust SO potentiometer.	Same as Step 4.

STEP	ACTION	VERIFICATION
6	Release relays and disconnect test equipment.	Circuit returned to normal.
<b>Y. Coin Relays</b>		
1	At SD-99311-01— Block CN relay operated.	
2a	If not equipped with dial-tone-first— Connect VOM across terminals 2 and 4 of TJ1 jack.	Check for continuity.
3b	If equipped with dial-tone-first— Connect VOM across terminal 2 of TJ1 jack and ground.	Check for continuity.
4	Remove block from CN relay.	
5	Momentarily operate CC relay.	CC and CN relays locked operated.
6	Momentarily operate CRR relay.	CC and CN relays released.
7	Momentarily operate CR relay.	CR and CN relays locked operated.
8	Momentarily operate CRR relay.	CR and CN relays released.
9	Using VOM, check applicable voltages in Table E.	
10	When measuring resistance, remove associated fuse.	
11	Restore fuse after test.	Voltage indications in Table E.
12	Momentarily operate DIS relay.	Circuit returned to normal.

TABLE E

RELAY AND CONDITION	OPTION PROVIDED	VOLTAGE AT TERMINAL 2 OF TJ1 JACK	OBSERVE $\approx$ 8 OHMS BETWEEN	
			TERMINAL ON TJ1 JACK	TERMINAL ON UNIT T.S.(E)
CC OPERATED AND CR RELEASED	X and T	-130V	2	22
	X and V	-116V	2	33
	Y and T	+130V	2	13
	Y and V	+116V	2	53
CR OPERATED AND CC RELEASED	X and T	+130V	2	13
	X and V	-116V	2	53
	Y and T	-130V	2	22
	Y and V	+116V	2	53

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
-------------	---------------	---------------------

**Z. Extended Remote Testing (Option ZQ)**

**Establishing An Extended Remote Test Connection**

- |    |   |   |
|----|---|---|
| 1  | At remote testing signal generator test set—<br>Connect OUT jack of test set to HYL jack of SD-99311-01 using 2P4C cord.        |   |
| 2  | Using 3W4A cord equipped with two 624B tools—<br>Connect -48 volts and ground to B/G jack.                                      |   |
| 3  | Connect 400-type HP voltmeter to OUT T and OUT R binding posts on remote testing signal generator test set.                     |   |
| 4  | At remote testing signal generator test set—<br>Set switch A to position 1, switch B and switch C to OFF.                       |   |
| 5  | Operate OUT switch to STDY position.  |   |
| 6  | Adjust LEV potentiometer on test set to obtain -20 dBm on VTVM.   |   |
| 7  | Operate OUT switch to OFF position.   |   |
| 8  | Disconnect 400-type HP voltmeter from OUT T and OUT R binding posts on remote testing signal generator test set.                |   |
| 9  | At SD-99311-01—<br>Block DIS relay nonoperated.   |   |
| 10 | Momentarily operate E relay.  | ON relay locked operated.                     |
| 11 | At remote testing signal generator test set—<br>Set switch A to position 4, switch B to position 4, and switch C to position 3. |   |
| 12 | At SD-99311-01—<br>Insulate 1M of EDR relay.  |   |
| 13 | At remote testing signal generator test set—<br>Operate OUT switch to PULSE position.   | At SD-99311-01—<br>ERT relay locked operated. |
| 14 | At SD-99311-01—<br>Connect 67C test set to terminals 1 and 5 of AMP amplifier.  |   |

STEP	ACTION	VERIFICATION
15	At remote testing signal generator test set— Set switch A to position 1, switch B to position 5, and switch C to position 1.	
16	Connect 1014A hand set to DIAL jack of remote testing signal generator test set.	
17	At remote testing signal generator test set— Operate OUT switch to STDY.	At 1014A handset— Burst of tone heard. At SD-99311-01— ED relay locked operated.
18	At 1014A hand set— Dial any digit from 1 to 0.	At SD-99311-01— OD selector follows pulsing of hand set. After dialing is completed— EDR relay locked operated.
19	At SD-99311-01— Apply ground to TS(A) terminal 14 using 1W13B cord.	ERTS and ERV relays operated. ED relay released. At 67C test set— 1017-Hz tone heard.
20	At remote testing signal generator test set— Operate OUT switch to OFF.	At SD-99311-01— ERV relay released. HR relay operated.
21	At SD-99311-01— Remove 67C test set from terminals 1 and 5 of AMP amplifier.	
22	At remote testing signal generator test set— Remove 1014A hand set from DIAL jack.	
23	At SD-99311-01— Using 14510 VOM— Check for presence of -48 VDC at terminal 34 of TS(B).	-48 VDC present at terminal 34 of TS(B).
24	Using KS-14510 VOM with selector switch set at 120ma— Connect (-) lead to terminal 54 of TS(A) and (+) lead to ground.	VOM indicates approximately 93ma.
25	At remote testing signal generator test set— Set switch A to position 5, switch B to position 5, and switch C to position 3.	
26	Operate OUT switch to PULSE.	At SD-99311-01— ST, GT, and GT1 relays pulse operated. ON1 and ON2 relays locked operated.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
<b>Testing On An Established Connection</b>		
<b>Incoming Test Trunk (No Test)</b>		
27	At remote testing signal generator test set— Set switch A to position 1, switch B to position 1, and switch C to position 3.	
28	Operate OUT switch to PULSE.	At SD-99311-01— NT, NT1, and ERV relays locked operated.
29	At SD-99311-01— Using KS-14510 VOM with range switch set at 120ma— Check for approximately 93ma at terminal 54 of TS(A).	Approximately 93ma present at terminal 54 of TS(A).
30	Using KS-14510 VOM with range switch set at OHMS X100— Check for presence of ground on terminal 34 of TS(A).	Ground present on terminal 34 of TS(A).
31	At remote testing signal generator test set— Set switch C to position 4.	
32	Operate OUT switch to PULSE.	At SD-99311-01— NT, NT1, and ERV relays released.
33	Using KS-14510 VOM with range switch set at OHMS X100— Check for absence of ground on terminal 34 of TS (A).	Ground not present on terminal 34 of terminal strip (A).
<b>MDF Test Trunk (In and Out Type)</b>		
34	At remote testing signal generator test set— Set switch A to position 3, switch B to position 2, and switch C to position 1.	
35	Operate OUT switch to PULSE.	At SD-99311-01— MDF relay locked operated.
36	Using KS-14510 VOM with range switch set at OHMS X100— Check for presence of ground on terminal 34 of TS (A).	Ground present on terminal 34 of TS (A).
<b>Test Trunk and Selector Circuit</b>		
37	At remote testing signal generator test set— Set switch A to position 1, switch B to position 4, and switch C to position 1.	

STEP	ACTION	VERIFICATION
38	Operate OUT switch to PULSE.	TS, TS1, and ERV relays locked operated.
39	Using KS-14510 VOM with range switch set at OHMS X100— Check for presence of ground on terminal 44 of TS (A).	Ground present on terminal 44 of TS (A).
40	Using KS-14510 VOM with range switch set at a 120ma— Check for approximately 93ma at terminal 54 of TS (A).	Approximately 93ma present at terminal 54 of TS (A).
41	At remote testing signal generator test set— Set switch C to position 2.	
42	Operate OUT switch to PULSE.	TS, TS1, and ERV relays released.
<b>Release of a Test Connection</b>		
43	At SD-99311-01— Block D relay operated.	
44	Using KS-14510 VOM with range switch set at 60 VDC— Check for presence of -48 VDC on terminal 24 of TS (A).	-48VDC present on terminal 24 of TS (A).
45	At SD-99311-01— Remove block from D relay.	
<b>Release of an Extended Remote Office</b>		
46	At remote testing signal generator test set— Set switch A, B, and C to position 4.	
47	At SD-99311-01— Remove ground from terminal 14 of TS (A).	
48	At remote testing signal generator test set— Operate OUT switch to PULSE.	At SD-99311-01— ERTR and ERV relays momentarily operated. ERTS and ERD relays released. OD selector restored to normal.
<b>AA. Night Test Coverage (Option M)</b>		
<i>Note:</i> Perform Steps 1 through 8 for Day and Night Test Center Non-Dedicated or Day Test Center Dedicated and Night Test Center Non-Dedicated		
1	At SD-99308-01— Insulate 12M contact of SD relay.	

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
2	Using 3W4A cord equipped with two 624B tools on white and black leads— At SD-99308-01— Connect 624B tools to 6M and 12M of SD relay.	
3	Connect other end of 3W4A cord to PLS IN jack of dial digit pulse receiver test set.	
4	Using another 3W4A cord— Connect -48 volts (white) and ground (red) to the B/G jack on test set.	
5	Turn test set on.	
6	Operate TR ACT-OFF-TRSIM switch to TR SIM.	
7	Operate 7 DIGIT—8 DIGIT switch to appropriate position.	
8	Depress RESET button.	All registers on test set indicate "0."
<b>Day Test Center Non-Dedicated—Night Test Center Non-Dedicated.</b>		
9	At SD-99311-01— Momentarily operate NC relay.	At SD-99311-01— NC relay locked operated. SD-99308-01— NC relay operated. At SD-97558-01— NC relay operated.
10	At SD-97558-01— Block TM1 relay nonoperated.	
11	Establish a connection to SD-97558-01 by dialing access code assigned to it.	At SD-97558-01— ST relay momentarily operated.** S, OH, and CT relays operated. At SD-99311-01— CT relay operated. **Approximately 6 seconds after ST relay of SD-97558-01 operates and releases— At SD-99311-01— E and ON relays operate. At SD-99308-01— 42A dialer starts dialing the number assigned to No. 14 or No. 16 LTD located at night test center. Number recorded on dial digit pulse receiving test set is correct number assigned to No. 14 and No. 16 LTD night test center.

STEP	ACTION	VERIFICATION
12	At SD-97558-01— Remove block from TM1 relay.	
13	Momentarily operate TM1 relay.  <i>Note:</i> Relay TM1 may operate when the blocking tool is removed if TMR timer has timed out.	At SD-97558-01— DIS relay operated. S, CT, and OH relays released. At SD-99311-01— E, ON, and CT relays released.
14	Disconnect connection established with SD-97558-01.	At SD-97558-01— DIS relay released.
15	Disconnect dial digit pulse receiver test set.	
16	At SD-99311-01— Manually release NC relay.	At SD-97558-01— NC relay released. At SD-99308-01— NC relay released.
17	At SD-99308-01— Remove insulator from 12M of SD relay.	

***Day Test Center Dedicated Night Test Center  
Non-Dedicated***

- 18 Perform Steps 9 through 17 of Day Test Center Dedicated—Night Test Center Non-Dedicated except in Step 11 relay E1 operates in SD-99311-01, and in Step 13 relay E1 will release instead of relay E.

***Day Test Center Dedicated Night Test Center  
Dedicated***

19	At SD-99311-01— Momentarily operate NC relay.	At SD-99311-01— NC relay locked operated. At SD-97558-01— NC relay operated. AT SD-99308-01— NC relay operated.
20	At SD-99308-01— Insulate 6M of ON relay.	
21	At SD-97558-01— Block TM1 relay nonoperated.	
22	Establish a connection to SD-97558-01 by dialing access code assigned to it.	At SD-97558-01— ST relay momentarily operated. S, OH, and CT relays operated. At SD-99311-01— E1, ON, and CT relays operated.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
23	At SD-97558-01— Remove block from TM1 relay.	
24	Momentarily operate TM1 relay.  <i>Note:</i> Relay TM1 may operate when the blocking tool is removed if TMR timer has timed out.	At SD-97558-01— DIS relay operated. S, OH, and CT relays released. At SD-99311-01— E1, ON, and CT relays released.
25	Disconnect connection established with SD-97558-01.	At SD-97558-01— DIS relay released.
26	At SD-99311-01— Manually release NC relay.	At SD-97558-01— NC relay released. At SD-99308-01— NC relay released.
27	At SD-99311-01— Remove insulator from 6M of ON relay.	

**AB. Incoming Remote Test Call (Option N)**

- 1 Notify tester not to use dialer.
  - 2 At SD-99308-01—  
Insulate 12M of SD relay.
  - 3 Using 3W4A cord equipped with two 624B tools on white and black leads—  
At SD-99308-01—  
Connect 624B tools to 6M and 12M of SD relay.
  - 4 Connect other end of 3W4A cord to PLS IN jack of dial digit pulse receiver test set.
  - 5 Using another 3W4A cord—  
Connect -48 volts (white) and ground (red) to the B/G jack on test set.
  - 6 Turn test set on.
  - 7 Operate TR ACT-OFF-TR SIM switch to TR SIM.
  - 8 Operate 7 DIGIT—8 DIGIT switch to appropriate position.
  - 9 Depress RESET button.
- All registers on test set indicate "0."

STEP	ACTION	VERIFICATION
<b><i>Non Dedicated Facilities</i></b>		
10	At SD-97557-01— Block TM1 relay non-operated.	
11	Establish a connection to SD-97558-01 by dialing access code assigned to it.	At SD-97558-01— ST relay momentarily operated. S, OH, and CT relays locked operated. At SD-99311-01— CT relay locked operated. Approximately 6 seconds after ST relay of SD-97558-01 operates and releases, relays E and ON, of SD-99311-01 locked operated. 42A dialer in SD-99308-01 starts dialing the number assigned to No. 14 or No. 16 LTD. Number recorded on dial digit pulse receiving test set is correct number assigned to No. 14 or No. 16 LTD.
12	At SD-97558-01— Remove block from TM1 relay.	
13	Momentarily operate TM1 relay.  <b>Note:</b> Relay TM1 may operate when the blocking tool is removed if TMR timer has timed out.	At SD-97558-01— DIS relay locked operated. S, CT, and OH relays released. At SD-99311-01— E, ON, and CT relays released.
14	Disconnect connection established with SD-97558-01.	DIS relay released.
<b><i>Dedicated Facilities</i></b>		
15	At SD-99311-01— Insulate 6M of ON relay.	
16	At SD-97558-01— Block TM1 relay nonoperated.	
17	Establish a connection to SD-97558-01 by dialing access code assigned to it.	At SD-97558-01— ST relay momentarily operated. S, OH, and CT relays locked operated. At SD-99311-01— E, ON, and CT relays operated.
18	At SD-97558-01— Remove block from TM1 relay.	
19	Momentarily operate TM1 relay.  <b>Note:</b> Relay TM1 may operate when the	At SD-97558-01— DIS relay locked operated. S, CT, and OH relays released.

**SECTION 201-828-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
	blocking tool is removed if TMR timer has timed out.	At SD-99311-01— E, ON, and CT relays released.
20	Disconnect connection established with SD-97558-01.	At SD-97558-01— DIS relay released.
21	At SD-99311-01— Remove insulator from 6M of ON relay.	