

E1L-A AND E2L-A AUXILIARY SIGNALING CIRCUITS
OUT-OF-SERVICE TESTS USING TESTING CIRCUIT
SD-96519-01 OR SD-96519-02

1. GENERAL

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1.01 This section describes methods of making out-of-service tests on the E1L-A and E2L-A auxiliary signaling circuit SD-98142-01 or SD-98142-02 using testing circuits SD-96519-01 or SD-96519-02.

features of the E1L-A or E2L-A signaling units. 8

1.02 This section is reissued to include the electrical test for the S1 relay in test D. Revision arrows are used to show the more significant changes. This reissue does not affect the Equipment Test List.

F. Forward Disconnect Delay Circuit Test Using 4A Signaling Test Set (J94743A): This test checks the forward disconnect delay features of the E1L-A or E2L-A signaling units. 10

1.03 The tests covered are:

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A. Transmitted Tone Level: This test checks the level of the transmitted 2600-Hz tone. 4

B. Oscillator Output: This test checks the frequency and symmetry of the square-wave oscillator and describes the adjustment of the TM1 and TM2 potentiometers. This test applies to unmodified E1L-A signaling units only. 6

C. Ringing Detector Action: This test checks the 20-Hz ringing detector for proper operation. 7

D. Transmission Test: This test checks the voice path. This test applies to E1L-A-() and E2L-A-() units only. 7

E. Forward Disconnect Delay Circuit Test Using 2B Signaling Test Set (J64730B): This test checks the forward disconnect delay

1.04 If the requirements of this section cannot be met after readjustment of relays, the unit should be returned to a repair center because of special techniques involved in testing and clearing trouble on some of the components.

1.05 The J94021A (21A) transmission measuring set is referred to in this section as TMS.

1.06 The 2B signaling test set is referred to in this section as 2B test set.

1.07 The 4A signaling test set is referred to in this section as 4A test set.

1.08 The pulse checking test set is referred to in this section as PCTS.

1.09 The J9813AY test panel (SD-96519-01 or SD-96519-02) is referred to in this section as test circuit. KEYERS switch 1 and RECEIVER switch 2 on this panel are referred to as SW1 and SW2, respectively. Jacks and keys mentioned in this section are part of the test circuit unless otherwise specified.

1.10 The volt-ohm-milliammeter is referred to in this section as VOM.

NOTICE

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1.11 The tests should be made in the order specified in this section.

1.12 **Lettered Steps:** A letter (a, b, c, etc) added to a step number in Part 4 indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series 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. The details of each item are covered in the paragraph indicated by the number in parentheses.

2.02 Test circuit, J98613AY (SD-96519-01 or SD-96519-02), including folding test fixture.

2.03 The J94021A (21A) TMS (Section 103-221-101).

2.04 Pulse checking test set, J94723A (SD-96362-01).

2.05 VOM KS-14510.

2.06 2B test set, J64730B (SD-56134-02) W option or later includes power cords and patch cords for E and M leads (2P1D and 2P3B cords).

2.07 4A test set, J94743A equipped with E&M interface unit J94743AD.

2.08 Monitoring cord, P8E, 12 feet long, equipped with one KS-8585, L10 plug and one KS-8586, L7 socket.

2.09 Patching cord, P3E cord, 3 feet long, equipped with two 310 plugs (3P7A cord assembly).

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

2.11 Testing cord, W3M, 6 feet long, equipped with a 310 plug and 360 A, B, and C tools (3W4A cord assembly).

2.12 Patching cord, P2A, 6 feet long, equipped with two 347A plugs (2P1D cord assembly).

2.13 Testing cord, 893, 6 feet long, equipped with two 360A tools (1W13B cord assembly), and a 365 (test connector) tool connected to one end.

2.14 Testing cord, W2CF cord, 1 foot long, equipped with one 310 plug, one 360B tool, and one 360C tool (2W17D cord assembly).

2.15 The 725A tool is used in prying loose the auxiliary signaling unit from connectors.

2.16 Blocking and insulating tools, as required. Use tools and and apply as covered in Section 069-020-801.

2.17 ♦Patching cord, W1AP, equipped with two alligator clips.♦

3. PREPARATION

STEP	ACTION	VERIFICATION
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All Tests

1 At test circuit—
Set all keys to normal position before starting any tests.

Note: Twist keys in the test circuit are operated when the white line is in the vertical position and normal when the white line is in the horizontal position.

2 Calibrate TMS per Section 103-221-101.

STEP

ACTION

VERIFICATION

TABLE A

APPARATUS	TESTS					
	A	B	C	D	E	F
Test Circuit (2.02)	1	1	1	1	1	1
TMS (2.03)	1			1		
PCTS (2.04)		1				
VOM (2.05)			1		1	1
2B Test Set (2.06)					1	
4A Test Set (2.07)						1
Cord (2.08)		1	1	1		
Cord (2.09)		2	1	1		
Cord (2.10)	1			1		
Cord (2.11)						
Cord (2.12)					1	
Cord (2.13)					1	
Cord (2.14)			1			1
Tool (2.15)	1	1	1	1	1	1
Blocking tools (2.16)	✓	✓	✓	✓	✓	✓
Cord (2.17)				✓		

✓ As required

- 3 Obtain release of signaling circuit in accordance with approved procedures.
- 4 Remove signal circuit from its in-service position, using 725A tool, as shown in Fig. 1 or Fig. 2.
- 5 Plug signaling unit into folding test fixture.

STEP	ACTION	VERIFICATION
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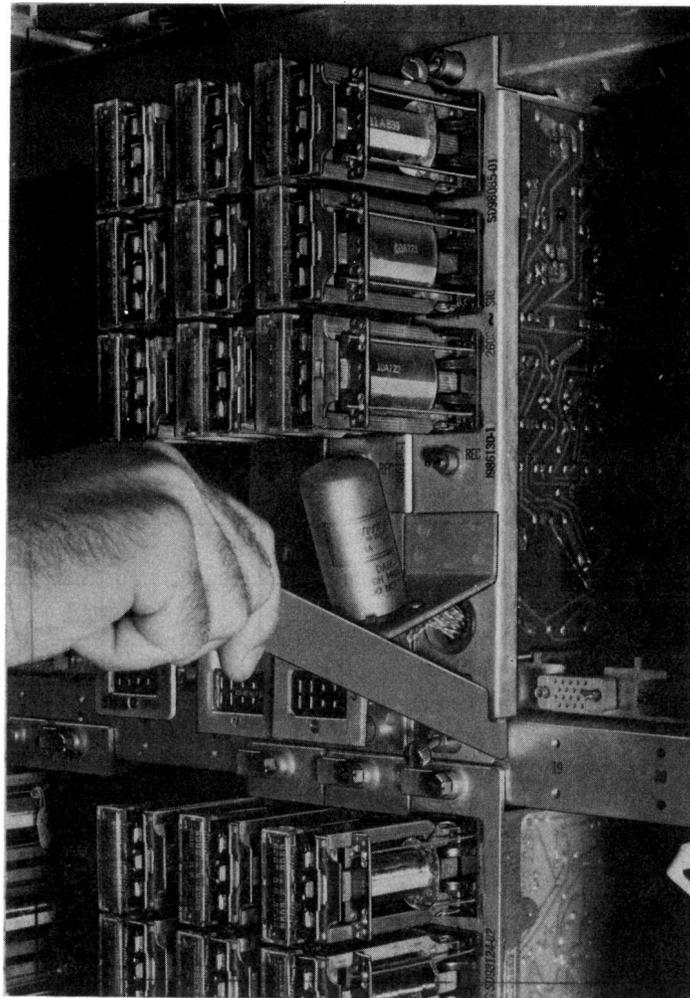


Fig. 1—Method of Removal of Fabricated Chassis

4. METHOD

STEP	ACTION	VERIFICATION
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A. Transmitted Tone Level

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|---|---|---|
| 6 | Using P3N cord, connect DET IN jack of TMS to TMS jack of test circuit. | |
| 7 | Set SW1 to position 3, SW2 to position 1. | |
| 8 | Simultaneously depress TMS A, TMS B keys. | TMS indicates between -28.0 and -31.0 dB. |

STEP

ACTION

VERIFICATION

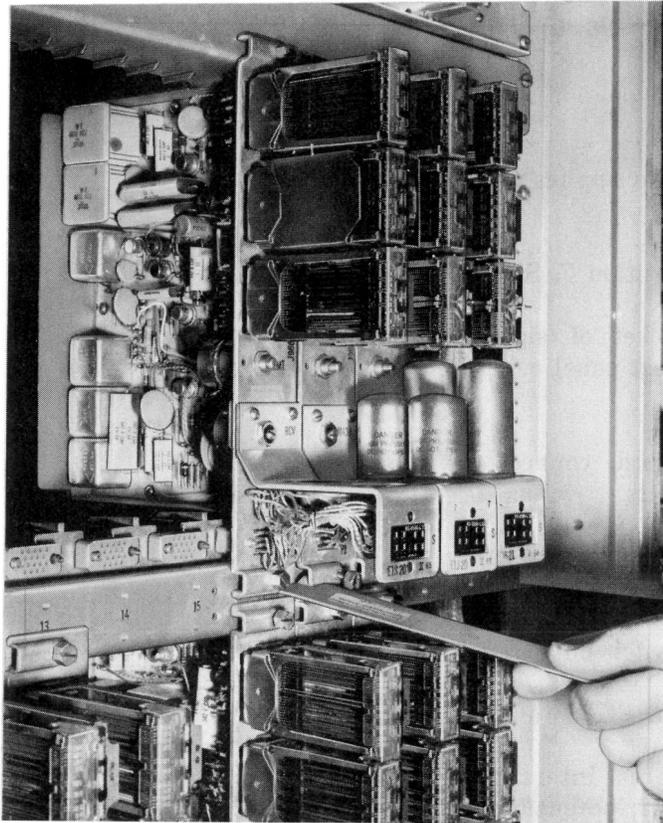


Fig. 2—Method of Removal of Die Cast Chassis

Note: The 21A TMS requires that the DET INPUT switch be set to the proper position for each measurement. The TMS indications called for as verification in this section are the combined total of the DET INPUT switch setting and the meter indication.

- | | | |
|----|--|--|
| 9 | Release TMS A, TMS B keys. | |
| 10 | At SF unit—
Block CT relay nonoperated. | |
| 11 | Simultaneously depress TMS A, TMS B keys. | TMS indicates less power than -45 dBm. |
| 12 | Release TMS A, TMS B keys. | |
| 13 | Remove blocking tool from CT relay. | CT relay operated. |

STEP	ACTION	VERIFICATION
14a	If no other tests are to be made— Remove all cords, restore all keys to normal, and return signaling unit to service or spare position.	
B. Oscillator Output		
<i>Note:</i> This test applies to E1L-A units only.		
6	At test circuit— Set SW1 to position 7, SW2 to position 4.	
7	Connect S socket of signaling unit to S1 connector on test panel using P8E monitoring cord.	
8	Using 3P7A cord, connect BAT G jack of PCTS to 48 volts.	
9	Using P3E cord, connect P jack on PCTS to E & M jack on test circuit.	
10	Set SCALE switch on PCTS to 40.	
11	Operate key on PCTS to PPS.	PCTS meter indicates between 38.5 and 40.0 PPS.
<i>Note:</i> There is interaction between the TM1 and TM2 potentiometers; therefore, repetition of Steps 12a through 14b may be necessary until the requirements are met.		
12a	If requirement of Step 11 is not met— Adjust TM1 potentiometer on signaling unit to obtain indication of 39.5 PPS, or as close to 39.5 PPS as possible, on PCTS meter.	
13	Operate key on PCTS to PCB.	PCTS meter indicates between 45 and 55 percent break.
14b	If requirement of Step 13 is not met— Adjust TM2 potentiometer to obtain indication of 50 percent break, or as close to 50 percent break as possible, on PCTS meter.	
15	Repeat Steps 11 through 14b until requirements of Steps 12a and 14b are met.	
16c	If no other tests are to be made— Remove all cords, restore all keys to normal, return signaling unit to service or spare position.	

STEP	ACTION	VERIFICATION
C. Ringing Detector Action		
6	At test circuit— Set SW1 to position 7, SW2 to position 4.	
7	Set VOM switch to 60 volts ac scale.	
8	Using W2CF cord, patch between SENS 1 jack and VOM.	
9	Using P8E cord, connect S socket on signaling unit to S1 connector on test panel.	
<i>Caution: To avoid blowing the 20 fuse when the 20 P key is not provided, follow sequence exactly as stated. Never leave one end of a cord hanging loose while the other end is plugged into the 20 R jack because the loose end may touch frame ground. Also, be sure to hold the plugs of the cord by insulating shell to avoid shock when inserting into or removing from the 20 R jack.</i>		
10	Patch P3E cord first from 2W or EQ RCV jack and then to 20 R jack. At test panel, depress 20 P key when provided.	If testing E1L-A signaling unit— VOM meter needle vibrates within 10- to 20-volt range. If testing E1L-A-() or E2L-A-() signaling unit— VOM indicates between 20 and 40 volts.
11	Remove end of P3E cord from 20 R jack first, then remove cord from 2W or EQ RCV jack.	
12a	If no other tests are to be made— Remove all cords, restore all keys to normal, and return signaling unit to service or spare position.	
D. Transmission Test		
<i>Note:</i> This test applies to E1L-A-() and E2L-A-() units only.		
6	Using P3N cord, connect DET IN jack on TMS to AMP OUT jack of test circuit.	
7	At test panel— Set SW1 to position 2, set SW2 to position 2.	TMS indicates 0 dB.

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STEP	ACTION	VERIFICATION
8a	If requirement of Step 7 is not met— Adjust gain control of MON amplifier on test circuit to obtain an indication of 0 dB on TMS.	
9	Disconnect TMS from AMP OUT jack, connect TMS to 2W or EQ RCV jack.	
10	At SF unit— Block CT relay nonoperated.	
11	◆Using W1AP cord, connect one end to pin 5 of GS connector and the other end to pin D of P1 connector.	S1 relay operated.◆
12	Using P8E cord, connect S socket on signaling unit to S1 connector on test panel.	
13	Using P3E cord, connect AMP OUT jack to LINE RCV jack.	TMS indicates 0, ± 0.2 dB.
14	Remove blocking tool from CT relay.	
15	◆Remove W1AP cord from pin 5 of GS connector and pin D of P1 connector.	S1 relay nonoperated.◆
16b	If no other tests are to be made— Remove all cords, restore all switches and keys to normal, and restore all circuits to normal.	
E. Forward Disconnect Delay Circuit Test Using 2B Signaling Test Set		
6	At 2B test set— Set all keys to normal position.	
7	Set SCALE SEL switch to PPS.	
8	Plug power cords of 2B test set into A and B jacks of test circuit.	After 1 minute, PULSES PER SECOND meter indicates other than 0.
9	Operate CONT PLS key to DIAL PLS.	PERCENT BREAK meter indicates 0 on <i>black</i> scale. See Step 10a.
10a	If requirement of Step 9 is not met— Adjust pointer adjustment screw of PERCENT BREAK meter to obtain 0 indication.	
11	Insert 258D plug into P jack.	PERCENT BREAK meter indicates 100 on <i>black</i> scale. See Step 12b.

STEP	ACTION	VERIFICATION
12b	If requirement of Step 11 is not met— Unlock CAL % BK control, adjust to obtain reading of 100 on black scale of PERCENT BREAK meter and relock control taking care not to change 100 indication.	
13	Remove 258D plug.	
14	Restore CONT PLS key to normal.	
	Note: Repeat Steps 9 through 13 if Test E extends beyond 30 minutes.	
15	Block CT relay on E1L-A or E2L-A unit nonoperated.	
16	At VOM— Set selector switch to 1.2 MA.	
17	Connect negative test lead of VOM to pin number 4 of male octal GS plug on E1L-A or E2L-A unit; connect positive lead of VOM to ground.	VOM indicates between .85 and 1.2 MA.
18	Remove blocking tool from CT relay.	
19	Set selector switch on VOM to .06 MA.	VOM indicates less than .05 MA.
	Note: Leave VOM connected while performing remainder of the steps in this test.	
20	Insert one end of P2A cord to M jack of 2B test set.	
21	Connect 365 tool on 1W13B cord to tip of 2P1D cord (other end of cord from Step 20).	
22	Connect 360A tool on 1W13B cord to pin number 1 of male octal GS plug on E1L-A or E2L-A unit.	
23	At 2B test set— Operate TWD-L key to OFF-HOOK.	VOM indicates less than .05 MA.
24	At VOM— Set selector switch to 1.2 MA.	
25	Block S1 relay operated, and CT relay nonoperated at E1L-A or E2L-A unit.	VOM indicates between .85 and 1.2 MA.
26	At 2B test set— Restore TWD-L key to normal.	

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STEP	ACTION	VERIFICATION
27	Set SCALE SEL switch to PPS.	
28	Adjust the ADJ PPS control to obtain 3 PPS on PULSES PER SECOND meter.	
29	Set ADJ % BK switch to M.	
30	Adjust ADJ % BK potentiometer to obtain indication 32 on <i>black</i> scale of PERCENT BREAK meter.	
31	Operate PLS key to LINE.	VOM pointer pulsates.
32	Restore PLS key to normal.	
33	Set ADJ % BK switch to L.	
34	Adjust ADJ % BK control to obtain reading of 70 on <i>black</i> scale of PERCENT BREAK meter.	
35	Operate PLS key to LINE.	
36	At VOM— Set selector switch to .06 MA.	VOM indicates less than .05 MA and does not pulsate.
37	Remove all cords, restore all keys to normal, and return auxiliary signaling units to bay position.	

F. Forward Disconnect Delay Circuit Test Using 4A Signaling Test Set

6	At SF auxiliary unit— Block nonoperated CT relay.	
7	At VOM— Set selector switch to 1.2 MA.	
8	Connect negative lead of VOM to pin 4 of male octal GS plug of auxiliary unit.	
9	Connect positive lead of VOM to ground.	VOM indicates 0.85 to 1.2 MA.
10	Remove blocking tool from CT relay.	
11	At VOM— Set selector switch to .06 MA.	VOM indicates less than 0.05 MA.
12	Connect 4A test set to 110 volts ac.	
13	Equip 4A test set with E&M interface unit.	

STEP	ACTION	VERIFICATION
14	At 4A test set— Set SEND switch to EM.	
15	Set PULSE MODE switch to CONT.	
16	Operate GEN SUPV key to OFF HK.	
17	Set E&M/CX-S/R switch to E&M/CX.	
18	Operate PULSE/MEAS key to LINE.	
19	Connect 310 plug of 2W17D cord to LINE/R jack of 4A test set.	
20	Connect 360B (black) tool of 2W17D cord to pin 1 of male octal GS plug of E1L-A or E2L-A unit.	
21	Operate OPERATE-CLEAR key.	
22	Operate TWD LINE key to OFF HK.	VOM indicates less than .05 MA.
23	At VOM— Set selector switch to 1.2 MA.	
24	At auxiliary unit— Block operated S1 relay.	
25	Block nonoperated CT relay.	VOM indicates .85 to 1.2 MA.
26	At 4A test set— Operate TWD LINE key to ON HK.	
27	Set PULSE PERIOD switch to 333.	
28	Set PULSE WIDTH switch to 100.	
29	Operate TWD LINE key to OFF HK.	Pointer on VOM pulsates at about 3 pulses-per-second.
30	Set PULSE WIDTH switch to 233.	
31	At VOM— Set selector switch to .06 MA.	VOM indicates less than .05 MA and does not pulsate.
32	Remove all cords and restore all circuits to normal.	