

E-TYPE SIGNALING TEST CIRCUIT

SD-96519-01 AND SD-96519-02

TESTS

1. GENERAL

PAGE

1.01 This section describes methods of testing and adjusting the SD-96519-01 and SD-96519-02 testing and monitoring circuit.

1.02 This section is reissued to change the reference in paragraph 1.07 from Test J to Test K. Revision arrows are used to emphasize more significant changes. This reissue does not affect the Equipment Test List.

1.03 The tests covered are:

PAGE

A. Signaling Tone Supply Levels:

This test checks that the 2600-, 2400-, and 2000-Hz signaling tones supplied to the test circuit are at correct levels.

3

B. Signaling Tone Supply

Frequencies: This test checks that the 2600-, 2400-, and 2000-Hz signaling tones supplied to the test circuit are at correct frequencies.

3

C. Test Amplifier Gain:

This test checks that the level adjustment in the test amplifier is correctly set to produce the proper amplifier gain with signaling tone input.

4

D. Monitor Amplifier Gain:

This test checks that the level adjustment in the monitor amplifier is correctly set to produce the proper amplifier gain with 1000-Hz tone input.

4

E. Mixing Pad Loss: This test checks the 1000-Hz tone transmission loss through the mixing pad which connects output circuits of the test amplifier and the monitor amplifier.

5

F. CO Key: This test checks continuity between the signaling tone distribution circuit and the TMS jack of the testing and monitoring circuit.

5

G. M Relay Pulsing Using 2B

Test Set: This test checks that the M pulsing relay in the testing and monitoring circuit pulses correctly.

5

H. M Relay Pulsing Using 4A

Test Set: This test checks that the M pulsing relay in the testing and monitoring circuit pulses correctly.

6

I. 20-Hz Signaling Level:

This test checks that the 20-Hz signaling level supplied to the test circuit is at the correct level.

7

J. 2000-Hz Band Elimination

Filters: This test checks that the 2000-Hz band elimination filters provide the proper attenuation to 2000-Hz signaling frequencies. This test is applicable only if the test circuit is mounted in a revertive-terminating bay.

8

K. Control Circuits: This test checks that the test circuit supplies the correct operate, hold, soak, and release currents to units under test.

8

NOTICE

Not for use or disclosure outside the Bell System except under written agreement.

1.04 Two levels of 2600- and 2400-Hz signaling tone are specified in Test A for offices having either a -13 line level or a -16 line level. The -13 and -16 levels are transmission levels of the signaling tone as measured at the patch bay. The signaling tone level measured in Test A should correspond to the transmission level used in the particular office.

1.05 The SD-96519-01 or SD-96519-02 testing and monitoring circuit is referred to in the test procedures as the test circuit.

1.06 The 2B signaling test set is referred to in the test procedures as the 2B test set. The 21A transmission measuring set is referred to as the TMS. It is assumed that the 72A frequency meter will be used for frequency measurements. This instrument is referred to as the frequency meter. An equivalent instrument, such as a Hewlett Packard or a Berkeley EPUT counter, may be substituted for the frequency meter.

1.07 Test ~~AK~~ is necessary only if this test circuit is to be used with the E1E or E1F signaling units.

1.08 **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 The J94021A (21A) transmission measuring set (TMS).

2.03 72A frequency meter, J64072A (SD-59373-01), or equivalent.

2.04 2B test set, J64730B (SD-56134-02) including power cords and patch cords for E and M leads, (2P1D and 2P3B cords).

2.05 4A test set, J94743A (SD-1C244-01), including E&M interface unit, J94743AD.

2.06 KS-14510 VOM, or equivalent, including testing leads.

TABLE A

APPARATUS	TESTS										
	A	B	C	D	E	F	G	H	I	J	K
J94021A (21A) TMS (2.02)	1		1	1	1	1				1	
J64072A (72A) frequency meter (2.03)		1								1	
2B Test set (2.04)							1				
4A Test set (2.05)								1			
KS-14510 VOM (2.06)									1		1
Cord (2.07)							1				
Cord (2.08)							1				
Cord (2.09)	1	1	1	1	1	1		1		2	
Cord (2.10)									1		
Screwdriver, C (2.11)			1	1			1	1			
258D (dummy) Plug							1				

- 2.07 Patching cord, P2A cord, 6 feet long, equipped with two 347 plugs (2P3B cord).
- 2.08 Patching cord, P2A cord, 6 feet long, equipped with two 347A plugs (2P1D cord).
- 2.09 Patching cord, P3N cord, 6 feet long, equipped with a 241A plug and a 310 plug (3P17B cord).
- 2.10 Testing cord, W2CF cord, equipped with a 310 plug and two 360 type tools (2W17D cord).
- 2.11 Screwdriver, C, or equivalent (for making potentiometer adjustments).

3. PREPARATION

- 3.01 Each test set should be known to be correctly calibrated. Connect the test sets to power and allow sufficient time to attain operating stability

4. METHOD

STEP

ACTION

VERIFICATION

A. Signaling Tone Supply Levels

- 1 Connect 3P17B cord between DET IN jack of TMS and SF SUP jack of test circuit.

TMS indicates -11.6 to -13.1 dB for -13 line
-14.6 to -16.1 for -16 line.

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.

- 2 ◆At test circuit—◆
Operate the 2600-2400 key.

TMS indicates -11.6 to -13.1 dB for -13 line
or -14.6 to -16.1 dB for -16 line.

- 3a If test circuit is mounted in a revertive-terminating bay—
Operate 2000 key of test circuit.

TMS indicates between -4.5 and -5.5 dB.

- 4 Restore test circuit keys to normal. Disconnect testing cord.

B. Signaling Tone Supply Frequencies

- 1 Connect frequency meter to SF SUP jack of test circuit using 3P17B cord.

Frequency meter indicates between 2595 and 2605 Hz.

before beginning the tests. Leave the test sets connected to power until all tests are completed.

- 3.02 Set all keys to normal position before starting each test.

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

- 3.03 Single-frequency (SF) signaling units should **not** be plugged into the folding test fixture during the tests.

- 3.04 The F and F1 potentiometers located on the front of the test circuit should be known to be correctly adjusted per information note on SD-96519-01.

- 3.05 The F1 potentiometer located on the rear of the test circuit should be known to be correctly adjusted per information note on SD-56134-02.

STEP	ACTION	VERIFICATION
2	◆At test circuit—◆ Operate the 2400-2600 key.	Frequency meter indicates between 2395 and 2405 Hz.
3a	If test circuit is mounted in a revertive-terminating bay— Operate 2000 key of test circuit.	Frequency meter indicates between 1970 and 2030 Hz.
4	Restore all keys to normal.	
5	Disconnect frequency meter.	

C. Test Amplifier Gain

1	At test circuit— Set KEYERS switch to position 6.	
2	Set RECEIVER switch to position 1.	
3	Set attenuator controls to 10.	
4	Connect 3P17B cord between DET IN jack of TMS and TMS jack of test circuit.	TMS indicates 0 dBm.
5a	If requirement of Step 4 is not met— Adjust gain control of TST amplifier to obtain exactly 0 dBm.	
6	Disconnect cord from TMS jack of test circuit.	
7	Restore all keys on test circuit to normal.	

D. Monitor Amplifier Gain

1	At test circuit— Set KEYERS switch to position 5.	
2	Set RECEIVER switch to position 2.	
3	Connect 3P17B cord between DET IN jack of TMS and 1000-0-600 jack of test circuit.	TMS indicates 0 dBm.
4	Disconnect patch cord from 1000-0-600 jack and connect to AMP OUT jack of test circuit.	TMS indicates 0 dBm.
5a	If requirement of Step 4 is not met— Adjust gain control of MON amplifier to obtain exactly 0 dBm.	
6	Disconnect cord from AMP OUT jack of test circuit.	

STEP	ACTION	VERIFICATION
E. Mixing Pad Loss		
1	At test circuit— Set KEYERS switch to position 5.	
2	Set RECEIVER switch to position 6.	
3	Connect 3P17B cord between DET IN jack of TMS and TMS jack of test circuit.	TMS indicates between -18.5 and -19.5 dB.
4	Disconnect cord from TMS jack of test circuit.	
F. CO Key		
1	At test circuit— Operate CO key.	
2	Set KEYERS switch to position 3.	
3	Set RECEIVER switch to position 1.	
4	Connect 3P17B cord between DET IN jack of TMS and TMS jack of test circuit.	TMS indicates -15.0 to -16.2 dB for -13 line or -18.0 to -19.2 dB for -16 line.
5	Restore CO key to normal.	
6	Disconnect 3P17B cord.	
G. M Relay Pulsing—Using 2B Test Set		
1	At 2B test set— Set the five lever-type keys to normal (center position).	
2	Set SCALE SEL switch to PPS.	
3	Using 2P3B and 2P1D cords, connect E and M jacks of 2B test set to E and M jacks, respectively, of test circuit.	
4	Connect power cords to A and B jacks of test circuit.	After 1 minute, PULSES PER SECOND meter indicates other than 0.
5	◆At 2B test set—◆ Operate CONT PLS key to DIAL PLS.	PERCENT BREAK meter indicates 0 on black scale.
6a	If requirement of Step 5 is not met— Adjust pointer adjustment screw of PERCENT BREAK meter to obtain 0 indication.	
7	Insert 258D plug into P jack.	PERCENT BREAK meter indicates 100 on black scale.

STEP	ACTION	VERIFICATION
8b	If requirement of Step 7 is not met— Unlock CAL % BK control, adjust to obtain indication of 100, relock control taking care not to change 100 indication.	
9	Remove 258D plug.	
10	Restore CONT PLS key to normal.	
11	Adjust ADJ PPS control to obtain 10 pps on PULSES PER SECOND meter (0 to 20 scale).	
12	Set ADJ % BK switch to M.	
13	Adjust ADJ % BK control to minimum, then rotate slowly to obtain reading of 55 on <i>black</i> scale of PERCENT BREAK meter.	PERCENT BREAK meter indicates 55 on <i>black</i> scale.
14	At test circuit— Set KEYERS switch to position 7.	
15	Set RECEIVER switch to position 1.	
16	At 2B test set— Operate TWD L key to OFF HK, PLS key to LINE, MEAS % BK key to LINE.	PERCENT BREAK meter indicates 55 on <i>black</i> scale.
17	If requirement of Step 16 is not met— Adjust M potentiometer on test circuit to obtain 55.	
18	Disconnect all test cords.	

H. M Relay Pulsing—Using 4A Test Set

- 1 Connect 4A test set to 110 volts ac.
- 2 Equip 4A test set with E&M interface unit, operate POWER switch to ON.
- 3 Using 3P17B cord, connect LINE/R jack of 4A test set to E jack and M jack of test circuit, with notched side of 241 plug toward the E jack.
- 4 At 4A test set—
Set MS RANGE switch to 999.
- 5 Set READ switch to MSEC UPDATE.
- 6 Set FUNCTION switch to MSEC MK.

STEP	ACTION	VERIFICATION
7	Set SELECTOR switch to NORM.	
8	Set RECEIVE switch to EM.	
9	Set SEND switch to EM.	
10	Set PULSE MODE switch to CONT.	
11	Operate GEN SUPV key to OFF HK.	
12	Operate TWD LINE key to OFF HK.	
13	Operate TWD DROP key to ON HK.	
14	Operate PULSE/MEAS key to LINE.	
15	Set E&M/CX-S/R switch to E&M/CX.	
16	Set PULSE PERIOD switch to 100.	
17	Set PULSE WIDTH switch 55.	
18	At test circuit— Set KEYERS switch to position 7.	
19	Set RECEIVER switch to position 1.	
20	◆At 4A test set—◆ Operate START-STOP key.	
21	Operate OPERATE-CLEAR key.	4A display indicates 45 ms make. See Step 20a.
	Note: The OPERATE-CLEAR and START-STOP keys are operated when the lamps behind the keys are lighted and released when the lamps are extinguished.	
22a	If requirement of Step 19 is not met— Adjust M potentiometer of test circuit to obtain 45 ms make.	
23	Disconnect all test cords.	

I. 20-Hz Signaling Level

1	Set selector switch of VOM to 300 VOLTS AC.	
2	Connect VOM to 20 T or 20 R jack on test circuit using P2CH cord.	If test circuit is not equipped with 20 key— VOM indicates at least 75 volts ac.

STEP	ACTION	VERIFICATION
	Caution: Connect P2CH cord to VOM first; then to 20 T or 20 R jack.	
3a	If test circuit is equipped with 20 P key— Depress 20 P key.	VOM indicates at least 75 volts ac.
4a	Release 20 P key.	
5	Disconnect VOM by removing P2CH cord from 20 T or 20 R jack.	
J. 2000-Hz Band Elimination Filters		
1	Connect 3P17B cord between OSC OUT jack of frequency meter and SF TEST jack of test circuit.	
2	Connect 3P17B cord between DET IN terminals of TMS and TMS jack of test circuit.	
3	At test circuit— Set KEYERS switch to position 6.	
4	Set RECEIVER switch to position 1.	
5	At frequency meter— Adjust output frequency to 2000 Hz.	
6	Adjust output level until TMS indicates 0 dB.	TMS indicates 0 dB.
7	At test circuit— Operate CT key.	TMS indicates less than -24 dB of power.
8	Restore CT key to normal.	
9	Disconnect 3P17B cords.	

K. Control Circuits

Note: This test is necessary only if test circuit is to be used with E1E's or E1F's.

Caution: -48V battery must be removed from test circuit by removing -48V B fuse from fuse panel before performing steps of this test.

- 1 Set VOM to measure resistance by setting selector switch to appropriate position as indicated in VERIFICATION.

STEP	ACTION	VERIFICATION
2	Connect VOM to measure resistance between pins L and R of connector P1 (SD-96519-02) or connector P (SD-96519-01) of test circuit.	
3	At test circuit— Operate KEYERS switch to position 1.	
4	Operate E1E-1 key.	
5	Depress E1E NON OPR key.	VOM indicates between 5140 and 5460 ohms.
6	Release E1E NON OPR key.	
7	Depress and hold E1E SOAK key.	VOM indicates 0 ohms.
8	Release E1E SOAK key.	
9	Depress E1E OPR key.	VOM indicates between 1425 and 1520 ohms.
10	Release E1E OPR key.	
11	Depress E1E HOLD key.	VOM indicates between 4390 and 4670 ohms.
12	Release E1E HOLD key.	
13	Depress E1E RLS key.	VOM indicates between 49,500 and 52,650 ohms.
14	Release E1E RLS key.	
15	Restore E1E-1 key to normal.	
16	Disconnect VOM probe from pin R of connector P1 or P.	
17	Connect VOM probe to pin D of connector P1 or P.	
18	At test circuit— Operate E1F-LB key.	
19	Operate E1F ON-OFF key.	
20	Operate E1F SOAK key.	VOM indicates 0 ohms.
21	Restore E1F SOAK key.	
22	Operate E1F OPR key.	VOM indicates between 3050 and 3260 ohms.
23	Restore E1F OPR key.	

SECTION 179-315-501

STEP	ACTION	VERIFICATION
24	Operate E1F RLS key.	VOM indicates between 54,500 and 57,900 ohms.
25	Restore E1F RLS key.	
26	Restore E1F ON-OFF key.	
27	Disconnect VOM probes from pins D and L of connector P1 or P.	
28a	If testing rack mounted units SD-96519-02 or SD-96519-01— Connect VOM probes to pin L of connector P1 or P and terminal 18 of the test circuit terminal strip.	
29b	If testing portable unit SD-96519-01— Connect VOM probes to pin L of connector P and pin 6 of TST plug on cord.	
30c	If testing portable unit SD-96519-02 (for non ESS offices)— Connect VOM probes to pin L of connector P1 and pin 6 of TST plug on cord.	
31d	If testing portable unit SD-96519-02 (for ESS offices)— Connect VOM probes to pin L of connector P1 and pin 5 of TST plug on cord.	
32	At test circuit— Operate E1F SOAK key.	VOM indicates 0 ohms.
33	Restore E1F SOAK key.	
34	Operate E1F OPR key.	VOM indicates between 3050 and 3260 ohms.
35	Restore E1F OPR key.	
36	Operate E1F RLS key.	VOM indicates between 54,500 and 57,900 ohms.
37	Restore E1F RLS key.	
38	Restore E1F-LB key.	
39	Operate E1F-HB key.	
40	Operate EIF SOAK key.	VOM indicates 0 ohms.
41	Restore EIF SOAK key.	

STEP	ACTION	VERIFICATION
42	Operate EIF OPR key.	VOM indicates between 11,700 and 12,500 ohms.
43	Restore EIF OPR key.	
44	Operate EIF RLS key.	VOM indicates between 0.450 and 0.478 megohms.
45	Restore all keys.	
46	Remove test probes from test circuit.	
47	Replace -48V B fuse.	