

**2600-HZ E1C OR E2C SINGLE-FREQUENCY SIGNALING CIRCUIT
OUT-OF-SERVICE TESTS USING TESTING CIRCUIT
SD-96519-01 OR SD-96519-02**

1. GENERAL

PAGE

1.01 This section describes methods of making out-of-service tests of 2600-Hz single-frequency signaling circuits per SD-98086-01 or SD-98086-02 using testing circuit per SD-96519-01 or SD-96519-02. If the requirements of this section cannot be met after readjustment of potentiometers or relays, the units should be returned to a repair center, since special techniques are involved in testing and clearing trouble in some of the components.

transmission loss from 2-wire to 4-wire transmit, (b) transmission loss from 4-wire receive to 2-wire and adjustment of REC or RCV potentiometer, (c) transhybrid loss from 4-wire receive to 4-wire transmit, and (d) blocking of the voice amplifier by the received signal frequency and insertion of band-elimination network.

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1.02 This section is reissued to revise the brief test for new or modified E2C units.

F. Operate Sensitivity of Receiver Signaling Amplifier: This test checks the receiver sensitivity and describes its adjustment by means of the SS potentiometer.

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This reissue does not affect the Equipment Test List.

1.03 The tests covered are:

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A. Pulsing of Transmitter A Relay:

This test checks that the A relay is properly following pulses and that the pulse corrector and cut circuit are functioning properly.

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B. Hold of B Relay: This test checks the B relay release time.

10

C. Transmitted Tone Level: This test checks the level of the transmitted single-frequency tone

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D. Cutoff Voltage of Q9 Transistor:

This test checks that Q9 transistor is not conducting when there is no signal input.

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E. Test of 4-Wire Terminating Circuit, Gain of Receiver Voice Amplifier, Blocking of Amplifier, and Insertion of Band-Elimination Network: The following features are checked: (a)

G. Timing of Receiver R Relay: This test checks the operate and release time of the R relay.

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H. Receiver Guard Action: This test checks the receiver guard circuit in limiting operation by voice signals.

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1.04 The 13A or the J94021A (21A) transmission measuring set is referred to in this section as the TMS.

1.05 The dial switch on the 13A TMS or the DET INPUT switch on the 21A TMS is referred to in this section as the TMS attenuator switch. The specific settings of the TMS attenuator switch are not given in the procedure unless necessary to prevent overload and possible damage to the instrument. The proper setting will be that which results in an on-scale reading on the TMS meter and will depend upon whether the 13A or 21A TMS is used and the specific value to be measured.

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

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1.07 The J98613AY 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 practice are part of the test circuit unless otherwise specified.

1.08 Percent break adjustments of the 2B test set should be made slowly above 70 percent. Incorrect values will be obtained if the rate of vibration of the PERCENT BREAK meter pointer is not the same as that of the PULSES PER SECOND meter pointer. To restore correct percent break values, turn the ADJ % BK control counterclockwise until both pointers are vibrating at the same rate, turn the control slowly clockwise until the desired percent break value is obtained. It may also be necessary to change the coarse ADJ % BK control from S, M, or L setting to obtain the desired range on the PERCENT BREAK meter.

1.09 Since this section covers units of various degrees of circuit modifications, the following designations are used and apply to the units shown.

The E1C is used as an example, similar notations will apply to E2C units.

DESIGNATION USED IN SECTION	DESIGNATION ON SF UNIT
E1C	E1C
E1C-10	E1C-10 (number will be specified)
E1C Stamping followed by any dash numbers	E1C-()
All E1C units with or without series numbers	All E1C

1.10 Lettered Steps: A letter *a, b, c*, etc, added to a step number in Part 3 or 4 of this section indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or 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.

1.11 A Brief Test for New or Modified Units: The steps listed below are to be used only

when it is reasonably certain that units have not suffered damage; otherwise, the complete test must be performed. These limited tests are not extensive enough to ensure that a unit will meet all requirements; however, they provide a reasonable degree of assurance of proper operation.

TEST FOR	UNIT	TEST	STEPS
A Relay	E1C	A	26 through 37f, 46, 70g, 71, and 72.
	E2C	A	26, 38g through 48, 54g through 74h
B Relay		B	26 through 32, 34, 38, and 40.
RCV Pot.		E	17 through 19, 53, 54, and 55.
SS Pot.		F	16 through 23.
R Relay		G	26 through 34.

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 J98613AC.

2.03 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).

2.04 13A or J94021A (21A) transmission measuring set (TMS). The 21A TMS must be used if test circuit is mounted in a REVERTIVE-TERMINATING bay.

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

2.06 Patching cord, P2A cord, 6 feet long, equipped with two 347B plugs (2P3B cord).

2.07 Patching cord, P3E cord, 6 feet long, equipped with two 310 plugs (3P7A cord).

2.08 Testing cord for 13A TMS, W2DL cord, 6 feet long, equipped with a 310 plug and

TABLE A

APPARATUS	TESTS							
	A	B	C	D	E	F	G	H
Test Circuit (2.02)	1	1	1	1	1	1	1	1
2B Test Set (2.03)	1	1	-	1	-	-	1	-
TMS (2.04)	1	-	1	-	1	1	-	1
Cord (2.05)	1	1	-	-	-	-	1	-
Cord (2.06)	1	1	-	-	-	-	1	-
Cord (2.07)	-	-	-	1	-	-	-	-
Cord (2.08)	1	-	1	-	1	1	-	1
Cord (2.09)	1	-	-	-	-	-	-	-
258D (dummy) Plug	1	1	-	-	-	-	1	-
Screwdriver, R-8210	-	-	-	-	1	1	-	-
Tool (2.10)	1	1	1	1	1	1	1	1
Blocking Tool (2.11)	√	-	-	-	√	-	-	-

√ As required.

two 35 cord tips (2W42A cord); for 21A TMS, P3N cord, 6 feet long, equipped with a 241A plug and 310 plug (3P17B cord). If test circuit is mounted in a REVERTIVE-TERMINATING bay, two 3P17B cords are required.

2.09 Testing cord, 2 feet long, equipped with 8-pin (male) Jones plug, KS-8585 L10 and 347 plug (P1P cord).

2.10 725A tool, used to gain mechanical advantage in prying loose the signaling units from connectors.

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

3. PREPARATION

STEP	ACTION	VERIFICATION
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All Tests

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

Note: The 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 Obtain release of signaling circuit in accordance with approved procedures.
- 3 Remove signaling unit from its in-service position, using 725A tool as shown in Fig. 1 or 2.

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STEP	ACTION	VERIFICATION
4	Plug signaling unit into folding test fixture.	
5	Set SF key of testing circuit to 2600.	
6	Operate 2-WIRE key.	
7a	If test circuit is mounted in a REVERTIVE-TERMINATING bay, J98613AP— Turn CT key to operate position.	

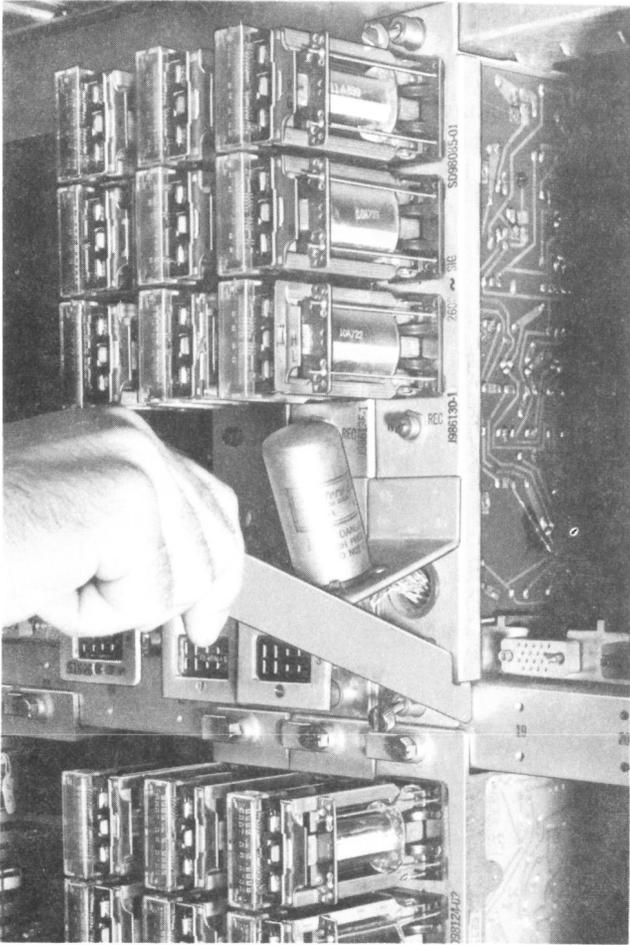


Fig. 1—Method of Removal of Fabricated Chassis

Tests A, C, E, F, and H

Note: Ac or dc ground must not be applied to tip or ring of line transmit terminals.

STEP	ACTION	VERIFICATION
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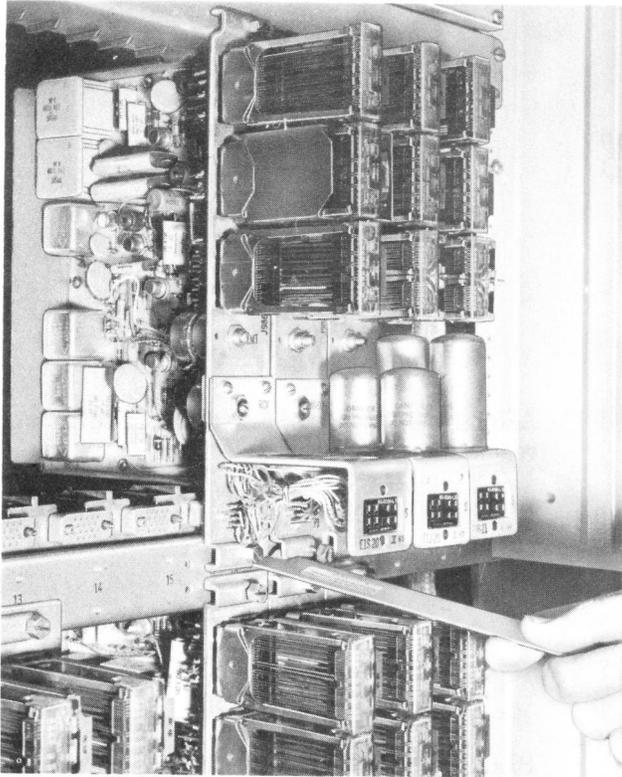


Fig. 2—Method of Removal of Die-Cast Chassis

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|-----|---|---|
| 8 | Connect 2W42A cord to IN terminals of 13A TMS or 241A plug of 3P17B cord to DET IN jack of 21A TMS. | |
| 9 | TMS should be known to be correctly calibrated. | |
| 10 | Connect TMS cord to SF SUP jack of test circuit. | TMS reads between -14.6 and -16.1 dB. |
| 11 | Set TMS attenuator switch to 0. | |
| 12 | Disconnect plug from SF SUP jack, connect to AMP OUT jack of test circuit. | |
| 13 | Set SW2 to position 2. | TMS reads 0 dB.
See Step 14b. |
| 14b | If requirement of Step 13 is not met—
Adjust gain control of MON AMPL to exactly 0 dB. | |

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STEP	ACTION	VERIFICATION
15	Disconnect plug from AMP OUT jack, connect to TMS jack of test circuit.	
Tests A, B, D, and G		
16	Patch E and M jacks of test circuit to E and M jacks of 2B test set, using 2P3B and 2P1D cords.	
17	On 2B test set— Set all keys to normal position.	
18	Set SCALE SEL switch to PPS.	
19	Plug power cords of 2B test set into A and B jacks of test circuit.	After 1 minute, PULSES PER SECOND meter reads other than 0.
20	Operate CONT PLS key to DIAL PLS.	PERCENT BREAK meter reads 0 on <i>black</i> scale. See Step 21c.
21c	If requirement of Step 20 is not met— Adjust pointer adjustment screw of PERCENT BREAK meter to obtain 0 reading.	
22	Insert 258D plug into P jack.	PERCENT BREAK meter reads 100 on <i>black</i> scale. See Step 23d.
23d	If requirement of Step 22 is not met— Unlock CAL % BK control, adjust to obtain reading of 100 on <i>black</i> scale of PERCENT BREAK meter and relock control taking care not to change 100 reading.	
24	Remove 258D plug. <i>Note:</i> Repeat Steps 22, 23d, and 24 if test extends beyond 30 minutes.	
25	Restore CONT PLS key to normal.	

4. METHOD

STEP	ACTION	VERIFICATION
A. Pulsing of Transmitter A Relay		
26	On 2B test set— Restore all keys to normal.	

STEP	ACTION	VERIFICATION
27	On test circuit— Set SW1 to position 7, SW2 to position 1.	
28	On 2B test set— Adjust ADJ PPS control to 10 pps on PULSES PER SECOND meter (0 to 20 scale).	
29	With coarse ADJ % BK switch on M— Adjust ADJ % BK control to 55 on <i>black</i> scale of PERCENT BREAK meter.	
30	Operate TWD L key to OFF HK, then PLS and MEAS % BK keys to LINE.	PERCENT BREAK meter reads 55 on <i>black</i> scale. See Step 31e.
31e	If requirement of Step 30 is not met— Adjust M potentiometer of testing circuit to 55 on <i>black</i> scale of PERCENT BREAK meter.	
32	Adjust ADJ % BK control to 45 on <i>black</i> scale of PERCENT BREAK meter.	
33	Connect P1P test cord from S socket of signaling unit to M1 jack on test circuit.	PERCENT BREAK meter reads 100 on <i>black</i> scale.
34	On test circuit— Set SW1 to position 2.	
35	Operate E1C 1 and E1C 2 keys.	
36	Press MIN LP key and hold.	B relay is operated. PERCENT BREAK meter reads between 34 and 44 on <i>black</i> scale. (If percent break requirement is not met, check A relay electrical and mechanical requirements.)
37f	◆If A relay required readjustment—◆ Remove cord from M1 jack and restore E1C1 and E1C2 keys. Repeat Steps 32 through 36.	
38g	If testing E2C unit— On 2B test set— Adjust ADJ % BK control fully counterclockwise and then clockwise until 10 on <i>black</i> scale of PERCENT BREAK meter is obtained.	
39g	Press TMS A and TMS B keys simultaneously.	TMS reads –45 dBm or less power.
40g	Release TMS A, TMS B keys.	

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STEP	ACTION	VERIFICATION
41g	Set attenuator switch of TMS to 20, 25, or 30.	
42g	On 2B test set— Adjust ADJ % BK control clockwise until 30 on black scale of PERCENT BREAK meter is obtained.	
43g	Press TMS A and TMS B keys simultaneously.	TMS reads between -26 and -31 dB with pulsating swings of approximately 1 dB.
44g	On 2B test set— Adjust ADJ % BK control slowly clockwise until the pulsating reading on the TMS starts to indicate greater power. (This may be repeated by adjusting the ADJ % BK control counterclockwise and then clockwise until the just-start-to-shift point is reached.)	Reading on PERCENT BREAK meter black scale should be between 45 and 55 percent.
45g	Release TMS A and TMS B keys.	
46	Release MIN LP key.	
47	Set SW1 to position 7.	
48	Remove P1P cord from M1 jack.	
49	On 2B test set— Adjust ADJ % BK control to 70 on black scale of PERCENT BREAK meter.	
50	On test circuit— Set SW1 to position 2.	
51	Insert P1P cord into M1 jack.	
52	Press MAX LP key and hold for the following steps.	B relay is operated. PERCENT BREAK meter reads between 70 and 80 on black scale of 2B test set. (If percent break requirement is not met, check A relay electrical and mechanical requirements.)
53f	◆If A relay required readjustment—◆ Remove cord from M1 jack and restore E1C 1 and E1C 2 keys. Repeat Steps 32 through 52.	
54g	If testing E2C unit— Block B relay operated.	
55g	On 2B test set— Adjust ADJ % BK control slowly clockwise	

STEP	ACTION	VERIFICATION
	until 90 on the black scale of the PERCENT BREAK meter is obtained.	
56g	Press TMS A and TMS B keys simultaneously.	TMS reads between -24 and -28 dB with pulsating swings of approximately 0.7 dB.
57g	On 2B test set— Adjust ADJ % BK control slowly counterclockwise until the pulsating reading on the TMS starts to indicate less power. (This may be repeated by slowly adjusting the ADJ % BK control clockwise and then counterclockwise until the just-start-to-shift point is reached.)	Reading on PERCENT BREAK meter black scale should be between 65 and 79 percent.
58g	Release TMS A and TMS B keys.	
59g	Remove blocking tool from B relay.	
60	Release MAX LP key.	
61g	On 2B test set— Adjust ADJ PPS control to 3 pps on PULSES PER SECOND meter.	
62g	Set attenuator switch of TMS to 20.	
63g	Insert dummy plug into SF SUP jack.	
64g	Press MIN LP, TMS A, and TMS B keys simultaneously.	
65g	On 2B test set— Adjust ADJ % BK control to 30 on black scale of PERCENT BREAK meter.	TMS meter needle pulsates at approximately 3 pps. See note 68g.
66g	Release MIN LP, TMS A, and TMS B keys.	
67g	Operate MAX LP, TMS A, and TMS B keys.	
68g	On 2B test set— Adjust ADJ % BK control slowly clockwise until reading on TMS just stops pulsating. (For greater range, set coarse ADJ % BK to L.)	PERCENT BREAK meter reads less than 80 on black scale. See note.
	Note: If requirements of Steps 65g and 68g are not met, cut circuit is not functioning properly. Replace unit.	
69g	Release MAX LP, TMS A, and TMS B keys.	
70g	Remove dummy plug from SF SUP jack.	

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STEP	ACTION	VERIFICATION
71	Remove test cord from S socket and M1 jack.	
72	On 2B test set— Restore keys to normal.	
73	On test circuit— Restore E1C 1 and E1C 2 keys to normal.	
74h	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. Hold of B Relay		
26	On test circuit— Set SW1 and SW2 to position 1.	
27	On 2B test set— Adjust ADJ PPS control to 3 pps on PULSES PER SECOND meter.	
28	With coarse ADJ % BK control on L— Adjust ADJ % BK control to 80 on <i>black</i> scale of PERCENT BREAK meter.	
29	Operate TWD L key to OFF HK; PLS and MEAS % BK keys to LINE.	
30	On test circuit— Operate E1C 1 and E1C 2 keys.	
31	Press MAX LP key.	A relay pulses while B relay remains operated. Observe that S lamp remains lighted.
32	Release MAX LP key.	A and B relays released. S lamp is extinguished.
33e	If B relay is readjusted— Repeat Steps 27 through 32.	
34	On 2B test set— Restore <i>only</i> PLS and MEAS % BK keys to normal.	
35	On test circuit— Press MAX LP key.	A and B relays operated.
36	Release MAX LP key.	A relay released. In less than 1 second, B relay should release.
	<i>Note:</i> Steps 35 and 36 may be repeated in order to observe release time of B relay.	

STEP	ACTION	VERIFICATION
37e	If B relay is readjusted— Repeat Steps 27 through 36.	
38	On 2B test set— Restore TWD L key to normal.	
39	Adjust ADJ % BK control to 20 on <i>black</i> scale of PERCENT BREAK meter.	
40	On test circuit— Restore E1C 1 and E1C 2 keys to normal.	
41f	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.	
C. Transmitted Tone Level		
16	On test circuit— Operate E1C 1 and E1C 2 keys.	
17	Set SW1 to position 3, SW2 to position 1.	
18	Press TMS A and TMS B keys simultaneously.	TMS reads between -34.4 and -37 dB.
19	Release TMS A and TMS B keys.	
20	Set SW1 to position 4.	
21	Press TMS A, TMS B, and MAX LP keys simultaneously.	A and B relays operated. TMS reads less power than -45 dBm.
22	Release TMS A, TMS B, and MAX LP keys.	
23	Set attenuator switch of TMS to 20.	
24	Press TMS A and TMS B keys simultaneously.	
25	While TMS A and TMS B keys are still operated, manually operate B relay.	TMS reads between -22 and -25 dB.
26	Release TMS A and TMS B keys and B relay.	
27	Restore E1C 1 and E1C 2 keys to normal.	
28c	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.	

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STEP	ACTION	VERIFICATION
D. Cutoff Voltage of Q9 Transistor		
26	On test circuit— Set SW1 to position 5, SW2 to position 1.	
27	Patch between SENS 1 jack and VM jack on 2B test set using 3P7A cord.	
28	On 2B test set— Set SCALE SEL switch to 20V.	VOLT meter of 2B test set reads: No more than 0.2 for E1C() or E2C() and between 0.5 and 1.7 for E1C.
29	Remove patch between SENS 1 jack and VM jack.	
30	On 2B test set— Set SCALE SEL switch to PPS.	
31e	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.	

E. Test of 4-Wire Terminating Circuit, Gain of Receiver Voice Amplifier, Blocking of Amplifier, and Insertion of Band-Elimination Network

2-Wire to 4-Wire Loss

16	Operate 1000~A key.	
17	Set SW1 to position 5, SW2 to position 2.	
18	Operate BAT LP key to LP.	
19	Operate LP CUR 1 key.	A and B relays operate.
20	Set attenuator switch of TMS to 10 or 15.	
21	On test circuit— Press TMS A and TMS B keys simultaneously.	TMS reads -15 to -16.3 dB for any E1C up to E1C-19 or E2C-10 to E2C-14 and -15.5 to -16.1 dB for any E1C-20 or E2C-15 or higher.
22	While pressing TMS A and TMS B keys, restore LP CUR 1 key to normal.	A and B relays release. TMS reads -45 dBm or less power.
23	Operate LP CUR 1 key.	A and B relays operate.
24	Release TMS A and TMS B keys.	

STEP	ACTION	VERIFICATION
25	Restore 1000 ~A key to normal.	TMS reads -45 dBm or less power. If the requirement is not met, battery noise may be excessive.
4-Wire to 2-Wire Loss		
26	Operate 1000~B key.	
27	Set REC or RCV potentiometer of signaling unit fully counterclockwise.	
28	Set attenuator switch of TMS to 30 or 35.	TMS reads -39 dBm or less power.
29	Set attenuator switch of TMS to 0 (red scale).	
30	Adjust REC or RCV potentiometer to full clockwise position.	TMS reads $+1$ dBm or greater power.
31	Adjust REC or RCV potentiometer to obtain exactly 0 dB.	TMS reads 0 dB.
32	Manually operate R relay on signaling unit.	TMS reading should not be less than -1.0 dB.
33	Release R relay.	
34	On test circuit— Press TMS A and TMS B keys simultaneously.	TMS reads between -14 and -18 dB.
35	Operate 2W TER key.	TMS reading drops at least 15 dB below reading of Step 34.
36	On test circuit— Release TMS A and TMS B keys.	
37	Restore 2W TER key to normal.	
38	Set dial switch of TMS to 0.	
39	On test circuit— Restore LP CUR 1 and 1000~ B keys to normal.	A and B relays release.
40	Set SW1 to position 6, SW2 to position 4.	
41	Set ATT attenuator to 10.	TMS reads 0 ± 0.2 dB. See Step 42d.
42d	If requirement of Step 40 is not met— Adjust gain potentiometer of TEST AMPL to obtain reading of 0 dB.	
43	Set SW1 to position 5, SW2 to position 3.	

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STEP	ACTION	VERIFICATION
44	Operate LP CUR 1 key.	A and B relays operate.
45	Block R relay of signaling unit nonoperated.	
46	On test circuit— Set SW1 to position 6.	TMS reads -36 dBm or less power.
47	Remove blocking tool from R relay.	R relay operates. See Step 47e.
48e	If R relay does not operate— Perform Test F, then repeat Steps 39 through 46 before continuing with this test.	
49	On test circuit— Restore LP CUR 1 key to normal.	A and B relays release. TMS reads -30 dBm or less power, or if the test circuit is in a REVERTIVE-TERMINATING bay and the CT key is operated (see Step 7a of Preparation), a TMS reading of -28 dBm or less power is satisfactory.
50f	If the test circuit is in a REVERTIVE-TERMINATING bay and the CT key is operated and the requirement of Step 48 is not met— Adjust the oscillator of the 21A TMS to 2600 ± 10 Hz at a level of -15.6 dB, and connect it to the SF TST jack using a 3P17B cord.	TMS reads -30 dBm or less power.
51	Set SW1 to position 5, SW2 to position 2.	R relay releases.
52	Set attenuator switch of TMS to 0.	
53	On test circuit— Operate LP CUR 1 key.	A and B relays operate.
54	Operate 1000~B key and adjust REC or RCV potentiometer of signaling unit for specific 4-wire to 2-wire loss. Note: Minor readjustments of REC or RCV potentiometer of less than 1 dB may be necessary to meet overall trunk net loss requirements.	TMS reads specified value shown for signaling unit on trunk layout record plus 0.2 dB. (Additional 0.2 dB is caused by measuring a 900-ohm circuit using a 600-ohm TMS). Example: Specified value shown for signaling unit on trunk layout record is 8.8 dB. $8.8 \text{ dB} + 0.2 \text{ dB} = 9 \text{ dB}$.
55	On test circuit— Restore LP CUR 1 and 1000~B keys to normal; BAT LP key to BAT.	A and B relay released.
56	Set SW2 to position 4.	

STEP	ACTION	VERIFICATION
57g	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.	
F. Operate Sensitivity of Receiver Signaling Amplifier		
16	Set attenuator switch of TMS to 0.	
17	On test circuit— Set SW1 to position 6, SW2 to position 4.	
18	Set ATT attenuator to 10.	TMS reads 0 ± 0.2 dB. See Step 19c.
19c	If requirement of Step 18 is not met— Adjust gain control of TEST AMPL for 0 dB.	
20	Set ATT attenuator to 36.	
21	Change SW2 to position 3.	R relay not operated. See Step 22d.
22d	If R relay does operate— Turn SS potentiometer of signaling unit slightly counterclockwise until R relay releases.	R relay released.
23	Set ATT attenuator to 32.	R relay operated. See Step 24e.
24e	If R relay does not operate— Turn SS potentiometer clockwise until R relay just operates.	
25e	Repeat Steps 20 through 23 until the requirements of Steps 21 and 23 are met, starting with SW2 in position 4.	
26	Set ATT attenuator to 40.	R relay released.
27	Set SW1 to position 5.	
28f	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.	

G. Timing of Receiver R Relay

Note: Timing of R relay depends upon proper adjustment of SS potentiometer. Perform

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STEP	ACTION	VERIFICATION
	Test F first, if the setting of the SS potentiometer is unknown.	
26	On 2B test set— Adjust ADJ PPS control to 10 pps on PULSES PER SECOND meter (0 to 20 scale).	
27	With coarse ADJ % BK control on M— Adjust ADJ % BK control to 55 on <i>black</i> scale of PERCENT BREAK meter.	
28	On test circuit— Set SW1 to position 7.	
29	On 2B test set— Set TWD L key to OFF HK; PLS and MEAS % BK keys to LINE.	PERCENT BREAK meter reads 55 on <i>black</i> scale. See Step 30e.
30e	If requirement of Step 29 is not met— Adjust M potentiometer of testing circuit to 55 on <i>black</i> scale of PERCENT BREAK meter.	
31	Set ATT attenuator to 11.	
32	On 2B test set— Adjust ADJ PPS control to 3 pps.	
33	On 2B test set— With coarse ADJ % BK switch on L— Adjust ADJ % BK control to obtain reading on <i>black</i> scale of PERCENT BREAK meter of: 55, if testing R relay AJ79; 21, if testing R relay AJ130.	
34	On test circuit— Set SW1 to position 8, SW2 to position 3.	R relay should pulse. Reading on PERCENT BREAK meter <i>red</i> scale should be: 44 to 66 percent, for R relay AJ79; 17 to 30 percent, for R relay AJ130.
35f	If SF unit is E1C-10 or higher or E2C— Change ATT attenuator setting in 2-dB increments from 5 to 17 dB.	Reading in Step 34 should not change more than ± 2 percent.
36	Set ATT attenuator to 11.	
37g	If unit is equipped with R relay type AJ130— Set SW1 to position 7.	

STEP	ACTION	VERIFICATION
38g	On 2B test set— Adjust ADJ % BK control to 38 on <i>black</i> scale of PERCENT BREAK meter.	
39g	On test circuit— Set SW1 to position 8.	R relay should pulse. Reading on PERCENT BREAK meter <i>red</i> scale should be 42 or less.
40	On 2B test set— Restore all keys to normal.	
41h	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.	

H. Receiver Guard Action

16	Set attenuator switch of TMS to 10 or 15.	
17	On test circuit— Set SW1 to position 5, SW2 to position 6.	TMS reads between -18.5 and -19.5 dB.
18	Set ATT attenuator to: 32 for E1C; 22 for E1C-() or E2C-().	
19	Set SW2 to position 5.	R relay remains released.
20	Change SW1 to position 6.	R relay remains released.
21	Set SW1 to position 5.	
22	Change ATT attenuator to: 19 for E1C; 13 for E1C-() or E2C-().	
23	Set SW1 to position 6.	R relay operated.
24	Set SW1 to position 5.	R relay released.
25	Remove all cords, restore all keys to normal, and return signaling unit to service or spare position.	