2600-HZ E1D, E2D,OR E3D SINGLE-FREQUENCY SIGNALING CIRCUIT OUT-OF-SERVICE TESTS USING TESTING CIRCUIT SD-96519-01 OR SD-96519-02

1. GENERAL

1.01 This section describes methods of making out-of-service tests of 2600-Hz single-frequency signaling circuits per SD-98087-01 or SD-98087-02 using testing circuit per SD-96519-01 or SD-96519-02. It also describes methods of making potentiometer adjustments to correct for changes in the characteristics of some circuit elements. If the requirements of this section cannot be met after readjustment of potentiometers or relays, the units should be returned to a repair center because of special techniques involved in testing and clearing trouble on some of the components.

> ***Note:*** 291- and 303-type relays shall be maintained in an upright position not less than 1 minute before beginning any tests.

1.02 This section is reissued to correct information in Tests D and F. This reissue does not affect the Equipment Test List.

1.03 The tests covered are:

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.

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 above 70 percent on the 2B test set should be made slowly. 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, then turn the control more slowly clockwise until the desired percent break value is obtained. It may also be necessary to change the coarse ADJ % BK switch from S, M, or L setting to obtain the desired range on the PERCENT BREAK meter.

1.09 Since this section covers E1D units with different wiring arrangements, the following designations are used to identify the units. All E2D and E3D units, regardless of dash numbers, are referred to as E2D and E3D, respectively.

DESIGNATION	DESCRIPTION
E1D	E1D units without series number (unmodified)
E1D-#	A specific numbered unit
E1D-( )	All E1D units with series numbers
No Designation	All units with or without series numbers

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:*** A brief test may be used to check new or modified units prior to placing them in service. The brief test is to be used only when it is reasonably certain that units have not suffered damage. 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. If the unit fails to meet these test requirements, a complete test must be performed. Brief test steps in this section are designated with a bullet mark (•) preceeding the steps in Tests A, D, E, F, and PREPARATION.

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 The 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 The 13A or the J94021A (21A) transmission measuring set (TMS).

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 310 plug and two 35 cord tips (2W42A cord); for 21A TMS, P3N cord, 6 feet long, equipped with a 241A plug and a 310 plug (3P17B cord).

TABLE A

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

√ As 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 The 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
All Tests		
● 1	At 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.	

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.	

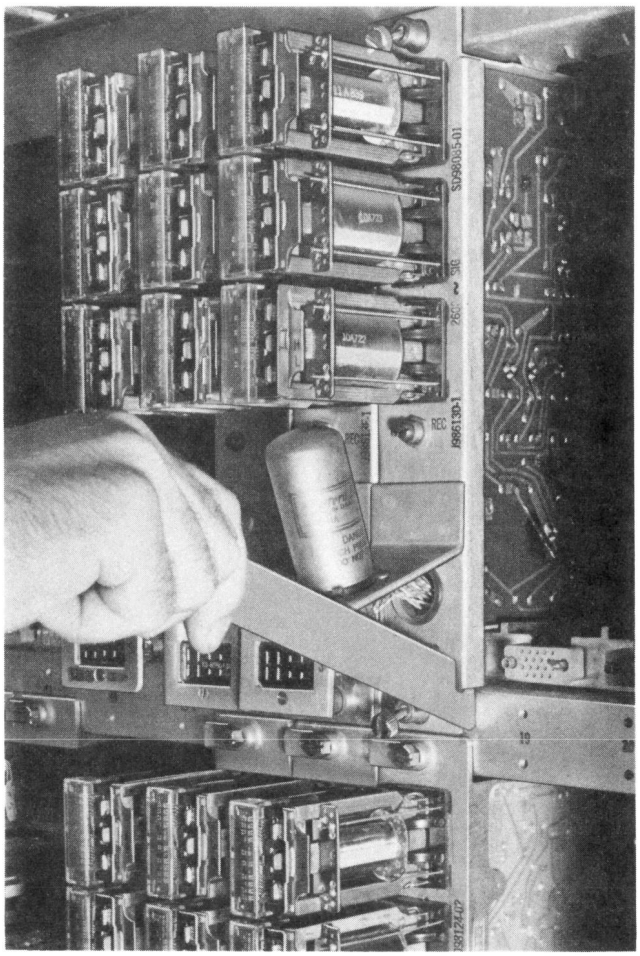

Fig. 1—Method of Removal of Fabricated Chassis

Tests A, B, D, E, and G

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

STEP	ACTION	VERIFICATION

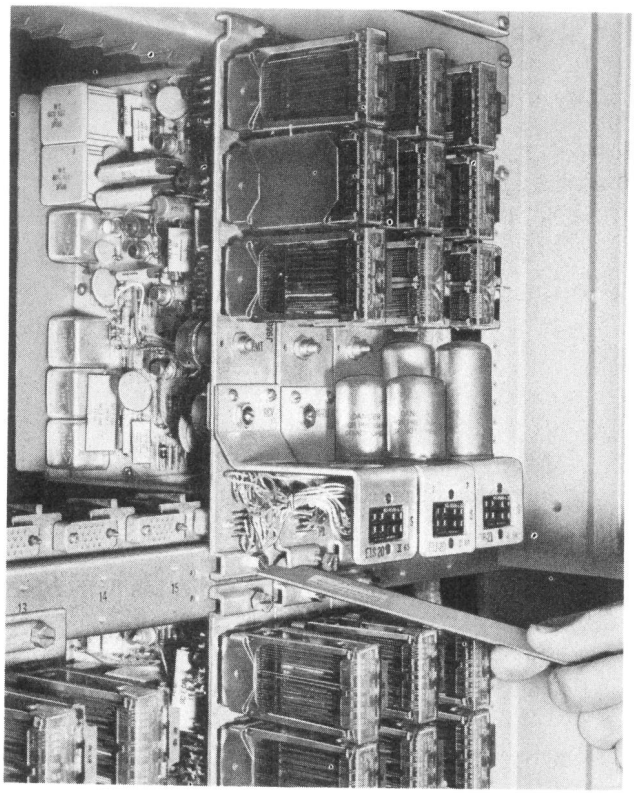

Fig. 2—Method of Removal of Die-Cast Chassis

● 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 indicates 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 RECEIVER SW2 to position 2.	TMS indicates 0 dB. See Step 14b.
● 14b	If requirement of Step 13 is not met— Adjust gain control of MON AMPL to exactly 0 dB.	

STEP	ACTION	VERIFICATION
● 15	Disconnect plug from AMP OUT jack, connect to TMS jack of test circuit.	
Tests A, C, and F		
● 16	Patch E, M jacks of test circuit to E, M jacks of 2B test set, using 2P3B, 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, B jacks of test circuit.	After 1 minute, PULSES PER SECOND meter indicates other than 0.
● 20	Operate CONT PLS key to DIAL PLS.	PERCENT BREAK meter indicates 0 on ***black*** 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. ***Note:*** Repeat Steps 22, 23d, and 24 if test extends beyond 30 minutes.	PRECENT BREAK meter indicates 100 on ***black*** scale. See Step 23d.
● 23d	If requirement of Step 22 is not met— Unlock CAL % BK control, adjust control with screwdriver to obtain reading of 100, relock control taking care not to change 100 reading. ***Note:*** The proper performance of the tests covered in this section depends upon the correct pulse-per-second calibration and range of the 2B test set. See Section 100-263-501 for calibration if accuracy is not known.	
● 24	Remove 258D plug.	
● 25	Restore CONT PLS key to normal.	

4. METHOD

STEP	ACTION	VERIFICATION
	A. Operation of Transmitter CS Relay and Operation of CS1 and HL Relays E2D and E3D Units	
● 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 switch on M— Adjust ADJ % BK control to 55 on ***black*** scale of PERCENT BREAK meter.	
● 28	On test circuit— Set SW1 to position 7.	
● 29	On 2B test set— Operate TWD L key to OFF-HK then PLS, MEAS % BK keys to LINE.	PERCENT BREAK meter indicates 55 on ***black*** scale. See Step 30e.
● 30e	If requirement of Step 29 is not met— Adjust M potentiometer of testing circuit to 55 on ***black*** scale of PERCENT BREAK meter.	
● 31	Adjust ADJ % BK control to 70 on ***black*** scale of PERCENT BREAK meter.	
● 32	Adjust ADJ PPS control until 21 on ***black*** scale of PER CENT BREAK meter is obtained.	PULSES PER SECOND meter indicates between 2.6 and 3.4 pps.
● 33	Patch P1P test cord from S socket of signaling unit to M1 jack on test circuit.	
● 34	On test circuit— Set SW1 and SW2 to position 1.	
● 35	On test circuit— Operate E1D 1, E1D 2 keys.	CS relay pulses. ON E2D and E3D units, CS1 relay also pulses. PERCENT BREAK meter indicates between 20 and 29 on ***black*** scale. See Step 36f.
● 36f	If requirement of Step 35 is not met— Mechanical and electrical requirements of CS relay on unit under test should be checked.	
● 37f	Repeat Steps 26 and 31 through 35, if any adjustments were made on CS relay.	

STEP	ACTION	VERIFICATION
● 38g	If testing E2D or E3D units— On 2B test set— Operate course ADJ % BK control to L. Adjust ADJ % BK control to 80 on ***black*** scale of PERCENT BREAK meter.	CS and CS1 relays pulse. HL relay remains operated. If requirement is not met, check requirements of CS and CS1 relays.
● 39g	Restore PLS key to normal.	CS and HL relays are operated. CS1 relay is released.
● 40g	Restore TWD L key to normal.	CS relay releases. CS1 relay operates releasing HL relay in less than 1 second. ***Note:*** In order to confirm verfication, this step may be repeated by operating the TWD L key to OFF HK and then to normal.
● 41g	Set attenuator switch of TMS to 20.	
● 42g	Insert dummy plug into SF SUP jack.	
● 43g	Set SW1 to position 2.	
● 44g	Press TMS A and TMS B keys simultaneously.	
● 45g	On 2B test set— Operate TWD L key to OFF HK, PLS key to LINE.	
● 46g	Adjust ADJ % BK control counterclockwise until 50 on ***black*** scale of PERCENT BREAK meter is obtained.	Needle on TMS pulsates at approximately 3-pps rate. See Step 50h.
● 47g	Adjust ADJ % BK control slowly clockwise until TMS stops pulsating.	PERCENT BREAK meter inidcates less than 80 on ***black*** scale. See Step 50h.
● 48g	Release TMS A and TMS B keys.	
● 49g	Remove dummy plug from SF SUP jack.	
● 50h	If the requirements of Steps 46g and 47g are not met— Cut circuit is not operating properly and unit must be returned to a repair center.	
● 51	Restore E1D 1, E1D 2 keys to normal.	
● 52	Remove test cord between S socket and M1 jack.	

STEP	ACTION	VERIFICATION
● 53	On 2B test set— Restore keys to normal.	
● 54i	If no other tests are to be made— Remove all cords, restore all keys to normal, return signaling unit to service or spare position.	
	B. Transmitted Tone Level	
● 16	On test circuit— Operate E1D 1, E1D 2 keys.	
● 17	Set SW1 to position 3, SW2 to position 1.	
● 18	Press TMS A, TMS B keys simultaneously.	TMS indicates between −34.7 and −37.3 dB.
● 19	With TMS A, TMS B keys still pressed, set SW1 to position 4.	CS relay operated. On E2D and E3D units, CS1 relay releases operating HL relay. Reading of TMS should indicate less power than −45 dBm.
● 20	Release TMS A, TMS B keys.	
● 21c	If testing E1D-10 or higher, E2D, or E3D unit— Set attenuator switch of TMS to 20.	
● 22c	Block CS relay operated.	
● 23c	Press TMS A, TMS B keys.	
● 23c	Set SW1 to position 3.	
● 25c	Remove blocking tool from CS relay. ***Note:*** In order to confirm verification, this step may be repeated by manually operating the CS relay and then allowing it to release.	CS relay releases. On E2D or E3D unit, CS1 relay operates releasing HL relay. Peak (kick) reading of TMS should be between −22 and −27 dB.
● 26c	Release TMS A, TMS B keys.	
● 27	Restore E1D 1, E1D 2 keys to normal.	
● 28	Set attenuator switch of TMS to 0.	
● 29d	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. Cutoff Voltage of Q9 Translator		
26	Set SW1 to position 5, SW2 to position 1.	
27	Using 3P7A cord, patch between SENS 1 jack and VM jack of 2B test set.	
28	On 2B test set— Set SCALE SEL switch to 20V.	VOLTS meter of 2B test set indicates: E1D—between 0.5 and 1.7 E1D-( ), E2D, or E3D—not more than 0.7.
29	Remove patch between SENS 1 jack and VM jack.	
30e	If no other tests are to be made— Remove all cords, restore all keys to normal, return signaling unit to service or spare position.	
D. Test of 4-Wire Terminating Circuit, Gain of Receiver Voice Amplifier, and Blocking of Amplifier		
2-Wire to 4-Wire Loss		
● 16	Operate 1000~A key.	
● 17	Set SW1 to position 5, SW2 to position 2.	
● 18	Verify that BAT LP key is in BAT position.	
● 19	Operate LP CUR 1 key.	CS relay operated. On E2D or E3D unit, CS1 relay releases operating HL relay.
20	Set attenuator switch of TMS to 15 or 10.	
21	Press TMS A, TMS B keys simultaneously.	TMS indicates: For E1D up to E1D-19, E2D-10, or E3D-10, between −15 and −16.3 dB. For E1D-20 or higher, E2D-15 or higher, and E3D-15 or higher, between −15.4 and −16.2 dB.
22c	If testing E2D or E3D unit— With TMS A and TMS B keys operated, restore LP CUR 1 key to normal.	
23c	While observing TMS reading, operate LP CUR 2 key.	Reading in Step 21 is removed, but reappears in about 1 second.

STEP	ACTION	VERIFICATION
	Note: To recheck this requirement, restore LP CUR 2 key and operate LP CUR 1 key, then repeat Steps 22c and 23c.	***Note:*** If this requirement is not met, the unit must be replaced.
24c	Restore LP CUR 2 key and operate LP CUR 1 key.	
25	Release TMS A, TMS B keys.	
26	Restore 1000~A key to normal.	
4-Wire to 2-Wire Loss		
27	Operate 1000~B key.	
28	Set REC or RCV potentiometer fully counterclockwise.	TMS indicates −39 dB or less power.
29	Set attenuator switch of TMS to 0 ***red*** scale.	
30	Adjust REC or RCV potentiometer to full clockwise position.	TMS indicates +1 dBm or greater power.
31	Adjust REC or RCV potentiometer to obtain exactly 0 dB.	TMS indicates 0 dB on ***red*** scale.
2-Wire Loss		
32	Press TMS A, TMS B keys simultaneously.	TMS indicates between −14 and −18 dB.
33	Operate 2W TER key.	TMS reading at least 15-dB below that of Step 32.
34	Set TMS attenduator switch to 0.	
35	Release TMS A, TMS B keys.	
36	Restore 2W TER key to normal.	
37	Restore LP CUR 1, 1000~B keys to normal.	
38	Operate, then release LP CUR 2 key.	CS relay releases.
39	Set SW1 to position 6, SW2 to position 4.	
40	Set ATT attenuator to 10. ***Note:*** See Step 7a of PREPARATION.	TMS indicates 0. See Step 41d.
41d	If requirement of Step 40 is not met— Adjust gain potentiometer of TEST AMPL to obtain 0 dB.	

STEP	ACTION	VERIFICATION
Electronic Cut		
42	◗Set SW1 to position 5, SW2 to position 3.	
43	Operate LP CUR 1 key.	CS relay operated.
44	Block RG relay nonoperated.	
45	Set SW1 to position 6.	TMS indicates −40 dBm or less power.
46	Remove blocking tool from RG relay.	RG relay operated. CS relay releases. ***Note:*** Operation of RG relay depends on sensitivity adjustment. If RG relay does not operate, perform Test E, then repeat Steps 39 through 46 of this test.
47	Restore LP CUR 1 key to normal.	TMS indicates −45 dBm or less power.
48e	If testing E2D or E3D unit— Set SW1 to position 5, SW2 to position 2.	
49e	Operate 1000~A key.	
50e	Block RG relay operated.	
51e	Set attenuator switch of TMS to 10 or 15.	
52e	Press TMS A and TMS B keys simultaneously.	CS relay should be released. If not, release manually. TMS indicates between −15.4 and −16.2 dB.
53e	Set SW1 to position 6.	TMS indicates −40 dB or less power. ***Note:*** If this requirement is not met, the unit must be replaced.
54e	Release TMS A and TMS B keys.	
55e	Remove blocking tool from RG relay.	
56e	Restore 1000~A key to normal.	
57	Set SW1 to position 5, SW2 to position 2.	RG relay releases.
58	Set attenuator switch of TMS to 0.	
59	Operate LP CUR 1 key.	CS relay operates.
60	Operate 1000~B key.	TMS indicates 0 dBm.

STEP	ACTION	VERIFICATION
● 61	Adjust REC or RCV potentiometer of signaling unit for specific 4-wire to 2-wire loss. ***Note:*** Readjustment of the REC or RCV potentiometer of less than 1 dB may be made to meet overall trunk net loss requirements.	TMS indicates 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 dB + 0.2 dB = 9 dB.
● 62	Restore LP CUR 1, 1000~B keys to normal.	
● 63	Operate, then release LP CUR 2 key.	CS relay releases.
● 64	Set SW2 to position 4.	
● 65	If no other tests are to be made— Remove all cords, restore all keys to normal, return signaling unit to service or spare position.◀	

E. Operate Sensitivity of Receiver Signaling Amplifier

● 16	On test circuit— Set SW1 to position 6, SW2 to position 4.	
● 17	Set attenuator switch of TMS to 0.	
● 18	Set ATT attenuator to 10.	TMS indicates 0. 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 34.	
● 21	Change SW2 to position 3.	RG relay not operated. See Step 22d.
● 22d	If RG relay operates— Adjust SS potentiometer of signaling unit slightly counterclockwise until RG relay releases.	
● 23	Set ATT attenuator to 32.	RG relay operated. See Step 24e.
● 24e	If RG relay does not operate— Increase setting of SS potentiometer until RG relay just operates.	

STEP	ACTION	VERIFICATION
25e	Repeat Steps 20 through 24e, until requirements of Steps 21 and 23 are met, starting with SW2 in position 4.	
26	Set ATT attenuator to 40.	RG relay releases.
27f	If testing E1D-( ), E2D, or E3D unit— Set SW1 to position 5, SW2 to position 3.	
28f	Operate LP CUR 1 key.	CS relay operated.
29f	Set ATT attenuator to 26.	
30f	Set SW1 to position 6.	RG relay remains released.
31f	Set ATT attenuator to 20.	RG relay operates, releasing CS relay.
32f	Set SW2 to position 1.	RG relay releases.
33f	Restore LP CUR 1 key to normal.	
34g	If no other tests are to be made— Remove all cords, restore all keys to normal, return signaling unit to service or spare position.	

F. Timing of Receiver R and RG relays

Note: The requirements of this test depend upon the setting of the SS potentiometer. Perform Test E first, if setting of 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 switch on M— Adjust ADJ % BK control for 55 on ***black*** scale of PERCENT BREAK meter.	
● 28	On test circuit— Set SW1 to position 7.	
● 29	On 2B test set— Operate TWD L key to OFF-HK then PLS, MEAS % BK keys to LINE.	PERCENT BREAK meter indicates 55 on ***black*** scale. See Step 30e.
● 30e	If requirement of Step 29 is not met— Adjust M potentiometer of testing circuit to 55 on ***black*** scale of PERCENT BREAK meter.	

STEP	ACTION	VERIFICATION
● 31	Set ATT attenuator to 11.	
● 32f	If testing E1D with no list number following the J number, E1D with L1 following J number, or E2D unit— On 2B test set— Adjust ADJ % BK control to 31 on ***black*** scale of PERCENT BREAK meter.	
● 33f	Turn ADJ PPS control counterclockwise to 3 PPS on PULSES PER SECOND meter.	
● 34f	On test circuit— Set SW1 to position 8, SW2 to position 3.	PERCENT BREAK meter indicates between 0 and 6 on ***red*** scale. See Steps 40g through 45g.
● 35f	Set SW1 to position 7.	
● 36f	On 2B test set— Adjust ADJ PPS control to 10 pps on PULSES PER SECOND meter.	
● 37f	Adjust ADJ % BK control to 35 on ***black*** scale of PERCENT BREAK meter.	
● 38f	Turn ADJ PPS control counterclockwise to 3 pps on PULSES PER SECOND meter.	
● 39f	On test circuit— Set SW1 to position 8.	Reading on PERCENT BREAK meter of 8 or more on ***red*** scale. See Steps 40g through 45g.
Adjust OT		
40g	If requirement of Step 34f or 39f is not met— Set SW1 to position 7.	
41g	On 2B test set— Adjust ADJ PPS control to 10 pps on PULSES PER SECOND meter.	
42g	Adjust ADJ % BK control to 33 on ***black*** scale of PERCENT BREAK meter.	
43g	Turn ADJ PPS control counterclockwise to 3 pps on PULSES PER SECOND meter.	
44g	On test circuit— Set SW1 to position 8.	

STEP	ACTION	VERIFICATION
45g	Adjust OT potentiometer of signaling unit until RG relay pulses steadily at 3 pps. (Gauge by observing PPS meter.)	PERCENT BREAK meter indicates 8 or more on ***red*** scale.
Adjust RT		
● 46f	On test circuit— Set SW1 to position 7.	
● 47f	On 2B test set— Adjust ADJ PPS control to 10 pps on PULSES PER SECOND meter.	
● 48f	Adjust ADJ % BK control to 45 on ***black*** scale of PERCENT BREAK meter.	
● 49f	On test circuit— Set SW1 to position 8.	PERCENT BREAK meter indicates 48 to 50 on ***red*** scale. See Step 50h.
50h	If requirement of Step 49f is not met— Turn RT potentiometer of signaling unit fully counterclockwise, then rotate clockwise until 49 is obtained.	
51f	Set SW1 to position 7.	
52i	If testing E1D-( ) with L1 following J number, or E2D unit— On 2B test set— Adjust ADJ PPS control to 12 pps on PULSES PER SECOND meter.	
53i	Adjust ADJ % BK control to minimum and then to 50 on ***black*** scale of PERCENT BREAK meter.	
54i	Set SW1 to position 8.	
56i	On 2B test set— Adjust ADJ % BK control to 75 on ***black*** scale of PERCENT BREAK meter.	
57i	Set SW1 to position 8.	Unit pulses uniformly with PERCENT BREAK meter reading between 56 and 69 on ***red*** scale. ***EID Units upper limit is 72***
58i	On 2B test set— Adjust ADJ PPS control to 10 pps on PULSES PER SECOND meter.	

STEP	ACTION	VERIFICATION
Rering Response		
59f	Set SW1 to position 7.	
60f	On 2B test set— Adjust ADJ % BK control to 55 on ***black*** scale of PERCENT BREAK meter.	
61f	Adjust ADJ PPS control to 4 pps on PULSES PER SECOND meter.	PERCENT BREAK meter reads 22 on ***black*** scale. See Step 62f.
62f	If requirement of Step 61f is not met— Adjust ADJ PPS control until 22 on ***black*** scale of PERCENT BREAK meter is obtained.	
63f	On test circuit— Operate LP CUR 1 key.	
64f	Set SW1 to position 8.	CS, RG relays pulse. PERCENT BREAK meter reads between 20 to 30 on ***red*** scale.
65f	Change ATT attenuator in 2-dB increments from 5 to 17.	Reading in Step 64f should not vary more than ± 2 percent.
66f	Set ATT attenuator to 11.	
67f	Set SW1 to position 7.	
68f	On 2B test set— Adjust ADJ % BK control to 50 on ***black*** scale of PERCENT BREAK meter.	
69f	Set SW1 to position 8.	PERCENT BREAK meter indicates between 39 and 54 on ***red*** scale.
70f	Set SW1 to position 7.	
71f	Restore LP CUR 1 key to normal.	
72f	On 2B test set— Restore all keys to normal.	
● 73j	If testing E1D with L2 following J number or E3D unit— Turn OT potentiometer to cw position.	
● 74j	On 2B test set— Adjust ADJ PPS control to 4 pps on PULSE PER SECOND meter.	PERCENT BREAK meter indicates 22 on ***black*** scale. See Step 76i.

STEP	ACTION	VERIFICATION
● 75k	If requirement of Step 74j is not met— Adjust ADJ PPS control until 22 is obtained.	
● 76j	With coarse ADJ % BK switch on L— Adjust ADJ % BK control to 32 on ***black*** scale of PERCENT BREAK meter.	
● 77j	On test circuit— Operate LP CUR 1 key.	
● 78j	Set SW1 to position 8, SW2 to position 3.	CS relay operates. RG relay does not pulse as indicated by 0 on ***red*** scale of PERCENT BREAK meter.
79j	Set SW 1 to position 7.	
80j	On 2B test set— Adjust ADJ %BK control to 60 on ***black*** scale of PERCENT BREAK METER for E1D to E1D-11, E1D-20, E1D-21 units. For E1D-12 or higher (except E1D-20 and E1D-21) and E3D, adjust ADJ %BK control to 75 on ***black*** scale.	
81j	On test circuit— Set SW1 to position 8.	For units with 60 percent input— RG relay pulses, which causes CS relay to pulse. Reading on PERCENT BREAK meter of 15 or more on ***red*** scale. For units with 75 percent input— RG relay operates, which causes CS relay to release. Reading on PERCENT BREAK meter ***red*** scale ***of 100***
82j	On 2B test set— Set coarse ADJ % BK control to M.	
83j	Restore all keys to normal.	
84	On test circuit— Restore LP CUR 1 key to normal.	
85l	If no other tests are to be made on this unit— Remove all cords, restore all keys to normal, return signaling unit to service or spare position.	

G. Receiver Guard Action

16	Set attenuator switch of TMS to 10 or 15.	

STEP	ACTION	VERIFICATION
17	On test circuit— Set SW1 to position 5, SW2 to position 6.	TMS indicates between −18.5 and −19.5 dB.
18	Set ATT attenuator to: 32 for E1D; 26 for E1D-( ), E2D, and E3D.	
19	Set SW2 to position 5.	RG relay remains released.
20	Set SW1 to position 6.	RG relay remains released.
21	Set SW1 to position 5.	
22	Change ATT attenuator to: 27 for E1D; 21 for E1D-( ), E2D and E3D.	
23	Set SW1 to position 6.	RG relay operated.
24	Set SW1 to position 5.	RG relay should release.
25	Operate LP CUR 1 key.	CS relay operated.
26	Set ATT attenuator to: 28 for E1D; 22 for E1D-( ), E2D and E3D.	
27	Set SW1 to position 6.	RG relay remains released.
28	Change ATT attenuator to: 18 for E1D; 16 for E1D-( ), E2D and E3D.	RG relay operated. CS relay releases.
29	Set SW2 to position 4.	
30	Remove all cords, restore all keys to normal, return signaling unit to service or spare position.	