Installation Engineering Handbook 62
Western Electric Company, Incorporated
Columbus Works

Section 227
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DIAL PULSE TERMINATING SENDER

CONTENTS

1. GENERAL INFORMATION

1.1 Description of Test

1.11 This section describes a method of testing:

(1) SD-25434-01 - DP Terminating Sender Circuit, and
(2) SD-25059-01 - Miscellaneous Circuit For DP Terminating Sender Circuit

1.12 The greater part of the test is performed by means of the DP sender testing facilities provided in the Terminating Sender Test Circuit, SD-25153-01, which includes means for routine testing of DP Terminating Senders.

1.13 One cycle of routine tests consists of performing the tests described in Paragraph 8 once on each DP sender circuit.

1.14 Refer to Handbook 62, Section 221 for a description of Key Functions and Lamp Indications.

2. RECORDS AND REQUIREMENTS

2.1 Records: Forms SD-4-1313 and SD-4-1315 are required for recording the results of these tests.

2.2 Requirements: The tests of Section 227 must be applied to meet the equipment performance requirements per BSP 816-007-181.

3. TESTING EQUIPMENT

3.1 Test Sets and Accessories

Amt	Code	Description	With ITE
1	ITE-8253	Contact Protection Set	4023
1	R-3314	Stop Watch	4023
2	ITE-9650	TEL-SET	4023
1	ITE-4208	Hand Test TEL-SET	4023
As Req.	322A	MB Plugs	4023
1	ITE-9572	Test Receiver	4023
1	ITE-4442	Volt-Ohmmeter	

4. FUSE VERIFICATION

4.1 Test Procedure - General

CAUTION: TO ELIMINATE A FIRE HAZARD, VERIFY THAT DIRECT GROUND IS NOT PRESENT ON THE ALARM BAR OR STUD ON A FUSE PANNEL BEFORE INSTALLING ITS FEEDER FUSE.

NOTE: Use ITE-4442 Volt-ohmmeter. To avoid damaging the meter, first verify that battery is not present on the alarm bar by using the voltmeter portion of ITE-4442. If clear, switch to the ohmmeter portion for the resistance reading which should be either infinity or approximately 600 ohms.

4.11 Fuse verification is, ordinarily, only required on fuse panels wired by the installer.

4.12 On shop wired and fused fuse panels, inspect the panel for missing or operated fuses. If a fuse is missing or operated, test the fuse terminal for the absence of low resistance ground. Clear any grounded condition and install the proper fuse. At the completion of this test all fuse panels should be fully equipped with proper fuses. These may be either the proper specified type or a dummy.

4.13 The operation of relays in circuits when fuses or potentials are applied is normal in some circuits. Oscillation, chatter, and signs of overheating should be analyzed and cleared immediately.

4.14 ITE-4442 Volt-ohmmeter should be used to verify all potentials at fused terminals to insure that polarity and voltages are correct. Many errors are caused by the use of the R-9572 Test Receiver on potentials other than -48 Volts. Handbook 100, TMO-4442, provides full instructions for the use of the volt-ohmmeter.

4.15 When the R-9572 Test Receiver is used, avoid placing it directly on the ear.

5. CONTACT PROTECTION

5.1 For those contact protection networks installed on the job, test in accordance with Handbook 61, Section 0.2.

6. MISCELLANEOUS CIRCUIT FOR DP TERMINATING SENDER CIRCUIT, SD-25053-01

6.1 Verify the below listed features of the Miscellaneous Circuit, not checked on other tests, as follows:

6.11 Test Battery Jack and Supply

6.111 Verify presence of 48 Volts on 48V test battery terminal and tip of jack A.

6.112 Verify presence of direct ground on test terminal G.

6.113 Verify presence of high resistance ground (12,000 ohms) on test terminal HRG.

6.114 Verify presence of direct ground on sleeve of jack A.

6.12 Spare Jack

6.121 Verify presence of continuity and absence of cross for leads T, R, and S of jack B to all associated jack B appearances and to the M.D.F.

6.13 Frame Line Jack

6.131 Jack TEL (A and B) - Verify presence of continuity and absence of cross for the leads on the tip and sleeve of jack TEL (A and B) to all associated jack TEL appearances and to the M.D.F.

6.132 Jack D - Verify presence of continuity and absence of cross for leads T and R of jack D to all associated jack D appearances.

6.14 Remote Control Jacks

6.141 Jack C - Verify presence of continuity and absence of cross for leads T, R, and S of jack C to all associated jack C appearances.

6.142 Jacks (MX and MN) and (MX-D and MN-D) - Verify presence of continuity and absence of cross for the leads on the tip and ring of jacks (MX and MN) and (MX-D and MN-D) to all associated appearances of these jacks.

6.143 Jack E - Verify presence of continuity and absence of cross for leads RC, RC1, RC2, and RC3 to all associated appearances of these leads.

6.144 Jack TEL 1 (A and B) - Verify presence of continuity and absence of cross for the leads on the tip and sleeve of jack TEL 1 (A and B) to all associated jack TEL 1 appearances.

6.15 Fuse Alarm

6.151 Connect 48V battery through test receiver R-9572 to the alarm bar of the 20 ampere frame fuse. Observe that the major alarm sounds, lamps 20A and the associated red aisle pilot light, relay A operates in the Floor Alarm Fuse and Time Alarm Circuit, and lamp FA does not light.

6.152 Disconnect the battery from the alarm bar. Observe that the alarm is silenced, the lighted lamps are extinguished, and relay A is released.

6.153 Verify the 20A resistance shunt by removing lamp 20A and repeating the tests of Paragraphs 7.151 and 7.152. Replace lamp 20A at the completion of this test.

6.154 To verify the presence of the 350 ohm resistance between the 20 ampere alarm bar and lamp 20A:

(1) Connect 48V battery through test receiver R-9572 to the alarm bar for the 20A fuse,

(2) Using another test receiver R-9572, connect to the same point on the alarm bar and to the fuse mounting side of lamp 20A,

(3) Verify an appreciable click in both receivers, and

(4) Disconnect both test receivers.

6.155 Connect 48V battery through test receiver R-9572 to the frame fuse panel alarm bar. Observe that the major alarm sounds, lamps FA and the associated red aisle pilot light, relay A operates in the Floor Alarm Fuse and Time Alarm Circuit, and lamp 29A does not light.

6.156 Disconnect the battery from the alarm bar. Observe that the alarm is silenced, the lighted lamps are extinguished, and relay A is released.

7. SUPPLEMENTARY TESTS

NOTE 1: For General Description, Test Call Progress, and Test Set-Up information, refer to Paragraphs 8.1, 8.2, and 8.3 respectively, and

NOTE 2: Keys PCR and PCS may be used to advance the test frame to the particular sender to be tested.

7.1 Sender Lamp S

7.11 At the TTI, operate key BAT. On one of the test calls to each DP sender, verify that the associated lamp S, on the TTI, lights momentarily when the sender is seized.

7.2 Jacks MB

7.21 At the TTI, insert a make-busy plug into jack MB of each DP sender. Operate keys APB and DPS.

7.22 Refer to TABLE B for test call set-up. Originate a Class 0 test call. Observe that sender locating lamps lights for the first DP sender to be tested and that all DP senders are passed.

7.23 Remove all make-busy plugs from jacks MB.

7.3 Jack HLD

7.31 Refer to TABLE B for test call set-up. Without operating key TH-, originate any Class 0 test call. Verify that the Sender Test Frame blocks with lamp TH lighted, lamp RC is lighted while the sender times out in 28-58 seconds, lamp S at the test frame and the associated lamp TL at the TTI light, and the alarm sounds 5-12 seconds later.

7.32 At the TTI, insert a make-busy plug into jack HLD. Restore the Sender Test Frame to normal and silence the alarm.

7.33 With all digits keyed, repeat the test call. Verify that the test frame blocks with lamp BY lighted.

7.34 Repeat tests of Paragraphs 7.31 through 7.33 on each DP sender.

7.35 Restore the sender and test frame to normal. Remove the make-busy plug from jack HLD.

7.4 Reorder

7.41 At the Sender Test Frame, operate keys CL-0, TH-0, H-0, T-0, U-0, DPS, REP-2, TA, and RO. Originate a test call. Observe that lamp RC lights and remains lighted for 28-58 seconds, lamp TC lights, the test frame completes two test calls to each DP sender before lamp EC lights, and the minor alarm sounds.

7.42 Restore the test frame to normal.

7.5 Time Out

NOTE 1: This test holds the sender group busy continually. Notify other testers attempting to use these senders, and

NOTE 2: Do not use the TTI when making time out tests.

7.51 At the TTI, insert a make-busy plug into jack HLD of the first sender to be tested. At the Sender Test Frame, block operated relay FTO and operate keys CL-6, TH-0, H-0, T-0, U-0, DPS, and TA. Originate a test call.

7.52 Using stop watch R-3314, verify that lamp RC is lighted for 28-58 seconds.

7.53 After lamp RC is extinguished, verify lamp TC lights, lamp S at the test frame and the associated lamp TL at the TTI light, and the alarm sounds 5-12 seconds later.

7.54 Restore relay FTO to normal, operate key MGB, and remove the make-busy plug from jack HLD. Verify the alarm is silenced and lamp TL is extinguished.

7.55 Operate and release key AV. The test frame advances to the next sender to be tested. Release key MGB.

7.56 Repeat tests of Paragraph 7.5 on each DP sender.

7.57 Restore the test frame to normal.

7.6 Interrupter TS

7.61 Block operated relay ON1. Observe that relay TM1 locks operated within 29 seconds and relays TM2, TM3, and TM4 operate 29, 30, and 59 seconds later respectively, lamp TL lights at the TTI, and the alarm sounds.

NOTE: When leads A and B to the interrupter are reversed, relay TM2 will operate about 1 second after relay TM1.

7.62 Restore to normal relay ON1. Verify relays TM1, TM2, TM3, and TM4 release, lamp TL is extinguished, and the alarm is silenced.

7.63 Repeat this test using relay ON2.

8. OPERATIONAL TESTS

8.1 General Description

8.11 The Terminating Sender Test Frame is used for applying operational tests by simulating various types of calls in the senders and checking the resulting operations.

8.12 On a test call, a connector connects the test circuit to the sender. The sender is first tested for busy and, if idle, the test circuit transmits frame indication and, on senders arranged to serve calls to multi-office terminating units, the office indication.

8.13 In areas where the office code is represented using the C digit, this numeral will be dialed for the terminating office indication.

8.14 After units dialing and the completion of sender registration, the sender is connected to a terminating marker via a terminating marker connector.

8.15 When selections are completed and the fundamental has been opened for the proper interval, the test circuit recloses the fundamental for reverse battery.

8.16 The test circuit records the information passed from the sender to the marker and checks that this information corresponds to the selections imposed on the sender by the test circuit. As each digit is being checked, a corresponding lamp is lighted. If any digit does not check with that set up on the keys, the test circuit will block with the corresponding lamp lighted. Frame registration is checked in a similar manner.

8.17 If the sender fails to perform any of its functions, the test circuit blocks and, except in making time out tests, causes an alarm to be sounded. Lamps are provided to indicate which sender is being tested and progress lamps are provided to indicate what function of the sender is being tested at any time.

8.18 The test circuit makes use of regular service circuits in addition to the sender under test. These include the Terminating Marker Connector, Terminating Marker, and the sender selector equipment which is common to the Terminating Sender Links.

8.19 Registers are provided to record the number of circuits tested, the number of repeated single tests, and the number of busy senders passed without testing.

8.2 Test Call Progress

8.21 With the proper keys operated for a particular test call, operate key ST. A connector connects the test circuit to the first idle DP sender and to the associated sender subgroup circuit of the Terminating Sender Link.

8.22 The appropriate digits for the test call must now be dialed for the test frame to complete the call.

8.23 When the first sender has been tested, register CT will operate and the test circuit will advance to the next sender. This process will continue until a busy sender is encountered or a test failure occurs or all senders in the group have been tested.

8.24 If a test failure occurs, lamp TA will light and the associated alarm will sound.

8.25 After all DP senders in the first subgroup have been tested, the test circuit advances to the next link sub-group and sequentially tests the DP senders.

8.26 When all DP senders have been tested, lamp EC lights.

8.27 Release key ST. Operate and release key RN.

8.3 Test Set-Up

8.31 Restore all keys to normal. Operate and release key RN.

8.32 When all senders are to be tested without changing the key setting, be sure that a frame indication (F and FA keys) is set up which all senders are equipped to accept. When testing with a frame indication which all senders will not accept, tests should be limited to the group of senders which will accept the frame indication used. Change the frame indication keys for each cycle or part of cycle, to insure a simulated check from each incoming trunk frame.

8.33 Operate key DRS to test only DP senders.

8.34 If the dial pulse senders serve a multi-office terminating unit, rotate the office indication signals (keys LOA, LOB, LOC and all ODD and all EVEN office code digits) so that, if possible, all office indication signals will be used during the routine tests.

8.35 Complete test calls on a supplementary test basis for any office indication signals not included in the routine tests.

NOTE: Sender test frame key settings and dialing operations are associated with the dial pulse sender and multi-office apparatus and wiring options as follows:

SDR. APP SPECIFIED	OP. OFF KEYS	DIAL TONE	DIAL-OFF CODE DIGIT	FOR OFF UNIT
A & U	FA-0	Low	None	A
A & U	FA-1&OAB	Low	None	B
B & U	LOA	Low	None	A
B & U	LOB&OAB	Low	None	B
V	None	High	Odd	A
V	OAB	High	Even	B
B,C,U & V	LOA	Low	None	A
B,C,U & V	LOB&OAB	Low	None	B
B,C,U & V	LOC	High	Odd	A
B,C,U & V	LOC&OAB	High	Even	B

8.36 Refer to TABLES A and B for test set-up of test calls to be made.

8.4 Test Calls

NOTE 1: If sender is equipped for reverse battery, start pulse, operate key SP, and

NOTE 2: If sender is equipped for dial tone, start pulse, operate key DT.

8.41 Perform each call of TABLE A on each DP sender.

8.42 Verify that each call of TABLE A completes satisfactorily. This is indicated by lamp RC lighted and then extinguished.

8.43 When DID is furnished, perform each call of TABLE B on each DP sender modified for DID.

8.44 Verify that each call of TABLE B completes satisfactorily. This is indicated by lamp RC lighted and then extinguished.

8.45 DID Test

8.451 Description - This test checks that the Dial Pulse Terminating Sender functions properly on a DID call to a PBX station. On this test, the sender records the C digit of the Office Code and then translates it into a DID Number Series Indication.

8.452 Procedure:

(1) Refer to TABLE B, operate keys as shown to set up test call.

(2) Operate key ST. Verify lamp RC and OB1 lighted.

(3) Dial an assigned code digit corresponding to the code digit key operated and the number set up on the numerical keys TH-, H-, T-, and U-.

(4) Verify that lamp RC and OB1 are extinguished, the test circuit advances to the next sender, and lamp RC and OB1 then lights.

(5) Repeat Paragraphs 8.452(3) and (4) until all senders modified for DID have been tested.

(6) When the last sender has been tested, verify that lamp EC lights and a minor alarm sounds. Restore key ST to normal.

(7) Momentarily operate key RN. Verify that all lamps are extinguished and the minor alarm is silenced.

(8) Repeat Paragraphs 8.452 (1) through (7) using an unassigned code digit.

TABLE A

CALL NBR.	TEST CALL DESCRIPTION	KEYS OPERATED CL	TH	H	T	U	MISC	LAMP LIGHTED	DIGITS DIALED TH H T U	SEE NOTE
1A	Dial	0	1	1	1	1			All	1
1B	Reorder	0	0	0	0	0	RO		TH Digit	1
1C	Regular at 20 PPS								All	1 and 2
2	Special Marker	1	1	1	1	1		TC	All	1
3	Trouble Release by Link	3	6	9	5	4	LTK		All	1
4	Trouble Release by Marker	4	5	3	4	1	LTK		All	1
5	Disconnect After Registration Complete	5	5	8	8	4	REP-2	D	All	1
6	Disconnect Before Registration Complete	0	4	3	3	5	LTK & DSD; DSR Momentarily		TH Digit	1
7	Fast Release	0	2	1	1	6	LTK, FTO	D	All	1
8	Regular at 10 PPS	0	2	2	2	4	LT, SST		All	1 and 3
9	Double Office Indication	0	3	3	2	2	LOA & LOC or LOB;CA Momentarily	RL		1 and 4

NOTE 1: Dial a prefix digit as required by local office conditions and then dial the TH-, H-, T-, and U- digits. Refer to the Office Records to determine the appropriate prefix digit,

NOTE 2: Regular Call at 20 PPS

(a) Insert the plug of an ITE-9650 TEL-SET into the test circuit TEL jacks (PT).

(b) Operate a frame (F-) indication key. Operate an office (LOA, LOB or LOC) indication key, if equipped, and numerical keys 0, 1, 2, 3, Operate keys CL-0, DPS, and ST. Test progress lamps: MGB BY, GB, SEL, R1 and S light momentarily and the test circuit awaits dialing with lamp RC lighted.

(c) Verify the receipt of low or high dial tone as determined by the sender equipment and wiring options specified and the operated office indication signal keys. (See Paragraph 8.35)

(d) Dial office and numerical digits in accordance with the operated office and numerical keys on the test frame. Observe that the test call is completed and that the test circuit automatically advances to the next dial pulse sender in the order of test.

(e) Complete the same test call to each of the remaining dial pulse senders.

(f) Operate key LTK, numerical keys 1, 2, 3, 4, a different F key and repeat the test described in Note 2 (b). Observe the same test results.

(g) Continue the test in this way for the remaining numerical keys, namely 2345, 3456, 4567, 5678, 6789, 7890, 8901, and 9012. Operate key LTK on alternate test calls, to that, minimum and maximum trunk loop conditions will be represented about equally.

NOTE 3: Using ITE-4208 Hand Test TEL-SET, plug into jack MN-D to dial. Repeat the test using jack MX-D, and

NOTE 4: Change key LOA to key LOB and repeat the test.

TABLE B

CALL NBR	TEST CALL DESCRIPTION	KEYS OPERATED CL	TH	H	T	U	MISC	LAMP LIGHTED	DIGITS DIALED TH H T U	SEE NOTE
1	Non-DID									1 and 2
2	Assigned DID Indication	0	X	X	X	X			All	1,3,4,5
3	Unassigned DID Indication	0	X	X	X	X	RO		All	1,3,6

NOTE 1: Dial a prefix digit as required by local office conditions and then dial the TH-, H-, T-, and U- digits. Refer to the Office Records to determine the appropriate prefix digit,

NOTE 2: After the DP sender has been modified and before returning the sender to service, the satisfactory completion of Test Calls 1C through 6 of TABLE A is required. When the Terminating Sender Link, Terminating Marker Connector, and Terminating Marker have been modified, the satisfactory completion of test calls 2 and 3 of TABLE B is required,

NOTE 3: X shows keys, switches, and/or dials to be operated in accordance with information obtained from the Office Records for the test call being made,

NOTE 4: When the Assigned DID Indication required is an Office Code, operate keys OI- and LOA/ LOC or keys LOB and OAB,

NOTE 5: When a Number Series Indication is required, operate key NS- in combination with the keys required to give an Assigned DID Indication. This information is obtained from the cross-connection information of the Office Records, and

NOTE 6: When an Unassigned DID Indication is required, operate the appropriate OI- key. This information is obtained from the Office Records for the test call being made.

No changes are indicated due
to extensive revision

Manager, Crossbar Product Engineering
Control Center

Reason for Reissue:
1) Add information required for No. 1 Crossbar Direct for Dialing
2) Make a general revision to update to current engineering standards