

**ORIGINATING AND AUXILIARY SENDER
AND TRANSVERTER TEST FRAME
TESTS
NO. 1 CROSSBAR OFFICES**

1. GENERAL

PAGE

1.01 This section describes a method of testing the No. 1 crossbar originating and auxiliary sender and transverter test frame SD-25221-01. The tests covered in this section are intended to detect trouble that would not be evident in the normal operation of the test frame.

E. PCI Register—Resistance: This test checks the resistances used to test the trunk guard and assignment feature of the sender. **5**

1.02 This section is reissued for the following reasons:

F. Overflow Test—Sender OF Relay Operate Resistance: This test checks the resistances used to make sender OF relay operate tests with and without the use of the MTG key. **5**

(a) To add a procedure to Test Z for checking the TO relay under dynamic operating conditions.

G. Dial Pulse Generator—Resistance: This test checks the resistances used in the dial pulse generator. **6**

(b) To generally update section.

H. Key pulsing—Key Release Resistance: This test checks the resistances used to make sender KRA relay tests. **7**

This reissue does not affect the Equipment Test List.

1.03 The tests covered are:

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A. Revertive Pulsing—Shunt Resistance: This test checks the shunt resistances used for regular and readjust tests of the sender STP relay. **3**

I. Key pulsing—Registration Resistance: This test checks the resistances used to make operate and nonoperate tests of the registration relays of the key pulsing sender. **7**

B. Compensating Resistance: This test checks the compensating resistances used in revertive and PCI pulsing. **4**

J. Key pulsing—Stored Ring Resistance: This test checks the resistance used to make sender SRR and SRT relay tests. **8**

C. Trunk Guard Tests—Sender TG and MTG Relay Resistance: This test check the resistances used to make sender TG and MTG relay tests. **4**

K. Key pulsing—Class Relay Resistance: This test checks the resistances used to make sender FTA and FTB relay tests. **8**

D. 2-Party Check—Resistance: This test checks the resistances used to make sender TP relay operate and nonoperate tests. **5**

L. Transverter Identification Check Lead—Resistance: This test checks the resistances used to test transverter response to battery and ground conditions on the identification check lead. **8**

| | PAGE | | PAGE |
|---|------|--|------|
| M. Multifrequency Receiver Pad—Resistance: This test checks the series resistances in the multifrequency receiver pad. | 9 | W. Trunk Test Closure and Reverse Battery Closure Timing—TC1 Relay: This test checks the TC1 relay used in connection with three digit operator class calls in keypulsing senders. | 11 |
| N. Dial Pulse—Pulse Generator: This test checks the pulse generator circuit used in registering into the dial pulse sender. | 9 | X. PCI Register—Pulse Checking: This checks the MG, SN+, and SN- relays of the PCI checking circuit. | 11 |
| O. Revertive Pulsing—Pulse Generator: This test checks the pulse generator circuit used for regular and slow revertive pulsing tests. | 9 | Y. Slow Assignment Timing—SA1 Relay: This test checks the SA1 relay used to test the sender on a slow PCI assignment. | 11 |
| P. Keypulsing—Pulse Generator: This test checks the pulse generating circuit used for keypulsing the calling number to the sender circuit. | 10 | Z. Multifrequency Digit Timing—TO Relay: This test checks the TO relay timing used to time the checking of the multifrequency digits in relation to the test switch setting and to check the time interval of a digit. ♦A procedure for checking the TO relay under dynamic operating conditions is also included.♦ | 11 |
| Q. Dial Pulse Generator—Between Digits Timing: This test checks the BD1 relay used in the dial pulse generator to control the between digits interval. | 10 | 1.04 Lettered Steps: A letter a, b, c, etc, added to a step number in Part 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. | |
| R. Dial Pulse Generator—Progress Timing: This test checks the R relay used in the dial pulse generator to check dialing progresses. | 10 | 2. APPARATUS | |
| S. Dial Pulse Generator—Surge Timing: This test checks the S relay used in the dial pulse generator in connection with the surge test of senders. | 10 | 2.01 The apparatus required for each test is shown in Table A. The details for each item are covered in the indicated paragraphs. | |
| T. Overflow Timing—RV2 Relay: This test checks the RV2 relay for the operation of the sender OF relay. | 10 | 2.02 KS-14510 Volt-ohm-milliammeter and one pair of List 2 test prod leads. This instrument is referred to throughout the section as a VOM. | |
| U. Trunk Closure Timing—TC3 Relay: This test checks the TC3 relay used in connection with office overflow testing of subscriber senders. | 10 | 2.03 893 Cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 419A tool (for connecting VOM test prods to contact springs). | |
| V. Trunk Closure Timing—TC4 Relay: This test checks the TC4 relay used in connection with trunk closure timing of keypulsing senders. | 10 | | |

TABLE A

| APPARATUS | TESTS | | | | | | | |
|-------------------------------------|-------|--------|---|------|--------|---|--------|---|
| | A, B | C to E | F | G, H | I to L | M | N to Y | Z |
| Volt-ohm-milliammeter (2.02) | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Test cord (2.03) | 2 | 1 | 2 | 2 | 1 | | | |
| Test cord (2.04) | | 1 | 1 | | 1 | 2 | | |
| Test set for timing test (2.05) | | | | | | | | 1 |
| 35F Test set (or equivalent) (2.06) | | | | | | | 1 | 1 |
| Tool (2.07) | | | | √ | √ | | | √ |

√ As required

2.04 893 Cord, 6 feet long, equipped with two 360A tools (1W13B cord) and two KS-6278 connecting clips (for connecting VOM test prods to terminals).

2.05 Test set for timing tests J24753A (SD-25707-01) with one P3K cord, 6 feet long, equipped with two 310 plugs (3P15B cord); and one W3M cord, 6 feet long, equipped with one 310 plug, one 360A tool, one 360B tool, one 360C tool (3W4A cord), one KS-6278 connecting clip, and two 4294 tools.

2.06 35F test set with one W2W cord, 6 feet long, equipped with one 310 plug, one 360B tool, one 360C tool (2W17A cord), one KS-6780 connecting clip, and one 419A tool.

2.07 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 Restore all keys to normal.
- 2 Momentarily operate CA key.
- 3 Momentarily operate RN key.

All lamps extinguished.

Test Z

- 4 Calibrate the timing test set in accordance with Section 100-130-101.

4. METHOD

| | | |
|-------------|---------------|---------------------|
| STEP | ACTION | VERIFICATION |
|-------------|---------------|---------------------|

A. Revertive Pulsing—Shunt Resistance

- 4 Operate STP key.

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| STEP | ACTION | VERIFICATION |
|------|---|--------------------------------|
| 5 | Connect VOM to 3T of L2 relay and front contact of P1 relay (route keys and revertive pulsing circuit). | VOM indicates 107 to 113 ohms. |
| 6 | Restore STP key. | VOM indicates 88 to 92 ohms. |
| 7 | Disconnect VOM. | |

B. Compensating Resistance Tests

| | | |
|---|--|---------------------------|
| 4 | Connect VOM to 3B and 5T of OB relay (route keys and revertive pulsing circuit). | |
| 5 | Operate the OFF-CR keys in succession. | VOM indicates as follows: |

| KEY OPERATED | READINGS |
|--------------|-------------------|
| 0 | 0 |
| 300 | 294 to 306 ohms |
| 600 | 588 to 623 ohms |
| 700 | 686 to 714 ohms |
| 900 | 882 to 918 ohms |
| 1000 | 980 to 1020 ohms |
| 1300 | 1274 to 1326 ohms |
| 1600 | 1568 to 1632 ohms |

| | | |
|---|--|---------------------------|
| 6 | Change VOM connections to 1T of SY relay (incoming and final selections control circuit) and 8B of CIP relay (PCI register circuit). | |
| 7 | Operate the B-OFF-CR keys in succession. | VOM indicates as follows: |

| KEY OPERATED | READINGS |
|--------------|-----------------|
| 0 | 0 |
| 300 | 294 to 306 ohms |
| 600 | 588 to 612 ohms |
| 700 | 0 |
| 900 | 882 to 918 ohms |
| 1000 | 294 to 306 ohms |
| 1300 | 588 to 612 ohms |
| 1600 | 882 to 918 ohms |

8 Disconnect VOM.

C. Trunk Guard Test—Sender TG and MTG Relay Resistance

4 Operate MTG key.

| STEP | ACTION | VERIFICATION |
|--|---|--------------------------------------|
| 5 | Connect VOM to 1T of SY2 relay (incoming and final selections control circuit) and 48V test battery. | VOM indicates 14,138 to 14,820 ohms. |
| 6 | Restore MTG key. | VOM indicates 24,635 to 25,965 ohms. |
| 7 | Change VOM connection from 1T of SY2 relay to 5B of N4 relay (incoming and final selections control circuit). | VOM indicates 7482 to 7787 ohms. |
| 8 | Disconnect VOM. | |
| D. 2-Party Check—Resistance | | |
| 4 | Operate TP0 key. | |
| 5 | Connect VOM to 2B of RL relay (code keys and dial pulsing circuit) and ground. | VOM indicates 3263 to 3397 ohms. |
| 6 | Operate TPN0 key. | VOM indicates 4387 to 4609 ohms. |
| 7 | Restore TPN0 key. | |
| 8 | Disconnect VOM. | |
| E. PCI Register—Resistance | | |
| 4 | Connect VOM to 1T of FAS relay (PCI register circuit) and 48V test battery. | VOM indicates 27,977 to 29,119 ohms. |
| 5 | Change VOM connection from 1T to 5B of FAS relay. | VOM indicates 39,347 to 40,953 ohms. |
| 6 | Change VOM connection from 5B to 4T of FAS relay. | VOM indicates 665 to 735 ohms. |
| 7 | Disconnect VOM. | |
| F. Overflow Test—Sender OF Relay Operate Resistance | | |
| 4 | Connect VOM to 9T of FR relay and right contact post (4) of RV2 relay (over-flow control circuit for subscriber senders). | VOM indicates 1528 to 1592 ohms. |
| 5 | Operate MTG key. | VOM indicates 588 to 612 ohms. |
| 6 | Change VOM connections to 6B of FR relay and ground. | VOM indicates 882 to 918 ohms. |
| 7 | Restore MTG key. | VOM indicates 2156 and 2244 ohms. |
| 8 | Disconnect VOM. | |

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| STEP | ACTION | VERIFICATION |
|---|---|--|
| G. Dial Pulse Generator—Resistance | | |
| 4 | Operate PBX SURGE key. | |
| 5a | If PBX relay is provided— Block operated PBX relay. | |
| 6a | Connect VOM to right contact post (4) of S relay and 4T of SY1 relay (code keys and dial pulsing circuit.). | VOM indicates 196 to 204 ohms. |
| 7a | Insulate right contact post (4) and armature (7) of S relay. | VOM indicates approximately 640 ohms. |
| 8a | Remove blocking tool from PBX relay. | |
| 9b | If PBX relay is not provided— Connect VOM to right contact post (4) of S relay and 4T of SY1 relay (code keys and dial pulsing circuit). | VOM indicates 1127 to 1173 ohms. |
| 10b | Insulate right contact post (4) and armature (7) of S relay. | VOM indicates approximately 1455 ohms. |
| 11 | Restore PBX surge key. | |
| 12 | Operate 26 PPS MAX BR key. | VOM indicates 1470 to 1530 ohms. |
| 13 | Restore 26 PPS MAX BR key. | |
| 14 | Operate 7 PPS MIN BR key. | VOM indicates 1675 to 1745 ohms. |
| 15 | Change VOM connection from 4T of SY1 relay to 1T of RL relay (code keys and dial pulsing circuit). | VOM indicates 1754 to 1826 ohms. |
| 16 | Restore 7 PPS MIN BR key. | |
| 17 | Block operated PLS relay. | |
| 18 | Change VOM connection from right contact post (4) of S relay to 4T of SY1 relay. | |
| 19 | Operate 15 PPS MIN BR key. | VOM indicates 9500 to 10,500 ohms. |
| 20 | Restore 15 PPS MIN BR key. | |
| 21 | Operate 15 PPS MAX BR key. | VOM indicates 9500 to 10,500 ohms. |
| 22 | Restore 15 PPS MAX BR key. | |
| 23 | Operate 26 PPS MIN BR key. | VOM indicates 14,250 to 15,750 ohms. |

| STEP | ACTION | VERIFICATION |
|--|---|--|
| 24 | Restore 26 PPS MIN BR key. | |
| 25 | Remove insulator from S relay. | |
| 26 | Remove blocking tool from PLS relay. | |
| 27 | Disconnect VOM. | |
| H. Keypulsing—Key Release Resistance | | |
| 4 | Connect VOM to 1T of KR relay and 1B of KR1 relay (keypulsing circuit). | VOM indicates 607 to 633 ohms. |
| 5 | Change VOM connections to 2T of KR relay and 2T of D2 relay (keypulsing circuit). | VOM indicates 163 to 167 ohms. |
| 6 | Disconnect VOM. | |
| I. Keypulsing—Registration Resistance | | |
| 4 | Connect VOM to 2B of 6 relay (keypulsing circuit) and ground. | VOM indicates: A—121 to 126 ohms. B—109 to 114 ohms. |
| | | Note: VOM indicates (A) when all position key sets are equipped with resistance lamps; otherwise VOM indicates (B). |
| 5 | Where provided— Operate SKP key. | VOM indicates: A—146 to 153 ohms. B—126 to 133 ohms. |
| 6a | Restore SKP key. | |
| 7 | Change VOM connection from 2B to 2T of 6 relay. | VOM indicates: A—121 to 126 ohms. B—109 to 114 ohms. |
| 8a | Operate SKP key. | VOM indicates: A—146 to 153 ohms. B—126 to 133 ohms. |
| 9a | Restore SKP key. | |
| 10 | Change VOM connection from 2T of 6 relay to 2T of 1 relay (keypulsing circuit). | VOM indicates: A—239 to 250 ohms. B—224 to 235 ohms. |
| 11 | Change VOM connection to 2B of 3 relay (keypulsing circuit) and 48V test battery. | VOM indicates 98 to 102 ohms. |

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| STEP | ACTION | VERIFICATION |
|--|---|---|
| 12 | Change VOM connection from 2B of 3 relay to 2B of 4 relay (keypulsing circuit). | VOM indicates 634 to 696 ohms. |
| 13 | Disconnect VOM. | |
| J. Keypulsing Stored Ring Resistance | | |
| 4 | Block operated RRS relay (office selection control circuit for keypulsing senders). | |
| 5 | Connect VOM to 2T of RS2 relay (office selection control circuit for keypulsing senders) and 48V test battery. | VOM indicates 5108 to 5317 ohms. |
| 6 | Remove blocking tool from RRS relay. | VOM indicates 306 to 319 ohms. |
| 7 | Change VOM connection from 2T of RS2 relay to 1B of RS1 relay (office selection control circuit for keypulsing senders). | VOM indicates 2367 to 2833 ohms. |
| 8 | Disconnect VOM. | |
| K. Keypulsing—Class Relay Resistance Tests | | |
| 4a | Where 2-INC, 4-INC, and 5-INC keys are provided: Connect VOM to 9B of CI relay (sender group test circuit) and ground. | |
| 5a | Operate 2-INC key. | VOM indicates 499 to 521 ohms. |
| 6a | Operate 4-INC key. | VOM indicates 1437 to 1497 ohms. |
| 7a | Operate 5-INC key. | Where sender is equipped with U-528 FTB relay— VOM indicates 3038 to 3162 ohms. Where sender is equipped with U-1252 FTB relay— VOM indicates 1862 to 1938 ohms. |
| 8a | Restore 5-INC key. | |
| 9a | Disconnect VOM. | |
| L. Transverter Identification Check Lead—Resistance | | |
| 4 | Connect VOM to top and bottom of K resistance. | VOM indicates 8550 to 9450 ohms. |
| 5 | Change VOM connections to 4B of A relay (AMA check circuit) and 48V test battery. | VOM indicates 1960 to 2040 ohms. |

| STEP | ACTION | VERIFICATION |
|------|--|----------------------------------|
| 6 | Change VOM connections to 1B of B relay (AMA check circuit) and terminal 151 of the MISC terminal strip. | |
| 7 | Operate RR key. | VOM indicates 1107 to 1153 ohms. |
| 8 | Change VOM connection from 1B to 7T of B relay. | |
| 9 | Operate MR and AMA keys. | VOM indicates 7516 to 7824 ohms. |
| 10 | Restore MR and AMA keys. | |
| 11 | Disconnect VOM. | |

M. Multifrequency Receiver Pad—Resistance

| | | |
|---|--|--|
| 4 | Connect VOM to top and bottom of AB ^{AB} resistance. | VOM indicates 397 to 439 ⁴⁴⁰ ohms. |
| 5 | Change VOM connections to top and bottom of AD resistance. | VOM indicates 397 to 439 ⁴⁴⁰ ohms. |
| 6 | Change VOM connections to top and bottom of AC resistance. | VOM indicates 215 to 225 ohms. 190 |
| 7 | Disconnect VOM. | |

N. Dial Pulse—Pulse Generator

| | | |
|---|---|-------------------------------|
| 4 | Perform percent break and pulse per second test using Section 040-009-501 and circuit requirement table for PLS and CTG relay (code keys and dial pulsing circuit). | Circuit requirements are met. |
| 5 | Perform per cent break and pulse per second test using Section 040-009-501 and circuit requirement table for the PLS relay under control of the INT, INT1, BD1, and BD2 relays. | Circuit requirements are met. |

O. Revertive Pulsing—Pulse Generator

| | | |
|---|--|--|
| 4 | Perform percent break and pulse per second tests using Section 040-009-501 and circuit requirement table for FND relay (route keys and revertive pulsing circuit). | Circuit requirements are met. |
| 5 | Perform percent break and pulse per second tests using Section 040-009-501 and circuit requirement table for CHK relay (route keys and revertive pulsing circuit). | Circuit requirements are met. SD 25221-0110 |

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| STEP | ACTION | VERIFICATION |
|--|--|-------------------------------|
| P. Keypulsing—Pulse Generator | | |
| 4 | Perform percent break and pulse per second tests using Section 040-009-501 and circuit requirement table for KP2 (keypulsing circuit). | Circuit requirements are met. |
| 5 | Perform percent break and pulse per second tests using Section 040-009-501 and circuit requirement table for KP3 relay (keypulsing circuit). | Circuit requirements are met. |
| 6 | Perform percent break and pulse per second tests using Section 040-009-501 and circuit requirement table for KP4 relay (keypulsing circuit). | Circuit requirements are met. |
| Q. Dial Pulse Generator—Between Digits Timing | | |
| 4 | Perform current flow tests of BD1 relay (code keys and dial pulsing circuit) using 35F test set and circuit requirement tables. | Circuit requirements are met. |
| R. Dial Pulse Generator—Progress Timing | | |
| 4 | Perform current flow test of R relay (code keys and dial pulsing circuit) using 35F test set and circuit requirement tables. | Circuit requirements are met. |
| S. Dial Pulse Generator—Surge Timing | | |
| 4 | Perform current flow tests of S relay (code keys and dial pulsing circuit) using 35F test set and circuit requirement tables. | Circuit requirements are met. |
| T. Overflow Timing—RV2 Relay | | |
| 4 | Perform current flow tests of RV2 relay (overflow control circuit for subscriber senders) using 35F test set and circuit requirement tables. | Circuit requirements are met. |
| U. Trunk Closure Timing—TC3 Relay | | |
| 4 | Perform current flow tests of TC3 relay (overflow control circuit for subscriber senders) using 35F test set and circuit requirement tables. | Circuit requirements are met. |
| V. Trunk Closure Timing—TC4 Relay | | |
| 4 | Perform current flow test of TC4 relay (office selection control circuit for key pulsing senders) | Circuit requirements are met. |

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| STEP | ACTION | VERIFICATION |
|---|---|--|
| | using 35F test set and circuit requirement tables. | |
| W. Trunk Test Closure and Reverse Battery Closure Timing—TC1 Relay | | |
| 4 | Perform current flow tests of TC1 relay (operators class control circuit for key pulsing senders) using 35F test set and circuit requirement tables. | Circuit requirements are met. - 0130 |
| X. PCI Register—Pulse Checking | | |
| 4 | Perform current flow tests of MG, SN+, and SN- relays (PCI register circuit) using 35F test set and circuit requirement tables. | Circuit requirements are met. - 0118 |
| Y. Slow Assignment Timing—SA1 Relay | | |
| 4 | Perform current flow tests of SA1 relay (PCI register circuit) using 35F test set and circuit requirement tables. | Circuit requirements are met. page 2 - 0118 |
| Z. Multifrequency Digit Timing—TO Relay | | |
| 5 | Perform timing tests of TO relay (AS MF pulse check control circuit) using test set for timing tests and circuit requirement tables. | Circuit requirements are met. 98 mil sec - 0142 |
| 6 | ▶To check TO relay under dynamic operating conditions— Set sender test frame for MF 7-digit SKIP 2 type call on flat spring sender SD-25012-01 in accordance with Section 216-251-501. | |
| 7 | Operate REP key. | |
| 8 | Operate ST key. | Test call passed. |
| 9 | At sender under test— Block SK2 relay nonoperated. | |
| 10 | At sender test frame— Momentarily operate CA key. | Test call blocked. |
| 11 | Restore all keys to normal. | |
| 12 | Momentarily operate CA key. | |
| 13 | Momentarily operate RN key. | All lamps extinguished.▶ |



| <u>STEP</u> | <u>ACTION</u> | <u>VERIFICATION</u> |
|-------------|---|---|
| | <u>(T) Overflow Timing - RV2 Relay Test</u> | |
| 4 | Perform current flow tests of RV2 relay (overflow control circuit for subscriber senders) using 35F test set and circuit requirement tables. | Circuit requirements are met. <i>SD-25221-0120</i> |
| | <u>(U) Trunk Closure Timing - TC3 Relay Test</u> | |
| 4 | Perform current flow tests of TC3 relay (overflow control circuit for subscriber senders) using 35F test set and circuit requirement tables. | Circuit requirements are met. <i>SD 25221-0120</i> |
| | <u>(V) Trunk Closure Timing - TC4 Relay Test</u> | |
| 4 | Perform current flow tests of TC4 relay (office selection control circuit for key pulsing senders) using 35F test set and circuit requirement tables. | Circuit requirements are met. <i>- 0126</i> |
| | <u>(W) Trunk Test Closure and Reverse Battery Closure Timing - TC1 Relay Test</u> | |
| 4 | Perform current flow tests of TC1 relay (operators class control circuit for key pulsing senders) using 35F test set and circuit requirement tables. | Circuit requirements are met. <i>0120</i> |
| | <u>(X) PCI Register - Pulse Checking Test</u> | |
| 4 | Perform current flow tests of MG, SN+, and SN- relays (PCI register circuit) using 35F test set and circuit requirement tables. | Circuit requirements are met. <i>0117</i> |
| | <u>(Y) Slow Assignment Timing - SA1 Relay Test</u> | |
| 4 | Perform current flow tests of SA1 relay (PCI register circuit) using 35F test set and circuit requirement tables. | Circuit requirements are met. <i>0117</i> |
| | <u>(Z) Multifrequency Digit Timing - TO Relay Tests</u> | |
| 5 | Perform timing tests of TO relay (AS MF pulse check control circuit) using test set for timing tests and circuit requirement tables. | Circuit requirements are met. <i>0117</i> |
| | <i>98 mil sec</i> | |

