Installation Engineering Handbook 61
Western Electric Company, Incorporated
Columbus Works

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# SUBSCRIBER SENDER LINK

# CONTROLLER TROUBLE INDICATOR TEST

CONTENTS



## 1. GENERAL INFORMATION

1.1 Description of Test: This section describes a method of performing the supplementary tests on the controller trouble indicator equipment SD-25452 and SD-25453.

## 2. RECORDS AND REQUIREMENTS

### 2.1 Records

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

### 2.2 Requirements

2.21 The tests covered by this section are *listed in Section 3C of this handbook.*

## 3. TESTING EQUIPMENT

### 3.1 Accessories

| Amt. | Code | Description | With ITE |
|---|---|---|---|
| 1 | R-9572 | Test Receiver | 4023 |
| As Req. | 508A | U & Y Relay Blocking Tools | 4023 |
| As Req. | 322A | Make Busy Plugs | 4023 |
| As Req. | ITE-4069 | Multicontact Relay Blocking Tools | 4023 |

## 4. FUSING

4.1 Using a test receiver or voltohmmeter check each fuse post for absence of battery and ground.

4.2 Using fuses of correct type as indicated by circuit drawings and fuse panel designations, install the following fuses one at a time. Check at one point in the circuit that each fuse is associated with its proper equipment and is free from crosses with other unfused posts on the fuse panel.

| Fuse | Equipment |
|---|---|
| A | Winding |
| (GO)B | Winding, any C or DL (0-19) relay |
| C | Winding, any LL (0-59) relay |
| D | Winding, any SLF (0-19), SGP (0-39) or EMO relay |
| E | Winding, any S(0-9) or SG(0-9) relay |
| F | Winding, any DSG(0-9) relay |
| G | Winding, any D(0-9) relay |
| H | Winding, Relay DC |
| J | Winding, any LL(60-99) relay |
| K | Winding, any LL(100-159) relay |
| L | 6B relay BC |
| M | 8B relay BC |
| N | 10B relay BC |
| P | 12B relay BC |
| R | 2T relay BC |
| S | 4T relay BC |
| T | 6T relay BC |
| U | 8T relay BC |
| V | 10T relay BC |
| W | 12T relay BC |
| X | 4B relay BC |
| (G100)Y | Winding, any C or DL(100-119) or EM(100) relay |
| (G100)Z | Winding, any SLF(100-119) or EM(100) relay |
| AA | 2B relay BC |
| AB | 12B relay BC1 Fig. 15 |
| AC | 8BF wdg. VFO Fig. 17 |

| Fuse | Equipment |
|---|---|
| AD | 8BF wdg. SWO Fig. 17 |
| AE | 8BF wdg. CHO Fig. 17 |
| AF | 8BF wdg. CTO Fig. 17 |
| AG | 8BF wdg. CUO Fig. 17 |
| AH | 9B wdg. NK4 Fig. 15 |

Misc.

| | |
|---|---|
| TBS | 48V Terminal |
| SL-LA | Lamps (SL-LA) 0-19 |
| SL-LA | Lamps (SL-LA) 100-119 |
| LL-LA | Lamps (LL-LA) 0-19 |
| LL-LA | Lamps (LL-LA) 20-39 |
| LL-LA | Lamps (LL-LA) 40-59 |
| LL-LA | Lamps (LL-LA) 60-79 |
| LL-LA | Lamps (LL-LA) 80-99 |
| LL-LA | Lamps (LL-LA) 100-119 |
| LL-LA | Lamps (LL-LA) 120-139 |
| LL-LA | Lamps (LL-LA) 140-159 |
| A | Winding, Relay CA |
| C | Lamp (CW) 0 |
| C | Lamp (CW) 100 |
| D | Lamp LI |

5. MAKE BUSY

5.1 Insert a make busy plug in the TIB jack associated with a sender link controller. Check that the TIB relay of the controller circuit operates. Make this test on each sender link controller circuit.

6. PREFERENCE CHAIN LOCKOUT CIRCUIT

6.1 Make trouble indicator circuit busy to all sender link controller circuits by inserting make busy plugs into all TIB jacks at the CTI frame.

6.2 Connect battery through a test receiver to the T1S lead (refer to SD drawing for association between FP relays and T1S lead punchings) associated with the FP relay in the last position of the preference chain. Observe that the proper FP relay operates. Block this relay in the operated position and remove battery from T1S lead. Connect battery to the T1S leads (refer to SD drawing for association between FP relays and T1S lead punchings) of the other FP relays, one at a time and observe that these FP relays do not operate. Remove the block from the FP relay in the last position.

6.3 In like manner operate and block the FP relay in next to the last position in the preference chain and check that FP relays in the lower positions do not operate when battery is applied to their windings (T1S lead). Remove the block from the FP relay. Continuing in this manner check that FP relays in lower positions will not operate when an FP relay in the higher position is operated.

6.4 Block operated the FP relay in the first position. Connect battery thru test receiver to the T1S lead of the FP relay in the last position and check that it operates. Now check that all intermediate FP relays will operate when battery is applied to their windings (T1S lead). Remove the block from the FP relay.

6.5 Block all FP relays in the preference chain operated. Check that ground is present on the CIA lead (and lead CTI when Figure 14 is furnished) associated with the FP relay in the first position and is not present on any other CIA and CTI leads (refer to SD drawing for the association between FP relays and CIA and CTI lead punchings.) Remove block from relay FP in first position and check that ground is present on the CIA and CTI leads associated with the FP relay, in the second position but not on any other CIA and CTI leads. Continuing in this manner check that ground is present on only one CIA and CTI lead at a time when two or more FP relays are operated and that the grounded lead is associated with the operated FP relay in the lowest position. Remove block from the FP relay.

6.6 Test that contact 13B of relay RM1 is not grounded when all FP relays are in the nonoperated position. Momentarily operate in turn relays FP and check that ground is present on contact 13B of relay RM1 each time an FP relay is operated.

6.7 Remove make busy plugs from T1B jacks.

7. TROUBLE DETECTION FEATURES

NOTE: Perform tests in this paragraph once to each subscriber sender link controller circuit and once using the emergency controller.

7.01 Setup for Test

7.011 Establish a talking connection, as required, by means of the frame line circuit and two ITE-9650 Tel. Sets, between the sender link frame selected for test and the controller trouble indicator frame.

7.012 At the trouble indicator frame indicator frame insert make busy plugs in all TIB jacks except the TIB jack associated with the controller circuit of the sender link frame selected for test.

7.013 At the sender link frame selected for test insert make busy plugs into all MB jacks. Transfer switches A and B should be in the operated position unless otherwise specified.

7.02 Trouble Alarm

7.021 Block controller relays SS and GPO operated. Observe that after an interval of approximately 2.0 to 2.5 seconds, the frame alarm lamp AL lights and that the sender link alarm does not operate. Also check that the LA lamp corresponding to the sender link frame lights at the sender make busy frame or controller trouble indicator frame as specified.

(a) At the trouble indicator frame observe that the TI lamp lights and that the minor intermittent alarm sounds. Verify that the number of the C and DL relays, which are operated, agrees with the number of the controller circuit under test.

7.022 Remove blocks from controller relays SS and GPO. Observe that the frame alarm lamp AL is extinguished. Also check that the TI lamp at the trouble indicator remains lit and that the LA lamp is extinguished.

7.023 Momentarily operate controller relay TI and observe that the minor alarm is silenced and the major alarm sounds.

7.024 Momentarily operate the ACO key at the trouble indicator frame and observe that the major alarm is silenced and that the minor alarm does not sound.

7.025 Operate the RL key at the trouble indicator frame and observe that lamp TI is extinguished. Operate AR key on SSL or emergency controller frame and observe that the minor alarm is silenced.

7.03 D 0-9 Leads

7.031 At the trouble indicator frame operate key LP and block relay TS operated. Observe that relays BC, GC and GC1 operate. When Fig. 15 is furnished relay BC1 also operates.

7.032 At the sender link frame block controller relays, ON operated and W normal. Block operated controller relay CID operated when SD-25554 is provided. Observe that none of the lamps at the trouble indicator frame light.

7.033 Manually operate and release sender link controller relay DO. Observe that lamp DO lights and remains lit at the trouble indicator frame.

7.034 Repeat the test as described in Paragraph 7.033 using relays D1 to D9 and observing that the associated lamp D(1-9) lights and remains lit at the trouble indicator frame.

7.035 At the trouble indicator frame remove block from relay TS and observe that all D(0-9) lamps are extinguished. Release key LP.

7.036 Remove blocks from relays.

7.04 SG 0-9 Leads

7.041 Perform the operations described in Paragraph 7.031.

7.042 At the sender link frame block controller relay CID operated when SD-25004 is provided or relay CIC operated when SD-25554 is provided. Observe that none of the lamps at the trouble indicator frame light.

7.043 Apply ground momentarily through a test receiver to contact 5B of relay SG0 when SD-25004 is provided or contact 2T of SG0 when SD-25554 is provided in the sender link controller. Observe that lamp SG0 lights and remains lit at the trouble indicator frame.

7.044 Continuing as in 7.043 apply ground momentarily to contact 5B when SD-25004 is provided or contact 2T when SD-25554 is provided of the remaining relays SG1 to SG9, one at a time, and observe that the corresponding lamps (SG) 1-9 light and remain lit at the trouble indicator frame.

7.045 At the trouble indicator frame remove block from relay TS and observe that all SG (0-9) lamps are extinguished. Release key LP.

7.046 Remove blocks from relays.

7.05 DG 0-9 Leads

7.051 Perform the operations described in Paragraph 7.031.

7.052 At sender link frame block relays G0 to G4 normal. Block controller relay CIC operated when SD-25004 is provided or relay TIC operated when SD-25554 is provided. Observe that none of the lamps at the trouble indicator frame light with SD-25004 and the associated SLF lamp lights with SD-25554.

7.053 Manually operate and release relay BA0 at the sender link frame. Observe that lamps DG0 and DSG0 light and remain lit at the trouble indicator frame. Momentarily release relay TS to extinguish the lamps.

7.054 Manually operate and release relay BB0 at the sender link frame. Observe that lamps DG0 and DSG1 light and remain lit at the trouble indicator frame. Momentarily release relay TS to extinguish the lamps.

7.055 Similarly operate and release the remaining BA(1-4) and BB(1-4) relays, one at a time, and observe that even numbered lamps DSG2, 4, 6, and 8 and lamps DG1-4 light at the trouble indicator frame when relays BA1-4 are operated and that odd numbered lamps DSG3, 5, 7 and 9 and lamps DG1-4 light when relays BB1-4 are operated.

7.056 When the last pair of DG- and DSG- lamps are checked remove block from relay TS and observe that the lamps are extinguished. Release key LP.

7.057 Remove blocks from relays.

7.06 H, GH, DR, OC and SL Leads

7.061 Perform the operations described in Paragraph 7.031.

7.062 At the sender link frame insulate contact 1 and 2B of relay RL and then block relay CIB operated. Observe that lamp EM lights at trouble indicator frame when using emergency controller.

7.063 Momentarily ground leads, one at a time, as indicated below and observe that the proper lamp functions at the trouble indicator frame.

| To Check | At Sdr. Link Fr. Momentarily Grd. | CTI Frame Lamp |
|---|---|---|
| H Lead | Contact 2B(RL) Rel. | H Lights |
| GH Lead | Contact 2B(DE) Rel. | GH Lights |
| DR Lead | Contact 1T(DR) Rel. | DC Lights |
| OC Lead | Contact 12B(SS) Rel. | OC Lights |
| SL Lead | Contact 10(A) Switch | SL Lights |

Lamp remains lighted.

7.064 At the trouble indicator frame remove block from relay TS and observe that the lamps are extinguished. Release key LP.

7.065 Remove blocks from relays and insulation from contact 2B of controller relay RL.

7.07 AB, RL, TC, OH, DS and ON Leads

7.071 Perform the operations described in Paragraph 7.031.

7.072 At the sender link frame block relay CIA operated. Block controller relays TF and TC normal when SD-25004 is provided or TC and TIC normal when SD-25554 is provided. Observe that none of the lamps at the trouble indicator frame light.

7.073 Momentarily ground leads, one at a time, as indicated below and observe that the proper lamp lights and remains lit at the trouble indicator frame.

| Check | At. Sdr. Link Fr. Momentarily Grd. | CTI Frame Lamp |
|---|---|---|
| *AB Lead* | *Contact 3T(DR) Rel.* | *AB & LLH*Lights* |
| RL Lead | Contact 2B(GH) Rel. | RL Lights |
| TC Lead for SD-25004 or 5B(TL) Rel. when SD-25554 is provided. | Contact 4B(TL) Rel. | TC Lights |
| OH Lead | Contact 4T(DS) Rel. | OH Lights |
| ON Lead | Contact 18(B) Switch | ON Lights |

* *On SD-25004 does not light unless opt. WD is furnished.*

(a) To check DS lead momentarily apply battery to contact 8B of the ON1 relay and observe that the DS lamp lights and remains lit at the CT1 frame.

7.074 At the trouble indicator frame remove the block from relay TS and observe that all lamps are extinguished. Release key LP.

7.075 Remove blocks from relays.

7.08 SLF, SGP and S Leads

7.081 Perform the operations described in Paragraph 7.031.

7.082 At the sender link frame block relay CIA operated. Observe that the number of SLF lamp which lights at the trouble indicator frame agrees with the number of the sender link frame selected for test.

7.083 Make busy the subscriber sender subgroup associated with sender group connector relay C-0 on the sender link frame, by inserting a make busy plug into the associated sender subgroup MB jack on the sender make busy frame.

7.084 At the sender link frame block sender group connector relay C-0 operated. Observe that the number of the SGP lamp which lights agrees with the number of the sender subgroup associated with relay C-0.

7.085 At the sender selector unit associated with this sender subgroup momentarily operate and release relays S (0-9), one at a time, and verify that as each relay is operated the corresponding lamp S (0-9) lights and remains lit at the trouble indicator frame.

7.086 At the trouble indicator frame remove block from relay TS and observe that all lamps are extinguished. Release key LP.

7.087 At the sender link frame remove blocks from relays CIA and C-0. At the sender make busy frame remove make busy plug.

7.088 Repeat test operations 7.081 to 7.087 using the remaining C(1-9) relays, one at a time, and making the associated sender subgroup busy at the sender make busy frame.

7.09 LL (0-159) Leads

7.091 Perform operations as described in Paragraph 7.031.

7.092 At the Sender Link Frame

(a) When SD-25004 is provided insulate contact 1B of relay TF. Block relays CIA and G-0 operated. Observe that relay TF is operated.

(b) When SD-25554 is provided insulate contact 11B of relay TIC. Block relay CIA operated. Observe that relay TIC is operated.

7.093 At any line link frame having access to the sender link frame selected for test, momentarily cross contacts 7B and 8B when SD-25003 is provided or contacts 1B and 2B when SD-25553 is provided of the DF relay associated with relay G-0 of the sender link frame. Observe that the number of the LL- lamp which lights and remains lit at the trouble indicator frame agrees with the number of the line link frame.

7.094 At the trouble indicator frame remove block from relay TS. Observe that lamp LL- is extinguished. Block relay TS operated.

7.095 Repeat test operations as outlined in Paragraphs 7.093 and 7.094 using the remaining line link frames, one at a time, having access to the same district junctors on the sender link frame selected for test. Observe that the proper numbered LL- lamp lights as contacts 7B and 8B when SD-25003 is used or contacts 1B-2B when SD-25553 is used of the DF relay, associated with sender link relay G-0, are crossed on the remaining line link frames.

7.096 Repeat test operations as outlined in Paragraphs 7.092 to 7.095 using relays G-1 to G-4.

7.10 CRL Lamps

7.101 At the trouble indicator frame, block relay BC operated and insulate contacts 1 & 2B of the IRL relay when Fig. 1 is furnished or contacts 4 & 5B when Fig. 15 is furnished.

7.102 At the sender link frame block normal relay Z and block relays WA and TA operated when AMA is provided and then manually operate relay TI which locks operated. Observe that lamps TI and CRL light and that the minor alarm sounds at the trouble indicator frame. Also check that the number of the CRL lamp which lights agrees with the number of the controller circuit under test.

7.103 Manually release relay TI which is locked operated. Observe that lamps TI and CRL at the trouble indicator remain lighted and that the minor alarm is not silenced.

7.104 Operate the RL key at the trouble indicator frame and observe that lamps TI and CRL are extinguished. Operate AR key and observe that the minor alarm is silenced.

7.105 Remove insulation from relay IRL and the block from relay BC at the trouble indicator frame.

8. AMA FEATURES

NOTE: When Figures 14, 15, 16 and 17 are furnished perform the tests of this paragraph in addition to Paragraphs 5, 6, 7, 9 and 10.

8.1 CH, CT, CU, SW and VF Lamps

8.11 At the trouble indicator frame operate key LP and block relay TS operated. Observe that relays BC, BC1, GC and GC1 operate.

8.12 At the call identity indexer frames determine the TIR relay of the sender subgroup connector associated with the sender link frame under test.

8.13 Momentarily apply ground to contacts 10 to 14 or 15 to 19 of the TIR relay and observe that the associated VF0, VF1, VF2, VF4 and VF7 lamps light at the trouble indicator.

8.14 Momentarily operate relay CET at the trouble indicator. Observe that the VF0 to VF7 lamps are extinguished.

8.15 Continue in the same manner to check the remaining SW0 to CH7 lamps as listed in the following table.

| Ground Contact on TIR Relay | Lamp at CTI |
|---|---|
| 10 or 15 | VF0 |
| 11 or 16 | VF1 |
| 12 or 17 | VF2 |
| 13 or 18 | VF4 |
| 14 or 19 | FV7 |
| 20 or 25 | SW0 |
| 21 or 26 | SW1 |
| 22 or 27 | SW2 |
| 23 or 28 | SW4 |
| 24 or 29 | SW7 |
| 30 or 35 | CU0 |
| 31 or 36 | CU1 |
| 32 or 37 | CU2 |
| 33 or 38 | CU4 |
| 34 or 39 | CU7 |
| 40 or 45 | CT0 |
| 41 or 46 | CT1 |
| 42 or 47 | CT2 |
| 43 or 48 | CT4 |
| 44 or 49 | CT7 |
| 50 or 55 | CH0 |
| 51 or 56 | CH1 |
| 52 or 57 | CH2 |
| 53 or 58 | CH4 |
| 54 or 59 | CH7 |

8.16 Release relay TS and key LP.

8.2 2 Out of 5 Relay Chain

8.21 At the trouble indicator block operated the 0 and 7 relays in each of the CH-, CT-, CU-, SW- and VF- groups. Observe that relays PK and PK1 operate.

8.22 Operate and release one at a time in turn, the remaining 1, 2 and 4 relays in all of the CH-, CT-, CU-, SW- and VF- groups. Observe that as each relay is operated the PK and PK1 relays release and then reoperate when the relay is released.

8.23 Release the No. 7 relay in each group and continue in a similar manner for the remaining combinations of relays as indicated in the following table. The 0 relay is used in the next step and need not be released until that test is completed.

| Block Operated In Each Group Relay | Momentarily Operate One at a Time in Turn Relays in Each Group |
|---|---|
| 0-1 | 2-4-7 |
| 1-2 | 0-4-7 |
| 2-4 | 0-1-7 |
| 4-7 | 0-1-2 |

8.3 ET Lockout Circuit

8.31 Insert 322 plugs in all the ET jacks at the controller trouble indicator frame.

8.32 Using battery thru a test receiver check that ground is present on the CTI lead associated with the first ET jack and is absent from the next higher CTI lead.

8.33 Remove the plug from the first ET jack. Check that ground is removed from the first CTI lead and is present on the second but not the third.

8.34 Continuing this manner check that ground is present on the lowest numbered CTI lead having a plug in the ET jack and is not present on the next lower and higher leads.

8.4 ET Feature

8.401 At the call identity indexer frame insulate 2 & 3B contacts of relay CTI on the sender subgroup connector associated with the first ET jack on the controller trouble indicator frame.

8.402 At the sender link frame associated with the first ET jack block relay ON1 normal and block relays ON and AB operated.

8.403 At the controller trouble indicator insulate 9 & 10B of IRL relay and block relay TS normal.

8.404 Insert a 322A type plug into the ET jack associated with the first subscriber sender link frame. Observe the controller trouble indicator relays NK, NK1 and IRL operate.

8.405 Remove insulation from 9 & 10B of IRL. Observe that relays NK3 and C, DL and FP associated with the first subscriber sender link frame operate at the controller trouble indicator.

8.406 Release relay TS. Observe that relays CT and NK4 operate in about 0.1 seconds. Relays FP and NK release.

8.407 Remove blocks from relays ON, AB and ON1 at the subscriber sender link frame. Remove insulation from 2 & 3B contacts of CTI relay at the call identity indexer frame.

8.408 Momentarily operate key RL at the controller trouble indicator observe that the C and DL relays release.

8.409 Remove plug from ET jack. Observe that relay ET restores to normal.

8.410 Repeat Paragraph 8.401 to 8.409 for each ET jack furnished.

9. ALARM TRANSFER

NOTE: Perform this paragraph when alarm transfer is furnished.

9.1 Block relay TS operated at the controller trouble indicator circuit.

9.2 Operate key LP and observe that relay BC operates at the trouble indicator.

9.3 Manually operate and release alarm transfer circuit relay AT 15 at the relay rack and observe that CTI relay BC releases and reoperates.

9.4 Release key LP and relay TS at the CTI frame.

9.5 Using battery thru a test receiver check that ground is present on 7B contact and is not present on 12T contact of relay IRL at the CTI frame.

9.6 Block alarm transfer relay AR2 operated at the relay rack. Observe that CTI relay IRL operates.

9.7 Check that ground is not present on contacts 7B and 12T of relay IRL at the CTI frame.

9.8 Release alarm transfer relays AR2 and AT15. Observe that relay IRL is released.

10. RD AND TD LEAD TEST (Partial Touch-Tone)

10.1 Perform the operations described in Paragraph 7.031.

10.2 At the sender link frame block operated relay CIB. Manually operate relay RD. Lamp RD lighted at trouble indicator.

10.3 Manually operate relay TTD. Lamp TD lighted at trouble indicator.

10.4 Remove all blocked relays in sender line controller and trouble indicator frame.

11. MISCELLANEOUS CIRCUITS

11.1 Verify all miscellaneous circuits not checked on other tests as follows:

(1) Test battery supply

(2) Spare jack to MDF.

(3) Frame line circuit.

(4) Fuse alarm

Lines presented in Script indicate new or changed information.

11.2 Check that the fuse alarm is not stopped when the FA or 20A lamp is burned out or removed and that a major audible alarm and aisle pilot operate.

Manager, Crossbar Product Engineering
Control Center

Reason for Reissue:
To clarify Paragraph 7.073.