

5-19-72

TERMINATING MARKER AND  
 TERMINATING MARKER APPLIQUE TESTS  
 TROUBLE INDICATIONS

Replaces: Section 225.3  
 Dated: 6-18-71

CONTENTS

- |   |  |
|---|--|
| 1. GENERAL INFORMATION                      | 20. FALSE GROUND ON LEAD AK OR SL            |
| 2. TROUBLE ALARM                            | 21. CROSSED HORIZONTAL GROUP RELAY LEADS     |
| 3. GROUNDED RELEASE LEAD                    | 22. GROUNDED OR OPEN CK-CK1 LEADS            |
| 4. GROUNDED OR CROSSED NS LEADS             | 23. FALSE GROUND ON L RELAYS                 |
| 5. GROUNDED NF LEADS                        | 24. CROSSED PATTERN RELAYS                   |
| 6. GROUNDED OR CROSSED HOLD MAGNET LEADS    | 25. MISCELLANEOUS CROSS TESTS                |
| 7. GROUNDED LINK & JUNCTOR LEADS            | 26. CROSSED OFFICE DISCRIMINATION RELAYS     |
| 8. FALSE GROUND ON LEADS CTL & CTT          | 27. RINGING & TONE CONTROL RELAY TROUBLES    |
| 9. GROUNDED WINDINGS OF INTERCEPT RELAYS    | 28. FALSE CHARGE GUARD TEST                  |
| 10. GROUNDED TWENTY BLOCK LEADS             | 29. CONTINUITY TEST                          |
| 11. CROSSED TB LEADS                        | 30. GROUND TEST (FIRST TRIAL)                |
| 12. CROSSED CONTROL (C) LEADS               | 31. CROSSED JC LEADS                         |
| 13. CROSSED RF-TF LEADS                     | 32. CROSSED HUNDRED BLOCK LEADS (HB)         |
| 14. CROSSED HF-RF & HF-TF LEADS             | 33. TROUBLE REORDER                          |
| 15. CROSSED NF & NS LEADS                   | 34. JA & JB LEADS                            |
| 16. GROUNDED OR CROSSED SELECT MAGNET LEADS | 35. MISCELLANEOUS FEATURES                   |
| 17. CROSSED INCOMING PRIMARY SELECT MAGNETS | 36. FC, R., TR. AND RO LEADS                 |
| 18. CROSSED OVERFLOW OR BUSY BACK           | 37. SECOND TRIAL FAILURE TO OVERFLOW         |
| 19. FALSE GROUND ON LEAD FC                 | 38. FIRST TRIAL FAILURE TRUNK IDENTIFICATION |
|   | 39. TERMINATING MARKER APPLIQUE              |

- |  |   |
|--|---|
| 1. <u>GENERAL INFORMATION</u>  | 1.3 Trouble Alarms  |
| 1.1 Refer to Terminating Marker and Terminating Marker Applique Tests per Section 225 for General Information, Test Procedure, Records and Requirements, Test Equipment, and Test Set Up. This section describes tests of the trouble indicating features. | 1.31 The trouble indicator minor alarm operates when the trouble indicator is seized, if marker relay MT (marker test) of the marker associated with the seizure is not operated; however, if the trouble indicator already holds a trouble indicator record and the GLH1 relay of the marker associated with the second attempt to seize the trouble indicator was not operated. |
| 1.2 When applying ground or battery where specified in this section, use Test Receiver R9572.  |   |

- 1.32 The minor alarm remains unchanged on a second attempt to seize the trouble indicator when the GLH1 relay of the marker associated with the second attempt is operated.
- 1.33 The minor alarm operates on a second attempt to seize the trouble indicator, if the trouble indicator record already held was due to a marker test call.
- 1.34 This arrangement avoids major alarms for continuity test failures.
- 1.35 Trouble indicator seizures except those due to marker test calls.
- 1.4 Trouble Release Register
- 1.41 Trouble release register MTR scores once for each seizure of the trouble indicator, except when the seizure is due to a marker test or a sender test call.
2. TROUBLE ALARM
- 2.1 When Option GS is furnished, block operated relay CK10. Block operated relay X. Observe that the marker immediately connects to the trouble indicator; the marker trouble alarm (minor alarm) operates; lamps X, TI, and the associated DR light and trouble release register, MTR scores once. Do not release the trouble indicator. Remove the block from relay X.
- 2.11 Operate relay X of a marker other than the one under test. Observe that the minor alarm becomes a major alarm; the associated DL lamp lights and the associated register, MTR, scores. Operate key RL to release the trouble indicator and to retire the alarm. Repeat the test as required.
- 2.12 Repeat the test described in Paragraph 2.1. Block operated relay GLH1 and operate relay X of a marker other than the one under test. Observe that the minor alarm remains unchanged; the associated lamp DL lights and the associated register, MTR, scores once.
- 2.13 Operate key ACO. Observe that the minor alarm is silenced. Restore key ACO, operate key RL and remove the block from relay GLH1.
- 2.2 Block marker relay CK1 operated and make a test call. Observe that lamps CKG, K2, K3 and the associated DR and DL light, lamp TI does not light; the trouble alarm does not operate and register MTR does not score. Do not release the trouble indicator.
- 2.21 Block operated relay X of a marker other than the one under test. Observe that the minor alarm operates; lamps TI, and the DL associated with the operated X relay light and register MTR scores once. Remove the block from relay X and operate key RL.
- 2.22 If relay SDT is provided, insulate 8T and 9T contacts of relay SDT and cross 3T-4T contacts of relay MT. Repeat the test described in Paragraph 2.2 and observe the same test results. Remove the block from relay CK1, the cross from relay MT and the insulator from the relay SDT.
- 2.3 Insulate 9B-10B contacts of relay X, cross 3T-4T contacts of relay CK7 and block relay X operated. Observe that the minor alarm operates; lamps TI, X and the associated DR light, and the associated register MTR scores once. Remove the insulator and the block from relay X and the cross from relay CK6.
- 2.4 Verify that trouble indicator relays DR and DL associated with the marker under test, when operated one at a time, ground the TIL lead to the marker trouble alarm circuit and operate the minor alarm but the TI lamp is not lighted. The marker trouble alarm circuit (relays CA, CB and TR) must be normal when this test is made.
3. GROUND RELEASE LEAD
- 3.1 Ground T.S. (TMC) Punching 04. Observe that the marker times out in 3 to 4 seconds and lamp XRL lights. Remove the ground.
- 3.2 *Ground T.S. (TI-B) Punching 05. Operate relay TIB and observe that the marker times out and that lamps TI, XRL and RL light. Remove the ground and release relay TIB.*
4. GROUND OR CROSSED "NS" LEADS
- 4.1 Ground any NS lead at a number group connector between relays MCB and TB (for example, NS0, punching 20, terminal strip for MCB relays). Make a test call

- to a line in this number group connector and observe that the marker immediately connects to the trouble indicator and that the X and XS lamps light. The TB relay of the number group connector containing the called line does not operate.
- 4.2 Operate key TR2 and make another test call to a line in this number group connector except the one which is grounded. Observe that X and XS lamps do not light and that the call is completed OK. Remove the ground from the NS lead and restore key TR2.
- 4.3 At the trouble indicator frame check that ground is present on the XNS lead for the marker under test (punching 02 for marker 0, punching 12 for marker 1, etc., on terminal strip A). Check that the operation of the MT relay associated with the marker under test removes this ground. Then ground this lead at T.S. (A).
- 4.31 Cross two NS leads between a number group connector MCB relay and a TB relay. Then make a call that will reach one of the crossed lines and observe that the marker immediately connects to the trouble indicator and that X and XS lamps light. Remove the ground from the XNS lead at the terminal strip and the cross between the NS leads.
5. GROUNDING NF LEADS
- Insert a make busy plug in the XT jack at the trouble indicator frame. Momentarily ground any NF lead (for example NFO, T.S. (NG-B) Punching 40). Observe that the marker immediately connects to the trouble indicator and that the X and XS lamps light.
6. GROUNDING OR CROSSED HOLD MAGNET LEADS
- NOTE: If office is equipped with Fig. BK, only perform the ground test in Paragraph 6.2.*
- 6.1 Insert a make-busy plug in the XT jack at the trouble indicator frame. (Momentarily apply ground to any EH or OH lead (for example, EH0 at T.S. (LC-C) Punching 40). Observe that the marker immediately connects to trouble indicator and that the X, XT, and XT2 lamps light.
- 6.2 Repeat the test of PAR. 6.1 on T.S. (LC-C) Punchings 40-49 or 50-59 for the EH or OH leads respectively. On at least one of these terminals, momentarily apply -48 Volt battery instead of ground. Observe the results shown in PAR. 6.1.
7. GROUNDING LINK AND JUNCTION LEADS
- NOTE: If office is equipped with Fig. BK, only perform the ground test in the following paragraphs.*
- 7.1 Insert a make busy plug in the XT jack at the trouble indicator frame. Momentarily apply ground or battery to any LJ lead (for example, LJO at T.S. (LC-C) Punching 30). Observe that the marker immediately connects to the trouble indicator and that the X, XT, and XT1 lamps light.
- 7.2 Momentarily apply ground or battery to any LL lead at the marker (for example, LLO at T.S. (LC-C) Punching 00). Observe that the marker immediately connects to the trouble indicator and that the X, XT, and XT1 lamps light.
- 7.3 Momentarily apply ground or battery to any L or R lead for example, OR at T.S. (IMC) Punching 10). Observe that the marker immediately connects to the trouble indicator and that the X, XT, and XT1 lamps light.
8. FALSE GROUND ON LEADS CTL AND CTT
- NOTE: This test is made only on markers 0 and 1 arranged for number checking.*
- 8.1 If leads CTL and CTT are strapped together at the marker (F wiring), connect ground or battery to lead CTL at T.S. (NC) Punching 146 and make a test call. Observe that the marker immediately connects to the trouble indicator and that the X, XT, and XT1 lamps light. Remove ground or battery.
- 8.2 If leads CTL and CTT are not strapped together, connect ground or battery to lead CTL at T.S. (NC) Punching 146 and make a test call. Observe that the marker immediately connects to the trouble indicator and that the X, XT, and XT1 lamps light. Remove ground or battery. Connect ground or battery to lead CTT at T.S. (NC) Punching 142. Make a test call. Observe that the marker immediately connects to the trouble indicator and the X, XT, and XT1 lamps light. Remove ground or battery from lead CTT.
9. GROUNDING WINDINGS OF INTERCEPT RELAYS
- Insert a make busy plug in the XT jack at the trouble indicator frame. Momentarily apply ground to the top winding terminal of the LIN, TIN, LTI or TTI relay. Observe that the marker immediately connects to the trouble indicator and that the X and XIN lamps light.

10. GROUNDING TWENTY BLOCK LEADS

10.1 Momentarily apply ground to the TB-lead at T.S. (NG-A) Punching 25-29 one at a time. Observe that the marker immediately connects to the trouble indicator and that the X and XTL lamps light each time.

11. CROSSED TB LEADS

Block relay XTL normal. Cross two TB leads between a number group connector MCA relay and the windings of the TB relays (for example, leads TB0 and TB1 at T.S. (NG-A) Punchings 25 and 26. Make a call to a line in a 20 block associated with lead TB0 or TB1 of the number group where the leads are crossed. Observe that the marker immediately connects to the trouble indicator, that the two crossed TB relays release and that lamps X and XTB light. Remove the cross between leads TB0 and TB1 and the block from relay XTL.

12. CROSSED CONTROL (C) LEADS

Cross two HG leads (for example, HGA (0 & 1) at T.S. (NG-D) Punchings 00 & 01). Make a test call to a line in either the 0 or 1 horizontal group of the "A" line link frame of any line choice. Observe that the marker immediately connects to the trouble indicator, the X and XC lamps light and the line choice connector start lead is opened by the operation of relay XC1. Remove the cross.

13. CROSSED RF - TF LEADS

Cross leads TFO and RFO at T.S. (NG-C) Punchings 00 & 20. Make a test call to a ring or tip party line located in line choice 0. Observe that the marker immediately connects to the trouble indicator, the XF and X lamps light and the line choice connector start lead is opened by the operation of relay XF3. Remove the cross.

*NOTE:* The opening of the line choice start lead may be checked conveniently by observing that relay LK does not operate or only operates incompletely.

14. CROSSED HF-RF AND HF-TF LEADS

14.1 Cross leads HF-0 and RF-0 of any number group at the block relay frame. Make test calls to line numbers in the selected number group which require the

use of leads HF-0 and RF-0. Observe that the marker immediately connects to the trouble indicator and that lamps X, XF, HF and RF light.

14.11 Make test calls to line numbers in the selected number group which require the use of leads TF-0, TF-1, RF-1 and HF-1 as equipped. Observe that the test calls are completed with lamps RL followed by TRL lighting in each case. Remove the cross from leads HF-0 - RF-0.

14.2 Cross leads HF-0 and TF-0, (if TF leads are provided) in any number group. Make test calls to line numbers in the selected number group which require the use of leads HF-0 and TF-0. Observe that the marker immediately connects to the trouble indicator and that lamps X, XF, HF and TF light.

14.3 Make test calls to line numbers in the selected number group requiring the use of leads RF-0, RF-1, TF-1 and HF-1. Observe that the test calls are completed in each case. Remove the cross from leads HF-0 - TF-0.

15. CROSSED NF AND NS LEADS

15.1 Cross an NS and NF lead associated with the same position in a twenty block at a multiple terminal strip for TB relays of a block relay frame. Make a test call to an individual line number which requires the use of the crossed leads. Observe that the LK relay does not operate, the marker times out, and lamps LE, FC, AK, and TE light. Remove the cross.

*NOTE:* Marker arranged for speed-up has short time-out period, otherwise the marker may time out via relays TML1, - TML2 or TMS1, TM1-TM6 for this test.

16. GROUNDING OR CROSSED SELECT MAGNET LEADS

16.1 Momentarily apply ground to leads SMA (0-9) at T.S. (LC-B) Punchings (20-29) one at a time. Observe that the marker immediately connects to the trouble indicator and that the X and XSM lamps light in each case.

16.2 Cross two SMA- leads at T.S. (LC-B). For example, if channels 0 and 1 are the first and second choice channels, SMA0 and SMA1, punchings 20 and 21. Make a test call to the "A" line link frame of a line choice and observe that the marker immediately connects to the trouble indicator and that the X and XSM lamps light. Remove the cross from the SM leads.

17. CROSSED INCOMING PRIMARY SELECT MAGNETS
- NOTE A: This test is required only when Figure P of the marker is specified.
- NOTE B: The test described in Paragraph 17.1 is required only when AI wiring is specified for service with 100 trunk incoming link frames.
- NOTE C: The test described in Paragraph 17.11 is required only when AO wiring is specified for service with 100 or 160 trunk incoming links.
- 17.1 Connect ground through an R-9572 test receiver to any incoming link T.S. (MC) Punching 03 (for example, lead B between the incoming link relays MC and LC). Operate key F corresponding to the selected incoming link frame and make a test call. Observe that the marker immediately connects to the trouble indicator, that lamps X and XPS light and TE does not light. Repeat the test call and observe that marker relay HMT1 does not release before relay XPS1.
- 17.11 Connect ground through an R9572 test receiver to any incoming link T.S. (MC) Punching 51 (for example, lead B between the incoming link relays MC and LC). Operate key F corresponding to the selected incoming link frame and start a test call. Observe that the marker immediately connects to the trouble indicator and that lamps X, XPS and one of the LCF lamps light.
- 17.12 Cross 3T and 4T contacts of relay DL and make a test call. Observe that the marker immediately connects to the trouble indicator and that lamps X, XPS and TE light. Remove the cross from relay DL.
- 17.2 Operate any NS key and make a test call to an individual line number corresponding to the operated NS key. Observe that the marker immediately connects to the trouble indicator and that lamps X, XPS, BB, RV, TC, and TE light. Restore the operated NS key.
- 17.21 Make a test call to the overflow signal test line number. Observe that the marker immediately connects to the trouble indicator and that lamps X, XPS OF, TC, RV, RC and TE light.
- NOTE: On tests per Paragraph 17.2 and 17.21 the XFC lamp may or may not light.
- 17.22 Operate class key FS and make a test call to an unassigned line number, (NF and NC cross-connections omitted at the block relay frame). Observe that the marker immediately connects to the trouble indicator and that lamps X, XPS, LIN and TE light. Remove the R9572 test receivers from incoming link T.S. (MC).
18. CROSSED OVERFLOW OR BUSY BACK
- 18.1 *Block relay TIB operated. Momentarily apply ground at T.S. (TI-B) Punchings 30 and 31 one at a time. Observe that the marker immediately connects to the trouble indicator and that the X and XOB lamps light in each case. Release relay TIB.*
19. FALSE GROUND ON LEAD FC
- 19.1 Momentarily apply ground at T.S. (TMC) Punching 24 when relay SDT is provided or T.S. (TI-B) Punching 06 when relay SDT is not provided. Observe that the marker immediately connects to the trouble indicator and that the X and XFC lamps light.
- 19.2 Momentarily apply ground to the front contact (3) of relay GT. Observe that the marker immediately connects to the trouble indicator, relay XFC1 operates and lamps X and XFC light. Repeat the test by momentarily grounding the 4T contact of relay CON2 and also 4T of relay RO.
- NOTE: Lamp FC may or may not light on the test of 4T of CON2.
20. FALSE GROUND ON LEAD AK OR SL
- Block relay TIB operated. Connect ground to leads AK and SL in turn at T.S. (TI-B) Punchings 4 and 14. Observe that the marker immediately connects to the trouble indicator and that lamps X, SL and AK light. Remove the ground and release relay TIB.*
21. CROSSED HORIZONTAL GROUP RELAY LEADS
- Cross two H leads at a line link frame (for example, leads H (0 & 9) Punchings (20 & 29) at the T.S. between secondary switches 7 and 8). Make a test call to a line located in one of the horizontal groups whose associated HG relay operate path is crossed. Observe that the marker immediately connects to the trouble indicator and that the X and XHG lamps light. Remove the cross.

22. GROUNDING OR OPEN CK - CK1 LEADS

- 22.1 Cross T.S. (IMC) Punching 02 with T.S. (NG-A) Punching 55. Make a test call. Observe that the marker times out, lamp XIK lights, but no IF lamp lights. Remove the cross.
- 22.11 Cross T.S. (NG-A) Punching 55 with T.S. (MISC) Punching 175 and make a test call. Observe that the marker times out, lamp XIK lights but no IF lamp lights. Remove the cross.
- 22.2 Block non-operated relay IK. Make a test call and observe that the marker times out, lamps CKG, K1, K2, K3, TBK and MKO light, FC and AK do not light. Remove the block from relay IK.
- 22.21 Block non-operated relay IK1 and make a test call. Observe that the marker times out, lamps CKG, K1, K2 and K3 light and lamps FC, AK and MKO do not light. Remove the block from relay IK1.

23. FALSE GROUND ON L RELAYS

- 23.1 Momentarily apply ground to one of Punchings 00-19 on Cross-connecting T.S. (F-L). Observe that the marker immediately connects to the trouble indicator and that the X and XL lamps light.
- 23.2 Momentarily operate relays L (0-19) one at a time. Observe that the marker immediately connects to the trouble indicator and that lamps X and XL light in each case.

24. CROSSED PATTERN RELAYS

- 24.1 Manually operate relays JP0 and JP1. Observe that the marker immediately connects to the trouble indicator, and the X, XP and XT1 lamps light. Release the JP0 and JP1 relays.
- 24.2 Repeat the test of 24.1 using other JP relays until all JP relays have been used.
- 24.3 Manually operate relay JPN and one of relays JP (0-9). Observe that the marker immediately connects to the trouble indicator and lamps X and XP light. Release the JPN and JP relays.

25. MISCELLANEOUS CROSS TESTS

- 25.1 Momentarily operate the HCA and HCB relays at the same time. Observe that the marker immediately connects to the trouble indicator and that the X lamp lights.
- 25.2 Momentarily operate the LIL and RIL relays at the same time. Observe that the marker immediately connects to the trouble indicator and that the X lamp lights.
- 25.3 Momentarily operate relays EH and OH at the same time. Observe that the marker immediately connects to the trouble indicator and that the X lamp lights.
- 25.4 Momentarily operate relays AL and NAL at the same time. Observe that the marker immediately connects to the trouble indicator and that the X lamp lights.

26. CROSSED OFFICE DISCRIMINATION RELAYS

NOTE A: This test is required only when Figure G of the marker is equipped.

NOTE B: When Figure J is used with Figure G, operate relays IPT, IT and IP by connecting ground to contact 7T (winding terminal).

- 26.1 Manually operate relays IP and IT together. Observe that the marker immediately connects to the trouble indicator and that lamp X and lamps IP and IT (corresponding to the operated relays) light.
- 26.2 Repeat the test, operating pairs of relays as follows: IPT and IT; PN and TN, PTN and PN, PTN and TN, also IPT and IP, if AP wiring in Figure J is connected, or if Figure O is provided.

27. RINGING AND TONE CONTROL RELAY TROUBLES

NOTE: In the following tests the marker times out because the operate path of relays GT1 and GT2 is open. The GT2 lamp does not light.

- 27.1 Simulate an open TC lead by insulating the contact 10M of the MT1 relay. Then make a test call to a free line with the FS key operated. Observe that the marker times out and that FL lamp is lighted and the TC lamp is not lighted.

- If free lines are not equipped, make a test call to a busy line and observe that the marker times out, lamp BB is lighted and lamp TC is not lighted. Remove the insulation from the MT1 relay.
- 27.2 Simulate an open RV lead by insulating the contact 7M of the MT1 relay. Then make a test call to a line that connects ringing on the tip. Observe that the marker times out and that the RV lamp is not lighted. Remove the insulation from the MT1 relay.
- 27.3 Simulate an open RC lead by insulating the contact 9M of the MT1 relay. Then make a test call. Observe that the marker times out and that the RC lamp is not lighted. Make the same call with the TR2 key operated and observe that the call is completed OK. (This call does not time out as the contacts of relays RC and RC1 in the operate path of relays GT1 and GT2 are shunted on second trial.) Remove the insulation from the MT1 relay.
- 27.4 If four party ringing is provided, simulate an open RP lead by insulating the Contact 11M of the MT1 relay. Then make a test call to a line that requires the operation of the RP relay of the marker (any line in the second 500 block of a 1000 lines). Observe that the marker times out and that the RP lamp is not lighted. Remove the insulation from the MT1 relay.
- 27.5 Simulate a grounded RV lead by connecting ground to the top winding terminal of relay RV1. Then make a test call to a line that connects ringing on the ring. Observe that the marker times out and that the RV lamp is lighted. Make the same call with the TR2 key operated. Same results. Remove the ground.
- 27.6 Simulate a grounded RC lead by connecting ground to the top winding terminal of relay RC1. Then make a test call. Observe that the marker completes the call OK. Make the same test call to a busy line. Observe that the BB, RV, TC, RC and XR lamps light. At the time the marker releases check that ground is connected to the 2B spring of relay XR (RL lead) and not to the 1T spring of relay XR (TRL lead). Remove the ground from relay RC1 and remove the busy condition.
- NOTE: Lamp RL may or may not light for this test.
- 27.7 Ground a TC lead by connecting to the top winding of relay TC1. Make a test call to an assigned ring line. Observe that the marker times out and that lamps RC, TC, XR and TRL light and that lamp GT2 does not light. Remove the ground from relay TC1.
- NOTE: Lamp RL may or may not light for this test.
- 27.8 If four-party ringing is provided, simulate a grounded RP lead by connecting ground to the RP lead at the top winding terminal of relay RP1. Then make a test call to a line that does not require the operation of the RP relay of the marker (any line in the first 500 block of a 1000 lines). Observe that the marker times out and that the RP lamp is lighted. Remove the ground.
28. FALSE CHARGE GUARD TEST
- 28.1 Operate key FCG to apply the operate test to the marker FCG relay. Then make a test call and observe that the marker times out, the FCG lamp lights and the CON lamp does not light.
- 28.2 Repeat the test per 28.1 with relay XS1 blocked operated to simulate heavy traffic conditions. Observe that the call is completed OK. If marker is arranged for marker speed-up operation lamp FCG is lighted, otherwise lamp FCG is extinguished. Release key FCG and relay XS1.
- 28.3 Block the time out circuit to prevent relay TR from being operated. Manually operate relays LK and FCG and check that ground is present on spring 7 or armature of relay FCG and that ground is not present on spring 4 or back contact of relay FCG. This checks that the ground for operating the line link primary hold magnet is opened when relay FCG operates. Release relays LK and FCG and remove the block from the time out circuit.
29. CONTINUITY TEST
- 29.1 Operate key TC and start a test call. Observe that the test call is completed and that lamps CON and RL followed by TRL light. Restore key TC.
- 29.2 Cancel continuity test for intermediate PBX line numbers by inserting 322A make busy plugs into jack PBX and the CCT jack associated with the marker under test. Operate key RV and make a test call to an intermediate PBX line

- number (NF-HF). Observe that the test call is completed and that lamps CON and RL followed by TRL light. Repeat the test call to an individual ring party line number (NF-RF). Observe that the marker times out and that lamps RF, FC, AK, TK, BC, GJ, SL, GC and GLH light. Lamp CON does not light. Remove the make busy plug from jack PBX. Do not restore key RV and do not remove plug from the CCT jack.
- 29.21 Insert a make busy plug into jack NPC and make a test call to an individual ring party line number (NF-RF). Observe that the test call is completed and that lamps CON and RL followed by TRL light. Repeat the test call to an intermediate PBX line number. Observe that the marker times out and that lamps HF, FC, AK, TK, BC, GJ, SL, GC and GLH light. Lamp CON does not light. Repeat the test call to a coin line number. Observe that the marker times out and that lamps CN, RF, FC, AK, TK, BC, GJ, SL, GC and GLH light. Lamp CON does not light. Remove the make busy plug from jack NPC. Do not restore key RV and do not remove the plug from jack CCT.
- 29.22 Insert a make busy plug into jack CCN and make a test call to a coin line number. Observe that the test call is completed and that lamps CON and RL followed by TRL light. Repeat the test call to an individual ring party line number. Observe that the marker times out and that lamps RF, FC, AK, TK, BC, GJ, SL, GC and GLH light. Lamp CON does not light. Repeat the test call to an intermediate PBX line number. Observe that the marker times out and that lamps HF, FC, AK, TK, BC, GJ, SL, GC and GLH light. Lamp CON does not light. Remove the make busy plugs.
- 29.3 Operate key RV and insert make busy plugs into jacks NPC, PBX, CCN and CCT-0-9, excepting jack CCT associated with the marker under test. Make a test call to an individual ring party, an intermediate PBX and coin line number in turn, and observe that the marker times out in each case, lamps FC, AK, TK, BC, GJ, SL, GC and GLH light and that lamp CON does not light.
- 29.31 Operate key TR2 and repeat the test per 29.3. Observe that the test calls are completed and that lamps TR2, RL and TRL light. Restore the TR2 key.
- 29.4 If the ringing voltage is minimum 86V-maximum 87V operate key TVT and make a test call to a ring party line with key RV normal. This applies a nonoperate test to the continuity feature of the marker. Observe that the call is completed OK. Connect ground to the 1T terminal of resistance CB of the trouble indicator. This will cause relay CON to operate prematurely. Make a test call to a ring party line with key RV normal. Observe that lamps CON and TCT light. Lamp RL should not light. Remove the ground and release key TVT.
30. GROUND TEST (FIRST TRIAL)
- 30.1 Operate key GT and start a test call to an individual ring party (NF-RF) line number. Observe that the marker times out and that lamps RF, FC, GT2, CON and TRL light. Lamp RL does not light.
- 30.11 Repeat the test call to a coin line number. Observe the same test results except that lamp CN also lights.
- 30.12 Operate keys RV and GT and start a test call to a tip party line number, if tip party line numbers are available. Observe that the marker times out and that lamps TF, FC, GT2, CON and TRL light. Lamp RL does not light.
- 30.2 Ground Test (Second Trial and CCT)
- 30.21 Operate keys GT and TR2. Repeat the test calls described in Paragraphs 30.1 and 30.12. Observe that the test calls are completed and that lamps TR2 and RL followed by TRL light. Restore key TR2.
- 30.211 Operate key GT and cancel continuity test for individual lines by inserting 322A-MB plugs into jack NPC and jack CCT associated with the marker under test. Repeat the test calls described in Paragraphs 30.1 and 30.11 and observe that the test calls are completed.
- 30.22 Operate keys GT and TR2 and start a test call to a coin line number. Restore key GT when the NG lamp associated with the first number group seized by the marker has been observed to light momentarily. Observe that the test call is completed; lamps TR2 and RL followed by TRL light and that lamps TH, H, T, U and F light to agree with

the corresponding keys as operated, also observe that lamps NGC, HB, HP and L light to agree with the route as determined by the number group, hundred block twenty block and line terminal cross-connections, respectively, as specified for terminals ST, HB, TB and L of marker relay BBT. Restore key TR2.

- 30.221 Operate key GT and cancel continuity test for coin lines by inserting 322A-MB plugs into jack CCN and jack CCT associated with the marker under test. Observe test results as described in Paragraph 30.22 except that lamp TR2 does not light. Remove the make busy plugs.

NOTE: The tests described in Paragraphs 30.22 and 30.221 are required only when marker relay BBT, (Figure AH) is specified.

- 30.23 Operate keys GT and TR2 and start a test call to a coin line number. Observe that the test call is completed and that lamps TR2, OF, TC, RV, RC and RL followed by TRL light. Restore key TR2.
- 30.231 Operate key GT and cancel continuity test for coin lines by inserting 322A-MB plugs into jack CCN and jack CCT associated with the marker under test. Start a test call to a coin line number. Observe that the test call is completed and that lamps OF, TC, RV, RC and RL followed by TRL light.

NOTE: The tests described in Paragraphs 30.23 and 30.231 are required only when marker circuit Figure AG is specified.

### 31. CROSSED JC LEADS

NOTE: Refer to "Jump Hunting" test in Paragraph 6 Section 225.7 for the test setup for making this test.

Cross two JC leads one of which is used in a jump hunting group. The cross may be made at the top winding terminals of the two JC relays to be used for test or at the associated punchings, 30-39 for leads (JC)0, 2, 4-18, on the terminal strip for MCA relays on the number group connector. Make a test call that will cause the marker to jump hunt and operate one of the crossed JC relays. Observe that the marker times out and the two associated JC lamps are lighted.

### 32. CROSSED HUNDRED BLOCK LEADS (HB)

Block non-operated the XTL and XTBI relays to prevent the trouble indicator from being brought in by these relays due to two TB leads being involved in the test. Cross two equipped HB leads at the marker XTS. Using testing equipment other than the trouble indicator as for example, ITE-4010, terminating equipment test set or the OGT test frame, originate a test call via the marker under test to a line in one of the hundred blocks whose lead is crossed. Check that the marker immediately connects to the trouble indicator and that lamps X and XHB light. Both HB lamps should also light. Remove the cross and the block from relays XTL and XTBI.

### 33. TROUBLE REORDER

NOTE A: If the number group and the line choice connector circuits are not equipped with TMB relays, block marker relay LK nonoperated before making the tests described in Paragraphs 33.2 and 33.4; also, before making these tests (33.2 and 33.4) on markers 0 and 1 insulate 3T-4T contacts of marker relay NC1. Remove the block and the insulator at the completion of the tests.

NOTE B: The tests described in Paragraphs 33.3 and 33.5 are required only when wiring is specified.

- 33.1 Insert a 322A make busy plug into jack TRO at the trouble indicator, block relay MKO non-operated, and make a test call to any assigned line number. Observe that marker relays TR01, TM6, TR0 and OF operate, and lamps TC, RV, RC, CON, GT2 and RL followed by TRL light. Remove the block from relay MKO.
- 33.11 At a block relay frame, cross two HG terminals, one of which is cross-connected to the NC terminal of an individual line number. Make a test call to this line number and observe that marker relays TR01, X, TR0 and OF operate and that lamps TC, RV, RC, CON, GT2 and RL followed by TRL light. Remove the cross from the HG leads and the make busy plug from jack TRO.
- 33.2 Insert a 349A make busy plug into jack TMB of any number group connector and make a test call to a line number associated with the selected number

- group. Observe that marker relays TMBN and OF operate and that lamps TC, RV, RC, CON, GT2 and RL followed by TRL light. Remove the make busy plug from the number group TMB jack.
- 33.3 Cross leads; TMB and ST for number group 0, (T.S. NG-C, terminal 40 and T.S. MISC., terminal 100 respectively). Make a test call to a line number associated with number group 0 and observe that the marker immediately connects to the trouble indicator and that lamps XTMB and X light. Remove the cross.
- 33.4 Insert 349A make busy plug into jack TMB of line choice connector 0. Make a test call to an assigned line number whose NF terminal at the block relay frame is cross-connected to one of terminals HF-0 RF-0 or TF-0. Observe that marker relays TMBL and OF operate and that lamps TC, RV, RC, CON, GT2 and RL followed by TRL light. Remove the make busy plug from the line choice connector TMB jack.
- 33.5 Cross leads; TMB and ST for line choice 0, (T.S. (LC-A), terminal 11 and T.S. (MISC.), terminal 120 respectively). Make a test call to an assigned line number associated with line choice 0. Observe that the marker immediately connects to the trouble indicator and that lamps XTMB and X light. Remove the cross.
34. JA AND JB LEADS
- Check that direct ground is present on the 2T springs of relays (JA) 0-9 and (JB) 0-9. Check that the battery (thru 90 ohms) is present on 1T spring of relay JB9. Operate relay JB 8 to JB 0 and JA 9 to JA 0, one at a time and check that battery is removed from and ground connected to the 1T spring of relay JB 9.
35. MISCELLANEOUS FEATURES
- 35.1 Connect ground to contact 4B of relay PG. Manually operate relay X. Observe that the marker immediately connects to the trouble indicator and that lamp PG lights. Check the following lamps in a manner similar to that described for lamp PG. Observe that the lamp, associated with the grounded lead, lights for each of the tests.
- 35.2 Make ten test calls to a line on the A line link frame of a line choice using a different channel on each call. Observe at the line link frame that the primary select magnet that operates agrees in number with the channel selected (lighted CH lamp). Repeat these ten test calls to the B, C and D line link frames of the choice. These tests verify the SM leads and features of the marker for operating line link primary select magnets. Busy channels by inserting make busy plugs in the SS jacks at the line link frame used for test. Secondary select magnets will operate on these tests but may be disregarded.
- 35.3 Manually operate relay GLH and check that ground is present on spring 7B (GLH). The purpose of this ground is to discharge the line cable pair.
- 35.4 Manually operate relay PGT and check that battery is removed from the bottom winding terminal of relay CH0. This checks that a CH relay is not operated in case of an all channels busy condition.
- 35.5 Insulate 3 and 4T springs of relay TRB to open the operate path of the L relays. Make a test call to a line and observe that the marker times out and no L lamp is lighted. Remove insulation.
- 35.6 Insulate 1 and 2T springs of relay TRB to open the operate path of the CH relays. Make a test call and observe that the marker times out and no CH lamp is lighted. Remove insulation.
- 35.7 Check that relay CON1 when operated connects ground to the number 1 terminal of the ionic tube (A) of the continuity test feature.
- 35.8 *If marker is equipped with CB option, cross the 7T and 8T contacts, relay TBK. In markers arranged for marker speed-up block operated relays CK6 and TKT. Apply ground through a test receiver to contacts 4T and 5T of relays L0 to L19, in turn, and observe that relay SG operates when 4T is grounded and the associated S- relay operates when 5T is grounded.*

*NOTE: If marker is arranged for marker speed-up a visual check of S- relay operation cannot be made. Therefore, verify S- relay operated by grounding corresponding contact of relay TOD or REV as designated in the following table and verifying relay BB operates.*

<u>Lamp</u>	<u>Ground Connection</u>
TK	Operate relay TK
HTR	T winding (HTR)

S RELAY OPERATED	CONTACT TEV		CONTACT TOD	
	RELAY GROUNDED	S RELAY OPERATED	RELAY GROUNDED	S RELAY OPERATED
S0	1B	S10	1B	S10
S1	3B	S11	3B	S11
S2	5B	S12	5B	S12
S3	7B	S13	7B	S13
S4	9B	S14	9B	S14
S5	1T	S15	1T	S15
S6	3T	S16	3T	S16
S7	5T	S17	5T	S17
S8	7T	S18	7T	S18
S9	9T	S19	9T	S19

SD-25283

Dwg.	Loc.	Test At	Grd. Adj.	Appearance At
-0108	B132	#8B SDT		
-0108	B132	#8B SDT		4T RO
-0101	H6	#6T RO		7T RO, 2M MT1 and front contact of GT
-0103	H41	#1B PU1		
-0102	B22	#1B LT1		
-0102	B22	#1B TTI		3B LT1
-0102	I22	6B CNL1		
-0103	H49	6B IK		
-0103	H39	6T CN		2B GT2, 2T GT2, 4B GT2 & 4T GT2

35.9 Cross 11B and 12B contacts of CK10 also cross 5T and 6T contacts of relay NK. Observe that relays LE1 to LE12 operate. Momentarily open 1T & 3T contacts of relays L0 to L19, in turn, and observe that relays LE1 to LE12 release in each case. Remove cross from 5T-6T contacts of NK relay and 11B-12B contacts of CK10 relay.

# A click due to condenser CA1 may be heard when the test receiver is first connected to these contacts.

36.22 Remove the insulators from relays TTI, IK, IK1, CN and GT2.

36.23 Insulate relay contacts 2T-3T TR, 1B-2B TTIB and 3T-4T SDT before making tests on leads RL, TRL and RO.

36. FC, RL, TRL AND RO LEADS

RL Lead

36.1 The purpose of this test is to check for high resistance crosses to ground to relay cores and to adjacent springs on relays and also to check the operation of the S and SG relays and the L relay chain. The test may be made during the supplementary test interval, if desired, providing all wiring changes have been completed in the markers. It is suggested that this test be made before the tests involving the use of markers on test calls.

SD-25283

Dwg.	Loc.	Test At	Grd. Adj.	Appearance At
-0101	J3	9T LLB		Make contact #29 (RL) SDT1, 2T X, 2T XR
-0101	J3	7T LLB		9T LLB
-0104	B60	9B MT		8B MT
-0103	F43	7B SL1		
-0103	H44	1T LTR		2T LTR
-0103	H44	#3T LTR		4B SL1 and front contact of FCG
-0103	F42	#2B TLH		
-0103	G48	1B MT1		8B GLH1
-0103	I39	6B GT2		3T RV1
-0104	B60	2B MT		
-0102	I20	3T RV1		5T RV1
-0102	G23	3T SRL		1T SRL
-0102	I20	5B RV1		
-0101	J12	11B CK6		
-0104	C61	2B TRV		
-0101	I4	#2T X		

36.11 At the TTI frame insert a 322A MB plug in the DB jack associated with the marker under test.

36.12 Connect one side of test receiver R-9572 to a 48V supply. Connect the other end of the test receiver to the lead under test.

36.13 Check that no relays operate and that there is no click in either test receiver when the test receiver is connected to the lead under test or when ground is applied thru another test receiver to an adjacent relay spring as specified in the table or to the core. Where the table does not specify the grounding of an adjacent spring, the spring is normally connected to ground or to battery.

# A click due to condenser L may be heard when the test receiver is first connected to these leads.

36.2 FC Lead

Markers 0 and 1 only

36.21 Insulate relay contacts 1B-2B TTI, 6B-7B IK, 2B-3B IK1, 2B-3B CN, 1B-3B GT2 and 4T-5T GT2 before making tests on lead FC.

SD-25283

Dwg.	Loc.	Test At	Grd. Adj.	Appearance At
-0107	1109	7T NTT		8T NTT
-0107	1109	7T NTT		4B NTR
-0107	1109	1T NTT		3T NTT

TRL Lead

SD-25283

Dwg.	Loc.	Test At
-0101	14	2T XR
-0104	D54	6T TM7
-0104	D58	1B TTIB

RO Lead

NOTE: Remove Fuse C.

SD-25283

Dwg.	Loc.	Test At	Grd. Adj.	Appearance At
-0108	D133	Core of RO Re-lay	Armature contact #39 (RO) SDT1	

36.24 Remove insulators from relays TR, TTIB and SDT and replace fuse C.

37. SECOND TRIAL FAILURE TO OVERFLOW FEATURE (Figure 31 provided)

Set up test call per Section 225. Operate key 2TR and key TI-OFL to OFL position. Momentarily operate ST key. Check that lamp OFL lights.

38. FIRST TRIAL FAILURE TRUNK IDENTIFICATION (Option 1L of Figure 31)

Set up test call per Section 225. Induce a receiving lead failure (such as omission of TH- digit). Operate key TI-OFL to TI position. Momentarily operate ST key. Check that an IF lamp lights indicating the Incoming Frame.

39. TERMINATING MARKER APPLIQUE

39.1 Crossed Transmitting Leads (LLP Only)

NOTE: Terminal Strip EA- is for the even numbered markers. Terminal Strip EB- is for the odd numbered markers.

39.11 Insulate contact 8M and then block relay SON operated. Momentarily apply ground to the below listed terminals one at a time.

Lead	Terminal Strip	Punchings	FIELD
DL 1-4	EA-F or EB-F	10 - 13	MA2
CL 2-5 & 35	EA-F or EB-F	50 - 54	MA2
ND	EA-F or EB-F	10	MA1

Lines Presented in Script Indicate New or Changed Information

Observe that the marker immediately connects to the trouble indicator and that the X and XT1 lamps light each time ground is applied.

39.2 Crossed Sender Select Leads (LLP Only)

39.21 Block relay SSA operated. Momentarily apply -48V battery to leads SS (0-9) on T.S. (EA-G or EB-G) Punchings (12-21) one at a time. Observe that the marker immediately connects to the trouble indicator and the X and XSS lamps light each time battery is applied. Release relay SSA.

39.22 Block relay SSB operated and repeat the tests of Paragraph 39.21 observing the same results.

39.23 Remove block from relays SSB and SON. Remove insulator from contact 8M or relay SON.

39.3 Crossed LF Leads (LLP Only)

39.31 Momentarily apply ground to leads OSG (0-5) on T.S. (EA-G or EB-G) Punchings (05-10) one at a time. Observe that the marker immediately connects to the trouble indicator and the X and XLF lamps light each time.

39.4 Crossed S Leads (LLP Only)

39.41 Momentarily apply ground to Punching 77 on T.S. (EA-F or EB-F). Observe that the marker immediately connects to the trouble indicator and the X and XSC lamps light for each marker tested.

39.5 NS Relay Matrix (LLP or ESS)

39.51 If NS relays are provided, block marker relay CK10 operated and perform the following tests:

(a) Momentarily operate relays NS 0, 1, 2, & 4 one at a time. Observe that the marker immediately connects to the trouble indicator and the X lamp lights each time.

(b) Momentarily operate relays NS- in the following combinations at the same time NS 0&1; NS 0,1, & 2; NS 0,1, & 4; NS 0, 2, & 4; and NS 1,2, & 4. Observe that the marker immediately connects to the trouble indicator and the X lamp lights for each combination.

Manager, Crossbar Product Engineering  
Control Center

Reason for Reissue:

1. Make a general revision to update to current engineering standards.