ORIGINATING MARKER CONNECTORS
MANUAL TEST
NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes a method of making tests of the originating marker connector circuits in No. 1 crossbar offices.

1.02 This section is reissued to clarify the conditions under which optional steps are performed in Tests B, E, and F. This reissue does not affect the Equipment Test List.

1.03 The tests covered are:

A. Marker Busy to Connector: This test checks that the marker is made busy to the connector by inserting a plug into either a CB_ or a DB_ jack. A check is also made that the senders associated with the connector are made busy by inserting a plug into a GB_ jack and that an operated SA_ relay will hold CB_ relays operated.

B. Sender Preference and Lockout Features: This test checks the order of preference of the SS_ relays and that only one sender at a time can be served by a connector.

C. Marker Preference and Lockout Features—Access to All Markers from One Connector, CB_ Relay Chain: This test checks that an operated CB_ relay will transfer the preference to the next DS_ relay of the connector and that the connector will connect to only one originating marker at a time.

D. Marker Preference and Lockout Features—Access to One Marker from All Connectors, DS_ Relay Chain: This test checks that a connector prefers a particular marker and that only one connector at a time will connect to this marker. A check is also made that when a DMA_ relay operates the associated CB_ relay releases and the TM and DB leads to the marker and the GS and CL leads of the connector are grounded.

E. Time Out Features: This test checks that the connector will time out and give an audible and visual alarm within a measured time if a sender fails to connect to a marker or if the sender or marker fails to release. Where the marker sequence feature is not provided and when a time out occurs and if all markers are not busy at the time, a check is made that the senders associated with the connector are made busy. Where the marker sequence feature is provided, a check is made that an operated SB_ relay connects ground to the CP lead.

F. False Ground Features: This test checks that a visual and audible alarm is given if an RO, RL, or TRL lead is falsely grounded.

G. Marker Sequence Feature: This test checks that the DS_ relays will hold operated after the GT relay operates. The marker sequence feature is checked to insure that a connector will not serve a second call until all other connectors waiting for a marker have each served one call. A check is also made that this feature is cancelled and an audible and visual alarm signal given within a measured time if a connector is locked out of service while any marker is idle.
H. Test for False Continuity (SA_, SB_, DMA_ and DMB_ Relays):
This test checks for false continuity of all contacts on the sender and marker connector relays.

1.04 During Tests C, D, and G the DTR (marker trouble release) register may be scored.

1.05 Local instructions should be followed with reference to recording any register operations caused by performing these tests.

1.06 An assistant at the maintenance center will facilitate making Tests A, C, D, E, F, and G.

1.07 All tests covered in this section should preferably be made during periods of light traffic.

1.08 Lettered Steps: A letter, a, b, c, etc., added to a step number in Part 3 or 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a letter 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.

2. APPARATUS

2.01 The apparatus required for each test is shown in Table A. The details of each item are covered in the paragraph indicated by the number in parentheses.

2.02 322A make-busy plug.

2.03 716C receiver attached to a W2AB cord equipped with two 360A tools (2W21A cord), a 411A tool and a KS-6278 tool.

2.04 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), a KS-6278 tool and a 509A tool.

2.05 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), a KS-6278 tool and a 419A tool.

<table>
<thead>
<tr>
<th>APPARATUS</th>
<th>TESTS</th>
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<tbody>
<tr>
<td>322A Plug (2.02)</td>
<td>2</td>
</tr>
<tr>
<td>Receiver (2.03)</td>
<td>1</td>
</tr>
<tr>
<td>Testing Cord (2.04)</td>
<td>2</td>
</tr>
<tr>
<td>Testing Cord (2.05)</td>
<td>1</td>
</tr>
<tr>
<td>Testing Cord (2.06)</td>
<td>1</td>
</tr>
<tr>
<td>Stopwatch (2.07)</td>
<td>1</td>
</tr>
</tbody>
</table>

✓ As required

3. PREPARATION

STEP ACTION VERIFICATION

Tests A Through C and E Through H

1 At originating trouble indicator frame—Insert plug into GB_ jack of senders associated with connector under test. All senders in group are normal.
4. METHOD

A. Marker Busy to Connector

2. Insert plug into any CB_ jack associated with connector under test.

3. Remove plug from CB_ jack.

4. Repeat Steps 2 and 3 for all CB_ jacks associated with connector under test.

5. Insert plug into DB_ jack associated with any marker.

6. Remove plug from DB_ jack.

7. Repeat Steps 5 and 6 for all originating markers.

8. Block operated lower half of any SA_ relay.


10. Remove blocking tool from SA_ relay.

11. Repeat Steps 8 through 10 for remaining SA_ relays of connector except last SA_ relay.

12. Repeat Steps 8 and 9 on last SA_ relay.

13. Manually operate, one at a time, the other CB_ relays of connector.

Note: In case any CB_ relay fails to release, this might be caused by associated marker being busy on a call at the instant last CB_ relay was operated or by marker being made busy. To eliminate first possibility, repeat Step 13 and, if trouble is repeated, determine whether marker is made busy.

VERIFICATION

All CB_ relays operated in connector.

Associated CB_ relay operated in connector.

Associated CB_ relay releases.

Associated CB_ relay operates in connector.

Associated CB_ relay releases.

CB_ relay locks.

CB_ relay releases.

All CB_ relays lock until last CB_ relay is operated. When last CB_ relay is operated, all other CB_ relays release.

CB_ relay last operated locks.

Ground present on 2B and 3B of each CB_ relay except the last.
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STEP | ACTION | VERIFICATION
---|---|---
14 | Remove blocking tool from last SA_ relay. | Last CB_ relay releases.
15 | Remove plug from GB_ jack. | 

B. Sender Preference and Lockout Features

3a | If the marker sequence feature is provided—
At connector—
Operate TLO key. | No ground on 1B spring of CA5 relay.

4 | At connector—
Block CA1 and CA2 relays nonoperated. | 

5 | Connect battery to B winding terminal of
lowest numbered SS_ relay. | SS_ and associated SA_ and SB_ relays operated.

6 | Connect battery to B winding terminal of next
higher SS_ relay. | This SS_ relay not operated.

7 | Remove battery from lowest SS_ relay. | Lowest SS_, SA_ and SB_ relays release.

8 | Reconnect battery to B winding terminal of
lowest SS_ relay. | Next higher SS_, SA_, and SB_ relays operated.

9 | Remove battery from lowest SS_ relay. | Lowest SS_ relay operated.

10 | Repeat Steps 6 to 9, inclusive, for remaining
SS_ relays in succession. | Next higher SS_ relay holds operated.

11 | Remove battery from last SS_ relay and block
tools from CA1 and CA2 relays. | Lowest SA_ and SB_ relays not operated.

12 | Remove plugs from GB_ and CB_ jacks. | Lowest SS_ relay releases.

13a | If marker sequence feature is provided—
Restore TLO key. | 

C. Marker Preference and Lockout Features—Access
to All Markers from One Connector, CB_ Relay
Chain

Note: Silence any alarms which may sound
during test.

2 | At connector—
Block nonoperated all DMA_ relays. | 

3 | Block nonoperated CB_ relay associated with
lowest numbered DS_ relay. | 

Page 4
STEP | ACTION | VERIFICATION
--- | --- | ---
4 | Connect battery to 1T spring of highest CB relay. | Lowest numbered DS relay in chain operated. Associated DMA relay is energized.
5 | Block nonoperated CB relay associated with next higher numbered DS relay. | Next higher numbered DS relay operated. Lower numbered DS relay releases. DMA relay associated with higher numbered DS relay is energized.
6 | Block operated CB relay associated with operated DS relay. | |
7 | Repeat Steps 5 and 6 for all DS and CB relays in connector. | Highest numbered DS relay releases. Associated DMA relay is not energized.
8 | Remove battery from CB relay spring. | |
9 | Block operated highest numbered CB relay. | |
10 | Block nonoperated lowest numbered CB relay. | |
11 | Connect battery to 2T spring of highest numbered CB relay. | Lowest numbered DS relay operated.
12 | Remove battery from CB relay and blocking tools from CB and DMA relays. | |
13 | Remove plug from GB jack. | |

D. Marker Preference and Lockout Features—Access to One Marker from All Connectors, DS Relay Chain

*Note:* Silence any alarms which may sound during test.

1 | At originating trouble indicator frame—Insert plug into DB jack of originating marker to be tested. | At connector—Associated CB relay operated.

*Caution:* *Perform these operations as rapidly as possible in order to prevent interference with service.*

2 | Block operated MB relay of connector containing first preferred DS relay associated with marker made busy. | DS relay operated. Associated CB relay releases. GRA and CA5 relays operated. Ground present on terminals 04 and 06 of

3 | At connector—Connect battery to B winding terminal of first preferred DS relay. |
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STEP 4
Block operated MB relay of connector containing next preferred DS_ relay associated with marker made busy.

STEP 5
Connect battery to B winding terminal of next preferred DS_ relay in chain associated with marker made busy.

STEP 6
Remove battery from first preferred DS_ relay and blocking tool from MB relay of first connector.

STEP 7
Reconnect battery to B winding terminal of first preferred DS_ relay.

STEP 8
Remove battery from first preferred DS_ relay.

STEP 9
Proceed as outlined in Steps 4 through 8 for the other DS_ relays associated with marker made busy.

STEP 10
Remove battery from last DS_ relay and blocking tool from MB relay of last connector.

STEP 11
At originating trouble indicator frame—Remove plug from DB_ jack.

STEP 12
Repeat Steps 1 through 11 for remaining originating markers.

E. Time-Out Features

3
At originating trouble indicator frame—Operate BAT key.

4a
If marker sequence feature is not provided—At originating trouble indicator frame—Insert plugs into all CB_ jacks associated with connector under test.

5
At connector—Block nonoperated lowest numbered SS_ relay.

VERIFICATION

associated DMA terminal strip at connector frame.

DS_ relay not operated.

First preferred DS_ relay releases.
Associated DMA_ and DMB_ relays release.
Second preferred DS_ relay operated.
Associated CB_ relay releases.
Ground present on terminals 04 and 06 of associated DMA terminal strip on this connector frame.
GRA and CA5 relays operate in this connector.

DS_ relay operated.
Associated DMA_ relay not operated.
Second preferred DS_ relay holds operated.

DS_ relay releases.

AMB relay operated.
Ground not present on 6T spring of CA4 relay.
<table>
<thead>
<tr>
<th>STEP</th>
<th>ACTION</th>
<th>VERIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6a</td>
<td>If marker sequence feature is not provided— Connect battery to B winding terminal of blocked SS_ relay.</td>
<td>5 to 12 seconds later— At originating trouble indicator frame— CT and proper C_ lamps lighted. Corresponding S_ lamp extinguished. Major alarm sounds.</td>
</tr>
<tr>
<td>7b</td>
<td>If marker sequence feature is provided— Connect battery to B winding terminal of blocked SS_ relay.</td>
<td>5 to 12 seconds later— At originating trouble indicator frame— CT and proper C_ lamps lighted. Corresponding S_ lamp extinguished. TFA lamp lighted. Major alarm sounds.</td>
</tr>
<tr>
<td>8c</td>
<td>If marker sequence feature is provided and CA1 relay is UA41 type— Insulate 1B contact of CA1 relay.</td>
<td>CT lamp is extinguished. Minor alarm retired.</td>
</tr>
<tr>
<td>9d</td>
<td>If marker sequence feature is provided and CA1 relay is U245 type— Insulate 1T contact of CA1 relay.</td>
<td>CT lamp is extinguished. Minor alarm retired.</td>
</tr>
<tr>
<td>10e</td>
<td>If marker sequence feature is not provided and CA1 relay is UA41 type— Insulate 1B contact of CA1 relay.</td>
<td>CT and C_ lamps are extinguished. Minor alarm retired.</td>
</tr>
<tr>
<td>11f</td>
<td>If marker sequence feature is not provided and CA1 relay is U245 type— Insulate 1T contact of CA1 relay.</td>
<td>CT and C_ lamps are extinguished. Minor alarm retired.</td>
</tr>
<tr>
<td>12b</td>
<td>If marker sequence feature is provided— At originating trouble indicator frame— Operate LORL key.</td>
<td>C_ and TFA lamps are extinguished.</td>
</tr>
<tr>
<td>13g</td>
<td>If early operation of GRA relay is provided (S wiring) with marker sequence feature— Remove blocking tool from SS_ relay.</td>
<td>At originating trouble indicator frame— Corresponding S_ lamp lighted. 5 to 12 seconds later— At originating trouble indicator frame— CT, C_ and TFA lamps lighted. Major alarm sounds. At connector— GRA relay operated.</td>
</tr>
<tr>
<td>STEP</td>
<td>ACTION</td>
<td>VERIFICATION</td>
</tr>
<tr>
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</tr>
<tr>
<td>14h</td>
<td>If early operation of GRA relay is not provided (no S wiring) and marker sequence feature is provided— Remove blocking tool from SS_ relay.</td>
<td>At originating trouble indicator frame— Corresponding S_ lamp lighted. 5 to 12 seconds later— At originating trouble indicator frame— CT, C_ and TFA lamps lighted. Major alarm sounds.</td>
</tr>
<tr>
<td>15i</td>
<td>If early operation of GRA is provided (S wiring) without marker sequence feature— Remove blocking tool from SS_ relay.</td>
<td>At originating trouble indicator frame— Corresponding S_ lamp lighted. 5 to 12 seconds later— At originating trouble indicator frame— CT and C_ lamps lighted. Major alarm sounds. At connector— GRA relay operated.</td>
</tr>
<tr>
<td>16j</td>
<td>If early operation of GRA relay is not provided (no S wiring) and marker sequence feature is not provided— Remove blocking tool from SS_ relay.</td>
<td>At originating trouble indicator frame— Corresponding S_ lamp lighted. 5 to 12 seconds later— At originating trouble indicator frame— CT and C_ lamps lighted. Major alarm sounds.</td>
</tr>
<tr>
<td>17b</td>
<td>If marker sequence feature is provided— Insulate 2T contact of GT1 relay.</td>
<td>Ground present on this contact.</td>
</tr>
<tr>
<td>18a</td>
<td>If marker sequence feature is not provided— Remove battery from SS_ relay.</td>
<td>CT, C_ and S_ lamps are extinguished. Major alarm retired.</td>
</tr>
<tr>
<td>19b</td>
<td>If marker sequence feature is provided— Remove battery from SS_ relay.</td>
<td>CT and S_ lamps extinguished.</td>
</tr>
<tr>
<td>20b</td>
<td>Operate LORL key.</td>
<td>C_ and TFA lamps extinguished.</td>
</tr>
<tr>
<td>21b</td>
<td>Operate TLO key.</td>
<td>Minor alarm retired.</td>
</tr>
<tr>
<td>22</td>
<td>At connector— Block nonoperated CA4 relay.</td>
<td></td>
</tr>
<tr>
<td>23k</td>
<td>If marker sequence and early operation of GRA relay (S wiring) features are provided and GT1 relay locks to TLO key (G wiring)— Connect battery to B winding terminal of next higher numberd SS_ relay.</td>
<td>At originating trouble indicator frame— Corresponding S_ lamp lighted. At connector— Ground present on 2T spring of CA2 relay. GRA relay operated. Ground present on 2T spring of GT1 relay.</td>
</tr>
<tr>
<td>24l</td>
<td>If marker sequence feature is provided and GT1 relay locks to TLO key (G wiring)— Connect battery to B winding terminal of next higher numbered SS_ relay.</td>
<td>At originating trouble indicator frame— Corresponding S_ lamp lighted. At connector— Ground present on 2T spring of CA2 relay and 2T spring of GT1 relay.</td>
</tr>
</tbody>
</table>
If marker sequence and early operation of GRA relay (S wiring)) features are provided and GT1 relay does not lock to TLO key (H wiring)—
Connect battery to B winding terminal of next higher numbered SS_ relay.

Connect ground to 2B spring of CA5 relay.

If marker sequence feature is provided and GT1 relay does not lock to TLO key (H wiring)—
Connect battery to B winding terminal of next higher numbered SS_ relay.

If early operation of GRA relay is not provided (no S wiring) and marker sequence is not provided—
Connect battery to B winding terminal of next higher numbered SS_ relay.

If early operation of GRA relay is provided (S wiring) without marker sequence feature—
Connect battery to B winding terminal of next higher numbered SS_ relay.

If marker sequence feature is provided and GT1 relay does not lock to TLO key (H wiring)—
Remove ground from CA5 relay spring.

Remove battery from winding terminal of SS_ relay.

Repeat Steps 23k through 32 on remaining SS_ relays of connector under test.

Remove insulators from CA1 and GT1 relays and blocking tool from CA4 relay.

Connect ground to T winding terminal of CA5 relay.

At originating trouble indicator frame—
Corresponding S_ lamp lighted.
At connector—
Ground present on 2T spring of CA2 relay.
GRA relay operated.

At connector—
Ground present on 2T spring of GT1 relay.

At originating trouble indicator frame—
Corresponding S_ lamp lighted.
At connector—
Ground present on 2T spring of CA2 relay.

At connector—
Ground present on 2T spring of GT1 relay.

At originating trouble indicator frame—
Corresponding S_ lamp lighted.
At connector—
Ground present on 2T spring of CA2 relay.

At originating trouble indicator frame—
Corresponding S_ lamp lighted.
At connector—
Ground present on 2T spring of CA2 relay.
GRA relay operated.

At originating trouble indicator frame—
Corresponding C_ lamp lighted.
5 to 12 seconds later—
CT lamp lighted.
Major alarm sounds.
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<th>ACTION</th>
<th>VERIFICATION</th>
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<tr>
<td>36</td>
<td>Remove ground from winding terminal of CA5 relay.</td>
<td>C- and CT lamps extinguished.</td>
</tr>
<tr>
<td>37a</td>
<td>If marker sequence feature is not provided— Remove plugs from CB_ and GB_ jacks.</td>
<td>At connector— AMB and MB relays release.</td>
</tr>
<tr>
<td>38b</td>
<td>If marker sequence feature is provided— Remove plugs from CB_ and GB_ jacks.</td>
<td>MB relay releases.</td>
</tr>
<tr>
<td>39b</td>
<td>Release TLO key.</td>
<td></td>
</tr>
<tr>
<td>40a</td>
<td>If marker sequence feature is not provided— Manually operate CA4 relay.</td>
<td>MB relay operated.</td>
</tr>
<tr>
<td>41a</td>
<td>Release CA4 relay.</td>
<td>MB relay releases.</td>
</tr>
</tbody>
</table>

F. False Ground Features

2 At originating trouble indicator frame— Operate BAT key.

3a If RO lead is connected to operating spring 0 of SB_ relays (W wiring)— Momentarily ground operating spring 0 of last SB_ relay in connector under test. At originating trouble indicator frame— GR, CT and C_ lamps lighted. Major alarm sounds.

4b If RO lead is connected to operating spring 27 of SB_ relay (X wiring)— Momentarily ground operating spring 27 of last SB_ relay in connector under test. At originating trouble indicator frame— GR, CT and C_ lamps lighted. Major alarm sounds.

5 At originating trouble indicator frame— Operate RLA key. GR, CT and C_ lamps extinguished. Major alarm retired.

6a If RO lead is connected to operating spring 0 of SB_ relays (W wiring)— Repeat Steps 3 and 5 for operating springs 1 and 6.

7b If RO lead is connected to operating spring 27 of SB_ relay (X wiring)— Repeat Steps 4 and 5 for operating springs 34 and 6.

8 Remove plug from GB_ jack.

G. Marker Sequence Feature

Note: Retire any alarms which may sound during test.
**ACTION**

2. At originating trouble indicator frame—
   Observe that TLO key is normal.

3. Block nonoperated CA4 relay and CB_ relay associated with first preferred DS_ relay in connector.

4. Block operated GT relay.

5. Connect battery to 3T spring of GT relay.

6. Remove blocking tool from GT relay.

7. Block operated CB_ relay associated with operated DS_ relay.

8. Repeat Step 7 until all DS_ relays in connector have been tested.

9. Remove battery from GT relay and blocking tools from CA4 and CB_ relays.

10. Connect ground to TF winding terminal of GT relay.

11. Remove ground from GT relay and momentarily operate TLO key.

12. Block operated CA5 relay.

13. Connect ground to TF winding terminal of GT relay.

14. Connect ground to 2B spring of GT relay of succeeding connector. (CP lead)

**Note:** Do not ground the CP lead any longer than necessary to perform the test outlined in the following procedure.

**VERIFICATION**

No DS_ relay operated.

First preferred DS_ and associated DMA_ and DMB_ relays operated.
GT relay operated.
DS_ relay holds operated after GT relay operated.

First DS_, DMA_, and DMB_ relays release and another DS_ and associated DMA_ and DMB_ relays operated.
GT relay releases and reoperated.
DS_ relay holds operated.

GT and GT1 relays operated.
2 to 5 seconds later—
GT and GT1 relays release.
Minor alarm sounds.
At originating trouble indicator frame—
TFA lamp lighted.

Minor alarm retired.
TFA lamp extinguished.

GT and GT1 relays operated.
Minor alarm does not sound.
GT relay of succeeding connector is normal.
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<tbody>
<tr>
<td>15</td>
<td>Remove ground from winding of GT relay of connector under test.</td>
<td>GT and GT1 relays remain operated.</td>
</tr>
<tr>
<td>16</td>
<td>Remove ground from GT relay of succeeding connector.</td>
<td>GT and GT1 relays release in connector under test.</td>
</tr>
<tr>
<td>17</td>
<td>Remove blocking tool from CA5 relay and plug from GB_ jack.</td>
<td>Note: Release may be delayed due to some other marker connector serving a call in which case observe that they release after the call is served.</td>
</tr>
</tbody>
</table>

### H. Test for False Continuity (SA_, SB_, DMA_ and DMB_ Relays)

2. Connect battery, through test receiver, and ground to stationary and operating springs, respectively, of all pairs of relay contacts of SA_ and SB_ relays. Where stationary spring is normally grounded, check operating spring for false closure. No click heard in test receiver.

3. Insert plug into any DB_ jack at originating trouble indicator frame.

4. Repeat Step 2 on DMA_ and DMB_ relays associated with marker made busy. No click heard in test receiver.

5. Remove plug from DB_ jack.

6. Proceed as outlined in Steps 3 to 5, inclusive, until DMA_ and DMB_ relays of all originating markers have been tested.