

ORIGINATING MARKER CONNECTORS  
MANUAL TEST  
NO. 1 CROSSBAR OFFICES

1. GENERAL

PAGE

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

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.

5

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:

PAGE

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.

3

**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.

6

B. **Sender Preference and Lockout Features:** This test check the order of preference of the SS\_ relays and that only one sender at a time can be served by a connector.

4

**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.

10

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.

4

**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.

10

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

PAGE

**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. . . . .

12

**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 A

APPARATUS	TESTS							
	A	B	C	D	E	F	G	H
322A Plug (2.02)	2	✓	1	1	✓	1	1	2
Receiver (2.03)	1	1	1	1	1	1		1
Testing Cord (2.04)		2		2	1		1	
Testing Cord (2.05)			1		1		1	
Testing Cord (2.06)								1
Stopwatch (2.07)					1			

✓ As required

**2.06** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), a KS-6278 tool and a 411A tool.

**2.07** KS-3008 stopwatch or equivalent.

**3. PREPARATION**

**STEP ACTION VERIFICATION**

**Tests A Through C and E Through H**

1 At originating trouble indicator frame—  
Insert plug into GB<sub>1</sub> jack of senders associated with connector under test.

All senders in group are normal.

STEP	ACTION	VERIFICATION
<b>Tests B and E</b>		
2	Insert plugs into all CB_ jacks associated with connector under test.	All CB_ relays operated in connector.

**4. METHOD**

STEP	ACTION	VERIFICATION
<b>A. Marker Busy to Connector</b>		
2	Insert plug into any CB_ jack associated with connector under test.	Associated CB_ relay operated in connector.
3	Remove plug from CB_ jack.	Associated CB_ relay releases.
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.	Associated CB_ relay operated in connector.
6	Remove plug from DB_ jack.	Associated CB_ relay releases.
7	Repeat Steps 5 and 6 for all originating markers.	
8	Block operated lower half of any SA_ relay.	
9	Manually operate any CB_ relay.	CB_ relay locks.
10	Remove blocking tool from SA_ relay.	CB_ relay releases.
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.	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.

**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.

**SECTION 216-263-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
14	Remove blocking tool from last SA <sub>-</sub> relay.	Last CB <sub>-</sub> relay releases.
15	Remove plug from GB <sub>-</sub> jack.	
<b>B. Sender Preference and Lockout Features</b>		
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 <sub>-</sub> relay.	SS <sub>-</sub> and associated SA <sub>-</sub> and SB <sub>-</sub> relays operated.
6	Connect battery to B winding terminal of next higher SS <sub>-</sub> relay.	This SS <sub>-</sub> relay not operated.
7	Remove battery from lowest SS <sub>-</sub> relay.	Lowest SS <sub>-</sub> , SA <sub>-</sub> and SB <sub>-</sub> relays release. Next higher SS <sub>-</sub> , SA <sub>-</sub> , and SB <sub>-</sub> relays operated.
8	Reconnect battery to B winding terminal of lowest SS <sub>-</sub> relay.	Lowest SS <sub>-</sub> relay operated. Next higher SS <sub>-</sub> relay holds operated. Lowest SA <sub>-</sub> and SB <sub>-</sub> relays not operated.
9	Remove battery from lowest SS <sub>-</sub> relay.	Lowest SS <sub>-</sub> relay releases.
10	Repeat Steps 6 to 9, inclusive, for remaining SS <sub>-</sub> relays in succession.	
11	Remove battery from last SS <sub>-</sub> relay and block tools from CA1 and CA2 relays.	
12	Remove plugs from GB <sub>-</sub> and CB <sub>-</sub> jacks.	
13a	If marker sequence feature is provided— Restore TLO key.	

**C. Marker Preference and Lockout Features—Access to All Markers from One Connector, CB<sub>-</sub> Relay Chain**

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

- |   |  |  |
|---|--|--|
| 2 | At connector—<br>Block nonoperated all DMA <sub>-</sub> relays.                                |  |
| 3 | Block nonoperated CB <sub>-</sub> relay associated with lowest numbered DS <sub>-</sub> relay. |  |

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.	
6	Block operated CB_ relay associated with operated DS_ relay.	Next higher numbered DS_ relay operated. Lower numbered DS_ relay releases. DMA_ relay associated with higher numbered DS_ relay is energized.
7	Repeat Steps 5 and 6 for all DS_ and CB_ relays in connector.	
8	Remove battery from CB_ relay spring.	Highest numbered DS_ relay releases. Associated DMA_ relay is not energized.
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.	
3	At connector— Connect battery to B winding terminal of first preferred DS_ relay.	DS_ relay operated. Associated CB_ relay releases. GRA and CA5 relays operated. Ground present on terminals 04 and 06 of

## SECTION 216-263-501

STEP	ACTION	VERIFICATION
		associated DMA terminal strip at connector frame.
4	Block operated MB relay of connector containing next preferred DS <sub>-</sub> relay associated with marker made busy.	
5	Connect battery to B winding terminal of next preferred DS <sub>-</sub> relay in chain associated with marker made busy.	DS <sub>-</sub> relay not operated.
6	Remove battery from first preferred DS <sub>-</sub> relay and blocking tool from MB relay of first connector.	First preferred DS <sub>-</sub> relay releases. Associated DMA <sub>-</sub> and DMB <sub>-</sub> relays release. Second preferred DS <sub>-</sub> relay operated. Associated CB <sub>-</sub> 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.
7	Reconnect battery to B winding terminal of first preferred DS <sub>-</sub> relay.	DS <sub>-</sub> relay operated. Associated DMA <sub>-</sub> relay not operated. Second preferred DS <sub>-</sub> relay holds operated.
8	Remove battery from first preferred DS <sub>-</sub> relay.	DS <sub>-</sub> relay releases.
9	Proceed as outlined in Steps 4 through 8 for the other DS <sub>-</sub> relays associated with marker made busy.	
10	Remove battery from last DS <sub>-</sub> relay and blocking tool from MB relay of last connector.	
11	At originating trouble indicator frame— Remove plug from DB <sub>-</sub> jack.	
12	Repeat Steps 1 through 11 for remaining originating markers.	
<b>E. Time-Out Features</b>		
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 <sub>-</sub> jacks associated with connector under test.	AMB relay operated. Ground not present on 6T spring of CA4 relay.
5	At connector— Block nonoperated lowest numbered SS <sub>-</sub> relay.	

STEP	ACTION	VERIFICATION
6a	If marker sequence feature is not provided— Connect battery to B winding terminal of blocked SS <sub>-</sub> relay.	5 to 12 seconds later— At originating trouble indicator frame— CT and proper C <sub>-</sub> lamps lighted. Corresponding S <sub>-</sub> lamp extinguished. Major alarm sounds.  <i>Note:</i> Where the floor alarm frame, fuse and time alarm circuit is provided, the minor alarm will sound after the major alarm is retired.
7b	If marker sequence feature is provided— Connect battery to B winding terminal of blocked SS <sub>-</sub> relay.	5 to 12 seconds later— At originating trouble indicator frame— CT and proper C <sub>-</sub> lamps lighted. Corresponding S <sub>-</sub> lamp is extinguished. TFA lamp lighted. Major alarm sounds.  <i>Note:</i> Where the floor alarm frame, fuse and time alarm circuit is provided, the minor alarm will sound after the major alarm is retired.
8c	If marker sequence feature is provided and CA1 relay is UA41 type— Insulate 1B contact of CA1 relay.	CT lamp is extinguished. Minor alarm retired.
9d	If marker sequence feature is provided and CA1 relay is U245 type— Insulate 1T contact of CA1 relay.	CT lamp is extinguished. Minor alarm retired.
10e	If marker sequence feature is not provided and CA1 relay is UA41 type— Insulate 1B contact of CA1 relay.	CT and C <sub>-</sub> lamps are extinguished. Minor alarm retired.
11f	If marker sequence feature is not provided and CA1 relay is U245 type— Insulate 1T contact of CA1 relay.	CT and C <sub>-</sub> lamps are extinguished. Minor alarm retired.
12b	If marker sequence feature is provided— At originating trouble indicator frame— Operate LORL key.	C <sub>-</sub> and TFA lamps are extinguished.
13g	If early operation of GRA relay is provided (S wiring) with marker sequence feature— Remove blocking tool from SS <sub>-</sub> relay.	At originating trouble indicator frame— Corresponding S <sub>-</sub> lamp lighted. 5 to 12 seconds later— At originating trouble indicator frame— CT, C <sub>-</sub> and TFA lamps lighted. Major alarm sounds. At connector— GRA relay operated.

SECTION 216-263-501

STEP	ACTION	VERIFICATION
14h	If early operation of GRA relay is not provided (no S wiring) and marker sequence feature is provided— Remove blocking tool from SS_ relay.	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.
15i	If early operation of GRA is provided (S wiring) without marker sequence feature— Remove blocking tool from SS_ relay.	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.
16j	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.	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.
17b	If marker sequence feature is provided— Insulate 2T contact of GT1 relay.	Ground present on this contact.
18a	If marker sequence feature is not provided— Remove battery from SS_ relay.	CT, C_ and S_ lamps are extinguished. Major alarm retired.
19b	If marker sequence feature is provided— Remove battery from SS_ relay.	CT and S_ lamps extinguished.
20b	Operate LORL key.	C_ and TFA lamps extinguished.
21b	Operate TLO key.	Minor alarm retired.
22	At connector— Block nonoperated CA4 relay.	
23k	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 numbered SS_ relay.	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.
24l	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.	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.

STEP	ACTION	VERIFICATION
25m	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.	At originating trouble indicator frame— Corresponding S_ lamp lighted. At connector— Ground present on 2T spring of CA2 relay. GRA relay operated.
26m	Connect ground to 2B spring of CA5 relay.	At connector— Ground present on 2T spring of GT1 relay.
27n	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.	At originating trouble indicator frame— Corresponding S_ lamp lighted. At connector— Ground present on 2T spring of CA2 relay.
28n	Connect ground to 2B spring of CA5 relay.	At connector— Ground present on 2T spring of GT1 relay.
29j	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.	At originating trouble indicator frame— Corresponding S_ lamp lighted. At connector— Ground present on 2T spring of CA2 relay.
30i	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.	At originating trouble indicator frame— Corresponding S_ lamp lighted. At connector— Ground present on 2T spring of CA2 relay. GRA relay operated.
31n	If marker sequence feature is provided and GT1 relay does not lock to TLO key (H wiring)— Remove ground from CA5 relay spring.	
32	Remove battery from winding terminal of SS_ relay.	
33	Repeat Steps 23k through 32 on remaining SS_ relays of connector under test.	
34	Remove insulators from CA1 and GT1 relays and blocking tool from CA4 relay.	
35	Connect ground to T winding terminal of CA5 relay.	At originating trouble indicator frame— Corresponding C_ lamp lighted. 5 to 12 seconds later— CT lamp lighted. Major alarm sounds.

**SECTION 216-263-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
36	Remove ground from winding terminal of CA5 relay.	C_ and CT lamps extinguished.
37a	If marker sequence feature is not provided— Remove plugs from CB_ and GB_ jacks.	At connector— AMB and MB relays release.
38b	If marker sequence feature is provided— Remove plugs from CB_ and GB_ jacks.	MB relay releases.
39b	Release TLO key.	
40a	If marker sequence feature is not provided— Manually operate CA4 relay.	MB relay operated.
41a	Release CA4 relay.	MB relay releases.

**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.

STEP	ACTION	VERIFICATION
2	At originating trouble indicator frame— Observe that TLO key is normal.	
3	Block nonoperated CA4 relay and CB <sub>-</sub> relay associated with first preferred DS <sub>-</sub> relay in connector.	
4	Block operated GT relay.	
5	Connect battery to 3T spring of GT relay.	No DS <sub>-</sub> relay operated.
6	Remove blocking tool from GT relay.	First preferred DS <sub>-</sub> and associated DMA <sub>-</sub> and DMB <sub>-</sub> relays operated. GT relay operated. DS <sub>-</sub> relay holds operated after GT relay operated.
7	Block operated CB <sub>-</sub> relay associated with operated DS <sub>-</sub> relay.	First DS <sub>-</sub> , DMA <sub>-</sub> , and DMB <sub>-</sub> relays release and another DS <sub>-</sub> and associated DMA <sub>-</sub> and DMB <sub>-</sub> relays operated. GT relay releases and reoperated. DS <sub>-</sub> relay holds operated.
8	Repeat Step 7 until all DS <sub>-</sub> relays in connector have been tested.	
9	Remove battery from GT relay and blocking tools from CA4 and CB <sub>-</sub> relays.	
10	Connect ground to TF winding terminal of GT relay.	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.
11	Remove ground from GT relay and momentarily operate TLO key.	Minor alarm retired. TFA lamp extinguished.
12	Block operated CA5 relay.	
13	Connect ground to TF winding terminal of GT relay.	GT and GT1 relays operated. Minor alarm does not sound. GT relay of succeeding connector is normal.
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.

**SECTION 216-263-501**

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
15	Remove ground from winding of GT relay of connector under test.	GT and GT1 relays remain operated.
16	Remove ground from GT relay of succeeding connector.	GT and GT1 relays release in connector under test.  <i>Note:</i> 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.
17	Remove blocking tool from CA5 relay and plug from GB_ jack.	
<b>H. Test for False Continuity (SA_, SB_, DMA_ and DMB_ Relays)</b>		
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.	