MARKER CONNECTORS
NONWIRE SPRING RELAY TYPE
TESTS
NO. 5 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes a method of making tests of the nonwire-spring-relay type marker connector circuit for line link, originating register, incoming register, intermarker group sender, or CAMA sender circuits in No. 5 crossbar offices. Although this section deals primarily with nonwire-spring-relay type marker connectors, reference is made to wire-spring-relay type marker connectors in those tests where a marker connector is part nonwire-spring relay and part wire-spring relay.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 The tests covered are:

A. Marker Sequence and Lockout Feature — Access to All Combined or Dial Tone Markers From One Line Link Marker Connector — CB- Relay Chain: This test checks that an operated CB- relay will transfer the start lead to the next preferred MS- relay of the connector. It also checks that a line link marker connector has access to all combined or dial tone markers but can connect to only one marker at a time.

B. Marker Sequence and Lockout Feature — Access to All Combined or Completing Markers From One Originating or Incoming Register Marker Connector — CB- Relay Chain: This test checks that an operated CB- relay will transfer the start lead to the next preferred MS- relay of the connector. It also checks that an originating or incoming register marker connector has access to all combined or completing markers but can connect to only one marker at a time.

C. Marker Sequence and Lockout Feature — Access to One Dial Tone Marker From All Associated Nonwire- and/or Wire-spring-relay Type Line Link Marker Connectors — MS- Relay Chain: This test is made in offices having a group of dial tone markers and checks that only one line link marker connector (either nonwire or wire-spring-relay type) at a time may seize a dial tone marker. Although the title of this section indicates that its application is limited to nonwire-spring-relay type marker connectors, both nonwire- and wire-spring-relay type connectors may be used in the same marker chain; consequently, this test is referred to in Section 218-712-501 which covers wire-spring-relay type line link marker connectors.

D. Marker Sequence and Lockout Feature — Access to One Combined or Completing Marker From All Associated Nonwire- and/or Wire-spring-relay Type Marker Connectors — MS- Relay Chain: This test checks that only one marker connector (either non-wire or wire-spring-relay type) at a time may seize a combined or completing marker. Although the title of this section indicates that its application is limited to nonwire-spring-relay type marker connectors, both nonwire- and wire-spring-relay type connectors may be used in the same marker chain; consequently, this test is referred to in Section 218-730-501 which covers wire-spring-relay type originating and incoming register marker connectors.

E. Originating Register, Incoming Register, or Intermarker Group Sender Sequence and Lockout Feature: This test checks the order of preference of the RS- relays and that only one register or intermarker group

sender at a time can be served by a connector. It also checks the continuity of the TM lead between the register or intermarker group sender and the connector control circuit. The continuity check of the TM lead between the wire-spring-relay type register and the CAMA senders and the nonwire-spring-relay type marker connector control circuit is referred to in Section 218-730-501.

F. Marker Busy to Connector — Line Link Marker Connector — CB- Relay Chain: This test checks that the marker is made busy to the connector when a make-busy plug is inserted into either the MMB- or the LLMCMB- jack at the master test frame. It also checks that an operated MA- relay will hold the CB- relays operated.

G. Marker Busy to Connector — Originating or Incoming Register Marker Connector — CB- Relay Chain: This test checks that the marker is made busy to the connector when a make-busy plug is inserted into either the ORMCMB- or IRMCMB- jack, or the MMB- jack, at the master test frame. It also checks that an operated RD- relay on the nonwire-spring-relay type originating or incoming register frame, an operated RB- relay on the wire-spring-relay type originating register frame, an operated RA- relay on the wire-spring-relay type incoming register or CAMA sender frame, or an RC- relay on the intermarker group sender frame will hold the CB- relays operated.

H. Alternate Marker Preference Feature: This test checks the alternate marker preference feature by checking the leads from the W and Z relays to the marker start relays of the connector.

I. Time Out — Line Link Marker Connector: This test checks that the line link marker connector transfers the start lead in approximately 1 second, times out, and then brings in an alarm within 5 or 10 seconds when it fails to seize a marker or when a marker fails to release within the required time. It also checks the continuity of the TM lead from the associated line link frame.

J. Time Out — Originating or Incoming Register Marker Connector: This test checks that the originating or incoming register marker connector transfers the start lead in approximately 1 second, times out, and brings in an alarm within 5 to 10 seconds when it fails to seize a marker or fails to release within the required time.

K. False Ground Feature — Originating or Incoming Register Marker Connector: This test checks that a false ground, causing the premature disconnection of a register, will cause a trouble record to be taken and an alarm to be sounded. It also checks that the operation of the GT relay cancels the trouble record and the alarm.

L. Second Trial Feature — Line Link Marker Connector: This test checks that a trouble release signal on first trial will cause the connector to advance to the second marker, indicating to the marker that it is a second trial call. It also checks that a trouble release signal on second trial will cause the connector to advance to the next marker, and again indicate a second trial call.

M. Second Trial Feature — Originating or Incoming Register Marker Connector: This test checks that a trouble release signal on first trial will cause the connector to advance to the second marker, indicating to the marker that it is a second trial call.

N. Traffic Control Feature — Each Marker Connector: This test checks that a marker will not originate a second demand for a marker until the marker has released the connector and the start lead preference is changed by action of the W and Z relays. It also checks that the master traffic control circuit independently gates a connector until all waiting connectors have been served one call.

O. Master Traffic Control Feature: This test checks the alarm and marker connector lockout features of nonwire-spring-relay type master traffic control circuits in offices with common traffic control for line link and register marker connectors and offices with separate traffic control for register marker connectors.

P. Master Traffic Control Short-Cycle Gate Feature: This test checks the alarm, marker connector lockout, and short-cycle gate features of nonwire-spring-relay type master traffic control circuits in offices with combined marker groups with separate traffic control for line link marker connectors.

1.04 Tests A, C, F, I, and L apply only to line link marker connectors. Test P applies only to line link marker connectors with separate traffic control in offices with combined markers.

1.05 Tests B, E, G, J, K, and M apply only to originating and incoming register marker connectors.

1.06 Tests D, H, N, and O apply to both line link and register marker connectors.

1.07 If Test I, J, O, or P indicates trouble in a timing network, check the timing interval as outlined in the circuit requirements table.

1.08 When a line link marker connector frame is arranged to serve a maximum of four line link marker connectors, the marker connector control relays are located at the connector frame. With this arrangement, action and verification will be required at more than one location for making Tests E, F, G, I, J, and O.

1.09 When a line link marker connector frame is arranged to serve a maximum of eight line link marker connectors, the marker connector control relays are located at the line link frame. With this arrangement, action and verification is required at more than one location for making Tests A, C, D, H, L, and N, in addition to the tests listed in 1.08.

1.10 As described in 1.08 and 1.09, the marker connector control relays may be located at either the connector frame or at the line link frame. In the tests where reference is made to these relays in the ACTION or the VERIFICATION columns, the equipment location shall be designated "At connector frame —" to indicate either the connector frame or the line link frame.

1.11 The method of blocking apparatus or insulating contacts is covered by Section 069-020-801.

1.12 The method of making test connections to apparatus is covered by Section 069-131-811.

1.13 All tests covered by this section should be made as rapidly as possible.

1.14 *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 lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

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.

TABLE A

APPARATUS	TESTS															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
322A Plugs (2.02)	V	V	V	V	V	V	V	V	–	V	V	–	V	V	–	–
349A Plug (2.03)	V	–	–	–	–	–	–	V	–	–	–	–	–	–	–	–
411A Tool (2.04)	–	–	V	V	V	–	–	–	–	–	–	–	–	–	V	V
508A Tool (2.05)	V	V	V	V	V	–	–	V	V	–	–	V	V	V	V	V
627A Tool (2.06)	–	–	V	V	–	–	–	–	–	–	–	–	–	–	–	–
ITE 4069 Tool (2.07)	–	–	–	–	–	–	V	–	–	–	–	–	–	–	–	–
Patching Cord (2.08)	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Testing Cord [2.09(a)]	1	1	–	–	1	–	–	1	1	1	–	1	1	–	2	2
Testing Cord [2.09(b)]	–	–	2	2	–	–	–	–	1	1	–	1	1	–	2	1

TABLE A (Cont)

APPARATUS	TESTS															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Testing Cord [2.09(c)]	–	–	2	2	–	–	–	–	–	–	–	–	–	–	–	–
Testing Cord [2.09(d)]	–	–	–	–	–	1	–	–	–	–	1	–	–	–	3	3
Test Receiver (2.10)	–	–	–	–	√	√	√	√	√	√	√	√	√	√	√	√
KS-3008 Stop Watch or equivalent	–	–	–	–	–	–	–	–	√	√	–	–	–	–	√	√
Toothpicks (2.11)	–	–	√	√	√	–	–	–	–	–	–	–	–	–	–	–
KS-7187 Paper (2.12)	–	–	–	–	–	–	–	√	√	√	–	–	√	√	√	√

√ Indicates as required.

2.02 No. 322A (make busy) plugs, as required.

2.03 No. 349A (make busy) plug (for retiring the trouble recorder request alarm on a remote control basis from the marker connector frame).

Note: In Tests A and H, the trouble recorder request alarm may be retired on a remote control basis. Using the No. 3P3D cord (2.08), the TRR-AR jack is patched to the RC-AR-SP jack at the master test frame jack, lamp, and key bay. To retire the alarm, the No. 349A plug is inserted and withdrawn from the SP (spare) jack at the marker connector frame.

2.04 No. 411A tool (for checking relays energized or not energized).

Note: In Tests E, O, and P, the 411A tool of the test receiver may be used.

2.05 No. 508A (armature blocking) tools, as required.

2.06 No. 627A (armature blocking) tools, as required.

Note: No. 627A tools are required for Tests C, D, G, and M when the marker connectors are part wire-spring-relay type.

2.07 ITE 4069 (blocking) tools, as required.

2.08 One P3D cord, 9 inches long, equipped with two No. 309 plugs (No. 3P3D cord). (See 2.03 and note.)

2.09 No. 893 cord, 6 feet long, equipped with two No. 360A tools (No. 1W13B cord) and as follows:

(a) One KS-6278 connecting clip and one No. 419A tool (for connection to non-wire-spring-relay springs).

(b) One KS-6278 connecting clip and one No. 607A tool (for connection to winding terminal of U- or Y-type relay).

(c) One KS-6278 connecting clip and one No. 624A tool (for connection to winding terminal of AF-, AG-, or AJ-type relay).

Note: No. 624A tools are required for Tests C and D only when wire-spring-relay type marker connectors form part of an MS- relay chain.

(d) Two KS-6278 connecting clips (for connection to punching of No. 218-type terminal strip).

2.10 No. 716C or No. 525 receiver attached to a W2AB cord equipped with two No. 360A tools (No. 2W21A cord), one KS-6278 tool, and one No. 411A tool (to check for absence or presence of battery or ground).

2.11 Toothpicks (for blocking multicontact relays nonoperated).

2.12 KS-7187 Bell seal bond paper, No. 20 substance (for insulating relay contacts).

3. PREPARATION

STEP	ACTION	VERIFICATION
Tests A, E, H, I, J, K, O, and P		
1a	If office is arranged for alarm sending — At master test frame — Operate alarm transfer key to NTR position.	TR lamp lighted.
2a	Operate RS key momentarily.	LO lamp lighted momentarily. TR lamp extinguished.

4. METHOD

STEP	ACTION	VERIFICATION
	A. Marker Sequence and Lockout Feature — Access to All Combined or Dial Tone Markers From One Line Link Marker Connector — CB- Relay Chain	
3	At master test frame — Make busy trouble recorder to all dial tone or combined markers by inserting make-busy plugs into proper TRMB- M- jacks.	
4	At line link frame for connector under test — When Z relay of connector is nonoperated — Block nonoperated W, Z, TRS relays.	
5	When CB- relay associated with first preferred marker (for MS1 punching) is nonoperated — Momentarily connect battery to 2T spring of Z relay.	First preferred MS- relay (for MS1 punching) operated. *Note:* While making this test, the operation of the MS- relay causes the marker to time out and initiate a request for the trouble recorder. The resultant alarm may be retired by remote control as outlined in 2.03. If MS- relay is held operated for approximately 10 to 17 seconds, the major alarm is sounded and the TA lamp is lighted. To retire the latter alarm, momentarily operate the AR (alarm release) key at the marker frame.
6	Block operated CB- relay associated with MS- relay operated in Step 5.	
7	When CB- relay associated with next preferred marker (for MS1 punching) is nonoperated — Momentarily connect battery to 2T spring of Z relay.	Next preferred MS- relay (for MS1 punching) operated.

STEP	ACTION	VERIFICATION
8	Block operated CB- relay associated with MS- relay operated in Step 7.	
9	Repeat Steps 7 and 8 until each MS- relay has been operated in order and each CB- relay, except the last CB- relay, has been blocked operated.	
10	Remove all blocking tools from CB- relays.	
11	Remove blocking tool from W, Z relays.	
12	When Z relay of connector is operated — Block operated W, Z relays.	
13	When CB- relay associated with first preferred marker (for MS2 punching) is non-operated — Momentarily connect battery to 2B spring of Z relay.	First preferred MS- relay (for MS2 punching) operated.
14	Block operated CB- relay associated with MS- relay operated in Step 13.	
15	When CB- relay associated with next preferred marker (for MS2 punching) is non-operated — Momentarily connect battery to 2B spring of Z relay.	Next preferred MS- relay (for MS2 punching) operated.
16	Remove blocking tools from CB- relay.	
17	Remove blocking tools from W, Z, TRS relays.	
18	At master test frame — Remove make-busy plugs from TRMB-M- jacks.	
19a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to test.	

B. Marker Sequence and Lockout Feature — Access to All Combined or Completing Markers From One Originating or Incoming Register Marker Connector — CB- Relay Chain

1	At master test frame — Make busy all registers or senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack.	At register or sender frame — MB- relay of each register or sender operated. Each register or sender normal.

STEP	ACTION	VERIFICATION
2	At connector frame — Block nonoperated all CB-, MS- relays in connector under test.	
3	Block nonoperated Z, TRS relays.	
4	Connect battery to 2T spring of Z relay.	First preferred MS- relay (for MS1 punching) energized.
5	Remove blocking tool from CB- relay associated with MS- relay energized in Step 4 and block this CB- relay operated.	Next preferred MS- relay energized.
6	Repeat Step 5 until each MS- relay has been energized and each CB- relay, except the last CB- relay, has been blocked operated.	
7	Remove battery from 2T spring of Z relay.	
8	Remove blocking tools from all CB- relays and then block nonoperated the CB- relay associated with first preferred marker (for MS2 punching).	
9	Remove blocking tool from Z relay, then block Z relay operated.	
10	Connect battery to 2B spring of Z relay.	First preferred MS- relay (for MS2 punching) energized.
11	Block operated CB- relay associated with MS- relay operated in Step 10.	Next preferred MS- relay (for MS2 punching) energized.
12	Remove battery from 2B spring of Z relay.	
13	Remove blocking tools from Z, TRS, CB-, MS- relays.	
14	At master test frame — Remove make-busy plugs from ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack of senders or registers made busy for this test.	

C. Marker Sequence and Lockout Feature — Access to One Dial Tone Marker From All Associated Nonwire- and/or Wire-spring-relay Type Line Link Marker Connectors — MS- Relay Chain

1	At master test frame — Insert make-busy plug into M-D-MB- jack for dial tone marker.	

STEP	ACTION	VERIFICATION
2	At marker frame — Block nonoperated TM relay.	
3	At line link marker connector having first preference to marker made busy — Block nonoperated TM relay. *Note:* The arrangement of CB- and MS- relay chains is variable and may be determined from job wiring lists and office records.	
4	Block nonoperated MA-, MB- relays associated with marker made busy. *Note:* On a 4-connector frame, block nonoperated MA- relay only.	
5	Connect battery to lower or bottom winding terminal of MS- relay associated with marker made busy.	MS- relay operated. MA- relay energized.
6	At line link marker connector having next preference to marker made busy — Block nonoperated TM relay.	
7	With battery still connected to lower or bottom winding terminal of more preferred MS- relay — Connect battery to lower or bottom winding terminal of next preferred MS- relay.	Next preferred MS- relay operated. Associated MA- relay not operated.
8	Block nonoperated MA-, MB- relays associated with MS- relay operated in Step 7.	
9	Remove battery from lower or bottom winding terminal of more preferred MS- relay.	More preferred MS- relay release. MA- relay blocked nonoperated in Step 7 energized.
10	Reconnect battery to lower or bottom winding terminal of more preferred MS- relay.	More preferred MS- relay not operated.
11	Remove battery from lower or bottom winding terminal of more preferred MS- relay.	
12	Remove blocking tools from TM, MA-, MB- relays in connector having more preference to marker made busy.	
13	Repeat Steps 6 through 12 for all connectors associated with marker made busy.	

STEP	ACTION	VERIFICATION
14	At line link marker connector having last preference to marker made busy — Remove battery from lower or bottom winding terminal of MS- relay.	MS- relay released.
15	Remove blocking tools from TM, MA-, MB- relays.	
16	At marker frame — Remove blocking tool from TM relay.	
17	At master test frame — Remove make-busy plug from M-D-MB- jack.	

D. Marker Sequence and Lockout Feature — Access to One Combined or Completing Marker From All Associated Nonwire- and/or Wire-spring-relay Type Marker Connectors — MS- Relay Chain

1	At master test frame — Insert make-busy plug into MMB- or M-C-MB- jack of combined or completing marker.	
2	At marker frame — Block nonoperated TM relay.	
3	At originating register marker connector having first preference to marker made busy — Block nonoperated TM relay.	
	Note: The arrangement of CB-, MS- relay chains is variable and may be determined from job wiring lists and office records.	
4	Block nonoperated MA-, MC- relays, ME- relay (if provided) associated with marker made busy.	
5	Connect battery to lower or bottom winding terminal of MS- relay associated with marker made busy.	MS- relay operated. MA-, MC-, ME- relays energized.
6	At originating register marker connector having next preference to marker made busy — Block nonoperated TM relay.	

STEP	ACTION	VERIFICATION
7	With battery still connected to lower or bottom winding terminal of more preferred MS- relay — Connect battery to lower or bottom winding terminal of next preferred MS- relay.	Next preferred MS- relay operated. Associated MA- relay not operated.
8	Block nonoperated MA-, MC-, ME- relays associated with MS- relay operated in Step 7.	
9	Remove battery from lower or bottom winding terminal of more preferred MS- relay.	More preferred MS- relay released. MA-, MC-, ME- relays blocked nonoperated in Step 8 energized.
10	Reconnect battery to lower or bottom winding terminal of more preferred MS- relay.	More preferred MS- relay not operated.
11	Remove battery from lower or bottom winding terminal of more preferred MS- relay.	
12	Remove blocking tools from TM, MA-, MC-, ME- relays in connector having more preference to marker made busy.	
13	Repeat Steps 6 through 12 for all originating and incoming register marker connectors in marker group.	
14a	If marker made busy in Step 1 is a completing marker — At incoming register marker connector having last preference to marker made busy — Remove battery from lower or bottom winding terminal of MS- relay.	MS- relay released.
15a	Remove blocking tools from TM, MA-, MC-, ME- relays.	
16a	At completing marker frame — Remove blocking tool from TM relay.	
17a	At master test frame — Remove make-busy plug from M-C-MB- jack.	
18b	If marker made busy in Step 1 is a combined marker — At line link marker connector having next preference after last incoming register marker connector — Block nonoperated TM relay.	

STEP	ACTION	VERIFICATION
19b	With battery still connected to lower or bottom winding terminal of MS- relay at last incoming register marker connector — Connect battery to lower or bottom winding terminal of MS- relay at first preferred line link marker connector.	MS- relay operated. Associated MA- relay not operated.
20b	Block nonoperated MA-, MB- relays associated with MS- relay operated in Step 19b. *Note:* On a 4-connector frame, block nonoperated MA- relay only.	
21b	At last incoming register marker connector — Remove battery from lower or bottom winding terminal of MS- relay.	MS- relay released. At first preferred line link marker connector — MA- relay associated with MS- relay operated in Step 19b energized.
22b	At last incoming register marker connector — Reconnect battery to lower or bottom winding terminal of MS- relay.	MS- relay not operated.
23b	Remove battery from lower or bottom winding terminal of MS- relay.	
24b	Remove blocking tools from TM, MA-, MC-, ME- relays.	
25b	At line link marker connector having next preference after more preferred line link marker connector — Block nonoperated TM relay.	
26b	With battery still connected to lower or bottom winding terminal of more preferred MS- relay — Connect battery to lower or bottom winding terminal of next preferred MS- relay.	Next preferred MS- relay operated. Associated MA- relay not operated.
27b	Block nonoperated MA-, MB- relays associated with MS- relay operated in Step 26b.	
28b	Remove battery from lower or bottom winding terminal of more preferred MS- relay.	More preferred MS- relay released. MA- relay blocked nonoperated in Step 26b energized.
29b	Reconnect battery to lower or bottom winding terminal of more preferred MS- relay.	More preferred MS- relay not operated.

STEP	ACTION	VERIFICATION
30b	Remove battery from lower or bottom winding terminal of more preferred MS-relay.	
31b	Remove blocking tools from TM, MA-, MB- relays in connector having more preference to marker made busy.	
32b	Repeat Steps 25b through 31b for all connectors associated with marker made busy.	
33b	At line link marker connector having last preference to marker made busy — Remove battery from lower or bottom winding terminal of MS- relay.	MS- relay released.
34b	Remove blocking tools from TM, MA-, MB- relays.	
35b	At combined marker frame — Remove blocking tool from TM relay.	
36b	At master test frame — Remove make-busy plug from MMB-jack.	

E. Originating Register, Incoming Register, or Intermarker Group Sender Sequence and Lockout Feature

3	At master test frame — Operate BAT key.	
4	Make busy all registers or senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, or IMG-SMB- jack.	At register or sender frame — MB- relay of each register or sender operated. All registers or senders normal.
5b	If connector serves originating registers — At register frame — Block nonoperated all RD- relays associated with connector under test.	
6c	If connector serves incoming registers — At register frame — Block nonoperated all RD- relays associated with connector under test.	
7d	If connector serves intermarker group senders — At sender frame — Block nonoperated all RB- relays associated with connector under test.	

STEP	ACTION	VERIFICATION
8	At connector frame — Block nonoperated TM, TM1 relays.	
9b	If connector serves originating registers — At originating register associated with first preferred RS- relay in connector — Block operated MST relay. *Note:* First preferred RS- relay in the connector may be the lowest or the highest numbered RS- relay. Consult the job wiring lists or the office records.	At master test frame — Associated white ORP lamp lighted. At connector — GT relay operated. TM relay energized.
10b	At originating register associated with next preferred RS- relay in connector — Block operated MST relay.	At register frame — Associated RS- relay normal.
11b	Remove blocking tool from MST relay associated with more preferred RS- relay.	At master test frame — For register associated with more prefered RS- relay — ORP lamp extinguished. For register associated with next preferred RS- relay — ORP lamp lighted. At connector — GT relay operated. TM relay energized.
12b	Replace blocking tool in MST relay removed in Step 11b.	At register frame — Associated RS- relay operated. RS- relay operated in Step 11b (as indicated by lighted ORP lamp) remains operated.
13b	Remove blocking tool from MST relay blocked operated in Step 12b.	
14b	Repeat Steps 10b through 13b for each RS- relay in chain associated with connector under test.	
15c	If connector serves incoming registers — At incoming register associated with first preferred RS- relay in connector — Block operated TC2 relay.	At master test frame — Associated IRP lamp lighted. At connector — GT relay operated. TM relay energized.
16e	If connector serves incoming registers or a combination of incoming registers and intermarker group senders — Connect ground to 1B spring of operated RS- relay.	At connector — All CB- relays, except those associated with special markers 0, 1 operated. SPL relay operated. TM relay not energized. TM1 relay energized.

STEP	ACTION	VERIFICATION
17c	If connector serves incoming registers — At incoming register associated with next preferred RS- relay — Block operated TC2 relay.	Associated RS- relay normal.
18c	Remove blocking tool from TC2 relay associated with more preferred RS- relay.	At master test frame — For register associated with more preferred RS- relay — IRP lamp extinguished For register associated with next preferred RS- relay — IRP lamp lighted. At connector — TM relay energized. TM1 relay not energized.
19c	Replace blocking tool in TC2 relay that was removed in Step 18c.	At register frame — Associated RS- relay operated. RS- relay operated in Step 18c (as indicated by lighted IRP lamp) remains operated.
20c	Remove ground from 1B spring of more preferred RS- relay and connect to 1B spring of next preferred RS- relay.	At connector — All CB- relays except those associated with special markers 0, 1 are operated.
21c	Remove blocking tool from TC2 relay that was blocked operated in Step 19c.	Associated RS- relay normal.
22c	Repeat Steps 17c through 21c for each RS- relay in chain associated with connector under test.	
23d	If connector serves intermarker group senders — At intermarker group sender associated with first preferred RS- relay in connector — Block operated AV, LR relays.	At master test frame — Associated IRP lamp lighted. At connector — TM relay energized. GT relay operated.
24d	At intermarker group sender associated with next preferred RS- relay in connector — Block operated AV, LR relays.	Associated RS- relay normal.
25d	Remove blocking tools from AV, LR relays of sender associated with more preferred RS- relay.	At master test frame — For sender associated with more preferred RS- relay — IRP lamp extinguished. For sender associated with next preferred RS- relay — IRP lamp lighted. At connector — TM relay energized. GT relay operated.

STEP	ACTION	VERIFICATION
26d	Replace blocking tools in AV, LR relays removed in Step 25d.	At register frame — Associated RS- relay operated. RS- relay operated in Step 25d (as indicated by lighted IRP lamp) remains operated.
27d	Remove blocking tools from AV, LR relays blocked operated in Step 26d.	Associated RS- relay normal.
28d	Repeat Steps 24d through 27d for each RS- relay in chain associated with connector under test.	
29	At register or sender frame — Remove blocking tools from MST, TC2, or AV, LR relays. Remove blocking tools from RB- or RD- relays. Remove ground from 1B spring of RS- relay.	
30	At connector frame — Remove blocking tools from TM, TM1 relays.	
31	At master test frame — Remove plugs from ORMB-, IRMB-, or IMG-SMB- jack of registers or senders made busy for this test.	
32	Restore BAT key to position prior to test.	
33a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to test.	

F. Marker Busy to Connector — Line Link Marker Connector — CB- Relay Chain

Caution: This test may interfere with originating service for customer lines on associated line link frame. For this reason the test should be made as rapidly as possible.

1	At master test frame — Insert make-busy plug into an LLMCMB- jack associated with connector under test.	At line link marker connector — Associated CB- relay operated.
2	Remove plug from LLMCMB- jack.	CB- relay released.
3	Repeat Steps 1 and 2 for all dial tone or combined markers in marker group.	

STEP	ACTION	VERIFICATION
4	Insert a make-busy plug into MMB- jack.	Associated CB- relay operated.
5	Remove plug from MMB- jack.	CB- relay released.
6	Repeat Steps 4 and 5 for all dial tone or combined markers in marker group.	
7a	On a 4-connector frame — Check for ground on stationary spring 4 of each MA- relay in connector under test.	Ground present.
8a	Connect ground to punching 4 of MA- terminal strip adjacent to MA- relays.	
9a	Check for ground on operating spring 4 of each MA- relay in connector.	Ground present.
10b	On an 8-connector frame or a split basic 16-connector frame — Check for ground on stationary spring 12 of each MA- relay in connector.	Ground present.
11b	Connect ground to punching 12 of MA- terminal strip adjacent to MA- relays.	
12b	Check for ground on operating spring 12 of each MA- relay in connector.	Ground present.
13	Manually operate all CB- relays except first CB- relay in connector under test.	CB- relays hold operated.
14	Manually operate first CB- relay.	All CB- relays except first CB- relay released. ***Note:*** If first CB- relay operates on service call, the other held CB- relays will release, in which case repeat Steps 13 and 14.
15	Manually operate all but one of CB- relays in connector.	CB- relays hold operated.
16	Manually operate nonoperated CB- relay.	All CB- relays except last operated CB- relay released.
17	Repeat Steps 15 and 16 using a different CB- relay than the last to be operated until all CB- relays have been tested.	
18	Remove ground from terminal 4 or 12 of MA- terminal strip.	

STEP	ACTION	VERIFICATION
	G. Marker Busy to Connector — Originating or Incoming Register Marker Connector — CB- Relay Chain	
1	At master test frame — Make busy all registers or senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack.	At register or sender frame — MB- relay of each register or sender operated. All registers or senders normal.
2	Insert make-busy plug into an ORMCMB- or IRMCMB- jack associated with connector under test.	At register marker connector — Associated CB- relay operated.
3	Remove plug from ORMCMB- or IRMCMB- jack.	CB- relay released.
4	Repeat Steps 2 and 3 for all combined or completing markers in marker group.	
5	Insert make-busy plug into an MMB- jack.	Associated CB- relay operated.
6	Remove plug from MMB- jack.	CB- relay released.
7	Repeat Steps 5 and 6 for all combined or completing markers in marker group.	
8a	If connector serves originating registers at originating register frame — Nonwire-spring-relay type — Check both the stationary and operating springs 5 of each RD- relay associated with connector under test.	Ground present on stationary spring 5 of each RD- relay. Ground not present on operating spring 5 of each RD- relay.
	Wire spring relay type — Check both fixed and make contacts 03 of each RC- relay associated with connector under test.	Ground present on operating spring 03 of each RC- relay. Ground not present on stationary spring 03 of each RC- relay.
9a	Nonwire-spring-relay type — Block operated an RD- relay associated with connector under test. Wire-spring-relay type — Block operated an RC- relay associated with connector under test.	Ground present on operating spring 5 of all RD- relays associated with connector or on fixed contact 03 of all RC- relays associated with connector.
10a	Remove blocking tool from RD- or RC- relay and block operated another RD- or RC- relay.	Ground present on operating spring 05 of all other RD- relays or fixed contact 03 of all other RC- relays associated with the connector.

STEP	ACTION	VERIFICATION
11a	Repeat Step 10a until all RD- or RC- relays associated with same connector have been checked, but do not remove blocking tool from last RD- or RC- relay.	
12a	Manually operate all CB- relays except first CB- relay in connector.	CB- relays hold operated.
13a	Manually operate first CB- relay in connector.	First CB- relay holds operated. All other CB- relays released. *Note:* If first CB- relay operates on service call, held CB- relays will release, in which case repeat Steps 12a and 13a.
14a	Repeat Steps 12a and 13a, making each CB- relay the last to be operated until each CB-relay has been the last to be operated.	
15a	Remove blocking tool from RD- relay.	
16b	If connector serves incoming registers and/or CAMA senders — At register and/or sender frame — Nonwire-spring-relay type — Check both stationary and operating springs 5 of each RD- relay associated with connector under test. Wire-spring-relay type — Check both fixed and make contacts 54 of each RA- relay associated with connector under test.	Ground present on stationary spring 5 of each RD- relay. Ground not present on operating spring 5 of each RD- relay. Ground present on make contact 54 of each RA- relay. Ground not present on fixed contact 54 of each RA- relay.
17b	Nonwire-spring-relay type — Block operated an RD- relay associated with connector under test. Wire-spring-relay type — Block operated an RA- relay associated with connector under test.	Ground present on operating spring 5 of all other RD- relays or on fixed contact 54 of all other RA relays in connector.
18b	Remove blocking tool from RD- or RA- relay and block operated another RD- or RA- relay associated with connector under test.	
19b	Repeat Step 18b until all RD- or RA- relays associated with same connector have been checked but do not remove blocking tool from last RD- or RA- relay.	
20b	Manually operate all CB- relays except first CB- relay in connector.	CB- relays hold operated.

STEP	ACTION	VERIFICATION
21b	Manually operate first CB- relay in connector.	First CB- relay holds operated. All other CB- relays released. *Note:* If first CB- relay operates on a service call, held CB- relays will release, in which case repeat Steps 20b and 21b.
22b	Repeat Steps 20b and 21b making each CB- relay the last to be operated until each CB- relay has been the last to be operated.	
23b	Remove blocking tool from RD- or RA- relay.	
24c	If connector serves intermarker group senders — At intermarker group sender frame — Check both stationary and operating spring 1 or 6 of each RC- relay associated with connector under test.	Ground present on stationary spring 1 or 6 of each RC- relay. Ground not present on operating spring 1 or 6 of each RC- relay.
25c	Block operated an RC- relay associated with connector under test.	Ground present on operating spring 1 or 6 of all other RC- relays associated with connector.
26c	Remove blocking tool from RC- relay and block operated another RC- relay in connector.	Ground present on operating spring 1 or 6 of any other RC- relay in connector.
27c	Repeat Step 26c until all RC- relays associated with same connector have been checked, but do not remove blocking tool from last RC- relay.	
28c	Manually operate all CB- relays except first CB- relay in connector.	CB- relays hold operated.
29c	Manually operate first CB- relay in connector.	First CB- relay holds operated. All other CB- relays released. *Note:* If first CB- relay operates on service call, held CB- relays will release, in which case repeat Steps 28c and 29c.
30c	Repeat Steps 28c and 29c, making each CB- relay the last to be operated until each CB- relay has been the last to be operated.	
31c	Remove blocking tool from RC- relay.	
32	At master test frame — Remove plugs from ORMB-, IRMB-, IMG-SMG-, or CAMA-SMB- jack of registers or senders made busy for this test.	

STEP	ACTION	VERIFICATION
	H. Alternate Marker Preference Feature	
	Caution: This test may interfere with originating service for customer lines on associated line link frame. For this reason the test should be made as rapidly as possible on line link marker connectors.	
3	At master test frame — Make busy all registers or senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack.	At register or sender frame — MB- relay of each register or sender operated. All registers or senders normal.
4	At marker connector frame — With W, Z relays not operated — Manually operate W relay.	Z relay operated. W, Z relays hold operated.
5	Connect ground to 3T spring of W relay.	W relay released.
6	Remove ground from 3T spring of W relay.	Z relay released.
7	Block nonoperated W, Z relays.	
8	When both CB-, MS- relays associated with first preferred marker for MS1 punching are normal — Momentarily connect battery to 1B spring of TC relay.	Preferred MS- relay (for MS1 punching) operates at least once while battery is being applied. *Note:* While making this test, operation of an MS- relay causes marker to time out and initiate a request for trouble recorder. The resultant alarm may be retired by remote control as outlined in 2.03. If MS- relay is held operated for approximately 10 to 17 seconds, major alarm is sounded and TA lamp is lighted. To retire latter alarm, momentarily operate AR (alarm release) key at marker frame.
9	Block operated TC relay.	
10	Momentarily connect battery to 1B spring of TC relay.	Preferred MS- relay (for MS1 punching) does not operate.
11	Remove blocking tool from TC relay.	TC relay released.
12	Block operated TRS relay.	Ground present on 3B spring of any CB- ground relay in connector. *Note:* When testing line link marker connectors, check for this ground when no MA- relay is operated.

STEP	ACTION	VERIFICATION
13	Momentarily connect battery to 1B spring of TC relay.	Preferred MS- relay (for MS1 punching) does not operate.
14	When both CB-, MS- relays associated with first preferred marker for MS2 punchings are normal — Momentarily connect battery to 1B spring of TC1 relay.	Preferred MS- relay (for MS2 punching) operates at least once while battery is being applied.
15	Block operated TC1 relay.	
16	Momentarily connect battery to 1B spring of TC1 relay.	Preferred MS- relay (for MS2 punching) does not operate.
17	Remove blocking tool from TC1 relay.	TC1 relay released.
18	Remove blocking tool from TRS relay.	
19	Momentarily connect battery to 1B spring of TC1 relay.	Preferred MS- relay (for MS2 punching) does not operate.
20	Remove blocking tool from W, Z relays.	
21	Connect ground to 3T spring of W relay.	W relay operates.
22	Manually operate TC relay.	TC relay holds operated.
23	Remove ground from 3T spring of W relay.	Z relay operated. TC relay released.
24	Block operated Z relay.	
25	Momentarily connect battery to 2B spring of Z relay.	Preferred MS- relay (for MS2 punching) operates at least once while battery is being applied.
26	Block operated TRS relay.	
27	Momentarily connect battery to 2B spring of Z relay.	Preferred MS- relay (for MS2 punching) does not operate.
28	Momentarily connect battery to 2T spring of Z relay.	Preferred MS- relay (for MS1 punching) operates at least once while battery is being applied.
29	Remove blocking tool from TRS relay.	
30	Momentarily connect battery to 2T spring of Z relay.	Preferred MS- relay (for MS1 punching) does not operate.
31	Connect ground to 3T spring of W relay.	
32	Manually operate TC1 relay.	TC1 relay holds operated.

STEP	ACTION	VERIFICATION
33	Remove blocking tool from Z relay.	
34	Remove ground from 3T spring of W relay.	Z relay released. TC1 relay released.
35	At master test frame — Remove plugs from ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack of registers or senders made busy for this test.	
36a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to start of test.	

I. Time Out — Line Link Marker Connector

Caution: This test may interfere with originating traffic for customer lines located on associated line link frames. For this reason the test should be made as rapidly as possible.

3	At line link frame associated with connector under test — Connect ground to 1B spring of LO relay.	In 5 to 10 seconds, major alarm sounded. At master test frame — Red LLMC lamp associated with connector under test is lighted.
4	Remove ground from 1B spring of LO relay.	
5	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red LLMC lamp extinguished.
6	At connector frame — Block nonoperated MK relay.	
7b	On a 4-connector frame — Make certain TM1 relay is normal, then connect ground to 2B spring of MK relay.	TM, TM1 relays operated immediately. In approximately 1 second, TRS relay operated, TM relay released. In 5 to 10 seconds, major alarm sounded. Red aisle pilot lamp lighted. Ground present on 7T spring of TRS relay.
8b	Insulate 3T contact of MK relay.	
9b	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red aisle pilot lamp extinguished.
10b	Remove ground from 2B spring of MK relay.	TM1, TRS relays released.
11b	Connect ground to T winding terminal of MK relay, then remove blocking tool from MK relay.	MK relay operated. In 5 to 10 seconds, major alarm sounded. At master test frame — Red LLMC lamp associated with connector under test is lighted.

STEP	ACTION	VERIFICATION
12b	Remove ground from T winding terminal of MK relay, then remove insulator from 3T contact of MK relay.	MK relay released.
13b	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red LLMC lamp extinguished.
14c	On an 8-connector or split basic 16-connector frame — Make certain TM1 relay is normal, then connect ground to 8B spring of MK relay.	TM, TM1 relays operated immediately. In approximately 1 second, TRS relay operated, TM relay released. In 5 to 10 seconds, major alarm sounded. Red aisle pilot lamp lighted. Ground present on 7T spring of TRS relay.
15c	Insulate 10T contact of MK relay.	
16c	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red aisle pilot lamp extinguished.
17c	Remove ground from 8B spring of MK relay.	TM1, TRS relays released.
18c	Connect ground to T winding terminal of MK relay, then remove blocking tool from MK relay.	MK relay operated. In 5 to 10 seconds, major alarm sounded. At master test frame — Red LLMC lamp associated with connector under test lighted.
19c	Remove ground from T winding terminal of MK relay, then remove insulator from 10T contact of MK relay.	MK relay released.
20c	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red LLMC lamp extinguished.
21a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to start of test.	

J. Time Out — Originating or Incoming Register Marker Connector

3	At master test frame — Make busy all registers or senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB-jack.	At register or sender frame — MB- relay of each register or sender operated. All registers or senders normal.

STEP	ACTION	VERIFICATION
4	At connector frame — Connect ground to 2B spring of MK relay.	TM, TM1 relays operated immediately. In approximately 1 second, TRS relay operated, TM relay released. In 5 to 10 seconds, major alarm sounded. Ground present on 7T spring of TRS relay. Red aisle pilot lamp lighted. At master test frame — Red ORMC or IRMC lamp associated with connector under test lighted.
5	At connector frame — Insulate 3T contact of MK relay.	
6	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red ORMC or IRMC lamp extinguished. Aisle pilot lamp extinguished.
7	At connector frame — Remove ground from 2B spring of MK relay.	TM1, TRS relays released.
8	Connect ground to T winding terminal of MK relay.	MK relay operated. At master test frame — Red ORMC or IRMC lamp lighted. In 5 to 10 seconds, major alarm sounded.
9	Remove insulator from 3T contact of MK relay.	
10	Insulate 1T contact of MK relay.	
11	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red ORMC or IRMC lamp remains lighted.
12	At connector frame — Connect ground to 2B spring of MK relay.	
13b	When testing originating register marker connector — At register frame — Nonwire-spring-relay type — Check for ground on operating spring 2 of any RC- relay associated with connector under test. Wire-spring-relay type — Check for ground on fixed contact 11 of any RA- relay associated with connector under test.	Ground present.
14b	Remove ground from 2B spring of MK relay.	

STEP	ACTION	VERIFICATION
15b	Remove ground from T winding terminal of MK relay.	MK relay released. At master test frame — Red ORMC lamp extinguished.
16b	At connector frame — Remove insulator from 1T contact of MK relay.	
17c	When testing incoming register marker connector — At connector frame — Block operated SPL relay.	
18c	Remove ground from T winding terminal of MK relay.	MK relay released. TM, TRS relays not operated. TM1 relay operated. In 5 to 10 seconds, major alarm sounded.
19c	Remove ground from 2B spring of MK relay.	
20c	Remove blocking tool from SPL relay.	
21c	Remove insulator from 1T contact of MK relay.	
22c	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. Red IRMC lamp extinguished.
23	Remove plugs from ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack of registers or senders made busy for this test.	
24a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to test.	

K. False Ground Feature — Originating or Incoming Register Marker Connector

3	At master test frame — Make busy all registers or senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, IMG-SMB, or CAMA-SMB- jack.	At register or sender frame — MB- relay of each register or sender operated. All registers or senders normal.
4	At connector frame — Insulate 2T contact of CA relay.	

STEP	ACTION	VERIFICATION
5	Connect ground to punching 57 of MD- terminal strip adjacent to MD- relays.	Major alarm sounded. At connector — Ground present on operating springs 57, 58 of all MD- relays. At register frame — Nonwire-spring-relay type — If connector serves originating registers or incoming registers other than tandem incoming revertive pulse registers — Ground present on operating springs 57, 58 of all RD- relays. If connector serves tandem incoming revertive pulse registers — Ground present on operating springs 52, 53 of all RD- relays. At register frame — Wire-spring-relay type — If connector serves originating registers — Ground present on fixed contacts 12, 01 of all RC- relays. If connector serves incoming registers and/or CAMA senders — Ground present on fixed contacts 51, 52 of all RB- relays. At sender frame — If connector serves intermarker group senders — Ground present on operating springs 7, 8 of all RB- relays.
6	At connector frame — Manually operate MK relay momentarily	Major alarm silenced while MK relay is operated.
7	Remove ground from punching 57 of MD- terminal strip.	Major alarm silenced.
8	Remove insulator from 2T contact of CA relay.	
9	At master test frame — Remove plugs from ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack of registers or senders made busy for this test.	
10a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to start of test.	

STEP	ACTION	VERIFICATION
	L. Second Trial Feature — Line Link Marker Connector	
	Caution: This test may interfere with originating traffic for the customer lines on the associated line link frame. For this reason the test should be made as rapidly as possible.	
1	At line link marker connector — Block nonoperated CA relay.	Ground present on 5T, 6B springs of TR relay.
2	Connect ground to 6T spring of TRL relay.	TRL, MK, TR relays operated.
3	Block operated MK relay.	Ground not present on 5T, 6B springs of TR relay. Ground present on 3B spring of any CB- relay in connector under test when no MA- relay in connector is operated.
4	Remove ground from 6T spring of TRL relay.	TRL relay released.
5	Remove blocking tool from MK relay.	TR1 relay operated. Ground present on 1B spring of TR1 relay. Ground present on 5T, 6B springs of TR relay.
6	Connect ground to T winding terminal of MK relay.	MK relay operated. TR relay released.
7	Remove ground from T winding terminal of MK relay.	MK, TR1 relays released.
8	Remove blocking tool from CA relay.	
	M. Second Trial Feature — Originating or Incoming Register Marker Connector	
1	At master test frame — Make busy all registers or intermarker group senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, or IMG-SMB- jack.	At register or sender frame — MB- relay of each register or sender operated. All registers or senders normal.
2	At connector frame — Block nonoperated CA relay.	
3a	If connector under test serves originating registers, intermarker group senders, or incoming registers other than tandem incoming revertive pulse registers — At register or sender frame — Block operated an RB- relay associated with connector under test.	Ground present on operating spring 9 of all other RB- relays. At connector — Nonwire-spring-relay type control circuit — Ground present on 5T, 6B springs of TR relay. Wire-spring-relay type control circuit — Ground present on make contacts 2, 8 of TR relay.

STEP	ACTION	VERIFICATION
4b	If connector under test serves tandem incoming revertive pulse registers — At register frame — Insulate contact O of an RA- relay associated with connector under test, then block operated this RA- relay.	Ground present on operating spring 1 of all other RA- relays. At connector — Nonwire-spring-relay type control circuit — Ground present on 5T, 6B springs of TR relay. Wire-spring-relay type control circuit — Ground present on make contacts 2, 8 of TR relay.
5	Nonwire-spring-relay type — Connect ground to T winding terminal TRL relay. Wire-spring-relay type — Connect ground to U winding terminal TRL relay.	TRL, MK, TR relays operated.
6	Block operated MK relay.	Nonwire-spring-relay type connector control circuit — Ground not present on 5T, 6B springs of TR relay. Ground present on 3B spring of any CB- relay in connector. Wire-spring-relay type connector control circuit — Ground not present on make contacts 2, 8 of TR relay. Ground present on break contact 8 of any CB- relay in connector.
7	Remove ground from winding terminal of TRL relay.	TRL relay released.
8	Remove blocking tool from MK relay.	TR1 relay operated. Nonwire-spring-relay type connector control circuit — Ground present on 5T, 6B springs of TR relay. Ground present on 1B spring of TR1 relay. Wire-spring-relay type connector control circuit — Ground present on make contacts 2, 8 of TR relay. Ground present on make contact 8 of TR1 relay.
9	Nonwire-spring-relay type — Connect ground to T winding terminal MK relay. Wire-spring-relay type — Connect ground to U winding terminal MK relay.	MK, TR relays operated.

STEP	ACTION	VERIFICATION
10	Remove ground from relay winding terminal of MK relay.	MK, TR1 relays released.
11	At register or sender frame — Remove blocking tool from RA- or RB- relay.	
12b	If connector under test serves tandem incoming revertive pulse registers — Remove insulator from contact O of RA- relay.	
13	At connector frame — Remove blocking tool from CA relay.	
14	At master test frame — Remove plugs from ORMB-, IRMB-, or IMG-SMB- jack of registers or senders made busy for this test.	

N. Traffic Control Feature — Each Marker Connector

1	At master test frame — Make busy all registers or senders associated with connector under test by inserting make-busy plugs into proper ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack. ***Caution: Making this test on line link marker connectors may interfere with originating service for customer lines on associated line link frames. For this reason the test should be made as rapidly as possible on line link marker connectors.***	At register or sender frame — MB- relay of each register or sender operated. All registers or senders normal.
2	At master traffic control relay rack frame — Block nonoperated ALA, ALB relays.	
3	At connector frame — Block nonoperated CA, TM1 relays.	
4a	If line link marker connector is being tested — At line link marker connector — Block nonoperated TC, W relays.	
5	Insulate contact of TC1 relay as follows: (a) 2T contact of TC1 relay if figure F is provided. (b) 4T contact of TC1 relay if figure G is provided.	

STEP	ACTION	VERIFICATION
6	At connector frame — Block operated MK relay.	
7	Block operated TM relay.	After approximately 1 second, TRS relay operated.
8	Remove insulator from 2T or 4T contact of TC1 relay.	
9	Remove blocking tool from TM1 relay.	
10	Remove blocking tool from MK relay.	TRS relay holds operated.
11a	If line link marker connector is being tested — At line link marker connector — Insulate 7B contact of TRS relay.	
12a	Check for ground on 1T spring of TR relay.	Ground present.
13a	Remove insulator from 7B contact of TRS relay.	
14	Insulate 4B contact of TM1 relay.	TRS relay released.
15	Remove insulator from 4B contact of TM1 relay.	TRS relay operated.
16	Remove blocking tool from TM relay.	
17a	If line link marker connector is being tested — At line link marker connector — Remove blocking tools from TC, W relays.	
18a	Block operated W relay.	
19a	Block nonoperated TC1 relay.	
20	Insulate 2T contact of TC relay.	
21	Block operated TM relay.	After approximately 1 second, TRS relay operated.
22	Remove insulator from 2T contact of TC relay.	
23	Remove blocking tool from CA, TM relays.	

STEP	ACTION	VERIFICATION
24a	If line link marker connector is being tested — At line link marker connector — Remove blocking tools from TC1, W relays.	
	Caution: The condition established for the tests in Steps 25 through 56 will affect the continuity of the connector start leads. Since the test may introduce a traffic delay, these tests should be made as rapidly as possible.	
25	At connector frame — Block nonoperated CA relay.	
26	At master test frame — Operate CMTCA or DMTCA key associated with master traffic control circuit associated with connector under test.	
27	At connector — Block nonoperated Z relay.	
28	Block operated W relay.	
29	Manually operate TC relay.	TC relay holds operated.
30	Remove blocking tools from W, Z relays.	TC relay released.
31	At master test frame — Restore CMTCA or DMTCA key associated with master traffic control circuit associated with connector under test.	
32	Repeat Steps 25 through 31 for all connectors.	
33	At master test frame — Operate CMTCB or DMTCB key associated with master traffic control circuit associated with connector under test.	
34	At connector — Block nonoperated W relay.	
35	Block operated Z relay.	
36	Manually operate TC1 relay.	TC1 relay holds operated.
37	Remove blocking tools from W, Z relays.	TC1 relay released.

STEP	ACTION	VERIFICATION
38	At master test frame — Restore CMTCB or DMTCB key associated with master traffic control circuit associated with connector under test.	
39	Repeat Steps 33 through 38 for all connectors.	
40	At connector — Remove blocking tool from CA relay.	
41	In all connectors of type under test — Block nonoperated Z, W relays.	
42	At master traffic control relay rack frame — Block operated TCB (normally operated), TCB1 relays.	
43a	If line link marker connector is being tested — Start a call at line link frame.	TC1, FC1 relays operate and remain operated. TC, FC relays operate and release.
44a	Repeat Step 43a for all line link frames.	
45b	If connector is originating or incoming register marker connector — Manually operate TC1, FC1 relays.	TC1, FC1 relays held operated.
46	At master traffic control relay rack frame — Remove blocking tools from TCB, TCB1 relays.	TC1, FC1 relays released.
47	Remove blocking tools from W, Z relays.	
48	In all connectors of type under test — Block operated Z, W relays.	
49	At master traffic control relay rack frame — Block operated TCA (normally operated), TCA1 relays.	
50a	If line link marker connector is being tested — Start a call at the line link frame.	TC, FC relays operate and remain operated. TC1, FC1 relays operate and release.
51a	Repeat Step 50 for all line link frames.	
52b	If connector is originating or incoming register marker connector — Manually operate TC, FC relays.	TC, FC relays hold operated.

STEP	ACTION	VERIFICATION
53	At master traffic control relay rack frame — Remove blocking tool from TCA, TCA1 relays.	TC, FC relays released.
54	Remove blocking tools from Z, W relays.	
55	Remove blocking tools from ALA, ALB relays.	
56	At master test frame — Remove plugs from ORMB-, IRMB-, IMG-SMB-, or CAMA-SMB- jack of registers or senders made busy for this test.	
	O. Master Traffic Control Feature	
3	At master test frame — Operate CMTCB or DMTCB key.	CMTCB or DMTCB lamp lighted.
4	At relay rack frame — Block nonoperated CWA, CWB, IM1, IM2 relays.	
5	When SRA, TCA relays are nonoperated — Connect ground to 1T spring of SRA relay.	TCA relay operated. In 2 to 3 seconds, TCA relay released. Major alarm sounded. At master test frame — CMCGA or DMCGA (red) lamp lighted.
6	At master test frame — Operate CMTCA or DMTCA key.	CMTCA or DMTCA lamp lighted.
7	Momentarily operate MC-AR key.	Major alarm silenced. CMCGA or DMCGA (red) lamp extinguished.
8	At relay rack frame — Connect battery to B winding terminal of TMA relay.	
9	Connect battery to 3B spring of ALA relay.	
10	Block operated SRA relay.	TMA relay operated.
11	Insulate 3T contact of TCA relay.	TCA1 relay released. IM1, IM2 relays not energized.
12	Remove battery from B winding terminal of TMA relay.	TMA relay released. IM1, IM2 relays energized.
13	Remove insulator from 3T contact of TCA relay.	TCA1 relay operated. IM1, IM2 relays not energized.

STEP	ACTION	VERIFICATION
	Caution: Making the tests in Steps 14 through 22 may interfere with originating and terminating traffic. For this reason these tests should be made as rapidly as possible.	
14	At master test frame — Release CMTCA or DMTCA key.	CMTCA or DMTCA lamp extinguished.
15	At relay rack frame — Manually operate TCA relay.	TCA relay holds operated. TCA1 relay released. Battery present on punchings 1 through 7 of terminal strip A of master traffic control unit.
16b	If master traffic control unit is associated with a combined marker group — Connect ground to punching 23 of terminal strip A.	RFC relay operated. Battery not present on punchings 1, 2, 3 of terminal strip A.
17b	Remove ground from punching 23 of terminal strip A.	RFC relay released.
18	At master test frame — Operate CMTCA or DMTCA key.	CMTCA or DMTCA lamp lighted. At relay rack frame — TCA relay released. TCA1 relay operated.
19	Release CMTCA or DMTCA key.	CMTCA or DMTCA lamp extinguished.
20	At relay rack frame — Manually operate TCA relay.	TCA relay holds operated. TCA1 relay released.
21	Insulate 3B contact of TCA relay.	TCA relay released. TCA1 relay operated.
22	Remove insulator from 3B contact of TCA relay.	
23	At master test frame — Operate CMTCA or DMTCA key.	CMTCA or DMTCA lamp lighted.
24	At relay rack frame — Remove ground from 1T spring of SRA relay.	
25	Remove blocking tool from SRA relay.	
26	Remove battery from 3B spring of ALA relay.	
27	Remove blocking tool from CWA relay.	

STEP	ACTION	VERIFICATION
28	With CWA relay nonoperated — Connect ground to T winding terminal of CWA relay.	CWA relay operated. In 2 to 3 seconds, ALA relay operated. CWA relay released. ALB relay nonoperated. Major alarm sounded. At master test frame — CMCGA or DMCGA (red) lamp lighted.
29	Remove ground from T winding terminal of CWA relay.	
30	Block nonoperated CWA relay.	
31	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. CMCGA or DMCGA (red) lamp extinguished.
32	At relay rack frame — Remove blocking tool from CWB relay.	
33	With CWB relay nonoperated — Connect ground to T winding terminal of CWB relay.	CWB relay operated. In 2 to 3 seconds, ALB relay operated. CWB relay released. ALA relay nonoperated. Major alarm sounded. At master test frame — CMCGB or DMCGB (red) lamp lighted.
34	Remove ground from T winding terminal of CWB relay.	
35	Block nonoperated CWB relay.	
36	At master test frame — Momentarily operate MC-AR key.	Major alarm silenced. CMCGB or DMCGB (red) lamp extinguished.
37	Release CMTCB or DMTCB key.	CMTCB or DMTCB lamp extinguished.
38	At relay rack frame — With SRB, TCB relays nonoperated — Connect ground to 1T spring of SRB relay.	TCB relay operated. In 2 to 3 seconds, TCB relay released. Major alarm sounded. CMCGB or DMCGB (red) lamp lighted.
39	At master test frame — Operate CMTCB or DMTCB key.	CMTCB or DMTCB lamp lighted.
40	Momentarily operate MC-AR key.	Major alarm silenced. CMCGB or DMCGB (red) lamp extinguished.
41	At relay rack frame — Connect battery to B winding terminal of TMB relay.	

STEP	ACTION	VERIFICATION
42	Connect battery to 3B spring of ALB relay.	
43	Block operated SRB relay.	TMB relay operated.
44	Insulate 3T contact of TCB relay.	TCB1 relay released. 1M1, IM2 relays not energized.
45	Remove battery from B winding terminal of TMB relay.	TMB relay released. IM1, IM2 relays energized.
46	Remove insulator from 3T contact of TCB relay.	TCB1 relay operated. IM1, IM2 relays not energized.
	Caution: Making the tests in Steps 47 through 55 may interfere with originating and terminating traffic. For this reason these tests should be made as rapidly as possible.	
47	At master test frame — Release CMTCB or DMTCB key.	CMTCB or DMTCB lamp extinguished.
48	At relay rack frame — Manually operate TCB relay.	TCB relay holds operated. TCB1 relay released. Battery present on punchings 1 through 7 of terminal strip D of master traffic control unit.
49b	If master traffic control unit is associated with a combined marker group — Connect ground to punching 21 of terminal strip D.	RFC1 relay operated. Battery not present on punchings 1, 2, 3 of terminal strip D.
50b	Remove ground from punching 21 of terminal strip D.	RFC1 relay released.
51	At master test frame — Operate CMTCB or DMTCB key.	CMTCB or DMTCB lamp lighted. At relay rack frame — TCB relay released. TCB1 relay operated.
52	Release CMTCB or DMTCB key.	CMTCB or DMTCB lamp extinguished.
53	At relay rack frame — Manually operate TCB relay.	TCB relay holds operated. TCB1 relay released.
54	Insulate 3B contact of TCB relay.	TCB relay released. TCB1 relay operated.
55	Remove insulator from 3B contact of TCB relay.	

STEP	ACTION	VERIFICATION
56	At master test frame — Release CMTCA or DMTCA key.	CMTCA or DMTCA lamp extinguished.
57	At relay rack frame — Remove ground from 1T spring of SRB relay.	
58	Remove blocking tools from SRB, CWA, CWB, IM1, IM2 relays.	
59	Connect battery to punching 26 of terminal strip B.	
60	Simultaneously connect ground to punchings 13, 14 of terminal strip B.	TMA relay operated. ALA relay remains nonoperated. If major alarm has not sounded after approximately 5 seconds — Proceed immediately to Step 61.
61	Remove ground from punchings 13, 14 of terminal strip B.	
62	Remove battery from punching 26 of terminal strip B.	
63	Remove battery from 3B spring of ALB relay.	
64	Connect battery to 3B spring of ALA relay.	
65	Connect battery to punching 26 of terminal strip C.	
66	Simultaneously connect ground to punchings 13, 14 of terminal strip C.	TMB relay operated. ALB relay remains nonoperated. If major alarm has not sounded after approximately 5 seconds — Proceed immediately to Step 67.
67	Remove ground from punchings 13, 14 of terminal strip C.	
68	Remove battery from punching 26 of terminal strip C.	
69	Remove battery from 3B spring of ALA relay.	
70b	If master traffic control unit is associated with a combined marker group — Insulate 3B contact of RB2 relay in originating register group busy circuit.	At terminal strip D of master traffic control unit — Ground present on punching 22. Ground not present on punching 23.

STEP	ACTION	VERIFICATION
71b	Ground punching 23 of terminal strip A.	RFC relay operated. At terminal strip D — Ground present on punchings 22, 23.
72b	Ground punching 21 of terminal strip D.	RFC1 relay operated. At terminal strip D — Ground not present on punching 22. Ground present on punching 23.
73b	Remove ground from punching 23 of terminal strip A.	RFC relay released. At terminal strip D — Ground present on punchings 22, 23.
74b	Remove ground from punching 21 of terminal strip D.	RFC1 relay released.
75b	Remove insulator from 3B contact of RB2 relay in originating register group busy circuit.	
76a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to start of test.	

P. Master Traffic Control Short-Cycle Gate Feature

3	At master test frame — Operate DMTCB key.	DMTCB lamp lights.
4	At relay rack frame — Block nonoperated CWA, CWB, IM1, IM2 relays.	
5	Block operated AMB relay.	
6	When TCA relay is normal, connect ground to 1T of AMB relay.	TCA relay operates. In 2 to 3 seconds, TCA relay released. Major alarm sounds. At master test frame — DMCGA lamp lights.
7	At master test frame — Operate DMTCA key.	DMTCA lamp lights.
8	Operate MC-AR key momentarily.	Major alarm silenced. DMCGA lamp extinguished.
9	At relay rack frame — Connect battery to 3B of ALA relay.	
10	Connect battery to bottom winding of TMA relay.	TMA relay operates.

STEP	ACTION	VERIFICATION
11	Insulate 3T contact of TCA relay.	TCA1 relay released. IM1, IM2 relays not energized.
12	Remove battery from bottom winding of TMA relay.	TMA relay released. IM1, IM2 relays energized.
13	Remove insulator from 3T of TCA relay.	TCA1 relay operates. IM1, IM2 relays not energized.
14	Remove ground from 1T of AMB relay.	
15	Remove battery from 3B of ALA relay.	
16	Remove blocking tool from CWA relay.	
17	When CWA relay is nonoperated, connect ground to top winding of CWA relay.	CWA relay operates. In 2 to 3 seconds, ALA relay operates. CWA relay released. ALB relay is nonoperated. Major alarm sounds. At master test frame — DMCGA lamp lights.
18	Remove ground from top winding of CWA relay.	
19	At master test frame — Operate MC-AR key momentarily.	Major alarm silenced. DMCGA lamp extinguished.
20	Release DMTCA key.	DMTCA lamp extinguished.
21	At relay rack frame — Block operated TCA relay.	Battery absent on punchings 2, 3 of A terminal strip.
22	Remove blocking tool from TCA relay.	Battery present on punchings 2, 3 of A terminal strip.
23	At relay rack frame — Operate momentarily CWA relay of master traffic control circuit for register marker connectors.	At master traffic control circuit for line link marker connectors — TCA relay operates momentarily.
24	At master test frame — Release DMTCB key.	DMTCB lamp extinguished.
25	Operate DMTCA key.	DMTCA lamp lights.
26	At relay rack frame — Block nonoperated CWA relay.	
27	When TCB relay is normal, connect ground to 3B of AMB relay.	TCB relay operates. In 2 to 3 seconds, TCB relay released. Major alarm sounds. At master test frame — DMCGB lamp lights.
28	At master test frame — Operate DMTCB key.	DMTCB lamp lights.

STEP	ACTION	VERIFICATION
29	Operate MC-AR key momentarily.	Major alarm silenced. DMCGB lamp extinguished.
30	At relay rack frame — Connect battery to 3B of ALB relay.	
31	Connect battery to bottom winding of TMB relay.	TMB relay operates.
32	Insulate 3T of TCB relay.	TCB1 relay released. IM1, IM2 relays not energized.
33	Remove battery from bottom winding of TMB relay.	TMB relay released. IM1, IM2 relays energized.
34	Remove insulator from 3T of TCB relay.	TCB1 relay operates. IM1, IM2 relays not energized.
35	Remove ground from 3B of AMB relay.	
36	Remove battery from 3B of ALB relay.	
37	Remove blocking tool from CWB relay.	
38	When CWB relay is nonoperated, connect ground to top winding of CWB relay.	CWB relay operates. In 2 to 3 seconds, ALB relay operates. CWB relay released. Major alarm sounds. At master test frame — DMCGB lamp lights.
39	Remove ground from top winding of CWB relay.	
40	Block operated TCB relay.	Battery absent on punchings 2, 3 of D terminal strip.
41	Remove blocking tool from TCB relay.	Battery present on punchings 2, 3 of D terminal strip.
42	At master test frame — Operate MC-AR key momentarily.	Major alarm silenced. DMCGB lamp extinguished.
43	Release DMTCA key.	DMTCA lamp extinguished.
44	At relay rack frame — In master traffic control for register marker connectors — Operate CWB relay momentarily.	At master traffic control circuit for line link marker connectors — TCB relay operates.
45	Remove blocking tools from IM1, IM2, CWA, AMB relays.	
46	Release DMTCB key.	DMTCB lamp extinguished.
47a	If office is arranged for alarm sending — Restore alarm transfer key to position prior to start of test.	