LINE CHOICE CONNECTOR CIRCUITS

TESTS

NO. 1 CROSSBAR OFFICES

1. GENERAL

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

1.02 This section is reissued to incorporate material from the addendum in its proper location.

1.03 The tests and features covered are:

A. Marker Preference Chain Transfer and Alarm Features When the MTR and SA Keys Are Used: This test checks that the operation of a CH relay of a connector causes a transfer to an alternate set of marker preference relays and causes an audible and visual alarm signal.

B. Make-Busy Feature: This test checks that a make-busy plug inserted into a TMB jack lights a guard lamp signal and that all calls to the associated line choice are routed to overflow immediately.

C. False Continuity and Crosses on CR- and CE- Relays: This test checks for false closure of contacts and crosses between horizontally adjacent contacts of the CR- and CE- relays. A test is also made of the multiple wiring and contacts of these relays.

D. False Continuity and Crosses on LJA- and LJB- Relays: This test checks for false closure of contacts and crosses between horizontally adjacent contacts of the line junctor connector relays.

E. False Continuity and Crosses on MCA-, MCB-, and MCC- Relays: This test checks for false closure of contacts and crosses between horizontally adjacent contacts of the marker connector relays. A check is also made to insure that both CR- and CE- relays, of a pair, will operate from each terminating marker.

F. Marker Preference Chain Transfer and Alarm Features When the TR and AR Keys Are Used: This test checks that the operation of a CH relay of a connector causes a transfer to an alternate set of marker preference relays and causes an audible and visual alarm signal.

1.04 The letters a, b, c, etc, added to a step number in Part 3 of this section indicate an action which may or may not be required, depending on local conditions. The conditions under which a step or series of steps should be made are 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.

1.05 During Test C the PC (line link peg count), PL (line link frame or horizontal group load), and OF (overflow) traffic registers may be scored.

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

1.07 When performing Tests B, C, D, and E, it is necessary to remove the line choice connector from service.

Caution: Removing a line choice connector from service stops all terminating traffic to the subscribers in the line choice. For this reason a line choice connector should be made busy for as short a time as possible.

2. APPARATUS

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

TABLE A

APPARATUS	NO. REQUIRED FOR TESTS					
	A	B	C	D	E	F
Make-Busy Plug No. 349A or No. 298A		1	1	1	1	
Make-Busy Plug No. 322A					1	
Receiver (2.02)			1	1	1	
Testing Cord (2.03)			1	1	1	
Testing Cord (2.04)					1	
Testing Cord (2.05)			1		1	
Trouble Indicator (2.06)	1	1				1

2.02 No. 716E Receiver, attached to a W2AB Cord equipped with two No. 360A Tools (2W21A Cord), a KS-6278 Tool, and a No. 411A Tool.

2.03 No. 893 Cord, 6 feet long, equipped with two No. 360A Tools (1W13B Cord), a KS-6278 Tool, and a No. 411A Tool.

2.04 No. 893 Cord, 6 feet long, equipped with two No. 360A Tools (1W13B Cord), a KS-6278 Tool, and a No. 419A Tool.

2.05 No. 893 Cord, 6 feet long, equipped with two No. 360A Tools (1W13B Cord), a KS-6278 Tool, and a No. 547A Tool, or a No. 509A Tool, or a No. 509B Tool, as required.

2.06 Terminating Trouble Indicator Frame (SD-25284-01).

3. METHOD

STEP	ACTION	VERIFICATION
	A. Marker Preference Chain Transfer and Alarm Features When the MTR and SA Keys Are Used	
1a	If the SA key is in the operated (vertical) position — Momentarily operate the MTR (manual transfer) key and then restore the SA key to its normal (horizontal) position.	
2	Momentarily operate MTR key.	CH lamp lights. Minor alarm sounds. Green aisle pilot and main aisle pilot lamps light. All TR- relays of connector under test are operated.
3	Operate SA key.	CH lamp extinguished. Minor alarm silenced. Green aisle pilot and main aisle pilot lamps extinguished.
4	At terminating trouble indicator frame — Operate BAT key.	

STEP	ACTION	VERIFICATION
5	Route test calls through the connector under test using a different marker for each test call.	At terminating trouble indicator frame — Proper LC- (line choice connector busy) lamp lights on each test call.
6b	If coin lines are distinguished by ground on the CN lead from the connector under test, route test calls using each marker to each coin line link frame of the line choice under test.	At terminating trouble indicator— CN lamp lights on each test call.
7	At line choice connector frame under test — Momentarily operate MTR key.	At line choice connector under test — All TR- relays release. CH lamp lights. Minor alarm sounds.
8	Restore SA key to normal.	CH lamp extinguished. Minor alarm silenced.

B. Make-Busy Feature

1	At line choice connector frame — Insert a No. 349A plug into TMB jack of the connector under test.	On the line choice connector frame — TMB lamp lights. At floor alarm cabinet — LC-CFB lamp lights.
2	At terminating trouble indicator — Route test calls to the line choice connector under test, using a different marker for each test call, until all terminating markers have been used.	At terminating trouble indicator — RC, RV, TC, CON, GT2, and RL lamps, followed by the TRL lamp, light on each test call.
3	At line choice frame under test — Remove the No. 349A plug from TMB jack.	At line choice connector frame — TMB lamp extinguished. At floor alarm cabinet — LC-CFB lamp extinguished.

C. False Continuity and Crosses on CR- and CE- Relays

For 245- or 263-Type Relays

1	Insert a No. 349A plug into TMB jack of connector under test.	
2	On the CR- relays of the connector under test — Apply ground, in turn, to each stationary contact 0 to 4, 10 to 14, 5 to 9, and 15 to 19, inclusive.	Ground is not present on each associated operating spring.

STEP	ACTION	VERIFICATION
3	On the CR- relays of the connector under test — Apply ground, in turn, to each operating spring 20 to 24 and 25 to 29, inclusive.	Ground is not present on each associated stationary contact.
4a	If coin lines are distinguished by ground on the CN lead from the CR- and CE- relays, check for presence of ground on operating spring 34 or 39.	Ground not present.
5	Connect ground to T winding terminal of the CEA relay of connector under test.	CEA relay operates.
6	On CRA relay of connector under test — Apply ground, in turn, to each stationary spring 0 to 4 and 10 to 14, inclusive.	Ground is present on each associated operating spring.
7	Apply ground, in turn, to each operating spring 20 to 24, inclusive.	Ground is present on each associated stationary spring.
8a	If coin lines are distinguished by ground on the CN lead from the CR- and CE- relays, check for presence of ground on both stationary and operating spring 34.	Ground is present on both stationary and operating spring 34.
9b	If a line insulation test control circuit is not provided (A option wiring) — Check for presence of ground on both stationary and operating spring 23.	Ground is present on both stationary and operating spring 23.
10	Apply ground, in turn, to each stationary spring 10 to 14, inclusive.	Ground is not present on each horizontally adjacent stationary spring. (Ground will be present on stationary spring 23 if a line insulation test control circuit is not provided.) *Note:* Momentary grounds may be detected, while making these tests, if the associated line link frame serves an originating call, and may be disregarded.
11	Remove ground from winding of CEA relay.	CEA relay releases.
12	Connect ground to T winding terminal of the CEB relay of the connector under test.	CEB relay operates.
13	On CRB relay of connector under test — Apply ground, in turn, to each stationary spring 5 to 9 and 15 to 19, inclusive.	Ground is present on each associated operating spring.

STEP	ACTION	VERIFICATION
14	Apply ground, in turn, to each operating spring 25 to 29, inclusive.	Ground is present on each associated stationary spring.
15a	If coin lines are distinguished by ground on the CN lead from the CR- and CE- relays — Check for presence of ground on both stationary and operating spring 39.	Ground is present on both stationary and operating spring 39.
16b	If a line insulation test control circuit is not provided (A option wiring) — Check for presence of ground on both stationary and operating spring 28.	Ground is present on both stationary and operating spring 28.
17	Apply ground, in turn, to each stationary spring 15 to 19, inclusive.	Ground is not present on each horizontally adjacent stationary spring. (Ground will be present on stationary spring 28 if a line insulation test control circuit is not provided.) *Note:* Momentary grounds may be detected, while making these tests, if the associated line link frame serves an originating call, and may be disregarded.
18	Remove ground from winding of CEB relay.	CEB relay releases.
19	Connect ground to T winding terminal of CEC relay of connector under test.	CEC relay operates.
20	Repeat Steps 6 to 10, on the CRC relay.	
21	Remove ground from winding of CEC relay.	CEC relay releases.
22	Connect ground to T winding terminal of CED relay of connector under test.	CED relay operates.
23	Repeat Steps 13 to 17, on the CRD relay.	
24	Remove ground from winding of CED relay.	CED relay releases.
25	Remove the No. 349A plug from the TMB jack.	
For 287-Type Relays		
26	Insert a No. 349A plug into TMB jack of connector under test.	

STEP	ACTION	VERIFICATION
27	On the CR- relays of connector under test — Apply ground, in turn, to each movable contact terminal 0 to 4, 10 to 14, 5 to 9, and 15 to 19, inclusive. ***Caution: When connecting to terminals of the 287-type relays, do not apply the 419A tool or any other connecting tool over a solderless wrapped connection or in any manner that would disturb such a connection.***	Ground is not present on each associated fixed contact terminal.
28	Apply ground, in turn, to each fixed contact terminal 20 to 24 or 25 to 29, inclusive.	Ground is not present on each associated movable contact terminal.
29a	If coin lines are distinguished by ground on the CN lead from the CR- and CE- relays — Check for presence of ground on fixed contact terminal 34 or 39.	Ground not present.
30	Connect ground to T winding terminal of the CEA relay of connector under test.	CEA relay operates.
31	On CRA relay of connector under test — Apply ground, in turn, to each movable contact terminal 0 to 4 and 10 to 14, inclusive.	Ground is present on each associated fixed contact terminal.
32	Apply ground, in turn, to each fixed contact terminal 20 to 24, inclusive.	Ground is present on each associated movable contact terminal.
33a	If coin lines are distinguished by ground on the CN lead from the CR- and CE- relays — Check for presence of ground on both movable and fixed contact terminal 34.	Ground is present on both movable and fixed contact terminal 34.
34b	If a line insulation test control circuit is not provided (A option wiring) — Check for presence of ground on both movable and fixed contact terminal 23.	Ground present on both movable and fixed contact terminal 23.
35	Apply ground, in turn, to movable contact terminals 10 to 14, inclusive.	Ground is not present on adjacent movable contact terminal. (Ground will be present on movable contact terminal 23 if a line insulation test control circuit is not provided.)

STEP	ACTION	VERIFICATION
		Note: Momentary grounds may be detected, while making these tests, if the associated line link serves an originating call, and may be disregarded.
36	Remove ground from winding of CEA relay.	CEA relay releases.
37	Connect ground to T winding terminal of the CEB relay of the connector under test.	CEB relay operates.
38	On CRB relay of connector under test — Apply ground, in turn, to each movable contact terminal 5 to 9 and 15 to 19, inclusive.	Ground present on each associated fixed contact terminal.
39	Apply ground, in turn, to each fixed contact terminal 25 to 29, inclusive.	Ground present on each associated movable contact terminal.
40a	If coin lines are distinguished by ground on the CN lead from the CR- and CE- relays — Check for presence of ground on both movable and fixed contact terminal 39.	Ground is present on both movable and fixed contact terminal 39.
41b	If a line insulation test control circuit is not provided (A option) — Check for presence of ground on both movable and fixed contact terminal 28.	Ground is present on both movable and fixed contact terminal 28.
42	Apply ground, in turn, to each movable contact terminal 15 to 19, inclusive.	Ground not present on each adjacent movable contact terminal. (Ground will be present on movable contact terminal 28 if a line insulation test control circuit is not provided.) *Note:* Momentary grounds may be detected, while making these tests, if the associated line link frame serves an originating call, and may be disregarded.
43	Remove ground from winding of CEB relay.	CEB relay releases.
44	Connect ground to T winding terminal of CEC relay of connector under test.	CEC relay operates.
→45	Repeat Steps 31 through 35, on the CRC relay.	

STEP	ACTION	VERIFICATION
46	Remove ground from winding of CEC relay.	CEC relay releases.
47	Connect ground to T winding terminal of CED relay of connector under test.	CED relay operates.
→ 48	Repeat Steps 38 through 42, on the CRD relay.	
49	Remove ground from winding of CED relay.	CED relay releases.
50	Remove the No. 349A plug from the TMB jack.	

D. False Continuity and Crosses on LJA- and LJB- Relays

For 245- and 263-Type Relays

1	Insert a No. 349A plug into the TMB jack of the connector under test.	
2	On each LJA- and LJB- relay of connector under test — Apply ground, in turn, to each stationary spring 30 to 39, inclusive.	Ground not present on each associated operating spring.
3	Check stationary springs 4 and 5 of LJAO relay for presence of either battery or ground.	Neither battery nor ground present.
4	Apply high resistance ground, in turn, to each stationary spring 20 to 29, inclusive, of LJAO relay.	High resistance ground not present on each horizontally adjacent stationary spring. ***Note:*** If solid ground is detected on either stationary spring, it may be caused by a call being held on the associated line link vertical. In this case repeat the test after the call has released.
5	Repeat Steps 3 and 4 on each remaining LJA- and LJB- relay of the connector under test.	
6	Remove the No. 349A plug from the TMB jack.	

For 287-Type Relays

7	Insert a No. 349A plug into the TMB jack of the connector under test.	

STEP	ACTION	VERIFICATION
8	On each LJA- and LJB- relay of the connector under test — Apply ground, in turn, to each movable contact terminal 30 to 39, inclusive. ***Caution: When connecting to terminals of the 287-type relays, do not apply the 419A tool or any other tool over a solderless wrapped connection or in any manner that would disturb such a connection.***	Ground not present on each associated fixed contact terminal.
9	Check movable contact terminals 4 and 5 of LJAO relay for presence of battery or ground.	Neither battery nor ground present.
10	Apply high resistance ground, in turn, to each movable contact terminal 20 to 29, inclusive, of LJAO relay.	High resistance ground not present on each adjacent movable contact terminal. ***Note:*** If solid ground is detected on adjacent movable contact terminal, it may be caused by a call being held on the associated line link vertical. In this case repeat the test after the call has released.
→ 11	Repeat Steps 9 and 10 on each remaining LJA- and LJB- relay of the connector under test.	
12	Remove the No. 349A plug from TMB jack.	

E. False Continuity and Crosses on MCA-, MCB-, and MCC- Relays

For 245- and 263-Type Relays

1	At terminating trouble indicator frame — Insert a No. 322A plug into the DB- jack of a terminating marker.	
2	At line choice connector frame — Insert a No. 349A plug into the TMB jack of the connector under test.	
3	Check stationary springs 0, 2, 4, and 6 of the MCB- relay associated with the marker made busy for presence of battery.	Battery not present.

STEP	ACTION	VERIFICATION
4	Apply ground, in turn, to each of the following stationary springs: RELAY — STATIONARY SPRINGS MCA- — 0 to 8, inclusive; 12, 13, 17, 18, and 19 MCB- — 14, 15, 16, and 17 MCC- — 0 to 9, inclusive; 30 to 59, inclusive	Ground is not present on each associated operating spring.
5	Connect ground to the T winding terminal of the MCA- relay associated with the marker made busy.	MCA-, MCB-, and MCC- relays operate.
6	Insulate stationary spring 14 of the MCA- relay.	
7a	If coin lines are segregated by line link groups instead of by hundred blocks — Insulate stationary spring 14 at the MCB- relay.	
8	On MCB- relay — Check each stationary spring 14 to 17, inclusive, for presence of battery.	Battery not present. (Battery present on stationary spring 14 if coin lines are segregated by line link groups instead of by hundred blocks.)
9	On MCA- relay — Check for presence of ground on each stationary spring 1, 4, 5, 6, and 19. *Note:* This test need be made only on one line choice connector for each marker.	Ground not present.
10	On MCC- relay — Check for presence of ground on each stationary spring 0 to 9, inclusive. *Note:* This test need be made only on one line choice connector for each marker.	Ground not present.
11	Apply high resistance ground, in turn, to each of the following stationary springs:	High resistance ground not present on each horizontally adjacent stationary spring.

STEP	ACTION	VERIFICATION

RELAY	STATIONARY SPRINGS
MCA-	2, 3, 7, and 8
MCC-	40 to 49, inclusive

12	On MCB- relay — Connect ground, in turn, to each stationary spring 0, 2, 4, and 6.	On line junctor connector frame — The associated pair of CR- and CE- relays operate.
13	Remove insulator from MCA- relay.	
14a	If coin lines are segregated by line link groups instead of by hundred blocks — Remove insulator from MCB- relay.	
15	Remove ground from winding of MCA- relay.	MCA-, MCB-, and MCC- relays release.
16	Remove the No. 349A plug from the TMB jack.	
17	At terminating trouble indicator frame — Remove the No. 322A plug from the DB- jack.	
18	Repeat Steps 1 to 17, inclusive, to check the MCA-, MCB-, and the MCC- relays associated with the remaining terminating markers.	

For 287-Type Relays

19	At terminating trouble indicator frame — Insert a No. 322A plug into the DB- jack of a terminating marker.	
20	At line choice connector frame — Insert a No. 349A plug into the TMB jack of the connector under test.	
21	Check movable contact terminals 0, 2, 4, and 6 of the MCB- relay associated with the marker made busy, for presence of battery. ***Caution: When connecting to terminals of the 287-type relays, do not apply the 419A tool or any other connecting tool over a solderless wrapped connection or in any manner that would disturb such a connection.***	Battery is not present.

STEP	ACTION	VERIFICATION
22	Apply ground, in turn, to each of the following movable contact terminals: RELAY — MOVABLE CONTACT TERMINALS MCA- — 0 to 8, inclusive; 12, 13, 17, 18, and 19 MCB- — 14, 15, 16, and 17 MCC- — 0 to 9, inclusive; 30 to 59, inclusive	Ground is not present on each associated fixed contact terminal.
23	Connect ground to T winding terminal of the MCA- relay associated with the marker made busy.	MCA-, MCB-, and MCC- relays operate.
24	Insulate 14 contact of the MCA- relay.	
25a	If coin lines are segregated by line link groups instead of by hundred blocks — Insulate 14 contact of MCB- relay.	
26	On MCB- relay — Check each movable contact terminal 14 to 17, inclusive, for presence of battery.	Battery not present. (Battery present on movable contact terminal 14 if coin lines are segregated by line link groups instead of by hundred blocks.)
27	On MCA- relay — Check for presence of ground on each movable contact terminal 1, 4, 5, 6, and 19. *Note:* This test need be made only on one line choice connector for each marker.	Ground not present.
28	On MCC- relay — Check for presence of ground on each movable contact terminal 0 to 9, inclusive. *Note:* This test need be made only on one line choice connector for each marker.	Ground not present.
29	Apply high resistance ground, in turn, to each of the following movable contact terminals: RELAY — MOVABLE CONTACT TERMINALS MCA- — 2, 3, 7, and 8 MCC- — 40 to 49, inclusive	High resistance ground not present on each of the following movable contact terminals: RELAY — MOVABLE CONTACT TERMINALS MCA- — 12, 13, 17, and 18 MCC- — 50 to 59, inclusive

STEP	ACTION	VERIFICATION
30	On MCB- relay — Connect ground, in turn, to each movable contact terminal 0, 2, 4, and 6.	On the line junctor connector frame — The associated pair of CR- and CE- relays operate.
31	Remove insulator from MCA- relay.	
32a	If coin lines are segregated by line link groups instead of by hundred blocks — Remove insulator from MCB- relay.	
33	Remove No. 349A plug from TMB jack.	
34	Remove ground from winding of MCA- relay.	MCA-, MCB-, and MCC- relays release.
35	At terminating trouble indicator frame — Remove No. 322A plug from DB- jack.	
→36	Repeat Steps 19 through 35 to check the MCA-, MCB-, and MCC- relays associated with the remaining terminating markers.	

F. Marker Preference Chain Transfer and Alarm Features When the TR and AR Keys Are Used

1a	At line choice connector frame — If the TR key is in the operated (vertical) position — Restore the TR key to its normal (horizontal) position.	
2	With AL relay nonoperated, momentarily open contacts at 2T/3T of AL relay long enough to operate CH relay.	CH lamp lights. Minor alarm sounds. TR- relays operate. Green aisle pilot and main aisle pilot lamps are lighted. (This lamp check should be made only once for all circuits in the same aisle.)
3	Operate AR key.	Minor alarm silenced. CH lamp and aisle pilot lamps extinguished. TR- relays release.
4	Operate TR key.	TR- relays operate.
5	At terminating trouble indicator frame — Operate BAT key.	

STEP	ACTION	VERIFICATION
6	At the terminating trouble indicator — Route test calls through the connector under test using a different marker for each test call.	At terminating trouble indicator frame — Proper LC- (line choice connector busy) lamp lights on each test call.
7b	If coin lines are distinguished by ground on the CN lead from the connector under test — Route test calls using each marker to each coin line link frame of the line choice connector under test.	At terminating trouble indicator — CN lamp lights on each test call.
8	At line choice connector under test — Momentarily open contacts 2T/3T of AL relay long enough to operate CH relay.	At connector under test — TR- relays release. CH lamp lights. Minor alarm sounds.
9	Operate AR key.	CH lamp extinguished. Minor alarm silenced. TR- relays operate.
10	Restore TR key.	TR- relays release.