DISTRICT LINK AND CONNECTOR CIRCUITS
TESTS
NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes a method of making tests of district link and connector circuits in No. 1 crossbar offices.

1.02 This section is reissued for the following reasons:

(a) To remove former Test G which is now combined with Test A.

(b) To revise Test F to provide for testing multicontact wire-spring relays.

(c) To specify the use of the 1A fault locator test set, in Test F, for detecting crosses.

(d) To present the method of testing in tabular form.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests and features covered are:

A. Marker Preference Chain Transfer and Alarm Features: This test checks that the operation of a CH relay in a connector causes a transfer to an alternate set of preference relays and causes an audible alarm with a visual indication. It also verifies that test calls are completed using the alternate or regular preference chain.

B. Primary Switch Hold Magnet Winding Leads: This test checks that the proper LS leads are grounded when make-busy plugs are inserted in the MBO-9 jacks.

C. Primary Switch Select Magnet Winding Leads: This test checks that only the proper select magnet associated with a particular primary switch operates when the related terminal is grounded.

D. Secondary Switch Select Magnet Winding Leads: This test checks that the select magnets with numerical designations corresponding to an operated LC- relay operate on all secondary switches when the related terminals are grounded. The MB- jack control over the secondary select magnets is also verified.

E. Trouble Indicator Cut-in TI Relay Features: This test checks that the proper indicating leads are closed through to the trouble indicator.

F. False Continuity, Crosses, Battery, or Ground on Connector Relays: This test checks for false continuities, crosses, battery, or ground not readily detected during the normal operation of the equipment.

1.04 When connecting to wire-spring-relay contact terminals, test connections should not be applied over a solderless wrapped connection nor in any manner that would disturb such a connection.

1.05 In Test F, the No. 1A fault locator is employed for detecting crosses. Section 100-150-301 covers the method for using this test set.

1.06 *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 3 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
Test Set (2.02)	–	–	–	–	–	1
Test Receiver (2.03)	–	1	–	–	–	1
Cord (2.04)	–	–	2*	2	1	1
No. 322A (make-busy) Plug	–	√	√	–	√	√
No. 298A (make-busy) Plug	–	√	√	√	√	√
Tool (2.05)	√	–	√	√	√	√

√ As required.

* Only one required if battery wired to select magnets.

2.02 Oscillator J94730B (SD-95616-01) part of No. 1A fault locator test set, J94730A (for use in checking for crosses).

2.03 Test receiver, No. 716C receiver (or replaced No. 528 receiver) attached to a W2AB cord equipped with two No. 360A tools (No. 2W21A cord), one KS-6278 connecting clip and one No. 411A (test pick) tool (for use in checking the presence or absence of battery or ground, continuity, and crosses on connector relays).

2.04 Testing cord, No. 893 cord, 6 feet long, equipped with two No. 360A tools (1W13B cord) a KS-6278 connecting clip and a No. 419A (test connector) tool (for connecting battery or ground to relay springs or contact terminals).

2.05 Blocking and insulating tools, as required. Use tools and apply, as covered in Section 069-020-801.

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3. METHOD

STEP	ACTION	VERIFICATION
	A. Marker Preference Chain Transfer and Alarm Features	
	Connectors equipped with SA and MTR keys	
1a	If SA key is operated (vertical position) — Operate MTR (manual transfer) key momentarily.	CH lamp lighted. Minor alarm sounds. Green aisle pilot and main aisle pilot lamps lighted.
2a	Restore SA key (horizontal position).	CH lamp extinguished. Minor alarm silenced. Green aisle pilot and main aisle pilot lamps extinguished.
3	Operate MTR key momentarily.	CH lamp lighted. Minor alarm sounds. Green aisle pilot and main aisle pilot lamps lighted. All TR- relays operated.
4	Operate SA key (vertical position).	CH lamp extinguished. Minor alarm silenced. Green aisle pilot and main aisle pilot lamps extinguished.
5	At originating trouble indicator — Route simulated service calls through connector under test using a different marker for each test call (see 216-261-501, Test A).	Test completed and proper district frame indicated.
6	At district link and connector frame — Operate MTR key momentarily.	CH lamp lighted. Minor alarm sounds. All TR- relays released.

STEP	ACTION	VERIFICATION
7	Restore SA key (horizontal position).	CH lamp extinguished. Minor alarm silenced.
8	At originating trouble indicator — Route simulated service calls through connector under test using a different marker for each test call.	Test completed and proper district frame indicated.
Connectors equipped with TR and AR keys		
9b	If TR key is operated — Restore TR key.	
10	Insulate contacts 2T, 3T of AL relay momentarily.	CH lamp lighted. Minor alarm sounds. All TR- relays operated. Green aisle pilot and main aisle pilot lamps lighted.
11	Operate AR key momentarily.	CH lamp extinguished. Minor alarm silenced. Green aisle pilot and main aisle pilot lamps extinguished. All TR- relays released.
12	At originating trouble indicator — Route simulated service calls through connector under test using a different marker for each test call (see Section 216-261-501, Test A).	Test completed and proper district frame indicated.
13	At district link and connector frame — Operate TR key.	All TR- relays operated.
14	Repeat Step 12.	Same as Step 12.
15	At district link and connector frame — Insulate 2T, 3T of AL relay.	CH lamp lighted. Minor alarm sounds. TR- relays released.
16	Operate AR key.	CH lamp extinguished. Minor alarm silenced. TR- relays operated.
17	Release TR key.	TR- relays released.

B. Primary Switch Hold Magnet Winding Leads

1	At subscriber sender link frame associated with district link frame to be tested — Insert make-busy plugs in jacks MB0-4.	
2	At originating trouble indicator — Make-busy marker selected for test.	
3	At district link and connector frame — Insert make-busy plug in jack MB0.	
4	At MCA terminal strip — Check for ground on terminals 10 and 20.	Click is heard.

STEP	ACTION	VERIFICATION
5	Remove make-busy plug from jack MB0.	
6	Repeat Steps 3 through 5 using MB1-9 jacks and terminals 11 through 19 and 21 through 29.	
7	At subscriber sender link frame — Remove make-busy plugs from jacks MB0-4.	
8	At originating trouble indicator — Restore marker to service.	
	C. Primary Switch Select Magnet Winding Leads	
1	At subscriber sender link frame associated with district link frame to be tested — Insert make-busy plugs in jacks MB0-4.	
2	At district link and connector frame — Block operated LC0 relay.	
3a	If battery is not connected permanently to the primary switch select magnets — At LC terminal strip — Connect battery to terminal 6.	
	Note: Circuits wired with W option, provided on issue 7-B (and later) SD-25031-01 ***do not*** have battery connected.	
4	Connect ground to terminal 40.	Select magnet 0 on primary switch 0 operated.
5	Remove ground from terminal 40.	Select magnet 0 on primary switch 0 released.
6	Repeat Steps 4 and 5 using terminals 41 through 49.	The proper select magnet operates and releases on primary switch 0.
7	Remove block from LC0 relay.	
8	Repeat Steps 2 through 7 with LC1-9 relays.	The proper select magnets operate and release on primary switches 1-9.
9a	If battery is not connected permanently to the primary switch select magnets — At LC terminal strip — Remove battery from terminal 6.	
10	At subscriber sender link frame — Remove plugs from jacks MB0-4.	
	D. Secondary Switch Select Magnet Winding Leads	
1	At the subscriber sender link frame associated with district link frame to be tested — Insert make-busy plugs in jacks MB0-4.	
2	At district link and connector frame — Block operated LC0 relays.	

STEP	ACTION	VERIFICATION
3	At MCA terminal strip — Connect ground to terminal 6.	Select magnet 0 operates on secondary switches 0-4.
4	Connect ground to terminal 8.	Select magnet 0 operates on secondary switches 5-9.
5	Insert plug in MB0 jack.	Select magnet 0 on secondary switch 0 releases.
6	Remove block from LC0 relay.	Select magnet 0 on secondary switches 1-9 releases.
7	Remove plug from MB0 jack.	
8	Block operated next highest numbered LC- relay.	Select magnets corresponding with LC- relay number operate on secondary switches 0-9.
9	Insert plug in MB- jack corresponding with LC- relay number blocked operated in Step 8.	Select magnet on secondary switch corresponding to LC- relay number releases.
10	Remove block from LC- relay.	All associated select magnets on secondary switches release.
11	Remove plug from MB- jack.	
12	Repeat Steps 8 through 11 for each remaining LC- relay.	Same as Steps 8 through 11.

E. Trouble Indicator Cut-in TI Relay Features

1	At subscriber sender link frame associated with district link frame to be tested — Insert make-busy plugs in jacks MB0-4.	
2	At originating trouble indicator — Insert make-busy plugs in all TIB jacks.	
3	Block operated LP1 relay.	
4	At the district link and connector frame — Block operated the TI relay.	
5	At the LC terminal strip — Connect ground on terminal 40.	At originating trouble indicator — M0 lamp lighted.
6	Disconnect ground from terminal 40.	M0 lamp extinguished.
7	Repeat Steps 5 and 6 using terminals 41 through 49.	M1 through M9 lamps lighted and extinguished.
8	Block operated LC0 relay.	SW0 lamp lighted.
9	Release LC0 relay.	SW0 lamp extinguished.
10	Repeat Steps 8 and 9 with LC1-9 relays.	SW1 through SW9 lamps lighted and extinguished.

STEP	ACTION	VERIFICATION
11	Release TI relay.	
12	At the subscriber sender link frame — Remove make-busy plugs from MB0-4 jacks.	
13	At originating trouble indicator frame — Remove block from LP1 relay.	
14	Remove make-busy plugs from TIB jacks.	

F. False Continuity, Crosses, Battery, or Ground on Connector Relays

1	At subscriber sender link frame associated with district link and connector frame to be tested — Insert make-busy plugs in MB0-4 jacks.	
2	At originating trouble indicator — Make busy marker associated with lowest numbered district link and connector circuit MCA- relay.	
3	At district link and connector circuit — Check all JC- and LC- relays as listed in Table B.	
4	Check MCA- and MCB- relays associated with marker made busy as listed in Table B.	

TABLE B

RELAY	CHECK FOR ABSENCE OF	OPERATING SPG OR FIXED CONTACT TERM.	STATIONARY SPG OR MOVABLE CONTACT TERM.
JC- (ALL)	Battery	10 through 49	—
JC- (ALL)	Ground	4, 9	—
LC- (ALL)	Battery	4, 52	—
LC- (ALL)	"	30 through 50	—
MCA-	"	0 through 8	50, 57
MCA-	"	10 through 29	—
MCA-	"	51, 53, 55, 58, 59	—
MCA-	Ground	52	9
MCB-	"	—	0, 1, 9
MCB-	"	—	4 through 6

STEP	ACTION	VERIFICATION
5	Connect battery, in turn, to MCA- relay associated with marker made busy as follows: ***Nonwire-spring relay:*** Stationary springs 30 through 49. ***Wire-spring relay:*** Movable contact terminals 30 through 49.	No JC- relay operates.
6	Connect to contacts of the following pairs of contacts on all LC- relays, using test receiver connected to battery and test cord connected to ground: ***Nonwire-spring relays:*** Operating and associated stationary springs 0, 1, 2, 3, 5, 6, 7, 58, and 59. ***Wire-spring relays:*** Fixed and associated movable contact terminals 0, 1, 2, 3, 5, 6, 7, 58, and 59.	No click heard in test receiver.
7	Connect to contacts of the following pairs of contacts on the MCB- relay associated with the marker made busy, using test receiver connected to battery, and test cord connected to ground: ***Nonwire-spring relay:*** Operating and associated stationary springs 2, 3, 7, and 8. ***Wire-spring relay:*** Fixed and associated movable contact terminals 2, 3, 7, and 8.	No click heard in test receiver.
8a	If MCB- relay associated with marker made busy is an even-numbered relay — Connect to MCA- and MCB- relays as follows, using test receiver connected to battery and test cord connected to ground: ***Nonwire-spring relays:*** Stationary spring 9 of MCA- relay and stationary spring 4 of associated MCB- relay. ***Wire-spring-relays:*** Movable contact terminal 9 of MCA- relay and movable contact terminal 4 of associated MCB- relay.	Click heard in test receiver.
9b	If MCB- relay associated with marker made busy is an odd-numbered relay — Connect to MCA- and MCB- relays as follows, using test receiver connected to battery and test cord connected to ground: ***Nonwire-spring relays:*** Stationary spring 9 of MCA- relay and stationary spring 9 of associated MCB- relay.	Click heard in test receiver.

STEP	ACTION	VERIFICATION
	Wire-spring relays: Movable contact terminal 9 of MCA- relay and movable contact terminal 9 of associated MCB- relay.	
10	Connect to MCB- relay associated with marker made busy as follows, checking for crosses using 1A fault locator: ***Nonwire-spring relay:*** Connect test pick of 1A fault locator to operating and stationary springs 3, 8, and 10 through 49. ***Wire-spring relay:*** Connect test pick of 1A fault locator to fixed and movable contact terminals 3, 8, and 10 through 49.	Uniform tone heard.
11	Connect to all JC- relays as follows, using a test receiver connected to battery and a test cord connected to ***high resistance ground:*** ***Nonwire-spring relays:*** Connect test cord, in turn, to stationary springs 10 through 49 and, in each case, connect test pick of test receiver to all adjacent springs (see Note). ***Wire-spring relays:*** Connect test cord, in turn, to movable contact terminals 10 through 49 and, in each case, connect test pick of test receiver to all adjacent contact terminals (see Note). ***Note:*** Verify that all hold magnets on the secondary switches are normal as test results will be affected by estalished service calls.	No click heard in test receiver.
12	Block operated MCA- and MCB- relays associated with marker made busy.	At originating trouble indicator — D- lamp associated with district link frame under test lighted.
13	At originating marker made busy — Connect ground to 1T spring of HMT1 relay.	
14	Operate and release, in turn, CHR0-9 and CHL0-9 relays.	XX2 relay does not operate.
15	Remove ground from HMT1 relay.	
16c	If equipped with message registers and message register check relays (Fig. AC) are not provided — At district link and connector frame — Connect to contacts of all LC- relays as	Click heard in test receiver.

STEP	ACTION	VERIFICATION
	follows, using test receiver connected to battery and test cord connected to ground: ***Nonwire-spring relays*** (see Note): (a) Operating springs 58 and 59. (b) Stationary springs 58 and 59. ***Wire-spring relays*** (see Note): (a) Fixed contact terminals 58 and 59. (b) Movable contact terminals 58 and 59. ***Note:*** Verify that all hold magnets on the primary switches are normal as test results will be affected by established service calls.	
17	Connect ground to terminal 4 of MCA- terminal strip associated with originating marker made busy.	At originating marker — XCH relay not operated.
18	Remove ground from MCA- terminal strip.	
19d	If originating marker is arranged for condenser timed time out feature — At district link and connector frame — Check for presence of ground on contact of MCA- relay associated with marker made busy as follows: ***Nonwire-spring relay:*** Operating spring 55. ***Wire-spring relay:*** Fixed contact terminal 55.	Click is heard.
20	At originating marker — Connect ground to 6B spring of PS1 relay.	At district link and connector frame — PS lamp lighted. Minor alarm sounds.
21	At district link and connector circuit — Operate PS key, momentarily.	PS lamp extinguished. Minor alarm silenced.
22	At originating marker — Remove ground from PS1 relay.	
23	Unblock MCA- and MCB- relays.	
24	At originating trouble indicator — Restore marker to service.	
25	Make busy originating marker associated with next highest numbered district link and connector frame MCA- relay.	
26	Repeat Steps 4, 5, 7, 8, 9, 10, 12, and 13 through 25 until all MCA- and MCB- relays have been tested.	
27	At subscriber sender link frame — Remove make-busy plugs from MB0-4 jacks.	