

**SUBSCRIBER SENDER LINK AND CONTROLLER SD-25554-01**

**OPERATION TESTS**

**NO. 1 CROSSBAR OFFICES**

**1. GENERAL**

**PAGE**

**1.01** This section covers test methods to determine individual circuit performance of various circuit features provided by subscriber sender link and controller.

**1.02** This section is reissued for the following reasons:

- (a) To revise Test K, providing for optional triggering of the traffic release control.
- (b) To add Test S, providing a test of the false sender group busy alarm.
- (c) To add Test T, providing a test of sender subgroup preference where subgroups are partially converted for TOUCH-TONE® or dial tone first operation.

This reissue affects the Equipment Test List.

**1.03** The tests covered are:

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- A. Minor Time Alarm:** This test checks timing of minor time alarm and lighting of associated alarm lamps. . . . . **5**
- B. Major Time Alarm:** This test checks timing of major time alarm and lighting of associated alarm lamps when holding feature of controller is in use. . . . . **6**
- C. Sender Subgroup LL-Relay Chain Alarms:** This test checks that the minor alarm is operated when a continuity failure occurs in sender subgroup LL-relay chain. . . . . **7**

**D. Continuity Failure and Double Connection:** This test determines that sender link and controller recognizes a sleeve continuity failure, a double connection condition, or false ground on release lead to sender. . . . . **7**

**E. False Start:** This test checks release of sender link and controller when a calling subscriber abandons a call before dial tone is received. . . . . **9**

**F. Selection of an Idle District in a Group—D0 through D9 Relay Chain:** This test checks the ability of sender link and controller to select idle district junctors, and to determine when two or more district junctors in a group of ten are available. . . . . **9**

**G. Regular and Reserve Sender Selection:** This test checks that sender link and controller prefers sender groups having two or more senders available, and selects sender groups with one sender available when preferred groups are not available. This test also checks that a sender link and controller selects a sender in the subgroup when at least one sender is idle. . . . . **11**

**H. Sender Link Availability:** This test checks that all sender links are available. . . . . **13**

**I. Sender Group Lockout:** This test checks that a sender group can serve only one sender link and controller at a time. . . . . **14**

**J. Traffic Release:** This test checks that the sender link and controller dismisses the line link and controller,

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<b>K. Traffic Release Control:</b> This test checks traffic release control feature which releases the sender link and controller when all senders in any subgroup are busy, or when any number up to 15 sender subgroups are busy, and when two or more sender link and controllers have timed for 0.5 to 1.0 seconds without completing sender selection. . . . .	15
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<b>R. Trouble Indicator Indications:</b> This test checks the continuity of trouble recording leads from sender link and controller-to-controller trouble indicator, and checks that associated trouble indicator lamps light. Tests for offices equipped with AMA equipment are provided. . . . .	24
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<b>1.04</b> Tests O, P, and Q apply only to offices equipped with AMA equipment.	
<b>1.05</b> Consult office records for following information:	
(a) Tests C and I—Determine order of appearance of sender groups in LL- relay chains.	
(b) Test K—Determine if traffic release control is triggered by GGB and TTGB relays or by traffic register circuit load register. Determine number of busy sender groups required to operate load register.	
(c) Test T—Determine how sender preference chains are split and order of preference. Determine which line link verticals are of rotary dial, TOUCH-TONE, or dial tone first class.	
<b>1.06</b> Perform Tests A, B, D, E, F, G, J, K, M, R, and T using both regular and emergency controllers.	

**1.07** Local instructions should be followed with reference to recording LD register operations when performing Tests C, G, I, and K.

**1.08** *Lettered Steps:* A letter a, b, c, etc, added to a step number in Part 3 or 4 of this section indicates an action which may or may not be required depending on local conditions. The condition under which a 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** Apparatus required for each test is shown in Table A. Details for each item are indicated by a paragraph number shown in parentheses. Equivalent substitutions may be made when required.

**2.02** 1011G handset (dial hand test set) equipped with a 2W38A cord (or replaced 1011D handset, dial hand test set).

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

**2.04** P3U cord, 7 feet long, equipped with one 310 plug and one 351A plug (3P27A cord).

**2.05** P3E cord, 6 feet long, equipped with two 310 plugs (3P6D cord).

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

**2.07** 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 tool, and one 419A tool.

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

**2.09** Incoming trunk circuit, line verification test (SD-25611-01).

TABLE A

APPARATUS	TESTS																			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
322A plug	1	1		1			√		1		√				1			1		
349A plug (298A)	√	√	√	√	√	√			√	√			√	√	√	√	√	√		√
Stopwatch KS-3008	1	1		1	1					1	1	1								
Handset (dial hand test set) (2.02)							1	1		1	1					1				
Head telephone set				2	2		2		2		2				2					1
Test receiver (2.03)									1				1							
Patching cord (2.04)							1	1		1						1				1
Patching cord (2.05)																1				
Test cord (2.06)				2																
Testing cord (2.07)					1				1					1*	1			1	1	
Test circuit																1				

√Indicates as required.

\*Two testing cords are required if equipped with AMA equipment.

3. PREPARATION

<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
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Tests A, B, and D

- 1a If equipped with controller trouble indicator—  
Insert 322A plug into TIB- jack associated with sender link frame under test.
- 2b If testing emergency controller—  
Insert 322A plug into TIB- jack associated with emergency controller.

Tests A, B, D, E, F, G, J, K, M, R, and T

- 3b If testing emergency controller—  
At sender link frame under test—  
Disconnect regular controller and connect emergency controller.

Tests A through F, K, M, O, and R

- 4 At sender link frame under test—  
Insert 349A plugs into all MB jacks.

STEP	ACTION	VERIFICATION
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**Tests B and D**

- |   |  |  |
|---|--|--|
| 5 | At sender link frame under test—<br>Insert 349A plug into HD jack. |  |
|---|--|--|

**Tests D, G, H, J, K, and T**

- |   |  |  |
|---|--|--|
| 6 | At main distributing frame—<br>Cross-connect T, R, S terminals of common B jacks associated with sender link frames to corresponding common B jack terminals associated with line link frames. |  |
|---|--|--|

**Tests D, G, J, K, and T**

- |   |  |  |
|---|--|--|
| 7 | At a line link frame preferring the sender link frame under test—<br>Patch a spare line vertical (rotary dial class) to common B jack on miscellaneous jack strip with 3P27A cord. |  |
|---|--|--|

**4. METHOD**

STEP	ACTION	VERIFICATION
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**A. Minor Time Alarm**

- |    |   |  |
|----|---|--|
| 5  | At sender link under test—<br>Block operated SS, GP0 relays in the order given, start timing. | After 2.0 to 2.5 seconds—<br>White aisle pilot lamp lighted.<br>AL lamp flashes.<br>Minor alarm sounds.<br>At controller trouble indicator or sender make-busy frame—<br>LA- lamp lighted. |
| 6  | Momentarily operate AR key.   | Minor alarm silenced.<br>At sender link under test—<br>White aisle pilot lamp extinguished.<br>At floor alarm cabinet—<br>Guard lamp lighted.  |
| 7  | Remove blocking tool from GP0 relay.  | Restores circuit to normal.<br>AL lamp extinguished.<br>At floor alarm cabinet—<br>Guard lamp extinguished.  |
| 8  | Block operated GP0 relay.   |  |
| 9  | Recheck timing.   | Same as Step 5.  |
| 10 | Block operated WA relay.  |  |

STEP	ACTION	VERIFICATION
11	Remove blocking tool from GP0 relay.	ON1 relay remains operated.
12	Remove plugs from MB jacks.	All DP relays remain operated.
13	Replace plugs into MB jacks.	
14	Remove blocking tool from WA relay.	ON1 relay released.
15	Momentarily operate GP1 to GP4 relays, one at a time.	TS relay operated each time a GP relay operated.
16	Remove blocking tool from SS relay.	At controller trouble indicator or sender make-busy frames— LA- lamp extinguished.
17	Remove plugs from MB jacks.	
18a	If equipped with controller trouble indicator— At controller trouble indicator frame— Remove plug from TIB- jack.	
19b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	

**B. Major Time Alarm**

6	At sender link frame under test— Block operated SS and highest numbered GP- relay used in the order given, start timing.	After 2.0 to 2.5 seconds— White aisle pilot lamp lighted. AL lamp flashes. Major alarm sounds.
7	Remove blocking tool from GP- relay.	GP- relay remains operated.
8	Momentarily operate the next lower numbered GP- relay used.	Lower numbered GP- relay locks and higher numbered GP- relay released.
9	Repeat Step 8 for remaining GP- relays.	GP0 relay remains operated.
10	Remove plug from HD jack.	GP0 relay released. Major alarm silenced. Minor alarm sounds. At sender link frame under test— White aisle pilot lamp remains lighted.
11	Remove blocking tool from SS relay.	
12	Momentarily operate AR key.	Minor alarm silenced. At sender link frame under test— White aisle pilot lamp extinguished.
13	Remove plugs from MB jacks.	

STEP	ACTION	VERIFICATION
14b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
15a	If equipped with controller trouble indicator— At controller trouble indicator frame— Remove plug from TIB- jack.	
<b>C. Sender Group LL- Relay Chain Alarms</b>		
5	At sender link frame having first appearance of sender subgroup 0— Insulate 3B contact of associated LL- relay.	Associated GB- relay operated. At sender make-busy frame— CA lamp and associated GB- lamps lighted. Minor alarm sounds.
6	Remove insulator from LL- relay.	GB- relay released. GM-, CA lamps extinguished. Minor alarm silenced.
7	Repeat Steps 5, 6 substituting next higher numbered subgroup, until all sender subgroups have been tested.	
8	Remove plugs from MB jacks.	
<b>D. Continuity Failure and Double Connection</b>		
8	At sender link frame under test— Block nonoperated SL relay.	
9	Remove plugs from MB jacks.	
10	At miscellaenous jack strip— Insert handset into B jack and originate a call, start timing.  <i>Note:</i> It may be necessary to originate a second call since the preference of the line link frame for the sender link frame alternates between calls.	At sender link frame under test— Sender link and controller is seized.  After 2.0 to 2.5 seconds— AL lamp flashes. CF lamp flashes. Major alarm sounds.
11	Insert make-busy plugs into MB jacks.	
12	At sender link frame under test— Remove blocking tool from SL relay.	
13	Block operated SL relay.	CF lamp extinguished. DC lamp lighted.
14	Remove blocking tool from SL relay.	
15	Remove plug from HD jack.	

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STEP	ACTION	VERIFICATION
16	Momentarily operate AR key.	Major alarm silenced. At sender link under test— AL, DC lamps extinguished.
17	At miscellaneous jack strip— Disconnect handset.	
18	At sender link frame under test— Insert 349A plug into HD jack.	
19	Block nonoperated AL relay and block operated GB3, GB4, GB8, and GB9 relays.	
20	At primary switch associated with district junctor to be used for test call— Connect ground to sleeve terminal on horizontal 8, if this link is idle, using 1W13B cord.  <i>Note:</i> Sleeve terminal is contact 0 on A link.	
21	Manually operate primary switch A select magent to horizontal 8.	
22	Remove plugs from MB jacks.	
23	At miscellaneous jack strip— Originate call. (See Note, Step 10.)	
24	Insert make-busy plugs into MB jacks.	
25	At sender link frame under test— Release primary switch A select magnet after hold magnet operates.	DC relay does not operate. DC lamp lighted.
26	Disconnect ground from sleeve terminal at primary switch A.	DC relay operated. DC lamp remains lighted.
27	Connect ground to teminal 35 (REL) on terminal strip for C relay with 1W13B cord.	
28	Block GP- relay that is operated so that it will not release.	
29	Remove plug from HD jack.	DR relay not operated.
30	Disconnect ground from terminal 35 on terminal strip.	DR relay operated.
31	Remove blocking tools from AL, GP-, GB3, GB4, GB8 and GB9 relays.	

STEP	ACTION	VERIFICATION
32	Remove plugs from MB jacks.	
33b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
34a	If equipped with controller trouble indicator— At controller trouble indicator— Remove plug from TIB- jack.	
35	At line link frame— Remove patching cord.	

**E. False Start**

5	At sender link frame under test— Insulate contacts 1B, 3T of DR relay.	
6	Connect battery to contact 3B of TL relay, using 1W13B cord.	
7	At district junctor test frame— Select an idle district junctor associated with sender link frame under test. Originate a call as outlined in Section 216-230-501 for a "Local Charge Test", <i>start timing</i> .	At sender link frame under test— After 1.5 to 2.0 seconds— FS, AB relays operated. Controller alarm does not operate. Controller restored to normal.
8	Restore district junctor test frame to normal.	
9	At sender link frame under test— Remove insulators from DR relay and battery from TL relay.	
10	Remove plugs from MB jacks.	
11b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	

**F. Selection of an Idle District in a Group D0  
through D9 Chain**

5	At sender link frame under test— Block nonoperated W relay.
6	At the district junctor frame associated with sender link under test— Insert 349A plugs into MB- jacks on district junctors 1 through 9 for 0 district junctor group.

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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
7	At sender link frame under test— Block operated SS, GP0, BA0 relays in the order given.	TM relay does not operate. D0 relay operated.
8	Remove blocking tools from GP0, BA0 relays.	
9	At district junctor frame— Remove plug from MB- jack of district junctor 1 and insert into MB- jack for district junctor 0.	
10	Repeat Steps 7 through 9, substituting next higher numbered district junctor and D- relay until all D relays have been tested.	D1 through D9 relays associated with idle district junctor operated.
11	After D9 relay operated— Remove plug from MB- jack on district junctor 8. (District juncctors 0 through 7 are still made busy.)	
12	At sender link frame under test— Block operated GP0, BA0 relays.	TM, D8, D9 relays operated.
13	Remove blocking tools from GP0, BA0 relays.	
14	At district junctor frame— Shift plugs from district juncctors 6, 7 to 8, 9.	
15	At sender link frame under test— Block operated GP0, BA0 relays.	TM, D6, D7 relays operated.
16	Repeat Steps 13, 14, 15 substituting next lower numbered pair of district juncctors and D- relays until all D relays have been tested.	
17	Remove blocking tools from GP0, BA0, W, and SS relays.	
18b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
19	Remove plugs from MB jacks.	
20	At district junctor frame— Remove plugs from MB jacks.	

STEP	ACTION	VERIFICATION
<b>G. Regular and Reserve Sender Selection</b>		
<b>Controllers Arranged for Reserve Sender Selection</b>		
8	At sender link frame under test— Block operated all but one of GB0 to GB9 relays.	
9	Block nonoperated W relay.	
10	Block nonoperated R1, R2 relays.	
11	At sender make-busy frame— Insert 322A plugs into all but two sender MB-jacks of sender subgroup associated with unblocked GB- relay of Step 8.	
12	At sender link frame under test— Insert handset into B jack and originate call.	SG- relay associated with unblocked GB- relay operated. Dial tone heard.
	<i>Note:</i> If may be necessary to originate a second call since the preference of line link for sender link frame alternates between calls.	
13	Disconnect handset.	
14	At sender make-busy frame— Insert 322A plug into one of two remaining MB- jacks.	
15	At sender link frame under test— Attempt to originate a call. (See Note, Step 12.)	SG- relays do not operate.
16	Disconnect handset.	
17	Remove blocking tools from R1, R2 relays.	
18	Originate a call.	R1, R2 relays operated. SG- relay associated with unblocked GB- relay operated. Dial tone heard.
19	Disconnect handset.	
20	At sender make-busy frame— Remove plugs from MB- jacks of senders made busy in Steps 11, 14.	

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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
21	At sender link frame under test— Block operated GB- relay associated with sender subgroup just tested.	
22	Remove blocking tool from one of GB- relays in sender subgroup that has not been tested.	
23	At sender link and sender make-busy frames— Repeat Steps 10 through 22 shifting plugs each time until all GB- relays and associated sender subgroups have been tested.	
24	Remove blocking tools from GB-, W relays.	
25b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
26	At line link frame— Remove patching cord.	
<b>Controllers Not Arranged for Reserve Sender Selection</b>		
27	At sender link frame under test— Block operated all but one of GB- relays.	
28	Block nonoperated W relay.	
29	At sender make-busy frame— Make busy all senders except one in sender subgroup associated with unblocked GB- relay.	
30	At sender link frame under test— Insert handset into B jack and originate a call.	SG- and associated unblocked GB- relay operated. Dial tone heard.
	<i>Note:</i> It may be necessary to originate a second call since the preference of line link frames for the sender link frame alternates between calls.	
31	Disconnect handset.	
32	At sender link and sender make-busy frames— Repeat Steps 27 through 31, shifting blocking tools, make-busy plugs, each time until all GB relays have been tested.	At sender link frame under test— SG- and associated unblocked GB- relay operated. Dial tone heard.
33	At sender link frame under test— Remove blocking tools from W and GB- relays.	

STEP	ACTION	VERIFICATION
34b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
35	At sender make-busy frame— Remove plugs from senders made busy in Steps 29, 32.	
36	At line link frame— Remove patching cord.	

#### H. Sender Link Availability

7	At line link frame that prefers group 0 of district junctors— Patch a spare line vertical to B jack on miscellaneous jack strip, using 3P27A cord.	
8	At sender link frame under test— Block operated GB1 through GB9 relays.	
9	Insert handset into B jack on miscellaneous jack strip and originate a call.  <i>Note:</i> It may be necessary to originate a second call since preference of line link for sender link alternates between calls.	Dial tone heard. Call is served by sender link frame under test, using link 0.
10	Disconnect handset.	
11	Remove blocking tool from GB1 relay.	
12	Block operated GB0 relay.	
13	Repeat Steps 9 through 12 shifting blocking tool each time until all links associated with group of district junctors under test are used.	
14	Repeat Steps 7 through 13 using line link frames that prefer the other groups of district junctors of sender link frame under test, until all links have been tested.	
15	— Remove handset.	
16	Remove blocking tools from GB- relays.	
17	At line link frame— Remove patching cord.	

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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
<b>I. Sender Group Lockout</b>		
1	At sender make-busy frame— Insert 322A plug into GB- jack of lowest numbered subgroup of senders.	Associated GB- lamp lighted.
2	At sender link associated with last LL- relay in chain of sender subgroup made busy— Insert 349A plugs into all MB- jacks.	
3	Block operated associated SG- relay.	
4	Block nonoperated W relay.	
5	Connect battery to contact 4B of SG- relay blocked operated, using 1W13B cord.	Associated LL-, SS relays operated.
6	Insulate contact 2B of operated LL- relay.	
7	Test contact 2T for absence of ground on each lower numbered LL- relay in chain of sender group made busy, using test receiver.	Each 2T contact tests ungrounded.
8	Operate momentarily each lower numbered LL- relay in chain of sender subgroup made busy.	LL- relay operated in Step 5 released each time a lower numbered LL- relay is momentarily operated. SS relay associated with a lower numbered LL- relay operated.
9	Remove battery from contact 4B of SG- relay.	
10	Remove blocking tools from SG- and W relays.	
11	Remove insulator from contact 2B of operated LL- relay.	
12	Remove plugs from MB jacks.	
13	At sender make-busy frame— Remove plug from GB- jack and insert into GB- jack of next higher numbered subgroup of senders.	
14	At sender link and sender make-busy frame— Repeat Steps 2 through 13 until LL- relay chains of all the equipped sender groups have been tested.	
15	At sender make-busy frame— Remove plug from GB- jack.	

STEP	ACTION	VERIFICATION
<b>J. Traffic Release</b>		
8	At line link frame— Insert 349A plugs into SS0 through SS9 jacks of district junctor groups not associated with sender link frame under test.	
9	At sender link frame under test— Block nonoperated SG0 through SG9 relays.	
10	Insert handset into B jack on miscellaneous jack strip and originate a call.	Repeated seizure and release of sender link. LL0 through LL9 relays do not operate.
11	Remove blocking tool from one of SG- relays before line link times out (approximately 6 seconds).	Dial tone heard.
12	Disconnect handset.	
13	Remove blocking tools from all SG- relays.	
14b	If testing emergency controller— Disconnect emergency controller.	
15	At line link frame— Remove plugs from SS- jacks and remove patching cord.	
<b>K. Traffic Release Control</b>		
8	At sender link frame under test— Block nonoperated SG0 through SG9 and SS1 relays.	
9c	<p>◆ If control is triggered by SGB and TTGB relays—</p> <p>At sender make-busy frame— Insert 332A plug into GB- jack of a sender subgroup available to sender link frame under test.</p>	<p>At miscellaneous frame— Sender link traffic control relays GS, GS1 operated. If provided, GS2 relay operated.</p> <p>At sender make-busy frame— LI lamp lighted.</p>
10d	<p>If control is triggered by traffic register circuit—</p> <p>At sender make-busy frame— Insert 332A plugs into required number of GB- jacks to operate load register.</p>	Same as Step 9c.◆
11	Remove plugs from MB jacks.	
12	At sender link frame under test— Insert handset into B jack on miscellaneous jack strip and originate a call.	TR, OS relays operated. Repeated seizure and release of sender link.

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STEP	ACTION	VERIFICATION
13	Insert make-busy plugs into MB jacks.	
14	Disconnect handset.	
15	Remove blocking tools from SG0, SS1 relays.	
16	Insulate contacts 4B, 5B of LL0 relay.	
17	Remove plugs from MB jacks.	
18	Originate a second call.	ZA relay operated. SS1 relay operated. OC relay does not operate. Repeated seizure and release of sender link.
19	Insert make-busy plugs into MB jacks.	
20	Disconnect handset.	
21c	If control is triggered by SGB and TTGB relays— Remove plug from GB- jack of Step 9c.	In approximately 30 seconds— GS and GS1 relays released. If provided, GS2 relay released. At sender make-busy frame— LI lamp extinguished.
22d	If control is triggered by traffic register circuit— At sender make-busy frame— Remove plugs from GB- jacks.	Same as Step 21c.
23	At sender link frame under test— Remove blocking tools from SG- relay.	
24	Remove insulator from contacts of LL0 relay.	
25c	If control is triggered by SGB and TTGB relays— At sender make-busy frame— Insert 322A plug into GB- jack of a sender subgroup.	Same as Step 9c.
26c	Remove plug from GB- jack.	
27c	Repeat Steps 25c and 26c for each sender subgroup.	Approximately 30 seconds after plug is removed from last GB jack— GS and GS1 relays released. If provided, GS2 relay released. At sender make-busy frame— LI lamp extinguished.

STEP	ACTION	VERIFICATION
28	At sender link frame under test— Block operated TA relays in first two sender link controllers at same time.	SLT relay operated. At sender make-busy frame— LI lamp lighted.
29	Remove blocking tools from both TA relays.	In approximately 30 seconds— LI lamp extinguished.
30	Repeat Steps 28, 29 at remaining pairs of controllers.	SLT relay operated when two TA relays operated and released when both release. LI lamp extinguished approximately 30 seconds after last pair of controllers tested.
31	Momentarily operate TA relay of each controller.	SLT relay not operated.
32	Block nonoperated TA relay of each controller.	
33	Block operated ZA relays in first two controllers.	SLT relay operated. At sender make-busy frame— LI lamp lighted.
34	Remove blocking tools from both ZA relays.	In approximately 30 seconds— LI lamp extinguished.
35	Repeat Steps 33, 34 at remaining pairs of controllers.	SLT relay operated when two ZA relays operated, released when both release. Approximately 30 seconds after last pair of controllers tested— LI lamp extinguished.
36	Momentarily operate ZA relay of each controller.	SLT relay not operated.
37	Remove blocking tools from TA relays.	
38b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
39	Remove plugs from MB jacks.	
40	At link link frame— Remove patching cord.	
<b>L. Calls Waiting Alarm (Dialing District Junctors)</b>		
1	At sender link frame under test— Make busy a group of dialing district junctors by insulating contact 2T of associated DP-relay.	
2	Block operated CW relay.	DPA relay operated. DP-relays, associated with groups of nondialing

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STEP	ACTION	VERIFICATION
		district junctors, operated. Within 6 seconds— CWA relay operated. Within 6 seconds after CWA operated— CWB operated. Within 5 to 12 seconds— Major alarm sounds. At sender link frame under test— CW lamp lighted. At sender make-busy or controller trouble indicator frame— CW lamp, associated with group of dialing district junctors, lighted.
3	Remove blocking tool from CW relay.	
4	Momentarily operate R key.	Major alarm silenced. CW lamps extinguished.
5	Block operated DP- relay selected in Step 1.	Within 5 to 12 seconds— CWB relay operated. CWA relay operated. Major alarm sounds.
6	Remove blocking tool and insulator from DP- relay.	
7	Momentarily operate R key.	Major alarm silenced.
<b>M. Common Hold Jack Feature</b>		
5	At sender make-busy or controller trouble indicator frame— Check for absence of ground on contacts 2, 4, 6, 8 top and 2, 4, 6,8, 10, 12 bottom of A1 through A4 relays, using test receiver.	No contacts grounded.
6	Check for absence of ground on contacts 2, 4 top of A relay.	No contacts grounded.
7	Insert 349A plug into H jack associated with common hold jack circuit.	At sender link frame under test— HL relay operated.
8	At sender link frame under test— Insulate contact 3B of TS relay.	HL relay remains operated.
9c	If office is equipped with AMA— Connect ground to contact 6T of TA relay, using 1W13B cord.	
10	Momentarily connect ground to contact 3T of TB relay, using a second 1W13B cord.	Major alarm sounds. At sender link frame under test—

STEP	ACTION	VERIFICATION
		Frame and aisle pilot alarm lamps lighted. HD relay operated. HD lamp associated with common hold jack lighted.
11	Momentarily operate HR key.	Major alarm silenced. At sender link frame under test— Frame, aisle pilot alarm lamps extinguished.
12	At sender make-busy or controller trouble indicator frame— Remove plug from H jack.	HD lamp extinguished.
13	Momentarily operate HT key.	
14	At sender link frame— Remove testing cord from TA relay.	
15	Remove insulator from TS relay.	
16	Remove plugs from MB- jacks.	
17d	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
<b>N. Exercise of Emergency Controller</b>		
1	At the emergency controller— Determine that it is not in use.	At sender link frame— EF and EM- lamps are not lighted. If equipped with controller trouble indicator— No EC- lamps lighted.
2	At sender link frame under test— Insert 349A plugs into all MB jacks.	
3c	If equipped with ET jack on sender link frame— Insert 349A plug into ET jack.	At sender link frame under test— EF and EM- lamps lighted. At controller trouble indicator frame— EC- lamp lighted.
4d	If equipped with transfer switches— Turn switches A, B to OFF position and turn switches A-EM, B-EM to ON position.	Same as Step 3c.
5	Remove plugs from MB jacks.	At emergency controller frame— Emergency controller handles calls satisfactorily.
6	Reinsert plugs into MB jacks.	
7d	If equipped with transfer switches— Turn switches A-EM, B-EM to OFF position	At sender link frame under test— EF, EM- lamps extinguished.

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STEP	ACTION	VERIFICATION
	and turn switches A, B, to ON position.	At controller indicator frame— EC- lamp extinguished.
8c	If equipped with ET jack on sender link frame— Remove plug.	Same as Step 7d.
9	Remove plugs from MB jacks.	Sender link and regular controller handle calls satisfactorily.
<b>O. False Continuity of Sender Group Connector Relays</b>		
5	At the call identity indexer frame on which the sender group connector relays associated with the sender link frame under test are located— Apply ground to operating springs and check for absence of ground on corresponding stationary springs on sender subgroup relays GR0 through GR4, using 1W13B cord and test receiver.  <i>Note:</i> On even numbered sender link frames check springs 1, 10 through 14, 20 through 24, 30 through 34, 40 through 44, and 50 through 54.  On odd numbered sender link frames check springs 6, 15 through 19, 25 through 29, 35 through 39, 45 through 49, 55 through 59.	
6	Remove 1W13B cord, test receiver.	Each stationary spring tests ungrounded.
7	At sender make-busy frame— Insert 322A plug into GB- jack of sender subgroup associated with CR0 relay on sender link frame under test.	
8	At call identity indexer frame on which CR0 through CR9 relays associated with sender link frame under test are located— Connect ground to operating springs and check for absence of ground on corresponding stationary springs on CR0 relay shown in Note, Step 5.	Each stationary spring tests ungrounded.
9	At sender make-busy frame— Remove plug from GB- jack on sender subgroup made busy.	
10	Insert 322A plug into GB- jack on sender subgroup connected to CR1 relay.	

STEP	ACTION	VERIFICATION
11	Repeat Step 8 for CR1 relay.	
12	Repeat Steps 9 through 11 for CR2 through CR9 relays.	Each stationary spring tests ungrounded.
13	Remove plugs from MB jacks.	
14	Remove testing cords.	

**P. Transposition of Line Identification Leads**

- 1 At main distributing frame—  
Cross-connect T, R, S terminals of common B jack associated with sender link frames to T, R, S terminals of common B jack associated with miscellaneous frames.
- 2 At the miscellaneous frame on which the verification trunk serving the office line links selected is located—  
Patch VC jack of verification trunk to B jack of miscellaneous frame, using 3P6D cord.
- 3 Operate A0 key.
- 4a If line vertical selected for test is associated with a non-AMA line—  
Operate the NAL key.
- 5 At sender link frame under test—  
Block operated all but lowest numbered GB-relay.
- 6 At one of line link frames associated with columns to be used for test—  
Insert 349A plugs into all SS- jacks except pair associated with district junctor group of sender link frame under test.
- 7 At line link frame selected for test—  
Insert 310 plug of 3P27A cord into T jack on miscellaneous jack strip and 351A plug into idle line vertical jack.  
  
*Note:* Record the column, switch, and vertical file numbers of each line vertical used for this test.
- 8 Insert handset into B jack.

Dial tone heard.

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STEP	ACTION	VERIFICATION
9	Dial office code assigned to verification trunk serving office of line link frame selected and number assigned to busy test line.	Busy tone heard.
10	Remove 351A plug from line vertical.	
11	Originate calls from remaining columns selected for this test to complete check of column hundreds, tens, units digits using line verification trunk circuit.  <i>Note:</i> When calls are to be originated from a succeeding line link frame, remove plugs from SS- jacks on preceding frame and insert plugs into required SS- jacks on succeeding line link frame as outlined in Step 6.	Busy tone heard upon completion of each call.
12	Originate calls, using line verification trunk, from a line vertical in each horizontal group 0, 1, 2 at line link frame associated with last column used for this test.  <i>Note:</i> Distribute these calls to originate a call from each vertical file number 0, 1, 2.	Busy tone heard upon completion of each call.
13	At sender link frame under test— Remove blocking tool from lowest numbered GB- relay.	
14	Block operated next higher numbered GB- relay.	
15	Repeat test outlined in Steps 7 through 14 until all GB- relays and associated sender subgroups have been tested.	
16	At line link frame— Remove plugs from SS- jacks.	
17	Disconnect handset.	
18	Remove patching cord.	
19	At sender link frame under test— Remove blocking tools from GB relays.	
20	At miscellaneous frame— Remove patching cord and restore keys to normal.	
21	At the printer table of the maintenance recorder—	Record of each test call is obtained as shown in Table B.

**STEP**

**ACTION**

**VERIFICATION**

Momentarily operate P key.

**Note:** Check that printed line equipment number agrees with line equipment of each line recorded.

**Q. Code Connector Leads**

- 1 At district junctor test frame—  
Select any idle district junctor associated with sender link frame under test.
- 2 Operate TDN key.
- 3 Originate a call as described in Section 216-230-501 for a "Local Charge Test".
- 4 At transverter trouble indicator—  
Momentarily operate RL key.
- 5 At district junctor test frame—  
Restore test frame to normal.

At transverter trouble indicator—  
Lamps 1, 7 lighted in each of the groups for column hundreds, tens, units, switch and vertical file, indicating 88888 for line vertical number.

Transverter trouble indicator restored to normal.

**Sender Link Frame Equipped with Dialing District Junctors**

- 6 At call identity indexer frame—  
Block operated associated DT- relay.

**TABLE B**

12 Entry Index	21 TH H T U	Called Number	25 Number Series	28 Tens) Class of	29 Units) Service	31 Off Code A Digit	36 Off	TH H T U	Directory Number	40 U	43 Test Entry	45 Calling Line Entry	54 Col H	Line	Col T	Equipment	Col U	Number	SW	VF	58 VF	(Teletype Spaces Not Printed)	
2	9	9	7	0	0	X	X	*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X=Numerals 0 through 9  
 \*=Numerals 2 through 9  
 Z=1 for ring party  
 2 for tip party

STEP	ACTION	VERIFICATION
7	Repeat Steps 1 through 5.	At transverter trouble indicator— Lamps 2, 7 lighted in the group for column hundred and lamps 1, 7 lighted in the group for column tens, column units, switch and vertical file, indicating 98888 for line vertical number.
8	At call identity indexer frame— Remove blocking tool from DT relay.	
<b>R. Trouble Indicator Indications</b>		
5	At sender link frame under test and controller trouble indicator frame or between controller trouble indicator and call identity frame— Establish a talking connection by inserting plug of head telephone set into TEL jacks as required.	
6	At sender link frame under test— Block nonoperated AL, TB, TIB relays.	
7	Insulate contact 7T of TI relay and contact 11B of CID relay.	
8	Block operated TA, WA relays.	TI, TIC, CIA through CID relays operated.
9	At controller trouble indicator frame— Block nonoperated IRL relay and block operated BC, GC1 relays.	H lamp lighted. SLF-, CRL- lamps, associated with sender link frame under test, lighted.
10	At sender link frame under test— Using 1W13B cord apply ground or battery to relays (see Table C).	At controller trouble indicator frame— Corresponding lamp or lamps lighted.
11	At sender make-busy frame— Insert 322A plug into GB- jack of highest numbered sender subgroup used in office.	
12	At miscellaneous frame on which sender selector circuit, associated with sender subgroup made busy, is located— Block operated SGC relay.	At controller trouble indicator frame— SGP- lamp, associated with sender subgroup made busy, lighted.
13	Apply ground to contact 4T of S0 through S9 relays, one at a time, using 1W13B cord.	At controller trouble indicator frame— Corresponding S- lamp lighted.
14	At miscellaneous frame— Remove blocking tool from SGC relay.	
15	At sender make-busy frame— Remove plug from GB- jack.	



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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
18d	Disconnect emergency controller and connect regular controller.	
19	At controller trouble indicator frame— Remove blocking tools from GC1, BC, IRL relays.	
<b>Test for AMA Equipped Offices</b>		
20	At controller trouble indicator frame— Block operated TS relay.	BC, BC1, GC, and GC1 relays operated.
21	At the call identity indexer frame on which the GR0 through GR4 relays, associated with the sender link frame under test, are located— Block operated CTI relay.	
22	At GR0 relay— Apply ground to operating springs associated with VF- and SW- register leads (see Table D), using 1W13B cord.	Lamps corresponding to lead under test lighted as shown in Table D.
23	At controller trouble indicator frame— Momentarily operate CET relay.	Register lamps extinguished.
24	Repeat Steps 22, 23 for C- leads.	
25	Remove blocking tool from CTI relay.	
26	At sender link frame under test— Remove plugs from MB jacks.	
27b	Disconnect emergency controller and connect regular controller.	
<b>5. False Sender Group Busy Alarm</b>		
1	At SB0 relay of lowest numbered rotary dial sender subgroup— Using 1W13B cord, connect ground to 6T contact of SB0 relay.  <i>Note:</i> SB0 relay must be normal.	At sender make-busy frame— CA lamp lighted.
2	Remove ground from SB0 relay.	CA lamp extinguished.
3	Repeat Steps 1 and 2 for all other rotary dial sender subgroups.	
4	At SB- relay associated with preferred sender of lowest numbered TOUCH-TONE or dial tone first sender subgroup—	Same as Step 1.

STEP

ACTION

VERIFICATION

TABLE D

LEAD UNDER TEST	CONNECT GROUND TO SPRINGS ON GRO RELAY		LAMPS LIGHTED CONTROLLER TROUBLE INDICATOR
	EVEN FRAME	ODD FRAME	
VF0	10	15	VF0
VF1	11	16	VF1
VF2	12	17	VF2
VF4	13	18	VF4
VF7	14	19	VF7
SW0	20	25	SW0
SW1	21	26	SW1
SW2	22	27	SW2
SW4	23	28	SW4
SW7	24	29	SW7
CU0	30	35	CU0
CU1	31	36	CU1
CU2	32	37	CU2
CU4	33	38	CU4
CU7	34	39	CU7
CT0	40	45	CT0
CT1	41	46	CT1
CT2	42	47	CT2
CT4	43	48	CT4
CT7	44	49	CT7
CH0	50	55	CH0
CH1	51	56	CH1
CH2	52	57	CH2
CH4	53	58	CH4
CH7	54	59	CH7

Using 1W13B cord, connect ground to 6T contact of SB- relay.

**Note:** SB- relay must be normal.

- 5 Remove ground from SB- relay. Same as Step 2.
- 6 Repeat Steps 4 and 5 for all other TOUCH-TONE or dial tone first sender subgroups.

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STEP	ACTION	VERIFICATION
<b>T. Sender Subgroup Preference—Subgroups Partially Converted for TOUCH-TONE or Dial Tone First Operation</b>		
9	At sender link frame under test— Block operated all but one GB- relay.	
10	Using handset, originate a call.  <i>Note:</i> It may be necessary to originate a second call since the preference of the line link frame for the sender link frame alternates between calls.	SG- relay associated with unblocked GB- relay operates. Preferred SB- relay (rotary dial class) operates and locks. Dial tone heard.
11	Disconnect call.	Preferred SB- relay remains operated.
12	Repeat Step 10.	Next SB- relay in preference chain operates and locks.
13	Repeat Step 11.	Next SB- relay in preference chain remains operated.
14	Repeat Steps 10 and 11 until last SB- relay in preference chain operates and locks.	When last SB- relay in preference chain operates, all others release. When last call is disconnected, last SB- relay releases.
15	At line link frame, remove patching cord from rotary dial class line vertical and reconnect to TOUCH-TONE or dial tone first class line vertical.	
16	Repeat Steps 10 through 14 observing SB-relays associated with TOUCH-TONE or dial tone first senders.	
17	At line link frame— Remove patching cord.	
18	At sender link frame— Remove handset from B jack.	
19b	If testing emergency controller— Disconnect emergency controller and connect regular controller.	
20	Remove blocking tools from GB- relays.◀	