

SAGE DATA TRANSMISSION SYSTEMS — PRIVATE SERVICE SYSTEMS
AIR-GROUND VOICE COMMUNICATION SYSTEM
COMMON USER GROUP EQUIPMENT
LINK AND CONTROLLER
TESTS

1. GENERAL

1.01 This section describes a method of testing the link and controller circuit for the common user group equipment of the air-ground voice communication system. In general, these tests are made using the automatic test circuit and trouble indicator.

1.02 The tests covered are:

A. Channel-originated Test — Relay Operation Prior to Hold Magnet Operation:

This test checks the operating paths for associated channel group, group connector and group end relays, select magnet selection, controller connector relays, and other general function relays which operate prior to the hold magnet operation.

B. Trunk-originated Test — Relay Operation Prior to Hold Magnet Operation:

This test checks the operating paths for associated trunk group, group connector and group end relays, the trunk testing and connector relays, and other general function relays which operate prior to hold magnet operation.

C. Start Lead Guard Circuit: This test checks the operation of the guard lamp when a start lead is grounded.

D. Busy Level Checking Circuit: This test checks all operating paths of the busy level checking circuit.

E. Trunk Testing Relays — Channel-originated Test: This test checks the operating paths of all T- relays for a channel-originated call.

F. Translation Relays: This test checks the operating path of all translation relays using each trunk group.

G. Hold Magnet Operating and Checking Circuits: This test checks the relay which prepares and tests the hold magnet operating circuit and verifies the hold magnet operation.

H. Make-busy Circuit: These tests check the common group contacts and alarm controls associated with the controller make-busy circuit.

I. Preference Control: This test checks the operation of trunk and controller preference control relays.

J. Registers: This test checks the operating circuit of the controller registers.

K. Release Control: This test checks the operating and locking circuits which control circuit release.

L. Alarm Circuits: This test checks the operation of the control circuit major and minor alarms.

M. Glare (G) Relay Tests: This test checks the operating path of the controller G relay.

N. All-trunks-busy Register and Overload Relief Action (DC Only): This test checks the operation of the controller in conjunction with the trunk and channel alarm and control circuit for an all-trunks-busy condition.

O. Code Check Path Test: This test checks the ability of the controller to reject codes not meeting the two-out-of-five or the one-out-of-three requirement.

1.03 Tests C, I, M, and N may interfere with service. Suitable precautions should be taken to avoid excessive service reactions.

SECTION 314-556-501

- 1.04 Many of these tests will result in the operation of alarms and the maintenance personnel should be advised to disregard such alarms during the time these tests are in progress.
- 1.05 For these tests the first and second link controllers are referred to as controllers A and B, respectively.
- 1.06 All trouble indicator displays associated with test circuit operation are identified by an accompanying TCR lamp.
- 1.07 Where the automatic test circuit is used for conducting the tests, its start and advance may be remotely controlled by connecting the control cord to the RC jack of the frame under observation.
- 1.08 Reference to particular lamps means that only these lamps need be checked for that particular test. Other lamps may be present but are not involved in the test in progress.
- 1.09 Local instructions should be followed for recording and reporting any register operations caused by performing these tests.
- 1.10 Where tests of the spare channel are specified, the instructions apply where all regular service channels are in use, and no substitution of the spare for a service channel has been made.
- 1.11 **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 con-

dition 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 Automatic test circuit, J1G006 (SD-1G030).
- 2.02 Trouble indicator, J1G006 (SD-1G027).
- 2.03 No. 716E or 528 receiver attached to a No. 2W21A cord assembly, consisting of a W2AB cord, equipped with two No. 360A tools. Connected to the No. 360A tools are a No. 365 and a No. 411A tool.
- 2.04 No. 32A test set.
- 2.05 Blocking and insulating tools, as required. Use tools and apply, as covered in Section 069-020-801.
- 2.06 One No. 651A tool (relay contact connector holder for use on wire-spring relays equipped with a contact cover spring).
- 2.07 One No. 651C tool (relay contact connector holder for use on wire-spring relays not equipped with contact cover spring).
- 2.08 No. 893 cord, 6 feet long, equipped with two No. 360A tools (No. 1W13B cord), one KS-6278 connecting clip, and one No. 639A tool (relay contact connector) (for use in connecting ground to fixed contacts on wire-spring relays).

3. METHOD

STEP	ACTION	VERIFICATION
A. Channel-originated Test — Relay Operation Prior to Hold Magnet Operation		
1	Operate controller MBA key.	
2	In sequence block nonoperated controller GS relay, block operated controller COB relay, block nonoperated A controller HO relay.	
3	Set CHANNEL TENS, UNITS switches to 00, 0; TRUNK TENS, UNITS switches to 00, 0.	

STEP	ACTION	VERIFICATION
4	Operate test circuit CTA, ON keys.	
5	Operate test circuit ST key.	See Table A, A controller.
6	Operate test circuit RL key.	See Table A.
7	Continue operation of ST, RL keys until all relay operations per Table A are observed.	See Table A.
8	Operate CAT key.	
9	Operate trouble indicator RL key.	Trouble lamps restored.
10	Operate ST key.	See Table A. Start with channel 01 lamps.
11	Operate trouble indicator RL key.	
12	Operate CA key.	See Table A.
13	Continue operation and release of CA key until all idle channels are tested, or busy channels recorded and skipped.	See Table A.
14	Operate test circuit RL key when test circuit GE lamp lights to recycle test.	
15a	If busy channels were encountered — Test them on individual basis when idle by setting test circuit CHANNEL TENS, CHANNEL UNITS switches to channel to be tested.	CH lamp dark for busy channels.
16a	Restore test circuit CAT key.	
17a	Operate test circuit ST key.	See Table A.
18a	Operate test circuit RL key.	
19	To test test channels 00 and at DC (direction center) channel 29 — Set CHANNEL TENS, CHANNEL UNITS switches to corresponding positions.	
20	Restore test circuit CAT key.	
21	Operate test circuit ST key.	See Table A.
22	Operate test circuit RL key.	
23	To test spare channel — Operate test circuit CHANNEL TENS, CHANNEL UNITS switches to position 23.	
24	Operate test circuit TSC key.	
25	Operate test circuit ST key.	See Table A.
26	Operate test circuit RL key.	
27	In sequence remove blocking tools from COB relay, A controller HO relay.	

SECTION 314-556-501

STEP	ACTION	VERIFICATION
28	Restore controller MBA key, operate MBB key.	
29	In sequence block operated COA relay, block nonoperated B controller HO relay.	
30	Restore test circuit CTA, TSC keys.	
31	Operate test circuit CTB key.	
32	Repeat Steps 5 through 26 for B controller.	See Table A, B controller.
33	In sequence remove blocking tools from COA relay, B controller HO relay, GS relay.	
34	Restore controller MBB key.	
35	Operate controller RL key.	
36	Restore all test circuit keys.	
B. Trunk-originated Test — Relay Operation Prior to Hold Magnet Operation		
1	Operate controller MBA key.	
2	In sequence block nonoperated controller GS relay, block operated controller COB relay, block nonoperated A controller HO relay.	
3	Set test circuit CHANNEL TENS, CHANNEL UNITS switches to position 00, 0, set TRUNK TENS, TRUNK UNITS switches to first trunk to be tested.	
4	Operate TT key.	
5	In sequence operate test circuit CTA, TO, ON keys.	
6	Operate test circuit ST key.	See Table B.
7	Operate RL key.	
8	Repeat Steps 6, 7 as required for checking Table B relay operation.	
9	Operate trouble indicator RL key.	Display cleared.
10	Repeat Steps 6 through 9 for all desired trunks.	
11a	If busy trunks are encountered — They should be noted and tested later when available.	T lamp dark.
12	Set test circuit CHANNEL TENS, UNITS switches to position corresponding to any channel circuit from 10 to 19 [(CHANNEL TENS 1, CHANNEL UNITS). (0 to 9)].	
13	Operate test circuit RL key.	
14	Operate test circuit ST key.	Controller L10, SMB, BYB, SSB, CLB relays operate.

STEP	ACTION	VERIFICATION
15	Set test circuit CHANNEL TENS, UNITS switches to position corresponding to any channel circuit from 20 to 22 [(CHANNEL TENS 2, CHANNEL UNITS). (0 to 2)].	
16	Operate test circuit RL key.	
17	Operate test circuit ST key.	Controller L20, SMC, BYC, SSC, CLC relays operate.
18	Operate test circuit RL key.	
19	In sequence remove blocking tools from controller COB relay, A controller HO relay.	
20	Restore controller MBA key, operate MBB key.	
21	In sequence block operated controller COA relay, block nonoperated B controller HO relay.	
22	Restore test circuit CTA, operate CTB, keys.	
23	Repeat Steps 6 through 18 for B controller.	
24	In sequence remove blocking tools from COA relay, HO relay of B controller, GS relay.	
25	Restore controller MBB key.	
26	Operate controller RL key.	
27	Restore all test circuit keys.	

C. Start Lead Guard Circuit

1	Block nonoperated test circuit CST relay.	
2	Operate in sequence test circuit CTA, CAT, ON keys.	
3	Operate controller channel 1 CO key.	Major alarm sounds. Aisle pilot lights.
4	Operate controller AR key.	Major alarm, aisle pilot retired. Controller ACO lamp lights.
5	Operate test circuit ST key.	Controller G lamp lights.
6	Immediately (within test circuit time-out interval) after G lamp lights, operate and hold test circuit CA key.	Controller G lamp retired.
7	Operate controller channel 2 CO key, restore channel 1 CO key.	
8	Release test circuit CA key.	Controller G lamp lights.
9	Repeat Steps 6 through 8 for all channels.	

SECTION 314-556-501

STEP	ACTION	VERIFICATION
10a	If busy channels are encountered — Record channel involved. <i>Note:</i> Subsequent tests can be made on individual basis by setting test circuit CHANNEL TENS, CHANNEL UNITS switches to position of channel to be tested.	CH lamp dark.
11a	Restore test circuit CAT key.	
12a	Operate test circuit RL key.	
13a	Operate controller channel CO key for channel to be tested.	Major alarm sounds. Aisle pilot lights.
14a	Operate controller AR key.	Major alarm, aisle pilot retired. ACO lamp lights.
15a	Operate test circuit ST key.	Controller G lamp lights.
16a	Operate test circuit RL key immediately.	Controller G lamp retires.
17a	Restore controller channel CO key.	ACO lamp retired.
18	To test test channels 00 and at DC channel 29 — Set CHANNEL TENS, CHANNEL UNITS switches to corresponding position.	
19	Restore test circuit CAT key.	
20	Operate test circuit RL key.	
21	Operate controller channel CO key for channel to be tested.	Major alarm sounds. Aisle pilot lights.
22	Operate controller AR key.	Major alarm, aisle pilot retired. ACO lamp lights.
23	Operate test circuit ST key.	Controller G lamp lights.
24	Operate test circuit RL key immediately.	Controller G lamp retired.
25	Restore channel CO key.	ACO lamp retired.
26	Set test circuit CHANNEL TENS, CHANNEL UNITS switches to position 23.	
27	Operate test circuit TSC key.	
28	Operate test circuit RL key.	
29	Operate controller channel CO key for channel 23 (spare channel).	Major alarm sounds. Aisle pilot lights.
30	Operate controller AR key.	Major alarm, aisle pilot retired. Controller ACO lamp lights.
31	Operate test circuit ST key.	Controller G lamp lights.
32	Operate test circuit RL key.	Controller G lamp retired.
33	Restore channel 23 CO key.	ACO lamp retired.

STEP	ACTION	VERIFICATION
34	Set CHANNEL TENS, UNITS switches to 00, 0.	
35	Restore test circuit TSC key.	
36	Operate test circuit TAT, TO keys.	
37	Operate test circuit RL key.	
38	Operate controller trunk CO key for trunk.	Major alarm sounds.
39	Repeat Steps 4 through 17a for trunks.	GE lamp lighted after last trunk.
40	Restore controller trunk CO key.	ACO lamp retired.
41	Operate test circuit RL key.	GE lamp extinguished.
42	Restore test circuit keys.	
43	Remove blocking tool CST relay.	

D. Busy Level Checking Circuit

1	Operate controller MBA key.	
2	At radio site only — Block nonoperated test circuit CST relay.	
3	Block nonoperated controller GS relay, block operated A controller STK relay.	
4	Set TRUNK TENS, UNITS switches to a working trunk, for example 00.	
5	Operate test circuit CTA, CAT, TT, ON keys.	
6	Operate test circuit ST key.	Trouble indicator TIB lamp lights.
7	Operate trouble indicator LP key.	Trouble indicator BY lamp lights.
8	Operate trouble indicator RL key.	Trouble indicator lamps retired.
9	Operate test circuit CA key.	Trouble indicator TIB lamp lights.
10	Operate trouble indicator LP key.	Trouble indicator BY lamp lights.
11a	If trunk alarm lamp lights — At direction center only — Operate, restore associated ACO key.	Alarm lamp cleared.
12	Continue sequence of operation in Steps 8 through 11a until all idle channels are tested or busy channels skipped.	
13b	If busy channels were encountered — They should be recorded and tested later on individual basis by setting test circuit CHANNEL TENS, CHANNEL UNITS switches to channel to be tested.	CH lamp dark.
14b	Restore test circuit CAT key.	

SECTION 314-556-501

STEP	ACTION	VERIFICATION
15	At radio site only — Remove blocking tool from CST relay.	
16b	If busy channels were encountered — Operate test circuit RL key.	
17b	Operate test circuit ST key.	Trouble indicator TIB lamp lights.
18b	Operate trouble indicator LP key.	Trouble indicator BY lamp lights.
19b	Operate trouble indicator RL key.	BY lamp retired.
20b	Operate test circuit RL key.	
21	To test the test channels 00 and at DC channel 29 — Set CHANNEL TENS, CHANNEL UNITS switches to corresponding positions.	
22	Operate test circuit RL key.	
23	Operate test circuit ST key.	Trouble indicator TIB lamp lights.
24	Operate trouble indicator LP key.	Trouble indicator BY lamp lights.
25	Operate trouble indicator RL key.	BY lamp retired.
26	Operate test circuit RL key.	
27	To test spare channel — Operate test circuit CHANNEL TENS, CHANNEL UNITS switches to position 23.	
28	Operate test circuit TSC key.	
29	Operate test circuit RL key.	
30	Operate test circuit ST key.	Trouble indicator TIB lamp lights.
31	Operate trouble indicator LP key.	Trouble indicator BY lamp lights.
32	Operate trouble indicator RL key.	BY lamp retired.
33	Operate test circuit RL key.	
34	Remove blocking tools from STK relay of A controller.	
35	Restore controller MBA key, operate MBB key.	
36	Block operated STK relay of B controller.	
37	Restore test circuit CTA, TSC keys, oper- ate CTB, CAT keys.	
38	At radio site only — Block nonoperated test circuit CST relay.	
39	Operate test circuit RL key.	
40	Repeat Steps 6 through 33 for B controller.	
41	In sequence remove blocking tools from B controller STK relay, controller GS re- lay.	

STEP	ACTION	VERIFICATION
42	Restore TSC, TT, CTB keys.	
43	Release controller MBB, operate MBA keys.	
44	Operate test circuit CAT, CTA keys.	
45	Operate test circuit RL key.	
46	Operate test circuit ST key.	GE lamp lights.
47b	If busy channels were encountered — Operate test circuit CA key.	
48b	Continue operation, release of CA key until all idle channels are tested or busy channels skipped.	
49b	They should be recorded and tested when idle on individual basis by setting test circuit CHANNEL TENS, CHANNEL UNITS switches to channel to be tested.	
50b	Restore test circuit CAT key.	
51b	Operate test circuit ST key.	ET lamp lights.
52b	Operate test circuit RL key.	
53	To test test channels 00 and at DC channel 29 — Set test circuit CHANNEL TENS, CHANNEL UNITS switches to corresponding positions.	
54	Restore test circuit CAT key.	
55	Operate test circuit ST key.	ET lamp lights.
56	Operate test circuit RL key.	
57	Operate test circuit TSC key.	
58	To test spare channel — Operate CHANNEL TENS, CHANNEL UNITS switches to position 23.	
59	Operate test circuit ST key.	ET lamp lights.
60	Restore controller MBA key, operate MBB key.	
61	Restore test circuit CTA, operate CTB, CAT keys.	
62	Repeat Steps 46 through 59 for B controller.	
63	Restore all test circuit trouble indicator and controller keys.	
64	Operate controller RL key.	

STEP	ACTION	VERIFICATION
------	--------	--------------

E. Trunk Testing Relays — Channel-originated Test

- | | | |
|----|--|--------------|
| 1 | Operate controller MBA key. | |
| 2 | Set test circuit CHANNEL TENS, CHANNEL UNITS switches to position 00, 0. | |
| 3 | Set test circuit TRUNK TENS, TRUNK UNITS switches to position 00, 0. | |
| 4 | Operate test circuit CTA, ON keys. | |
| 5 | In sequence block nonoperated GS, HO relays of A controller. | |
| 6 | Operate trouble indicator LP key. | |
| 7 | Operate test circuit ST key. | See Table C. |
| 8 | Operate trouble indicator RL key. | |
| 9 | Advance TRUNK TENS, TRUNK UNITS switches to next trunk. | |
| 10 | Operate test circuit RL key. | |
| 11 | Continue operation in Steps 7 through 10 until all equipped trunks are tested. | |
| 12 | Remove blocking tool from HO relay of A controller. | |
| 13 | Restore controller MBA key, operate MBB key. | |
| 14 | Restore test circuit CTA key, operate CTB key. | |
| 15 | Block nonoperated HO relay of B controller. | |
| 16 | Repeat Steps 7 through 11 for B controller. | |
| 17 | In sequence remove blocking tools from HO relay of B controller and GS relay. | |
| 18 | Restore all test circuit and controller keys. | |
| 19 | Restore controller MBB key. | |
| 20 | Operate controller RL key. | |

F. Translation Relays

- | | | |
|---|---|--|
| 1 | Operate controller MBA key. | |
| 2 | In sequence block nonoperated controller GS relay, A controller HO relay. | |
| 3 | At radio site only —
Operate test circuit TT key. | |
| 4 | Operate test circuit CTA, TO, ON keys. | |

STEP	ACTION	VERIFICATION
5	Set test circuit TRUNK TENS, TRUNK UNITS switches to position of first equipped trunk in each trunk group (see Table D).	
6	For each setting of test circuit TRUNK TENS, TRUNK UNITS switches — Set CHANNEL TENS, CHANNEL UNITS switches to first position indicated in Table D.	
7	Operate test circuit SF key.	Trouble indicator TIB lamp lights.
8	Operate trouble indicator LP key.	See Table D.
9	Operate trouble indicator RL key.	Trouble indicator lamp retired.
10	Operate test circuit RL key.	
11	Repeat Steps 7 through 10 for each of TRUNK TENS, TRUNK UNITS, CHANNEL TENS, CHANNEL UNITS switch positions indicated in Table D; until each trunk group has been tested with each channel switch setting shown. Operate RL key after each change of switch settings.	
12	Remove blocking tool from HO relay of A controller.	
13	Restore controller MBA key, operate MBB key.	
14	Block nonoperated HO relay of B controller.	
15	Restore CTA, operate CTB key.	
16	Repeat Steps 5 through 11 for B controller.	
17	In sequence remove blocking tools from HO relay of B controller, controller GS relay.	
18	Restore all test circuit, controller, trouble indicator keys.	
19	Restore controller MBB key.	
20	Operate controller RL key.	

G. Hold Magnet Operating and Checking Circuits

- 1 Operate controller MBA key.
- 2 Set test circuit CHANNEL TENS, CHANNEL UNITS switches to 00.
- 3 In sequence block nonoperated controller GS relay, block operated STK relay.

SECTION 314-556-501

STEP	ACTION	VERIFICATION
4	Operate test circuit CTA, TAT, TT, TO, ON keys.	
5	Operate test circuit ST key.	Trouble indicator TIB lamp lights, unless trunk is busy.
6	Operate trouble indicator LP key.	Trouble indicator HO, HMK, HMT lamps light.
7	Operate trouble indicator RL key.	Trouble indicator lamps retired.
8	Operate test circuit CA key to advance test to next trunk.	Trouble indicator TIB lamp lights.
9	Operate trouble indicator LP key.	Trouble indicator HO, HMK, HMT lamps light.
10	Operate trouble indicator RL key.	Trouble indicator lamps retired.
11	Continue operation, release of test circuit CA key until all idle trunks are tested or busy trunks skipped.	
12a	If busy trunks are encountered — They should be recorded and tested when idle on individual basis by setting test circuit TRUNK TENS, TRUNK UNITS switches to trunk to be tested.	T lamp dark.
13a	Restore test circuit TAT key.	
14a	Operate test circuit RL key.	
15a	Operate test circuit ST key.	Trouble indicator TIB lamp lights.
16a	Operate trouble indicator LP key.	Trouble indicator HO, HMK, HMT lamps light.
17a	Operate trouble indicator RL key.	Trouble indicator lamps retired.
18a	Operate test circuit RL key.	
19	Remove blocking tool from A controller STK relay.	
20	Restore controller MBA key, operate MBB key.	
21	Block nonoperated B controller STK relay.	
22	Restore test circuit CTA key.	
23	Operate test circuit CTB, TAT keys.	
24	Repeat Steps 5 through 17a for B controller.	
25	In sequence remove blocking tools from B controller STK relay, controller GS relay.	
26	Restore all trouble indicator, test circuit, controller keys.	
27	Operate controller MBB key.	
28	Operate controller RL relay.	

STEP	ACTION	VERIFICATION
H. Make-busy Circuit		
1	Operate controller MBA key momentarily.	TRA lamp lighted.
2	In sequence operate controller RL, MBB keys.	TRA lamp dark. TRB lamp lighted.
3	In sequence restore controller MBB key, operate controller RL key.	TRB lamp dark.
4	Operate controller MBA key momentarily.	
5	Operate manually ASA relay of B controller, hold until controller times out.	Controller MA lamp lights. Controller GRL relay operates momentarily. Trouble indicator TIB lamp lights. Alarm sounds.
6	Operate ACO key of trouble indicator.	Alarm retired.
7	Operate controller RL key.	MA lamp retired.
8	Operate controller MBB key momentarily.	TRB lamp lights.
9	Operate manually ASA relay of A controller, hold until controller times out.	Controller MA lamp lights. Controller GRL relay operates momentarily.
10	Operate controller RL key.	Controller MA lamp retires.
11	Note state of CZ relay (operated or released).	
12	Operate manually controller GS relay, hold until controller times out.	Controller GRL relay operates momentarily.
13	Operate, release manually IN or OUT relay of either controller to produce opposite state of CZ relay to that noted in Step 11.	
14	Operate manually controller GS relay, hold until controller times out.	Controller GRL relay operates momentarily.
15	Operate controller RL key.	
16	Block controller SR relay operated.	
17	Operate controller MBA key.	
18	Operate manually A controller ASA relay, hold until controller times out.	Controller GRL relay operates momentarily.
19	Restore controller MBA key, operate MBB key.	MBB lamp lights.
20	Operate manually B controller ASA relay, hold until controller times out.	Controller GRL relay operates momentarily.
21	Remove blocking tool from controller SR relay.	
22	Restore controller MBB key.	
23	Operate controller RL key.	MBB lamp dark.
24	Operate controller, trouble indicator, RL keys.	Controller, TIB lamps dark.

STEP	ACTION	VERIFICATION															
I. Preference Control																	
1	Establish manually released condition of CW, CZ relays.																
2	Operate manually any G- relay.	LA relay operates.															
3	Establish manually operated condition of CW, CZ relays.																
4	Operate manually any G- relay.	LB relay operates.															
5	Operate controller MBA key.																
6	Operate, release manually A controller IN relay.	W, Z and CW, CZ relays should go through cycle of operation as follows: CW or W operated, CZ or Z released. CW or W operated, CZ or Z operated. CW or W released, CZ or Z operated. CW or W released, CZ or Z released.															
7	At direction center only — Operate, release manually A controller OUT relay.	Same as Step 6.															
8	At radio site only — Operate, release manually A controller OUT relay.	W, Z, CW, CZ relays go through state cycle of operation (- = released; + = operate) as follows: W-, Z-, CW-, CZ- W+, Z-, CW-, CZ- W+, Z+, CW-, CZ- W-, Z+, CW+, CZ- W-, Z-, CW+, CZ+ W+, Z-, CW+, CZ+ W+, Z+, CW+, CZ+ W-, Z+, CW-, CZ+															
9	For each of following states of W or CW, Z or CZ relays — Manually operate RL relay.	RL relay should lock for each condition.															
	<table border="1"> <thead> <tr> <th>BLOCK NO</th> <th>BLOCK NO</th> <th>MAN. OPR</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>CW & CZ</td> <td>Z</td> </tr> <tr> <td>Z</td> <td>CW & CZ</td> <td>W</td> </tr> <tr> <td>CW</td> <td>W & Z</td> <td>CZ</td> </tr> <tr> <td>CZ</td> <td>W & Z</td> <td>CW</td> </tr> </tbody> </table>	BLOCK NO	BLOCK NO	MAN. OPR	W	CW & CZ	Z	Z	CW & CZ	W	CW	W & Z	CZ	CZ	W & Z	CW	
BLOCK NO	BLOCK NO	MAN. OPR															
W	CW & CZ	Z															
Z	CW & CZ	W															
CW	W & Z	CZ															
CZ	W & Z	CW															
	<table border="1"> <thead> <tr> <th>BLOCK NO</th> <th>BLOCK OPR</th> <th>MAN. OPR</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>CW & CZ</td> <td>Z</td> </tr> <tr> <td>Z</td> <td>CW & CZ</td> <td>W</td> </tr> <tr> <td>CW</td> <td>W & Z</td> <td>CZ</td> </tr> <tr> <td>CZ</td> <td>W & Z</td> <td>CW</td> </tr> </tbody> </table>	BLOCK NO	BLOCK OPR	MAN. OPR	W	CW & CZ	Z	Z	CW & CZ	W	CW	W & Z	CZ	CZ	W & Z	CW	
BLOCK NO	BLOCK OPR	MAN. OPR															
W	CW & CZ	Z															
Z	CW & CZ	W															
CW	W & Z	CZ															
CZ	W & Z	CW															
10	Restore controller MBA key, operate MBB key.																
11	Repeat Steps 6 through 9 for B controller.																
12	Restore MBB key.																
13	Operate controller RL key.																

STEP	ACTION	VERIFICATION
J. Registers		
1	Operate MBA key.	
2	Operate manually IN relay of A controller momentarily.	FS register scores.
3	Operate manually OUT relay of A controller momentarily.	FS register scores.
4	Manually holding operated IN relay of A controller, operate manually in sequence BTK1, FS relays.	FS register scores after operation of each of designated relays.
5	Manually holding IN relay of A controller, operate manually LCA relay of A controller.	RL relay operates.
6	Repeat Step 5, holding OUT relay of A controller.	RL relay operates.
7	Manually holding operated OUT relay of A controller, operate manually in sequence HMK, STK, FS relays.	FS register scores after operation of each of designated relays.
8	Block operated BY relay of A controller.	
9	Operate manually IN relay of A controller.	BL register scores. BL relay operates.
10	Remove blocking tool from A controller BY relay.	
11	Restore MBA key, operate MBB key.	
12	Repeat Steps 2 through 10 for B controller.	
13	Restore MBB key.	
14	Operate controller RL key.	
Tests for Radio Site Controllers Only		
15	Operate controller MBA key.	
16	Set test circuit trunk TRUNK TENS, TRUNK UNITS switches to position of equipped trunk (trunk 0 is used here for purposes of illustration).	
17	Operate test circuit CTA, ON keys.	
18	Block nonoperated controller T- relay associated with selected trunk as indicated in Table C (T0 if trunk 0 was selected).	
19	Operate test circuit ST key.	BT register scores.
20	Restore controller MBA key, operate MBB key.	
21	Restore test circuit CTA key, operate CTB key.	

SECTION 314-556-501

STEP	ACTION	VERIFICATION
22	Operate test circuit RL key.	
23	Remove blocking tool from previously blocked T- relay (T0 if trunk 0 was used), block nonoperated T- relay associated with selected trunk when B controller is used as indicated in Table C (T19, T29, or T39, last T- relay of group, if trunk 0 was used).	
24	Operate test circuit ST key.	BT register scores.
25	Operate test circuit RL key.	
26	Remove blocking tool from T- relay.	
27	Restore test circuit, controller keys; remove blocking tool from T- relay.	
28	Operate controller RL key.	
Tests for Direction Center Controllers		
29	Set test circuit trunk TRUNK TENS, TRUNK UNITS switches to position of equipped trunk (trunk 0 is used here for purposes of illustration).	
30	Operate test circuit CTA, ON keys.	
31	Block nonoperated A controller T- relay associated with selected trunk as indicated in Table C (T0 if trunk 0 was selected).	
32	Operate test circuit ST key.	BTA relay operates momentarily. TB(A-C) relays, BT register scores.
33	Allow time for HT relay to operate.	TB(A-C) relays release.
34	Operate test circuit RL key.	
35	Restore test circuit CTA key.	
36	Operate test circuit CTB key.	
37	Remove blocking tool from previously blocked T- relay (T0 if trunk 0 was used), block nonoperated T- relay associated with selected trunk when B controller is used as indicated in Table C (T19, T29, or T39, last T- relay of group, if trunk 0 was used).	
38	Operate test circuit ST key.	BTB relay operates momentarily. TB(A-C) relays, BT register operate.
39	Operate test circuit RL key.	
40	Restore test circuit CTB, ON keys.	
41	Remove blocking tools from controller T- relay.	
42	Allow time for HT relay to operate.	TB(A-C) relays release.

STEP	ACTION	VERIFICATION
K. Release Control		
1	Operate controller MBA key.	
2	Operate manually A controller TK, HMK relays.	A controller RL relay operates.
3	Release manually HMK relay.	RL relay holds operated.
4	Release manually TK relay.	RL relay releases.
5	Block operated CH4, CH5 relays of A controller.	
6	Operate manually HMK relay of A controller.	RL relay operates.
7	Manually holding HMK relay for duration of step, in sequence operate manually STK, BTK relays; open (or insulate) contact 6 break of TK relay; manually release CH5 relay by removing blocking tool.	RL relay releases for each of indicated actions.
8	Remove blocking tool from CH4 relay.	
9	Operate manually A controller SMK relay momentarily.	RL relay holds when manually operated.
10	Repeat Step 9 for BY, HMT1, GCK relays.	
11	Block LCA relay of A controller operated, in sequence manually operate G, TK relays.	RL relay operates after both of designated relays are operated.
12	Remove blocking tool from LCA relay.	
13	Operate A controller RL key, momentarily operate TRL relay.	RL relay operates.
14	Operate manually A controller ASA relay, hold until alarm sounds.	RL relay operates.
15	Operate trouble indicator ACO key to silence alarm.	
16	Operate manually A controller RL relay, controller GA relay.	TRL relay operates.
17	In sequence release RL, GA relays.	TRL relay holds operated until GA relay is released.
18	Operate A controller RL relay, controller AA relay.	TRL relay operates.
19	In sequence release RL, AA relays.	TRL relay holds operated until AA relay is released.
20	Restore MBA key, operate MBB key.	
21	Repeat Steps 2 through 19 for B controller.	
22	Restore MBB key.	
23	Operate controller, trouble indicator RL keys.	

STEP	ACTION	VERIFICATION								
L. Alarm Circuits										
1	Operate controller MBA key.									
2	Operate test circuit CTA, ON keys.									
3	Operate test circuit ST key for each of controller relay conditions listed below.	For each test, GS relay operates. After a delay of 1.8 to 4.4 seconds, major alarm sounds. Trouble indicator activated.								
	<table border="0"> <thead> <tr> <th data-bbox="256 506 318 541">BLOCK NO</th> <th data-bbox="456 506 518 541">BLOCK O</th> </tr> </thead> <tbody> <tr> <td data-bbox="215 558 358 579">COA, COB</td> <td data-bbox="415 558 553 579">CH2, CH3</td> </tr> <tr> <td data-bbox="215 590 358 611">COA, COB</td> <td data-bbox="415 590 553 611">CH1, CH3</td> </tr> <tr> <td data-bbox="215 621 358 642">COA, COB</td> <td data-bbox="415 621 553 642">CH1, CH2</td> </tr> </tbody> </table>	BLOCK NO	BLOCK O	COA, COB	CH2, CH3	COA, COB	CH1, CH3	COA, COB	CH1, CH2	
BLOCK NO	BLOCK O									
COA, COB	CH2, CH3									
COA, COB	CH1, CH3									
COA, COB	CH1, CH2									
	Operate trouble indicator RL key after each test.									
4	Restore test circuit keys, remove blocking tools from controller relays.									
5	Operate, hold COA manually until alarm sounds.	Same as Step 3.								
6	Operate trouble indicator RL relay.									
7	Repeat Steps 5, 6 for COB relay.									
8	Release CH1 manually.	COA operates.								
9	Release CH2 manually.	COB operates.								
10	Operate manually any SM- relay of A controller, hold for duration of step.	ASA relay operates. After delay of 0.38 to 0.8 second, minor alarm sounds, aisle pilot lights.								
11	Operate manually any T- relay of A controller, hold for duration of step.	Same as Step 10.								
12	Operate manually LA relay, hold for duration of step.	Same as Step 10.								
13	Insulate contact 7 break of GA relay, manually operate ASA relay.	Aisle pilot lamp lights but audible alarm not sounded.								
14	Remove contact insulating tool from GA relay.									
15	Repeat Steps 13, 14, now insulating 2 break of MA relay.									
16	Block operated ASA relay of A controller.	Audible alarm actuated. Aisle pilot lamp lighted.								
17	Operate ACO key.	Both alarms of Step 16 retired. ACO lamp lights.								
18	Remove blocking tool ASA relay.									

STEP	ACTION	VERIFICATION
19	Insulate contact 8 make of A controller ASA relay, block operated A controller BY relay.	
20	Block operated A controller ASA relay.	Alarms should not be actuated.
21	Operate momentarily HMT1 relay of A controller.	Minor audible alarm sounds. Aisle pilot lights. RL relay operated.
22	Remove blocking tool ASA relay.	
23	Release RL relay manually.	Alarms restored.
24	Remove insulator from contact 8 make of A controller ASA relay.	
25	Operate momentarily A controller ASA relay.	Minor audible alarm sounds. Aisle pilot lights.
26	Release manually RL relay.	Alarm retired.
27	Block operated SR relay.	
28	Repeat Steps 25, 26.	
29	Remove blocking tool from SR relay.	
30	Remove blocking tool from A controller BY relay.	
31	Restore controller MBA key, operate MBB key.	
32	Restore test circuit CTA key.	
33	Operate trouble indicator RL key.	
34	Repeat Steps 2 through 29 for B controller.	
35	Remove blocking tool from B controller BY relay, restore MBB key.	
36	Restore test circuit CTB, ON keys.	
37	Operate controller, test circuit, trouble indicator, RL keys.	

M. Glare (G) Relay Tests

1	Operate controller MBA key.	
2	At air-ground testboard — Make any idle trunk busy.	
3	At radio site only — Request trunk be made busy at direction center air-ground testboard.	STATUS lamp lighted.
4	Block operated G relay of selected trunk circuit made busy.	

STEP	ACTION	VERIFICATION															
5	With test receiver connected to direct ground — Test for battery at designated LC- relay make contact.	Battery detected, controller G relay operates for each test.															
	<table border="1"> <thead> <tr> <th>TRUNK</th> <th>RELAY</th> <th>CONTACT</th> </tr> </thead> <tbody> <tr> <td>0 to 9</td> <td>LCA</td> <td>1 to 10</td> </tr> <tr> <td>10 to 19</td> <td>LCB</td> <td>1 to 10</td> </tr> <tr> <td>20 to 29</td> <td>LCC</td> <td>1 to 10</td> </tr> <tr> <td>30 to 39</td> <td>LCD</td> <td>1 to 10</td> </tr> </tbody> </table>	TRUNK	RELAY	CONTACT	0 to 9	LCA	1 to 10	10 to 19	LCB	1 to 10	20 to 29	LCC	1 to 10	30 to 39	LCD	1 to 10	
TRUNK	RELAY	CONTACT															
0 to 9	LCA	1 to 10															
10 to 19	LCB	1 to 10															
20 to 29	LCC	1 to 10															
30 to 39	LCD	1 to 10															
6	Remove blocking tool from trunk G relay.																
7	Restore trunk to service.																
8	Restore controller MBA key.																
9	Operate controller RL key.																

N. All-trunks-busy Register and Overload Relief Action (DC Only)

Controller Circuit

1	Insulate contact 2 make of BTA relay.	
2	Operate manually BTA relay.	TB(A-C) relays operate.
3	Release manually TBA relay.	TBB, TBC relays release.
4	Remove insulator from contact 2 make of BTA relay.	
5	Insulate contact 1 make of BTA relay, repeat Steps 2, 3.	
6	Remove insulator from contact 1 make of BTA relay.	
7	Insulate contact 2 make of BTB relay.	
8	Operate manually BTB relay.	TB(A-C) relays operate.
9	Release manually TBA relay.	TBB, TBC relays release.
10	Remove insulator from contact 2 make of BTB relay.	
11	Insulate contact 1 make of BTB relay, repeat Steps 8, 9.	
12	Remove insulator from contact 2 make of BTB relay.	
13	Operate manually BTA relay.	TB(A-C) relays operate. After a delay of a matter of seconds, TB(A-C) relays release.
14	Block operated TB(A-C) relays.	
15	With test receiver connected to -48V — Test for ground at contact 7 fixed of PT relay in each channel circuit, including spare.	Ground detected.
16	Remove tools from TB(A-C) relays.	

STEP	ACTION	VERIFICATION
Trunk and Channel Alarm and Control Circuit (Overload Relief Feature)		
17	Insulate 7B of ATB relay.	
18	Release momentarily ATB relay.	TB1 relay operates.
19	Remove insulator from 7B of ATB relay, insulate 9B of same, repeat Step 18.	
20	Remove insulator from 9B of ATB relay.	
21	Block nonoperated V1 relay, operated V2 relay.	
22	Operate momentarily TB1 relay manually.	If nonoperated, BW relays operates, then BZ relay operates. If operated, BW relay releases, then BZ relay releases. RTT, RSO, relays operate, release.
23	Hold BW manually operated, operate TB1 momentarily.	R2 operates.
24	Block operated V1 relay, nonoperated V2 relay.	
25	Operate momentarily TB1 relay manually.	If operated, BW relay releases, then BZ relay releases. If nonoperated, BW relay operates, then BZ relay operates. RTT, RSO relays operate, release.
26	Hold BW manually released, operate TB1 momentarily.	R1 operates.
27	Block nonoperated V1 relay, leaving blocked nonoperated V2 relay. Block nonoperated RTT relay, then operate, hold TB1 relay manually.	RC, R1, R2, A1 relays operate. ALARM, STATUS lamps light. Minor audible alarm sounds. Aisle pilot lights.
28	Release TB1 relay.	RC, R1, R2 relays release. STATUS lamp extinguished.
29	Operate, hold ACO key.	GUARD lamp lights. ALARM lamp dark. Audible, visual alarms restored.
30	Release ACO key.	A2 relay releases. GUARD lamp dark.
31	Remove blocking tools from V1, V2, RTT relays.	
32	Block operated R1, R2 relays.	
33	With test receiver connected to -48V — Test for ground at contact 11 fixed of TST relay in each channel circuit, except spare.	Ground detected.
34	Remove blocking tools from R1, R2 relays.	

SECTION 314-556-501

STEP	ACTION	VERIFICATION
O. Code Check Path Test		
1	Operate MBA key.	TRA lamp lights.
2	Apply ground contact 4F to L0 relay of A controller.	
3	Block operated L4, L7, L00 relays.	SMK relay operated.
4	Remove blocking tool from L00.	SMK relay releases.
5	Block operated L00, L10.	SMK normal.
6	Remove blocking tools from L00, L10.	
7	Repeat Steps 6, 7 for the following combinations of relays blocked operated. L00 and L20 L10 and L20 L00, L10, L20	
8	Remove blocking tools from all relays except L00.	SMK normal.
9	Block operated L0.	SMK normal.
10	Remove blocking tool from L0.	
11	Repeat Steps 9, 10 for following relay or relays: L7 L0,L1,L2 L1,L2,L4 L2,L4,L7	
12	Remove all blocking tools and ground connections.	
13	Restore MBA key.	
14	Operate MBB key.	TRB lamp lights. TRA lamp dark.
15	Repeat Steps 2 through 12 for B controller.	
16	Restore MBB key.	
17	Operate controller RL key.	TRB lamp dark.

Table A — Controller Relay Operation for Channel-originated Call

All Tests for Controllers A and B

CHANNEL CKT NO.	GROUP LAMP	TROUBLE INDICATOR LAMPS					SM RELAYS CONTROLLER		VV RELAY OPERATIONS OBSERVED AT CONTROLLER FRAME												SELECT MAGNET	BTK	BTK1				
		GROUP CONN. LAMP	TK	BTK	SMK	OCK	OUT	A	B	GCK	GE0	STK	COA	COB	FS	SMA	BYA	SSA	**CLA	**LC(A-H)				BTC(A-D)	TT(A-D)		
00	G0	GC0					SM0	SM9				<u>COA</u>	<u>COB</u>	<u>FS</u>	<u>SMA</u>										0		
												<u>*CH1</u>	<u>CH2</u>	<u>CH3</u>	<u>CH4</u>	<u>CH5</u>											
01							SM1	SM8																	1		
02							SM2	SM7																	2		
03							SM3	SM6																	3		
04							SM4	SM5																	4		
05							SM5	SM4																	5		
06							SM6	SM3																	6		
07							SM7	SM2																	7		
08							SM8	SM1																	8		
09							SM9	SM0																	9		
10	G1	GC1					SM0	SM9	GCK	GE1					<u>SMB</u>	BYB	SSB	**CLB							10		
												<u>CH1</u>	<u>CH2</u>	<u>CH3</u>	<u>CH4</u>	<u>CH5</u>											
11							SM1	SM8			STK														11		
12							SM2	SM7																	12		
13							SM3	SM6																	13		
14							SM4	SM5																	14		
15							SM5	SM4																	15		
16							SM6	SM3																	16		
17							SM7	SM2																	17		
18							SM8	SM1																	18		
19							SM9	SM0																	19		
20	G2	GC2					SM0	SM9	GCK	GE2					<u>SMC</u>	BYC	SSC	**CLC							20		
												<u>CH1</u>	<u>CH2</u>	<u>CH3</u>	<u>CH4</u>	<u>CH5</u>											
21							SM1	SM8																	21		
22							SM2	SM7																	22		
23							SM3	SM6																	23		
29			TK	BTK	SMK	OCK	OUT	SM9	SM0	GCK		STK													29		

* A dash over the relay designation (as CH1) indicates relay release.

** Relays at radio site only.

√ These lamps will be displayed at the trouble indicator frame after the LP key is operated. The display should be retired by operating the RL key to prepare the trouble indicator for the next test.

√√ Several tests per channel will be required to observe the operations of all designated relays.

Table B — Controller Relay Operation for Trunk-originated Call

TRUNK CKT NO.	TROUBLE INDICATOR LAMPS						T RELAY LAMPS			RELAY OPERATIONS OBSERVED AT CONTROLLER FRAME															
	A CONTROLLER ANY NO. TRKS						CAP. 20 TRKS		B CONTROLLER CAP. 30 TRKS		CAP. 40 TRKS		CONTROLLERS A AND B						A CONTROLLER ANY NO. TRKS		B CONTROLLER CAP. 30 TRKS		CAP. 40 TRKS		
	G3	GC3	TK	BTK	IN	NO	00	0	10	9	20	9	30	9	GE3	GCK	L00	SMA	BYA	SSA	*CLA	TK0 (A,B)	TK1 (A,B)	TK2 (A,B)	TK3 (A,B)
00							00	0	10	9	20	9	30	9	GE3	GCK	L00	SMA	BYA	SSA	*CLA	TK0 (A,B)	TK1 (A,B)	TK2 (A,B)	TK3 (A,B)
01								1		8		8		8											
02								2		7		7		7											
03								3		6		6		6											
04								4		5		5		5											
05								5		4		4		4											
06								6		3		3		3											
07								7		2		2		2											
08								8		1		1		1											
09								9		0		0		0											
10	G4	GC4					10	0	00	9	10	9	20	9	GE4							TK1 (A,B)	TK0 (A,B)	TK1 (A,B)	TK2 (A,B)
11								1		8		8		8											
12								2		7		7		7											
13								3		6		6		6											
14								4		5		5		5											
15								5		4		4		4											
16								6		3		3		3											
17								7		2		2		2											
18								8		1		1		1											
19								9		0		0		0											
20	G5	GC5					20	0			00	9	10	9	GE5							TK2 (A,B)		TK0 (A,B)	TK1 (A,B)
21								1				8		8											
21								2				7		7											
23								3				6		6											
24								4				5		5											
25								5				4		4											
26								6				3		3											
27								7				2		2											
28								8				1		1											
29								9				0		0											
30	G6	GC6					30	0					00	9	GE6							TK3 (A,B)			TK0 (A,B)
31								1						8											
32								2						7											
33								3						6											
34								4						5											
35								5						4											
36								6						3											
37								7						2											
38								8						1											
39								9						0											

*. CLA relay at radio site only.

TABLE C

TEST CIRCUIT TRUNK SWITCH		TROUBLE INDICATOR T RELAY LAMPS							
POSITION		A CONTROLLER		(CAP. 20 TRK)		B CONTROLLER		(CAP. 40 TRK)	
TENS	UNITS	ANY NO. OF TRKS				(CAP. 30 TRK)			
0	0	00	0	10	9	20	9	30	9
	1		1		8		8		8
	2		2		7		7		7
	3		3		6		6		6
	4		4		5		5		5
	5		5		4		4		4
	6		6		3		3		3
	7		7		2		2		2
	8		8		1		1		1
	9		9		0		0		0
1	0	10	0	00	9	10-	9	20	9
	1		1		8		8		8
	2		2		7		7		7
	3		3		6		6		6
	4		4		5		5		5
	5		5		4		4		4
	6		6		3		3		3
	7		7		2		2		2
	8		8		1		1		1
	9		9		0		0		0
2	0	20	0			00	9	10	9
	1		1				8		8
	2		2				7		7
	3		3				6		6
	4		4				5		5
	5		5				4		4
	6		6				3		3
	7		7				2		2
	8		8				1		1
	9		9				0		0
3	0	30	0					00	9
	1		1						8
	2		2						7
	3		3						6
	4		4						5
	5		5						4
	6		6						3
	7		7						2
	8		8						1
	9		9						0

TABLE D

TEST CIRCUIT TRUNK SWITCH		TEST CIRCUIT CHANNEL SWITCH		TROUBLE INDICATOR LAMPS		
TENS	UNITS	TENS	UNITS	CODE		
00		0	0	00	4	7
		0	1	00	0	1
		0	2	00	0	2
		1	0	10	4	7
		1	1	10	0	1
		1	2	10	0	2
		2	0	20	4	7
		2	1	20	0	1
		2	2	20	0	2
		10		0	0	00
0	1			00	0	1
0	2			00	0	2
1	0			10	4	7
1	1			10	0	1
1	2			10	0	2
2	0			20	4	7
2	1			20	0	1
2	2			20	0	2
20	Any			0	0	00
		0	1	00	0	1
		0	2	00	0	2
		1	0	10	4	7
		1	1	10	0	1
		1	2	10	0	2
		2	0	20	4	7
		2	1	20	0	1
		2	2	20	0	2
		30		0	0	00
0	1			00	0	1
0	2			00	0	2
1	0			10	4	7
1	1			10	0	1
1	2			10	0	2
2	0			20	4	7
2	1			20	0	1
2	2			20	0	2