SAGE DATA TRANSMISSION SYSTEMS—PRIVATE SERVICE SYSTEMS
AIR-GROUND VOICE COMMUNICATION SYSTEM
COMMON USER GROUP EQUIPMENT
TRUNKS AND CODE RECEIVERS
TESTS

1. GENERAL

1.01 This section describes a method of testing the trunk and code receiver circuits for the common user group equipment of the air-ground voice communication system using the SD-1G030-01 or SD-1G113-01 automatic test circuit. Miscellaneous tests are included in this section which are made without the automatic test circuit.

1.02 This section is reissued to make corrections to Tests L and M, and to clarify locational statements throughout the section. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests covered are:

A. Channel Originated Test—Single Trunk: This test checks the ability of the trunk to establish outgoing connections, to retransmit pulses received from the sender as frequency shifts to the toll line, to respond to the check pulse from the distant end, to hold the connection, to handle supervisory signals, and to release.

B. Trunk Originated Test—Single Trunk: This test checks the ability of the code receiver to respond to coded pulses, to start the controller on receipt of a valid code, and to establish a connection having the same features as the channel originated test.

C. Transfer Test—Single Trunk: This test checks, at the direction center, the ability of the trunk to receive a transfer indication from the channel circuit and to give the proper signal to the line. At the radio site, it tests the ability of the trunk to receive a transfer signal from the line and to effect the correct indication to the channel circuit.

D. Trunk Busy Tests: This test checks the ability of trunk to appear busy to the controller, to be made busy from the air-ground testboard, and to give a trunk-busy indication to the trunk and channel alarm and control circuit.

E. Simultaneous Seizure Tests: This test checks the ability of trunk to give a simultaneous seizure indication to the controller and the ability of the trunk to release.

F. Tone-Off Alarm Test—Trunk Idle: This test checks the ability of the trunk to recognize and respond to a pilot tone failure under idle condition.

G. Tone-Off Alarm Test—Trunk Busy: This test checks the ability of the trunk to recognize and respond to a pilot tone failure under busy condition.

H. Common User Group Alarm—Supervisory Test: This test checks the ability of the trunk to give suitable alarm for continuous "off-hook" supervision with no call having been established.

I. Common User Group Alarm—Cut Through and Release Tests: This test checks the ability of the trunk to give suitable alarms for failure of the connection to be established or released.

J. Code Receiver—Regular Code Test: This test checks the ability of the code receiver to respond to all regular codes.

K. Code Receiver—Extra Pulse Test: This test checks the ability of the code receiver to reject a code having extra pulses.

L. Code Receiver—Insufficient Pulse Test: This test checks the ability of the code receiver to reject a code having insufficient code pulses.

M. Local Talking Test: This test checks qualitatively the speech transmission of direction center trunk.

N. Guard Pulse Test: This test checks the ability of direction center trunks to generate a short guard pulse when cut through.

1.04 Before tests are applied, it is assumed that the associated telegraph channel terminal units have been adjusted to meet circuit requirements.

1.05 Test F and, to a lesser extent, Tests J, K, and L may interfere with service. Suitable precautions should be taken to avoid excessive service reactions.

1.06 Some of these tests will result in the operation of alarms. Maintenance personnel should be advised to disregard such alarms during the time these tests are in progress.

1.07 Where the automatic test circuit is used for conducting the test, the start and advance may be remotely controlled by connecting the control cord to the RC jack of the frame under observation.

1.08 During Tests G through J the trunk alarm register will score. The reporting of this register operation should be in accordance with local instructions.

1.09 Any of Tests A through C may be repeated by operation of the REP key.

1.10 If failure occurs with the REP key operated, the CA key operated will restart the test.

1.11 Any of Tests A through C may be applied to all trunks by operation of the TAT key.

1.12 The GE lamp lights when all trunks have been tested.

1.13 Operation of the PBT key when all trunks are being tested will allow busy trunks to be passed.

1.14 ***Lettered Steps:*** A letter a, b, c, etc, added to a step number in Part 3 or 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

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

TABLE A

APPARATUS	TESTS												
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Automatic test circuit (2.02)	1	1	1	–	1	–	1	–	1	1	1	1	1	1
Test receiver (2.03)	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Head telephone set (2.04)	–	–	–	–	–	–	–	–	–	–	–	–	2	–
322A (make-busy) plug	–	–	–	1	–	1	–	–	–	–	–	–	–	–
375A plug	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Tool (2.05)	–	–	–	√	√	–	–	√	–	√	√	√	√	√

√As required.

2.02 Automatic test circuits SD-1G030-01 or SD-1G113-01.

2.03 Test receiver, 716C or 528 receiver, attached to a W2AB cord equipped with two 360A tools (2W21A cords), one 365 (connecting clip) tool, and one 411A (test pick) tool.

2.04 Head telephone set equipped with 289B plug.

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

3. PREPARATION

3.01 The following steps apply to the automatic test circuit used for Tests A, B, C, G, I, J, K, L, M, and N.

STEP	ACTION	VERIFICATION
1	At automatic test circuit— Momentarily operate RL key.	All lamps extinguished.
2	Restore all keys, switches to normal.	
3a	If GROUPS switch is provided— Set GROUPS switch to select desired group.	
4	Set TRUNKS UNITS, TRUNKS TENS switches to test selected trunk or associated code receiver. Set CHANNELS UNITS, CHANNELS TENS switches to zero. Set TEST PULSE GEN switch to 24 PPS 45% BK position.	
5	Operate CTA key.	

4. METHOD

A. Channel Originated Test—Single Trunk

6	Operate ON key.	
7	Momentarily operate ST key.	Test starts. ET lamp lighted on completion of test.
8	Momentarily operate RL key.	ET lamp extinguished.

B. Trunk Originated Test—Single Trunk

6	Operate TO, ON keys.	
7	Momentarily operate ST key.	Test starts. ET lamp lighted on completion of test.
8	Momentarily operate RL key.	ET lamp extinguished.

C. Transfer Test—Single Trunk

6	Operate TR, ON keys, in sequence.	
7	Momentarily operate ST key.	Test starts. ET lamp lighted on completion of test.
8	Momentarily operate RL key.	ET lamp extinguished.

STEP	ACTION	VERIFICATION
9b	If at radio site— At automatic test circuit— Operate TOTL key.	
10b	Repeat Steps 7, 8.	

D. Trunk Busy Tests

Busy to Controller

1b	If E, RS relays are not operated— At trunk circuit— Block operated E, RS relays.	
2	Check for ground using test receiver at terminal 38 of trunk terminal strip A.	Ground detected.
3	Operate and release one at a time TC, MB, R1, BY1, BY2 relays; check for ground interruption.	Ground on terminal 38, terminal strip A interrupted by each operation.
4	Block nonoperated BY1.	
5	Operate and release BY relay; check for ground.	Same as Step 3.
6	Remove blocking tool from BY1 relay.	
7c	If, in Step 1b, E, RS relays were blocked operated— Remove blocking tool from RS relay; check for ground interruption.	Ground removed from terminal 38.
8c	Restore blocking tool to operate RS relay.	Ground detected on terminal 38.
9d	If RS relay is operated— Block nonoperated RS relay.	
10d	Check for ground on terminal 38.	Ground removed from terminal 38.
11d	Remove blocking tool from RS relay; check for ground on terminal 38.	Ground detected on terminal 38.
12c	If, in Step 1b, E, RS relays were blocked operated— Remove blocking tool from E relay.	
13c	Check for ground on terminal 38.	Ground removed from terminal 38.
14c	Restore blocking tool to operate E relay.	Ground detected on terminal 38.
15e	If E relay is operated— Block nonoperated E relay.	

STEP	ACTION	VERIFICATION
16e	Check for ground on terminal 38.	Ground removed from terminal 38.
17e	Remove blocking tool from E relay.	
Busy From Air-Ground Testboard		
18	At air-ground testboard— Insert 322A plug in trunk OS jack.	At trunk circuit— MB relay operated. At direction center— At trunk circuit— MB, MB1, BY2 relays operated.
19	Remove 322A plug from trunk OS jack.	MB relay released. At direction center— At trunk circuit— MB, MB1, BY2 relays released.
Busy to Trunk and Channel Alarm (Direction Center Only)		
20	In trunk and channel alarm and control circuit— Note that ATB relay is operated.	
21f	When trunks are connected to working lines— Insert 322A plugs in OS jack of all trunks except trunk under test.	ATB relay remains operated.
22	Momentarily operate, release MB, BY relays separately.	ATB relay released for each operation.
23	Remove blocking tool from RS relay, release relay manually if required.	ATB relay released.
24	Repeat Steps 21f through 23 for each trunk.	
25	Remove all plugs, blocking tools.	
E. Simultaneous Seizure Tests		
At Direction Center		
1	At automatic test circuit— Restore all keys to normal, operate test circuit ON key.	All lamps extinguished.
2	At trunk circuit— Block operated TC relay.	Trunk E relay operated.
3	Block nonoperated TS1, TS2 relays.	
4	Block operated OC relay.	BY, BY1, BY2 relays operated.

STEP	ACTION	VERIFICATION
5	At associated trunk 43A1 unit— Operate REC switch to L- position.	At trunk circuit— E relay released. G relay operated.
6	At associated trunk 43A1 unit— Restore REC switch to H+ position.	At trunk circuit— E relay operated. G relay remains locked.
7	Remove blocking tool from OC relay.	BY, BY1, BY2, G relays released.
8	Block operated OC relay again.	BY, BY1, BY2 relays operated.
9	Block operated S relay.	D relay operated.
10	Repeat Steps 5, 6.	
11	Momentarily operate FB relay.	At controller— G relay operated in response to FB operation.
12	At automatic test circuit— Restore ON key.	
13	At trunk circuit— Remove all blocking tools.	All relays restored (except E, RS if connected to working line).
At Radio Site		
14	At automatic test circuit— Restore all keys to normal, operate ON key.	All lamps extinguished.
15	At trunk circuit— Block operated TC relay.	Trunk E relay operated.
16	Block nonoperated TMS relay.	
17	Block operated S, OC relays.	BY, BY1, BY2 relays operated.
18	At associated trunk 43A1 unit— Operate REC switch to L- position.	At trunk circuit— E relay released. G relay operated.
19	At associated trunk 43A1 unit— Restore REC switch to H+ position.	At trunk circuit— E relay operated.
20	Remove blocking tools from OC, S relays.	BY, BY1 relays released. BY2, G relays remain operated.
21	Remove blocking tool from TMS relay.	TMS relay operated. T1 relay, followed shortly by T2 relay, operated. G, BY2 relays then released.
22	Remove blocking tool from TC relay.	

STEP	ACTION	VERIFICATION
23	Operate manually G, FB relays.	At controller— G relay operated.
24	At automatic test circuit— Restore ON key.	
F. Tone-Off Alarm Test—Trunk Idle		
1	At air-ground testboard— Note that BUSY lamp is extinguished.	
2	Insert 375A plug in associated DROP TRANS jack.	ST lamp lighted. At direction center— ALM lamp lighted. Audible, visual alarms given. After a few seconds— Trunk ALARM lamp lighted.
3	At direction center— Operate associated air-ground testboard ACO key. Operate trunk alarm ACO key.	Testboard, trunk alarm GUARD lamps lighted. Audible alarm silenced.
4	Remove 375A plug.	ST lamp extinguished. At direction center— ALM, ALARM, GUARD lamps extinguished.
5	At direction center— Restore trunk alarm ACO key.	Trunk alarm GUARD lamp extinguished.
6	In order, insert 322A plug into associated OS jack, reinsert 375A plug into DROP TRANS jack at air-ground testboard.	ST lamp lighted. ALM lamp remains extinguished.
7	Remove plug from DROP TRANS jack.	
8	Remove plug from OS jack.	ST lamp extinguished.
G. Tone-Off Alarm Test—Trunk Busy		
6	Operate TT key.	
7b	If at radio site— At automatic test circuit— Operate TO key.	
8	Operate ON key.	
9	Momentarily operate ST key.	At air-ground testboard— BUSY lamp lighted. At radio site— RPT lamp lighted.

STEP	ACTION	VERIFICATION
10	At automatic test circuit— At T43A1 unit— Move OSC switch to OFF position.	At air-ground testboard— After a few seconds— ST lamp lighted. BUSY lamp extinguished. ALARM lamp lighted. At trunk and channel alarm and control circuit— Counter A scored. Audible, visual alarms given. At air-ground testboard— At direction center— ALM lamp lighted. At automatic test circuit— TRT lamp lighted.
11c	If at direction center— At trunk and channel alarm and control circuit— Operate trunk alarm ACO key.	
12c	At trouble indicator circuit— Operate ACO key.	ALARM lamp extinguished. GUARD lamp lighted.
13c	At air-ground testboard— Operate ACO key.	GUARD lamp lighted. Audible alarm silenced.
14c	At automatic test circuit— Operate RL key.	Audible alarm sounds. At air-ground testboard— ST lamp extinguished. At direction center— ALARM, GUARD lamps extinguished.
15c	At trunk and channel alarm and control circuit— Restore trunk alarm ACO key.	Audible alarm silenced. GUARD lamp extinguished.
16b	If at radio site— At trunk and channel alarm and control circuit— Operate, restore trunk alarm ACO key.	Audible alarm silenced.
17b	At automatic test circuit— Operate RL key.	
18	Restore OSC switch to ON position.	

STEP	ACTION	VERIFICATION
	H. Common User Group Alarm—Supervisory Test	
	Supervisory Test—Working Line	
1	At associated trunk 43A1 unit— Operate REC switch to L- position.	At trunk and channel alarm and control circuit— After a few seconds— ALARM lamp lighted. Counter A scored. Audible, visual alarms given.
2	At associated trunk 43A1 unit— Restore REC switch to H+ position.	
3	At trunk and channel alarm and control circuit— Operate, restore associated trunk alarm ACO key.	ALARM lamp extinguished. Audible alarms silenced. Visual alarm lamps extinguished.
	I. Common User Group Alarm—Cut-Through and Release Tests	
6	Operate test circuit TT key.	
7b	If at radio site— At automatic test circuit— Operate TO key.	
8	At trunk circuit— Block nonoperated C2 relay.	
9	At automatic test circuit— Operate ON key.	
10	Momentarily operate ST key.	At trunk and channel alarm and control circuit— After a few seconds— ALARM lamp lighted. Counter A scored. Audible, visual alarms given. At direction center— At automatic test circuit— TRT lamp lighted. At radio site— At automatic test circuit— OFF lamp lighted.
11	Momentarily operate RL key.	TCT or OFF lamp extinguished.
12	At trunk and channel alarm and control circuit— Operate, restore trunk alarm ACO key.	Audible alarms silenced. Visual alarm lamps extinguished.

STEP	ACTION	VERIFICATION
13	At trunk circuit— Remove blocking tool from C2 relay.	
14c	If at direction center— At trunk circuit— Block operated RS relay.	
15c	Block operated OC relay.	
16c	Operate manually D relay.	D relay locked. After a few seconds— D relay released. At trunk and channel alarm and control circuit— ALARM lamp lighted. Counter A scored. Audible, visual alarms given.
17c	At trunk circuit— Remove blocking tool from OC relay.	
18c	At trunk and channel alarm and control circuit— Operate, restore trunk alarm ACO key.	ALARM lamp extinguished. Audible alarms silenced. Visual alarm lamps extinguished.
19c	At trunk circuit— Block operated OC, CH relays.	At trunk and channel alarm and control circuit— After a few seconds— ALARM lamp lighted. Counter A scored. Audible, visual alarms given.
20c	At trunk circuit— Remove blocking tools from RS, OC, CH relays.	
21c	At trunk and channel alarm and control circuit— Operate and restore trunk alarm ACO key.	ALARM lamp extinguished. Audible alarms silenced. Visual alarm lamps extinguished.
22c	At automatic test circuit— Restore TT, ON keys.	Test circuit lamps extinguished.
23b	If at radio site— At automatic test circuit— Restore TO, TT, ON keys.	
24b	At trunk circuit— Block nonoperated IN relay.	
25b	At automatic test circuit— Operate ON key.	

STEP	ACTION	VERIFICATION
26b	Momentarily operate ST key.	RT lamp lighted. At trunk and channel alarm and control circuit— After a few seconds— ALARM lamp lighted. Counter A scored. Audible, visual alarms given.
27b	At automatic test circuit— Momentarily operate RL key.	
28b	At trunk and channel alarm and control circuit— Operate, release trunk alarm ACO key.	ALARM lamp extinguished. Audible alarms silenced. Visual alarm lamps extinguished.
29b	At trunk circuit— Remove blocking tool from IN relay.	
30b	At automatic test circuit— Restore ON key.	
31	At trunk circuit— Block nonoperated R2 relay.	
32	At automatic test circuit— Operate ON key.	
33	Momentarily operate ST key.	At trunk and channel alarm and control circuit— After a few seconds— ALARM lamp lighted. Counter A scored. Audible, visual alarms given. At direction center— At automatic test circuit— TOF lamp lighted. At radio site— At automatic test circuit— ET lamp lighted.
34	Momentarily operate RL key.	At radio site— ET lamp extinguished.
35	At trunk circuit— Remove blocking tool from R2 relay.	
36	At trunk and channel alarm and control circuit— Operate, release trunk alarm ACO key.	ALARM lamp extinguished. Audible alarms silenced. Visual alarm lamps extinguished.
37	At automatic test circuit— Release ON key.	At direction center— TOF lamp extinguished.

STEP	ACTION	VERIFICATION
J. Code Receiver—Regular Code Test		
6	Operate TO, CAT keys.	
7	Operate ON key.	ET lamp lighted on completion of test.
8	Momentarily operate ST key.	
9	Repeat Steps 1 through 7 for all other TEST PULSE GEN switch settings.	
K. Code Receiver—Extra Pulse Test		
6	Block nonoperated CTA0 relay.	Channel 00 lamp extinguished.
7	At code receiving circuit— Block operated SR relay.	
8b	If at direction center— At trunk circuit— Block nonoperated TS2 relay.	
9c	If at radio site— At trunk circuit— Insulate 6B of T3 relay.	
10	At automatic test circuit— Operate TO, ON keys.	
11	Momentarily operate ST key.	PC lamp lighted. At code receiver circuit— EP relay operated. At automatic test circuit— TM lamp lighted. Alarm sounds.
12	Operate RL key.	Alarm silenced.
13	Remove blocking tools from CTA0 relay.	
14	At code receiving circuit— Remove blocking tool from SR relay.	
15b	If at direction center— At trunk circuit— Remove blocking tool from TS2 relay.	
16c	If at radio site— At trunk circuit— Remove insulating tool from T3 relay.	

STEP	ACTION	VERIFICATION
L. Code Receiver—Insufficient Pulse Test		
6	Block operated CTA1 relay.	Channel 10 lamp lighted.
7	At code receiver circuit— Block operated SR relay.	
8b	If at direction center— At trunk circuit— Block nonoperated TS2 relay.	
9c	If at radio site— At trunk circuit— Insulate 6B of T3 relay.	
10	At automatic test circuit— Operate TO, ON keys.	
11	Momentarily operate ST key.	PC, TM lamps lighted. At code receiving circuit— P6, P1 relays operated. CS, PC relays not operated.
12	At automatic test circuit— Operate RL key.	PC, TM lamps extinguished.
13	Remove blocking tools from CTA1 relay.	
14	At code receiver circuit— Remove blocking tool from SR relay.	
15b	If at direction center— At trunk circuit— Remove blocking tool from TS2 relay.	
16c	If at radio site— At trunk circuit— Remove insulating tool from 6B of T3 relay.	
M. Local Talking Test		
6	At direction center— Insert head telephone set into TEL C jacks of test frame.	
7	Insert another head telephone set into TEL T jacks of test frame.	
8	Operate TT, TK, ON keys.	
9	Operate ST key.	

STEP	ACTION	VERIFICATION
10b	If using automatic test circuit SD-1G030-01—Insulate 2B of SEQ7 relay.	Test circuit E relay operated.
11	Talk into telephone set of TEL T jack.	Speech received at telephone set in TEL C jack.
12	Operate PT key for duration of this step; talk into telephone set at TEL C jack.	Speech received at telephone set in TEL T jack.
13	Operate RL key.	
14	If desired, CHANNELS TENS, CHANNELS UNITS switches may be set to any desired channel.	
15b	If using automatic test circuit SD-1G030-01—Remove insulating tool from 2B of SEQ7 relay.	
16	Remove head telephone sets.	
17	Restore all keys to normal.	

N. Guard Pulse Test

6	At direction center—Operate TT, ON keys.	
7	Momentarily operate ST key.	
8b	If using automatic test circuit SD-1G030-01—Insulate 2B of SEQ7 relay.	Test circuit E relay operated.
9	Move SEND switch on test circuit T43A1 unit to HM position.	Test circuit E relay released, immediately reoperated.
10	Restore SEND switch to LM position.	
11	Operate RL key.	
12b	If using automatic test circuit SD-1G030-01—Remove insulating tool from 2B of SEQ7 relay.	
13	Restore all keys to normal.	