

SENDERS
MISCELLANEOUS TESTS
STEP-BY-STEP INTERTOLL DIALING OFFICES
ARRANGED FOR CAMA

1. GENERAL

1.01 This section describes a method of making miscellaneous tests of sender circuit SD-32261-01 in step-by-step intertoll dialing offices arranged for centralized automatic message accounting (CAMA).

1.02 This section is reissued to add Test M for SGR thermistor time delay and Test N for SSL lamp flash.

1.03 The tests covered are:

A. *Dial Outpulsing Interdigital Pulses:* In this test, the number of pulses of the pulse generator during interdigital time is counted.

B. *Position Link Double Connection:* This test checks that the DCK relay does not operate on double connection.

C. *STT Relay Operate Path:* This is a test of the path controlling the operation of the STT relay.

D. *DRL Lock and DST Second Seizure Paths:* This test checks that the sender is prevented from making a second seizure of the decoder while the transverter is connected.

E. *Connector TM Leads:* This is a continuity test of TM leads to decoder connector and transverter connector.

F. *SUS Relay — False Operation:* This test checks that an alarm is given if the SUS relay is falsely operated.

G. *Service Observing Leads:* In this test, continuity of service observing leads within the sender is tested.

H. *MF Receiver Shunt:* This test determines ability of the sender to hold a shunt on MF receiver input leads, on calls requiring operator identification, until position is connected.

I. *TUR and ATR Leads:* This test checks continuity of TUR and ATR leads within the sender.

J. *Hold Stuck Sender Control:* This test checks that, in each sender group, the number of senders for which the H1/HN key is operated and the CHS relay biased can be held on time-out. CHS and HSS leads are checked for continuity and crosses. CHS relay (in jack, key, and lamp circuit) is tested for ability to open HSS lead, by simulating service conditions. CHS resistor values are also checked.

K. *RR0 Through RR7 Diodes:* This is a test to detect faults in these diodes.

L. *CRS Through JS Resistors:* This test checks continuity and value of these resistors.

M. *SGR Thermistor — Time Delay Test:* This test checks time delay between release of primary route and start of alternate route by the sender.

N. *SSL Lamp Flash Test:* This test checks that if the sender sticks and holds on a non-CAMA call, the associated SSL lamp will flash.

1.04 *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

TABLE A

APPARATUS	TESTS													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Timing Test Set (2.02)													1	
Voltohmmeter (2.03)										1	1	1		
Resistor (2.04)											1			
Cord (2.05)		1	1	1	1		1	1			1		2	
Test Receiver (2.06)							1	1	1	1				
150 Plug (2.07)										1	1	1		
322 Plug (2.08)										1				
258-Type Plug (2.09)	√	√	√	√	√	√	√	√	√	√	√	√	√	√
KS-6278 Clip (2.10)		1	1	1	1		1	1	1	1	1			
639A Tool (2.10)		1	1	1	1								4	
651D Tool (2.10)		1	1	1	1								3	
624A Tool (2.10)													1	
624B Tool (2.10)							1	1			1			
411A Tool (2.10)							1	1	1	1				
419A Tool (2.10)													1	
Blocking and Insulating Tools (2.11)	√		√	√			√		√	√		√	√	√

√ As required.

required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

2. APPARATUS

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

↗ 2.02 Timing test set J24753A (SD-25707-01), equipped with one P3K (3P15A) cord and ↘ one W3M (3W4A) cord.

2.03 KS-14510, L1 voltohmmeter or equivalent.

2.04 Resistor, 0.1 megohm, KS-13490, L1 or equivalent.

↗ 2.05 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools ↘ (1W13B cord).

2.06 Test receiver, 716C (or equivalent high resistant) receiver, attached to a W2AB cord, equipped with two 360A tools (2W21A cord).

- 2.07 150 plug (for use in CHS jack).
- 2.08 322 plug (to prime held sender).
- 2.09 258-type (make-busy) plugs (for removing sender from service).
- 2.10 Connecting tools. Use and apply tools as covered in Section 069-131-801.
- 2.11 Blocking and insulating tools as required. Use tools and apply as covered in Section 069-020-801.

3. METHOD

STEP	ACTION	VERIFICATION
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A. Dial Outpulsing Interdigital Pulses

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|------|--|--|
| 1 | At trunk finder frame (s) —
Insert 258-type plug(s) into test and make busy jack(s) of trunk finder(s) associated with sender under test. | |
| → 2 | At sender —
When ON relay is normal —
Block nonoperated TMA, SV, AS, EP relays. | |
| 3 | Manually operate ON, A, DRL relays. | ON, A, DRL relays remain operated. |
| 4 | Block operated RR0, RR1, ABS relays. | |
| 5 | Manually release PG1 relay momentarily. | P1, P2 SP, W relays operated. |
| 6 | Manually release PG1 relay momentarily (1st interdigital pulse). | P1, P2 SP relays released.
Z, BD relays operated. |
| 7 | Manually release PG1 relay momentarily (2nd interdigital pulse). | P1, P2 relays operated. |
| 8 | Manually release PG1 relay momentarily (3rd interdigital pulse). | P1, P2 relays released.
P3 relay operated. |
| 9 | Manually release PG1 relay momentarily (4th interdigital pulse). | P1, P2, P4 relays operated. |
| 10 | Manually release PG1 relay momentarily (5th interdigital pulse). | P1, P2, W relays released.
SP relay operated. |
| 11 | Manually release PG1 relay momentarily (6th interdigital pulse). | P3, P4, SP, Z, BD relays released. |
| 12 | Manually operate SO relay. | PG1 relay pulsing. |
| 13 | Manually release ON relay. | All operated sender relays released. |
| → 14 | Remove blocking tools from TMA, SV, EP, RP0, RR1, AS, ABS relays. | |

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STEP	ACTION	VERIFICATION
15	At trunk finder frame(s) — Remove make-busy plug(s).	
B. Position Link Double Connection		
1	At trunk finder frame(s) — Insert 258-type plug(s) into test and make busy jack(s) of trunk finder(s) associated with sender under test.	
2	At sender — When ON relay is normal — Connect ground to 6B of H relay.	
3	Manually operate PLST relay.	PLST, H relays operated. DCK relay not operated.
4	In less than 2 seconds after performing Step 3 — Remove cord from 6B of H relay.	DCK relay operated momentarily. PLST relay released.
5	At trunk finder frame(s) — Remove make-busy plug(s).	
C. STT Relay Operate Path		
1	At trunk finder frame(s) — Insert 258-type plug(s) into test and make busy jack(s) of trunk finder(s) associated with sender under test.	
2	At sender — When ON relay is normal — Connect ground to contact 7 of RGC2 relay.	
3	Insulate 1M, 11M of STT relay.	
4	Insulate 7B of RR relay.	
5	Block operated DRL, STS relays.	STT relay operated.
6	Momentarily operate in sequence the following relays: ROP, TM1, TRT, RLT, RO, RO1, ROPA, ADB, STS1, RA, CKE, 1CK, CL3, DCF, TB1.	STT relay momentarily released for each operation in ACTION column.
7	Remove blocking tool from DRL relay.	STT relay released.
8	Remove blocking tool from STS relay.	
9	Disconnect cord from contact 7 of RGC2 relay.	

STEP	ACTION	VERIFICATION
10	Remove insulating tools from contacts of STT, RR relays.	
11	At trunk finder frame(s) — Remove make-busy plug(s).	
D. DRL Lock and DST Second Seizure Paths		
1	At trunk finder frame(s) — Insert 258-type plug(s) into test and make busy jack(s) of trunk finder(s) associated with sender under test.	
2	At sender — When ON relay is normal — Connect contact 9 of ON relay to ground.	
3	Insulate 6M, 8M, 10M of DST relay.	
4	Manually operate 2S relay.	DST relay operated. 2S relay remains operated.
5	Insulate 4B of STT relay.	DST relay released.
6	At ON relay — Move ground connection from contact 9 to contact 1.	2S relay released.
7	Remove insulating tools from contacts of DST, STT relays.	
8	Insulate 1M, 11M of STT relay.	
9	Block operated STT, 2S, ARA relays.	
10	Manually operate DRL relay.	DRL relay remains operated.
11	Remove blocking tool from STT relay.	DRL relay released.
12	Disconnect cord from contact 1 of ON relay.	
13	Remove insulating tools from STT relay.	
14	Remove blocking tools from 2S, ARA relays.	
15	At trunk finder frame(s) — Remove make-busy plug(s).	
E. Connector TM Leads		
1	At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.	

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STEP	ACTION	VERIFICATION
2	At sender — When ON relay is normal — Connect 893 cord to contact 10 of DST relay.	
3	At control relays of decoder connector — When D relay is normal — Connect 893 cord used in Step 2 to ground.	Decoder connector TM relay operated.
4	Disconnect 893 cord from ground.	When no other traffic is in connector, TM relay released.
5	At sender — Move 893 cord from contact 10 of DST relay to contact 11 of STT relay.	
6	At control relays of transverter connector — When D relay is normal — Connect 893 cord used in Step 5 to ground.	Transverter connector TM relay operated.
7	Disconnect 893 cord from ground.	When no other traffic is in connector — TM relay released.
8	At sender — Disconnect 893 cord from contact 11 of STT relay.	
9	At trunk finder frame(s) — Remove make-busy plug(s).	

F. SUS Relay — False Operation

1	At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.	
2	At sender — When ON relay is normal — Operate SUS relay momentarily.	Alarm sounds momentarily. At trouble ticketer and test frame — ALM lamp lighted momentarily.
3	At trunk finder frame(s) — Remove make-busy plug(s).	

G. Service Observing Leads

1	Request traffic department service observing group to make busy service observing circuit associated with CAMA office.	
2	At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.	

STEP	ACTION	VERIFICATION
3	At sender — When ON relay is normal — With a test receiver, check terminals 51 (NOB), 31 (SA), 21 (T), 11 (R) of E terminal strip; 37 (PA), 27 (PCA), 17 (PD), 56 (ROP) of B terminal strip; 54 (WO) of J terminal strip.	Ground absent from terminals listed in ACTION column.
4	Block nonoperated S relay.	
5	Insulate 6M of ON relay.	
6	Connect 13 of terminal strip E to ground.	
7	Block operated A, ON relays.	AA, ON1, OBV, TOBS relays operated. Ground present on 51, 31 of terminal strip E; 56 of terminal strip B.
8	Remove cord from 13 of terminal strip E.	
9	Insulate 3M of PLST relay.	
10	Block operated PLST relay.	Ground present on 27 of terminal strip B.
11	Remove insulating tool, blocking tool from PLST relay.	
12	Block operated PSTA relay.	Ground present on 37 of terminal strip B.
13	Block operated PRLA relay.	Ground absent from 37 of terminal strip B.
14	Remove blocking tools from PSTA, PRLA relays.	
15	Block operated ROPA relay.	Ground absent from 56 of terminal strip B.
16	Remove blocking tool from ROPA relay.	
17	Block operated PD1 relay.	Ground present on 17 of terminal strip B.
18	Remove blocking tool from PD1 relay.	
19	Block operated RR relay.	Ground present on 54 of terminal strip J.
20	Remove blocking tool from RR relay.	
21	Operate RLS relay momentarily.	TOBS relay released.
22	Remove insulating tool from 6M of ON relay.	
23	Remove blocking tools from A, ON, S relays.	

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STEP	ACTION	VERIFICATION
24	Manually release A relay.	ON, ON1, AA, S relays released.
25	At trunk finder frame(s) — Remove plug(s) from test and make-busy jack(s).	
26a	If no further tests are to be made — Request service observing group to restore circuit to service.	
H. MF Receiver Shunt		
1	At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.	
2	At sender — When ON relay is normal — Connect 54 of terminal strip B to ground.	Ground present on 44 of terminal strip B.
3	Operate PST relay momentarily.	While PST relay is operated — Ground absent from 44 of terminal strip B.
4	Disconnect cord from 54 of terminal strip B.	
5	At trunk finder frame(s) — Remove plug(s) from test and make-busy jack(s).	
I. TUR and ATR Leads		
1a	If ATR lead is being tested — Notify service observing group that tests are being made which can affect ATR register readings.	
2	At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.	
3	At sender — When ON relay is normal — Block nonoperated ON, TMA relays.	
4b	If TUR lead is being tested — Block operated ON1 relay.	Ground present on 52 of terminal strip E.
5b	Operate TT relay momentarily.	While TT relay is operated — Ground absent from 52 of terminal strip E.

STEP	ACTION	VERIFICATION
6b	Remove blocking tool from ON1 relay.	
7a	If ATR lead is being tested — Insulate 3M of PLST relay.	
8a	Block operated PLST relay.	Ground present on 53 of terminal strip B.
9a	Operate PSTA relay momentarily.	While PSTA relay is operated, ground absent from 53 of terminal strip B.
10a	Operate TT relay momentarily.	While TT relay is operated, ground absent from 53 of terminal strip B.
11a	Remove blocking tool from PLST relay.	
12a	Remove insulating tool from 3M of PLST relay.	
13	Remove blocking tools from ON, TMA relays.	
14	At trunk finder frame(s) — Remove plug(s) from test and make-busy jack(s).	
15c	If no further tests of ATR lead are to be made — Notify service observing group.	

J. Hold Stuck Sender Control

1a	If testing CHS resistors — At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.	
2b	If testing CHS resistor of first sender in current test series — At trouble ticketer and test frame — Operate H1/HN key(s) to H0 position(s).	
3b	Release each held sender in sender group by momentarily inserting 322 plug into associated RLS- jack.	
4b	At trouble ticketer and test frame — Operate H1/HN key associated with sender under test to HN position.	At sender — Battery present on contact 2 of RO1 relay.

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STEP	ACTION	VERIFICATION
5b	At trouble ticketer and test frame — Insert 150 plug into CHS jack associated with sender under test.	At sender — Battery absent from contact 2 of RO1 relay and from 46 of terminal strip K.
6a	If testing CHS resistors — At sender — When ON relay is normal — Block operated CTR, TM1 relays. Connect ohmmeter from 46 of terminal strip K to ground.	1900 ohms reading on ohmmeter.
7a	Remove blocking tools from CTR, TM1 relays.	
8a	At trunk finder frame(s) — Remove make-busy plug(s).	
9c	If no further tests of CHS resistors are to be made — At trouble ticketer and test frame — Remove plug(s) from CHS jack(s).	
<i>Note:</i> Perform Steps 10d through 16d only once per test cycle in each sender group, with last sender on HSS and CHS leads multiple.		
10d	If testing the hold one or hold none feature — At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender used for test.	
11d	At trouble ticketer and test frame — Release each held sender in sender group by momentarily inserting 322 plug into associated RLS- jack.	
12d	Operate H1/HN key associated with sender used for test to H1 position.	At sender — Battery present on contact 2 of RO1 relay.
13d	At sender — When ON relay is normal — Block operated CTR, TM1 relays.	Battery absent from contact 2 of RO1 relay. At trouble ticketer and test frame — CHS relay of associated sender group operated.
14d	At sender — Remove blocking tools from CTR, TM1 relays.	Battery present on contact 2 of RO1 relay. At trouble ticketer and test frame — CHS relay released.
15d	At trouble ticketer and test frame — Operate H1/HN key associated with sender used for test to HO position.	At sender — Battery absent from contact 2 of RO1 relay.

STEP	ACTION	VERIFICATION
16d	At trunk finder frame (s) — Remove make-busy plug (s).	
	<i>Note:</i> Perform Steps 17e through 23e once per test cycle in each sender group.	
17e	If testing to hold N number of senders — At trouble ticketer and test frame — Determine by wiring at B2 and B3 resistors, maximum number of senders that can be held.	
18e	At trunk finder frame (s) — Make busy number of senders determined in Step 17e by inserting 258-type plugs into test and make-busy jacks of trunk finders associated with senders used for test.	
19e	At trouble ticketer and test frame — Operate H1/HN key associated with sender group under test to HN position.	Battery present on contact 2 of RO1 relay. <i>Note:</i> Verify at only one of the senders used for test.
20e	At all except one of the senders made busy in Step 18e — When ON relay is normal — Block operated CTR, TM1 relays.	Battery still present at contact 2 of RO1 relay. At trouble ticketer and test frame — Associated CHS relay released. <i>Note:</i> Verify at only one of the senders used for test.
21e	At sender omitted in Step 20e — When ON relay is normal — Block operated CTR, TM1 relays.	Battery absent from contact 2 of RO1 relay. At trouble ticketer and test frame — Associated CHS relay operated. <i>Note:</i> Verify at only one of the senders used for test.
22e	At all senders used for test — Remove blocking tools from CTR, TM1 re- lays.	
23e	At trunk finder frame (s) — Remove make-busy plugs from all trunk finders associated with senders used for test.	

K. RRO Through RR7 Diodes

1	At trunk finder frame (s) — Insert 258-type plug (s) into test and make- busy jack (s) of trunk finder (s) associated with sender under test.
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STEP	ACTION	VERIFICATION
2	At sender — When ON relay is normal — Perform RR0 through RR7 diode tests using circuit requirements table.	Requirements of table are met.

3 At trunk finder frame(s) —
Remove make-busy plug(s).

L. CRS Through JS Resistors

1 At trunk finder frame(s) —
Insert 258-type plug(s) into test and make-busy (jacks) of trunk finder(s) associated with sender under test.

2 At sender —
Insulate 5M of DRS, ERS, AS, BS, CS relays.

3 When ON relay is normal —
Connect ohmmeter across 5, 5B of CRS relay.

Zero resistance reading on ohmmeter.

4 Momentarily operate CRS relay.

While relay is operated —
3000 ohms reading on ohmmeter.

5 Repeat Steps 3, 4 on DRS, ERS, AS through JS relays.

6 Remove insulating tools from DRS, ERS, AS, BS, CS relays.

7 At trunk finder frame(s) —
Remove make-busy plug(s).

M. SGR Thermistor — Time Delay Test

1 At trunk finder frame(s) —
Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.

2 At sender —
When ON relay is normal —
Block nonoperated RO, RO1, PG1, TMA relays.

3 Block operated ON, A relays.

4 Replace SO, 2S, RO1 relay covers with 651D tools.

STEP	ACTION	VERIFICATION
Γ 5	Connect 6F of SO relay to 2U winding of CTR relay using 893 cord equipped with 639 tool.	
6	Connect 1F to 1M of 2S relay, using 893 cord equipped with 639A tool and 419A tool.	
7	Insulate 9B of RCS2 relay.	
8	At timing test set J24753A — Connect 48V jack to 48-volt supply using P3K cord.	
9	Calibrate and prepare test set J24753A as covered in Section 100-130-101.	
10	Set SEND key to MK.	
11	Set REC switch to OC 48V.	
12	Set MIL-SEC switch to 0-5000.	
13	Connect 310 plug of W3M cord to TST1 jack.	
14	At sender — Connect W3M cord BK lead to ground, R lead to 8F of 2S relay using 639A tool; connect W lead to 8F of RO1 relay using 639A tool.	
15	At timing test set — Operate TST key to OPR and hold.	At timing test set — Meter reading is between 780 and 3000 ms.
16	Release TST key.	
17	At sender — Manually restore 2S relay.	
18e	If test is to be repeated — Wait at least 10 seconds after Step 16.	
19b	If delay provided by the circuit without thermistor SGR is to be determined — Remove insulating tool from 9B of RCS2 relay.	
20b	Repeat Step 15.	Meter reading is 300 to 1500 ms less than that obtained in Step 15.
21b	Repeat Steps 16 and 17.	
L 22	Remove blocking tools from A, ON, TMA, PG1, RO1, RO relays.	

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STEP	ACTION	VERIFICATION
↗ 23	Remove test tools from RO1, 2S, SO, CTR relays and replace relay covers.	
24	Remove insulating tool from 9B of RCS2 relay (if not removed as a result of Step 19b).	
25	Disconnect timing test set leads.	
26c	If no further tests are to be made — Remove make busy plugs.	
N. SSL Lamp Flash Test		
1	At trunk finder frame(s) — Insert 258-type plug(s) into test and make-busy jack(s) of trunk finder(s) associated with sender under test.	
2	At sender — When ON relay is normal — Block operated NCAM, RO1 relays.	At trouble ticketer and test frame — Associated SSL lamp flashes at 60 ipm.
3	At sender — Remove blocking tools from RO1, NCAM relays.	SSL lamp extinguished.
↙ 4	At trunk finder frame(s) — Remove make-busy plug(s).	