

**AUTOMATIC OUTGOING
INTERTOLL TRUNK TEST FRAME
TESTS
NO. 4A AND 4M TOLL SWITCHING SYSTEMS**

1. GENERAL

1.01 This section describes a method of testing the automatic outgoing intertoll trunk test frame SD-68404-01 in No. 4A and 4M toll switching systems.

1.02 This section is reissued for the following reasons:

- (a) To delete No. 4 and A4A toll switching systems from the title.
- (b) To add a new Test N to provide a method for compensating for office wiring loss.
- (c) Reletter Test N to Test O.
- (d) To add trunk identification to Test O.
- (e) To add Test P for trunk verification.

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

1.03 The tests and features tested are:

- A. Busy Timing:** This test checks the busy timing interval of the test frame.
- B. Trouble Timing:** This test checks the trouble timing interval of the test frame.
- C. Connector Control:** This test checks test class cross connections and crosspoints of all test connector switches.
- D. Marker Trouble Release:** This test checks ability of test frame to recognize a marker trouble release.
- E. Marker Channel Overflow:** This test checks ability of test frame to recognize marker failure to find an idle channel.
- F. MS Lead Continuity:** This test checks operation of test frame alarm circuit when marker encounters an open MS lead.

G. Pad Control: This test checks the pad control feature of the test frame.

H. SL Relay Failure: This test verifies operation of alarm circuit when test frame encounters a failure of the trunk SL relay.

I. OT and OR Lead Continuity: This test checks ability of test frame to check continuity of OT and OR leads.

J. Relay Verification: This test checks requirements of critical relays.

K. Resistance Measurements: This test measures resistance of critical paths.

L. Go Signal (500 Milliseconds): This test checks timing interval of go signal.

M. Supervision (1250 Milliseconds): This test checks timing interval of supervisory test.

N. Compensating for Office Wiring Loss:
This procedure is used to establish the required testing level of the AOIT at the outgoing switch appearances of the trunks being tested.

O. Operations Tests: This test verifies normal operating features of the test frame.

P. Trunk Verification: This test checks the outgoing trunk identification feature by allowing a trouble to be perforated, which must agree with the office record (E-4819).

1.04 Test H will require actions at trunk relay equipment.

1.05 Test N will require actions and verifications at outgoing link frame, also actions at trunk distribution frame.

1.06 Test P will require verifications at trouble recorder frame.

SECTION 212-505-501

1.07 Test N should be performed each time an addition is made to the office which includes new outgoing link frames.

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

2. APPARATUS

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

2.02 One of the following:

(a) 13 transmission measuring set and two testing cords, W1AD cord, 4 feet 7 inches long, code for cord includes one 35 cord tip and one 27 Mueller test clip with insulator (W1AD cord).

(b) 21A transmission measuring set and testing cord (made up locally) P2AA cord, 6 feet long, equipped with 241A plug, two 360A tools, and two KS-6278 connecting clips.

(c) 40B transmission measuring system and testing cord (made up locally) P2AA cord, 6 feet long, equipped with 241A plug, two 360A tools, and two KS-6278 connecting clips.

2.03 WV97A RCA Voltohmyst, or equivalent.

2.04 Test set for timing tests, J24753A (SD-25707-01).

TABLE A

APPARATUS	TESTS															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Transmission Measuring Set (2.02)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Voltohmyst (2.03)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Test Set (2.04)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Test Set (2.05)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Test Set (2.06)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Test Receiver (2.07)	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
Testing Cord (2.08)	1	-	-	1	2	-	-	-	-	-	-	-	-	2	-	-
Testing Cord (2.09)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Patching Cord (2.10)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Resistor (2.11)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Tool (2.12)	-	√	√	-	-	√	√	√	√	√	-	√	√	√	-	-

√ As required.

- 2.05** Pulse checking test set, J94723A (SD-96362-01).
- 2.06** Incoming, outgoing, and intertoll trunk test set circuit, J63525 (SD-68359-01).
- 2.07** 716C receiver attached to a W2AB cord, equipped with two 360A tools (2W21A cord), one 411A (test pick) tool, and one KS-6278 connecting clip.
- 2.08** Testing cord, 893 cord, 3 feet long, equipped with two 360A tools (1W13A cord) and two KS-6278 connecting clips.
- 2.09** Testing cord, W3M cord, 15 feet long, equipped with one 310 plug, three 360-type tools (3W4B cord), and one 419A (test connector) tool.
- 2.10** Patching cord, P3K cord, 6 feet long, equipped with two 310 plugs (3P15A cord).
- 2.11** 600-ohm $\pm 1\%$ resistor (145A or equivalent) equipped with two KS-6780 connecting clips (made up locally).
- 2.12** Blocking and insulating tools, as required. Use tools and apply as covered in Section 069-020-801.

3. METHOD

STEP	ACTION	VERIFICATION
A. Busy Timing		
1	Restore all keys to normal.	
2	Connect ground to terminals 112 and 113 of Home terminal strip, using 1W13A cords.	
3	Select any trunk.	Proper TH-, HU-, TN-, and U- lamps light.
4	Operate STT key.	TB lamp lights. Proper class lamps light. After approximately 5 minutes — TA lamp lights. Audible alarm sounds.
5	Momentarily operate ACO key.	Audible alarm silenced while key is operated.
6	Operate TA key.	Audible alarm silenced.
7	Operate CA key.	Test frame advances to next trunk.
8	Remove testing cords from Home terminal strip and ground.	
9	Momentarily operate RN key.	All lamps extinguished.
B. Trouble Timing		
1	Restore all keys to normal.	
2	Block operated CS relay.	
3	Select any trunk.	Proper TH-, HU-, TN-, and U- lamps light.
4	Operate STT key.	After approximately 75 seconds — TA lamp lights. Audible alarm sounds.

SECTION 212-505-501

STEP	ACTION	VERIFICATION
5	Remove blocking tool from CS relay.	
6	Momentarily operate RN key.	All lamps extinguished. Audible alarm silenced.

C. Connector Control

1	Restore all keys to normal.	
2	Insulate 4T of AL relay.	
3	Operate MAN-AP and STT keys.	TH-, HU-, TN-, and U- lamps light corresponding to closed crosspoints. One class lamp lights in accordance with test class cross connection specified for associated CG or CG1 terminal.
4	Operate and release CA key.	Test frame advances test connector to next crosspoint. One class lamp lights in accordance with test class cross connection specified for associated CG or CG1 terminal.
5	Repeat Step 4 until all equipped connector switches have been tested.	
6	Remove insulator from AL relay.	
7	Momentarily operate RN key.	All lamps extinguished.

D. Marker Trouble Release

1	Restore all keys to normal.	
2	Connect ground to terminal 18 of MC terminal strip, using 1W13A cord.	
3	Select any trunk.	Proper TH-, HU-, TN-, and U- lamps light.
4	Operate STT key.	Test frame blocks.
5	Remove testing cord from MC terminal strip and ground.	MKT and TA lamps light. Audible alarm sounds.
6	Momentarily operate RN key.	All lamps extinguished. Audible alarm silenced.

E. Marker Channel Overflow

1	Restore all keys to normal.	
2	Connect ground to terminals 04 and 18 of MC terminal strip, using two 1W13A cords.	
3	Select any trunk.	Proper TH-, HU-, TN-, and U- lamps light.
4	Operate STT key.	After approximately 75 seconds — TA lamp lights. Audible alarm sounds.
5	Remove testing cord from terminal 04.	

STEP	ACTION	VERIFICATION
6	Remove testing cord from terminal 18.	COF lamp lights.
7	Momentarily operate RN key.	All lamps extinguished. Audible alarm silenced.
F. MS Lead Continuity		
1	Restore all keys to normal.	
2	Insulate 4B of SLO relay.	
3	Select any trunk.	Proper TH-, HU-, TN-, and U- lamps light.
4	Operate STT key.	Test frame times out. MSC lamp lights.
5	Remove insulator from SLO relay.	
6	Momentarily operate RN key.	All lamps extinguished.
G. Pad Control		
1	Restore all keys to normal.	
2	Block operated SPC relay.	
3a	If APO key is provided — Operate APO key.	GPC lamp lights.
4b	If API key is provided — Connect 5T to 6T of SPC relay, using 1W13A cord.	GPC lamp lights.
5	Apply 48V battery to 2T of MT relay, using test receiver.	XPC lamp lights.
6	Remove battery from MT relay.	XPC lamp extinguished.
7	Apply battery to 5T of MT relay.	XPC lamp lights.
8	Remove battery from MT relay.	XPC lamp extinguished.
9a	If APO key is provided — Restore APO key.	GPC lamp extinguished.
10b	If API key is provided — Remove cord connected in Step 4b.	GPC lamp extinguished.
11	Remove blocking tool from SPC relay.	
H. SL Relay Failure		
1	Restore all keys to normal.	
2	Select any trunk.	Proper TH-, HU-, TN-, and U- lamps light.
3	At trunk relay equipment — Block nonoperated SL relay.	

SECTION 212-505-501

STEP	ACTION	VERIFICATION
4	Operate STT key.	Test frame times out. SLO lamp lights.
5	Remove blocking tool from SL relay.	
6	Momentarily operate RN key.	All lamps extinguished.

I. OT and OR Lead Continuity

1	Restore all keys to normal.	
2	Block operated SPC relay.	
3	Apply ground to 2B of MT relay, using test receiver.	XSP lamp lights.
4	Remove ground from MT relay.	XSP lamp extinguished.
5	Apply ground to 5B of MT relay, using test receiver.	XSP lamp lights.
6	Remove ground from MT relay.	XSP lamp extinguished.
7	Remove blocking tool from SPC relay.	

J. Relay Verification

1	Restore all keys to normal.	
2	Using test set for timing tests, in accordance with Section 100-130-101, check timing requirements of FS1, FS2, and MV relays.	Timing requirement table specifications are met.
3	Using pulse checking test set, check pulsing speed and per cent break requirements of P, PCK, and PG1 relays.	Circuit requirement table specifications are met.

K. Resistance Measurements

1	Restore all keys to normal.	
2	Connect Volttohmyst to terminal 4 of A retard coil and 5T of SPC relay.	Meter reads 415 ohms \pm 5 ohms.
3	Connect Volttohmyst to terminal 1 of A retard coil and 5T of SPC relay.	Meter reads 415 ohms \pm 5 ohms.
4	Connect Volttohmyst to terminal 1 and terminal 4 of B retard coil.	Meter reads 867.2 ohms \pm 5%.
5	Connect Volttohmyst to 3T of SLO relay and 6B of SLA relay.	Meter reads 500 ohms \pm 1%.
6	Connect Volttohmyst to 10T and 6B of SLA relay.	Meter reads 7905 ohms \pm 1%.
7a	If office has split A pads — Connect Volttohmyst to 6T of SPC relay and ground.	Meter reads 11,500 ohms \pm 1%.

STEP	ACTION	VERIFICATION
L. Go Signal (500 Milliseconds)		
1	Restore all keys to normal.	
2	Connect power cord of T-wagon to ac outlet.	
3	Patch 48V battery to 48V jack of T-wagon.	
4	Operate TIME key of T-wagon.	
5	Connect 310 plug of 3W4B cord to B jack of TL2 jack of T-wagon.	
6	Connect sleeve conductor (red) of 3W4B cord to 5B of GTC relay.	
7	Block operated TGO and CS relays.	
8	Block operated SLA relay.	GTF relay operates. GTC relay releases. S1 timer of test set stops at approximately 500 milliseconds.
9	Remove blocking tools from TGO, CS, and SLA relays.	
10	Disconnect all cords.	
M. Supervision (1250 Milliseconds)		
1	Restore all keys to normal.	
2	Connect power cord of T-wagon to ac outlet.	
3	Patch 48V battery to 48V jack of T-wagon.	
4	Operate TIME key of T-wagon.	
5	Connect 310 plug of 3W4B cord to B jack of TL2 jack of T-wagon.	
6	Connect sleeve conductor (red) of 3W4B cord to 2B of STC relay.	
7	Block operated CS, C1, M4A, SP1, F, FS1, and FS2 relays.	
8	Connect ground to 2T of V relay, using 1W13A cord.	
9	Block operated SLC relay.	STF relay operates. V relay operates. STF relay releases. DTC relay operates. STC relay releases. S1 timer of test set stops at approximately 1250 milliseconds.
10	Remove blocking tools from CS, C1, M4A, SP1, F, FS1, FS2, and SLC relays.	
11	Disconnect all cords.	

STEP	ACTION	VERIFICATION
N. Compensating for Office Wiring Loss		
<i>Note:</i> The milliwatt supply jacks 1MW at ATTC and AOIT should be within requirements as described in sections on the milliwatt distributing systems.		
1	Calibrate TMS as covered in section for selected TMS, using the properly adjusted output of 1MW jack at ATTC or AOIT.	
2	Select a number of intertoll trunks accessible to the AOIT, which go through the trunk distributing frame (TDF).	
<i>Note 1:</i> These trunks are chosen, taking into account the office layout, so as to include and be representative of the longest, shortest, and medium cable lengths through the junctors and outgoing link frames from the appearance of the AOIT on the incoming link frames.		
<i>Note 2:</i> Where intertoll trunks appear on the outgoing link frames of both switching trains, trunks on each train should be included.		
3	Make busy selected trunks.	
<i>Note:</i> Make trunks busy at both ends; also open E and M leads at circuit patch bay at near end.		
4	At HTDF — Remove OT1, OR1, OT, and OR jumpers for all selected trunks.	
5	At outgoing link frame appearance for a selected trunk — At secondary switch horizontal — Connect 600-ohm resistor to OT and OR terminals.	
6	Connect TMS to OT1 and OR1 terminals.	
7	At AOIT — Restore all keys to normal.	
8	Insulate 4B and 5B of MS relay.	
9	Connect 1T of RS relay to 8T of ST1 relay, using 1W13A cord.	
10	Connect 9T of ST1 relay to ground, using 1W13A cord.	
11	Select trunk chosen in Step 5.	Proper TH-, HU-, TN-, and U- lamps light.
12	Operate MAN KP key.	

STEP	ACTION	VERIFICATION
13	Operate STT key.	TB lamp lights. Proper class lamps light.
14	At near end — Remove busy condition on selected trunk.	TB lamp extinguished. ASX lamp lights (4A offices). DDL lamp lights (4M offices).
15	At outgoing link frame — Record reading for OT1 and OR1 leads.	
16	Transfer TMS and 600-ohm resistor to OT-OR and OT1-OR1 leads, respectively.	
17	Record reading for OT and OR leads.	
18	Restore TMS and 600-ohm resistor to origi- nal arrangement.	
19	At AOIT — Operate REP key.	
20	Operate momentarily CA key.	ASX lamp extinguished (4A offices). DDL lamp extinguished (4M offices).
21	Repeat Steps 15, 16, 17, 18, and 20 to obtain three sets of readings over different chan- nels through incoming and outgoing link frames.	
22	At outgoing link frame — Disconnect TMS and 600-ohm resistor.	
23	At near end — Restore busy condition on trunk.	
24	Repeat Steps 5 through 7 and 11 through 23 for all other selected trunks.	
25	Compute average reading recorded for OT-OR leads.	For offices with split A pad — Average reading -4 ± 0.05 db. For offices with single A pad — Average reading $-(A+2) \pm 0.05$ db.
26	Compute average reading recorded for OT1-OR1 leads.	For offices with split A pad — Average reading -4 ± 0.05 db. For offices with single A pad — Average reading $-(A+2) \pm 0.05$ db.
27a	If requirements of Step 25 or 26 are not met — Select a trunk whose reading came closest to average obtained in Step 25 or 26.	
28a	Repeat Steps 4 through 7 and 11 through 22.	
29a	Compute average reading recorded for OT-OR leads.	Same as Step 25.
30a	Compute average reading recorded for OT1-OR1 leads.	Same as Step 26.

SECTION 212-505-501

STEP	ACTION	VERIFICATION
31a	Strap build-out pads as required.	
32a	Repeat Steps 28a through 31a until requirements in Step 25 or 26 are met.	
33	Remove testing cords from ST1 and RS relays.	
34	Remove insulator from MS relay.	
35	At HTDF — Reconnect OT1, OR1, OT, and OR jumpers.	
36	Restore trunk to service.	

O. Operations Tests

Test Line (Class PT-M and PT-D)

1	Restore all keys to normal.	
2	Select proper trunk.	Proper TH-, HU-, TN-, and U- lamps light.
3	Set hundreds, tens, and units code selector switches for code of distant office test line (103 code).	
4	Operate REP and STT keys.	Call completed and test frame recycles.
5	Restore all keys.	
6	Momentarily operate RN key.	Test frame restores to normal.

Manual (Class PA-M and PA-D)

7	Select proper trunk.	Proper TH-, HU-, TN-, and U- lamps light.
8	Set hundreds, tens, and units code selector switches for code of distant office testboard (101 code).	
9	Operate MAN-AP, REP, TEL-ON-TEST, and STT keys.	SV lamp lights during automatic setup of test connection. SV lamp extinguished when testboard answers.
10	Momentarily operate RING-ON-TEST key.	Ringling signal received at distant testboard.
11	Request ringback from distant testboard.	SV lamp lights for duration of ringback.
12	Restore all keys.	
13	Momentarily operate RN key.	Test frame restores to normal.

Manual (Class OP1 and OP2)

14	Select proper trunk.	Proper TH-, HU-, TN-, and U- lamps light.
15	Operate REP, TEL-ON-TEST, and STT keys.	SV lamp lights during automatic setup of test connection. SV lamp extinguished when operator answers.

STEP	ACTION	VERIFICATION
16	Momentarily operate RING-ON-TEST key.	Operator cord lamp lights during ringing.
17	Request operator to ring back.	SV lamp lights during ringback.
18	Restore all keys.	
19	Momentarily operate RN key.	Test frame restores to normal.
Manual 103 Test (Class PT-M and PT-D)		
20	Select proper trunk.	Proper TH-, HU-, TN-, and U- lamps light.
21	Operate MAN-MP, REP and STT keys.	S lamp lights.
22	Dial or key pulse code of distant office test line (103 code).	S lamp extinguished.
23	Momentarily operate RING-ON-TEST key.	SV lamp lights.
24	Again operate RING-ON-TEST key momentarily.	SV lamp flashes at 120 ipm.
25	Momentarily operate RN key.	All lamps extinguished.
Trunk Identification Test		
26	Select proper trunk.	Proper TH-, HU-, TN-, and U- lamps light.
27	Set hundreds, tens, and units code selector switches for code of distant office test line (103 code).	
28	Operate TNI key.	
29	Operate REP and STT keys.	Call completed and test frame recycles.
30	Restore all keys.	
31	Momentarily operate RN key.	All lamps extinguished.
P. Trunk Verification		
1	Restore all keys to normal.	
2	Select proper trunk.	Proper TH-, HU-, TN-, and U- lamps light.
3	Set hundreds, tens, and units code selector switches for code of distant office test line (103 code).	
4	Operate VK key.	
5	Operate and restore STT key.	VK lamp lights. At trouble recorder frame — Trouble card perforated with IT or TC, TC-tens and units, TB-, and MS- punches. Trouble card punches must agree with office record (E-4819) for location of trunk being tested. VK lamp extinguished. Test frame restores to normal.
6	Restore all keys.	
7	Momentarily operate RN key.	All lamps extinguished.