

ROTARY OUT-TRUNK SWITCHES
OPERATION TESTS
USING TRUNK TEST SET SD-90469-02 (J94710A)
STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section describes a method of testing 3- and 4-wire rotary out-trunk switches, using the trunk test set SD-90469-02.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 The tests covered are:

(A) *SL Relay, Trunk Continuity, Polarity, and Stepping Tests:* This test checks the SL relay for speed of operation and, when "Q" option is provided in the test set, applies a marginal test to the SL relay. This test also checks the ability of a switch to find an idle trunk when the trunk on which it is resting is seized, and the continuity and polarity of the tip and ring. On 3-wire switches the continuity of the sleeve is verified. Test (D) is required to completely verify the continuity of the sleeve lead on 4-wire switches.

(B) *SL Relay, Trunk Continuity, Polarity, Stepping, and Alarm Tests:* Test (B), in addition to making the same checks as Test (A), also checks the alarm features. When Test (B) is scheduled, it is not necessary to make Test (A) on the same cycle.

(C) *All Trunks Busy Relay and Traffic Register Tests:* This test checks the C and SP relays of 3-wire switch groups and the C and TB relays of 4-wire switch groups. Test (C) also includes a test of the all trunks busy register operation. When making the traffic register test, an assistant is required

at the traffic register rack. Test (C) should be made only during periods of very light traffic.

(D) *Sleeve and Stepping Circuit — 4-Wire Rotary Out-Trunk Switches:* This test checks the sleeve continuity through the switch bank and bank multiple on 4-wire switches which have a separate bank for control of stepping. Since the test is effective on idle terminals only, it is recommended that this test be made during periods of very light traffic.

Note: Ordinarily this test should be made on a switch located at or near the end of the bank multiple in each rotary out-trunk switch group. It may also be applied on an individual switch basis.

(E) *A Lead Continuity (W Option) — 4-Wire Rotary Out-Trunk Switches:* This test checks the continuity of the A lead of 4-wire switches by using the test circuit for 4-wire switches such as are shown on SD-30868-01, and in conjunction with the trunk test set. This test can not be made on rotary out-trunk switches associated with trunks in which the A lead is not connected to battery through a relay while the trunk is idle, such as are shown on SD-31712-01.

1.04 *Lettered Steps:* The letters a, b, c, etc, are added to a step number to indicate that the steps cover an action which may or may not be required, depending on local conditions. The conditions under which a lettered step or series of steps should be made are given in the ACTION column, and all steps governed by the same condition are designated by the same let-

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ter. Where a condition does not apply, the associated steps may be omitted.

1.05 A timed delay interval, between application of the test condition and receipt of audible and visual alarm indications, will be encountered in a majority of the tests covered in this section. Reference to a specified time interval in receiving these individual alarm indications is omitted, as the intervals will vary depending on circuit options used, alarm speed-up features, etc. Accordingly, it will be necessary for the tester to familiarize himself with the particular time intervals applicable in his office on the various tests, and enter this information in the space provided in the test methods.

1.06 The test equipment specified in this section is designed to apply proper marginal tests (simulated critical circuit conditions) when the circuit under test equipment have an applied voltage of 48.5 to 50. In those offices where power plants are normally operated at more than 50 volts, the battery voltage should be reduced and maintained within the required limits while the tests are being made.

2. APPARATUS

All Tests

2.01 Trunk Test Set J94710A (SD-90469-02).

2.02 P3K Cord, 12 feet long, equipped with two No. 310 Plugs (3P15B Cord) (battery and ground cord).

2.03 P3E Cord, 6 feet long, equipped with two No. 310 Plugs (3P7A Cord).

Tests (A), (B), (D), and (E)

2.04 No. 258C or 258D Plug, as required (dummy plugs).

Test (B)

2.05 Two No. 262B Plugs (or equivalent), for offices not equipped to speed up the timing of alarms for test purposes.

Test (C)

2.06 No. 136B Tools, as required (for blocking flat-type relays).

Test (E)

2.07 P3E Cord, 10 feet long, equipped with No. 310 Plugs (3P6F Cord).

2.08 W1B Cord, 10 feet long, equipped with No. 310 Plug (1W5A Cord).

3. PREPARATION

STEP

ACTION

VERIFICATION

All Tests

1 Patch BAT G jack of test set to frame battery supply jack.

Note: To avoid possible grounding of battery supply lead, connect cord to test set first and, when disconnecting, remove from test set last.

2 Operate the 600 key.

3a If circuit is equipped with MB jack—Insert dummy plug into MB jack prior to making test to prevent seizure by service call. Remove all dummy plugs when tests are concluded.

STEP	ACTION	VERIFICATION
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Tests (A), (B), (D), and (E)

4b If set is wired for marginal SL relay test ("Q" option) —
Insert No. 258C or 258D plug into C jack of test set.

Note: A check for "Q" option may be made by connecting battery and ground to the test set (as in Step 1) and applying ground momentarily to sleeve of C jack. If RR lamp lights "Q" option is provided, if not, "R" option is provided.

4. METHOD

STEP	ACTION	VERIFICATION
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(A) SL Relay, Trunk Continuity, Polarity, and Stepping Tests

5	Insert one end of P3E cord into T jack.	
6	Operate REV, CT keys.	
7	Touch tip of free plug of P3E cord to sleeve of TST jack of switch under test.	C lamp does not light. <i>Note:</i> If C lamp is lighted, delay test, or proceed on another switch.
8	Restore REV, CT keys.	
9	Insert free plug of P3E cord associated with T jack into TST jack of switch.	BSY lamp does not light.
10	Operate SL key.	Switch does not step. Any other switches resting on same trunk step off.
11	Restore SL key.	
12	Operate ROT S key.	
13	Operate DL ST key.	Switch steps to next terminal and continues to step (other switches in same group may step also). <i>Note:</i> If switch fails to step, it may be due to a defective trunk which should be made busy before proceeding with test.
14	After switch steps over all terminals — Restore DL ST, ROT S keys.	
15	Remove P3E cord from TST jack of switch under test.	
16	Repeat Steps 6 through 15 on all switches to be tested.	
17	Restore all keys.	
18	Remove all cords.	

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STEP	ACTION	VERIFICATION
(B) SL Relay, Trunk Continuity, Polarity, Stepping, and Alarm Tests		
5c	If provision is made to speed up common timing circuit — Operate associated key. Restore it to normal at conclusion of tests.	
6	Insert one end of P3E cord into T jack.	
7	Operate REV, CT keys.	
8	Touch tip of free plug of P3E cord to sleeve of TST jack of switch under test.	C lamp does not light. <i>Note:</i> If C lamp lights, delay test, or proceed on another switch.
9	Restore REV, CT keys.	
10	Insert free plug of P3E cord associated with T jack into TST jack of switch.	BSY lamp does not light.
11	Operate SL key.	Switch does not step. Any other switches resting on same trunk step off.
12	Restore SL key.	
13	Operate ROT S key.	
14	Operate DL ST key.	Switch steps to next terminal and continues to step (other switches in same group may step also). <i>Note:</i> If switch fails to step, it may be due to a defective trunk which should be made busy before proceeding with test.
15	After switch steps over all terminals and again approaches terminal 21 — Restore DL ST key.	
16d	If switch did not stop on terminal 21 — Operate and restore DL ST key until switch rests on terminal 21 with DL ST key normal. <i>Note:</i> If terminal 21 is busy (switch fails to stop on 21) delay test until terminal is idle.	
17	Operate SL key.	Switch does not step. Any other switches resting on same trunk step off.

Alarms on ST Relay Only (3-Wire Rotary Out-Trunk Switch)

Alarms Speeded Up

18	Restore ROT S, SL keys.	
19	Operate DL ST key.	Switch steps to terminal 22. After short delay — Alarm and aisle pilot lamps light. Audible alarm sounds.

STEP	ACTION	VERIFICATION
20	Restore DL ST key.	
21	Operate ROT S key.	Switch steps to terminal 1 or beyond. BSY lamp does not light. Alarm indications retired.
22	Restore ROT S key.	
23	Remove P3E cord from TST jack of switch.	
24	Repeat Steps 7 through 23 on all switches to be tested.	
25	Restore all keys.	
26	Remove all cords.	
Alarms Not Speeded Up		
27	Restore ROT S, SL keys.	
28	Remove P3E cord from TST jack of switch.	
29	Insert No. 26B plug into TST jack of switch.	Switch steps to terminal 22 — After timing interval () — Alarm and aisle pilot lamps light. Audible alarm sounds.
30e	If this test is to be applied to other switches — Leave No. 262B plug in TST jack of switch. Repeat Steps 7 through 17 and 27 through 29 on next switch to be tested.	Alarm indications continue.
31e	After inserting No. 262B plug in TST jack of switch now under test — Remove No. 262B plug from switch previously tested.	Switch previously tested steps to terminal 1 or beyond. Alarm indications continue.
32e	Repeat Steps 30e and 31e on all switches to be tested.	
33	Remove No. 262B plug from TST jack of last switch tested.	Switch steps to terminal 1 or beyond. Alarm indications retired.
34	Restore all keys.	
35	Remove all cords.	

Alarm on ST and SL Relay (4-Wire Rotary Out-Trunk Switch)**Alarms Speeded Up — Key A Equipped**

36	Manually step switch under test to terminal 22.	
37	Restore ST key.	Switch does not step. After short delay — Alarm and aisle pilot lamps light. Audible alarm sounds.

STEP	ACTION	VERIFICATION
Alarms Speeded Up — Key A Not Equipped		
58	Manually step switch to terminal 22.	
59	Restore ROT S, SL keys.	Switch does not step. After short delay — Alarm and aisle pilot lamps light. Audible alarm sounds.
60	Manually step switch to terminal 1 (or beyond until BSY lamp, if lighted, is extinguished).	Alarm indications retired. BSY lamp does not light.
61	Operate the ROT S key.	
62	Momentarily operate and restore DL ST key until the switch rests on terminal 21 with DL ST key normal.	
63	Restore ROT S key.	
64	Operate DL ST key.	Switch steps to terminal 22. After short delay — Alarm and aisle pilot lamps light. Audible alarm sounds.
65	Restore DL ST key.	
66	Operate ROT S key.	Switch steps to terminal 1 or beyond. BSY lamp does not light. Alarm indications retired.
67	Restore ROT S key.	
68	Repeat Steps 7 through 17 and 58 through 67 on all switches to be tested.	
69	Restore all keys.	
70	Remove all cords.	
Alarms Not Speeded Up — Key A Not Equipped		
71	Manually step switch to terminal 22.	
72	Restore ROT S, SL keys.	After timing interval () — Alarm and aisle pilot lamps light. Audible alarm sounds.
73	Remove P3E cord from TST jack of switch.	Alarm indications continue.
74	Repeat Steps 7 through 17 and 71 and 72 on next switch to be tested.	
75	Remove P3E cord from TST jack of switch and reinsert into TST jack of first switch tested.	
76	Manually step first switch to terminal 1 (or beyond until BSY lamp, if lighted, is extinguished).	Alarm indications continue.

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STEP	ACTION	VERIFICATION
77	Operate ROT S key.	
78	Momentarily operate and restore DL ST key until first switch again rests on terminal 21 with DL ST key normal. <i>Note:</i> If terminal 21 is busy (switch fails to stop on 21) delay test until terminal is idle.	
79	Remove P3E cord from TST jack of switch under test.	
80	Insert No. 262B plug into TST jack of switch.	Switch steps to terminal 22. Alarm indications continue.
81	Insert P3E cord into TST jack of second switch.	
82	Restore ROT S key.	
83	Manually step switch to terminal 1 (or beyond, until busy lamp if lighted is extinguished).	Alarm indications continue.
84	Operate ROT S key.	
85	Momentarily operate and restore DL ST key until switch again rests on terminal 21 with DL ST key normal.	
86	Restore ROT S key.	
87	Remove P3E cord from TST jack of switch.	
88	Insert No. 262B plug into TST jack of switch.	Switch steps to terminal 22.
89	Remove No. 262B plug from TST jack of first switch.	Switch steps to idle terminal. Alarm indications continue.
90	Before removing No. 262B plug from TST jack of second switch — Repeat Steps 7 through 17 and 71 and 72 on next switch to be tested. <i>Note:</i> This avoids the necessity of waiting for the timing interval on the alarms, covered in the verification column of Step 71.	Switch previously tested steps to terminal 1 or beyond. When No. 262B plug is removed — Alarm indications continue.
91	Repeat Step 73 through 90 on all switches to be tested.	
92	Remove No. 262B plug from TST jack of switch.	Switch steps to terminal 1 or beyond. Alarm indications retired. BSY lamp does not light.
93	Restore all keys	
94	Remove all cords.	

STEP	ACTION	VERIFICATION
(C) All Trunks Busy Relay and Traffic Register Tests		
Test of 3-Wire Rotary Out-Trunk Switch Groups (Equipped with SP relay)		
4	Insert one end of P3E cord into T jack.	
5	Block operated all TK relays associated with group under test.	Group C relay releases. SP relays operate. Traffic register (if other than 14 type) scores.
6	Operate REV, CT keys.	
7	Touch tip of free plug of P3E cord to sleeve of TST jack of switch under test.	C lamp does not light. <i>Note:</i> If C lamp is lighted, delay test, or proceed on another switch.
8	Restore REV, CT keys.	
9	Insert free plug of P3E cord associated with T jack into TST jack of switch.	
10	Operate ROT S, DL ST keys.	Switch does not step.
11	Restore ROT S, DL ST keys.	
12	Remove blocking tools from TK relays, one at a time, until one of the TK relays releases.	All idle switches step to terminal associated with released TK relay. Traffic register (if 14 type) scores.
13	Remove blocking tools from all TK relays.	
14	Repeat Steps 5 through 13 on one switch in each 3-wire rotary out-trunk switch group to be tested.	
15	Restore all keys.	
16	Remove all cords.	
Test of 3- and 4-Wire Rotary Out-Trunk Switch Groups (Not Equipped with SP Relay)		
17	Block operated all TK relays associated with group under test.	Group C relay releases. TB relays operate (if provided). Idle switches in group step to terminal 22 and stop. Traffic register (if other than 14 type) scores.
18	Remove blocking tools from TK relays, one at a time, until one TK relay releases.	Idle switches step from terminal 22 to terminal associated with released TK relay. Traffic register (if 14 type) scores.
19	Remove blocking tools from all TK relays.	
20	Repeat Steps 17 through 19 in each 4-wire rotary out-trunk switch group to be tested.	

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STEP	ACTION	VERIFICATION
21	Restore all keys.	
22	Remove all cords.	
(D) Sleeve and Stepping Circuit — 4-Wire Rotary Out-Trunk Switches		
5	Insert one end of P3E cord into T jack.	
6	Operate REV, CT keys.	
7	Touch tip of free plug of P3E cord to sleeve of TST jack of switch under test.	C lamp does not light. <i>Note:</i> If C lamp is lighted, delay tests, or proceed on another switch.
8	Restore REV, CT keys.	
9	Insert free plug of P3E cord associated with T jack into TST jack of switch.	BSY lamp does not light.
10	Operate SL key.	Switch does not step, other switches may step.
11	Momentarily operate and restore DL ST key.	Switch does not step (stepping indicates open sleeve lead).
12	Restore SL key.	Switch may or may not step depending on release time of SL vs. TK relays.
13e	If switch did not step to next idle terminal in Step 11 — Momentarily operate and restore DL ST key.	Switch steps to next idle terminal (failure to step indicates stepping circuit is open).
14	Repeat Steps 10 through 13c until all idle terminals have been tested.	
15	Remove P3E cord from TST jack of switch under test.	
16	Repeat Steps 6 through 15 on all switches to be tested.	
17	Restore all keys.	
18	Remove all cords.	

(E) A Lead Continuity (W Option) 4-Wire Rotary Out-Trunk Switches

5	Insert plug of W1B cord into A jack of test circuit for 4-wire switches, and connect clip of this cord to incoming A lead terminal at unit terminal strip.	
6	Connect T jack of test set to IN jack of test circuit using a P3E cord, 10 feet long.	
7	Connect OUT jack of test circuit to TST jack of switch using a P3E cord, 6 feet long.	BSY lamp does not light. <i>Note:</i> If busy lamp is lighted, disconnect immediately. Delay test or proceed on another switch.

STEP	ACTION	VERIFICATION
8	Operate SL key.	Switch does not step. Any other switches resting on same terminal step off.
9	Restore SL key.	
10	Operate ROT S key.	
11	Operate DL ST key.	Switch steps and continues to step. <i>Note:</i> Failure of switch to step may indicate an open A lead, failure of AT relay to operate, an open tip, ring or sleeve, or a reversed tip and ring, in which case restore DL ST key and operate SL key. This will hold switch under test on trunk and step idle switches to next idle trunk. Trunk should be made busy before proceeding with test.
12	After switch has stepped over all terminals — Restore DL ST and ROT S keys.	
13	Remove P3E cord from TST jack of switch.	
14	Repeat Steps 7 to 13 on all switches to be tested.	
15	Restore keys.	
16	Remove all cords.	