CENTRAL OFFICE TEST CIRCUIT SD-98067-01
520-TYPE PBX EMERGENCY REPORTING SYSTEM
OPERATION TESTS

1. GENERAL

1.01 This section describes a method of testing line trouble, marginal operating, and miscellaneous alarm conditions of the central office test circuit SD-98067-01 when used with the line concentrator associated with the 520-type PBX.

1.02 This section is reissued to change the title of the section, to provide coverage for a second controller, and to bring the section up to date. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The circuits on which these tests are performed are part of a fire and police emergency reporting system, and precautions must be taken that service from station lines is not affected.

1.04 The tests covered are:

*A. **Operation Test When Line is in Trouble (Loop Failure):*** This test checks whether the test circuit will detect an open loop, and if this open is detected, whether proper alerting procedures are followed.

*B. **Marginal Resistance:*** This test checks each of the resistors used in making marginal tests to determine if they are within specified limits.

*C. **Marginal Relay:*** This test checks whether the test circuit recognizes that a line under test has been seized for a service call.

*D. **Leak Check Relay:*** This test checks whether the test circuit recognizes the condition where the leak to ground from tip or ring is too low.

*E. **Trunk DF Relay Simplex:*** This test checks the simplex which the test circuit applies to a trunk under test to operate the trunk DF relay.

*F. **Timing:*** This test checks the operation of the timing features incorporated in the test circuit.

*G. **No-Voltage Alarm:*** This test checks the operation of the voltage monitoring relays in the test circuit.

*H. **Manual Key Operation:*** This test checks for sounding of a major alarm if the LT key is not restored.

1.05 If it appears that a test may be interfering with service calls, or an alarm condition occurs other than one associated with the test being made, the test shall be stopped until the service calls are completed or the alarm condition cleared.

1.06 From office records or charts provided (as suggested in Section 067-302-501), determine equipment location and assignment of test line to be used in test.

1.07 Test A requires actions and verifications at the headquarters location. The test shall be terminated temporarily at the request of the headquarters operator when it might interfere with the efficient handling of service calls and dispatch duties at the headquarters switchboard.

1.08 ***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 of each item are covered in the paragraph indicated by the number in parentheses.

TABLE A

APPARATUS	TESTS						
	A	B	C	D	E	F	G
KS-14510 L1 Volt-Ohm-Milliammeter	–	1	–	–	1	–	–
Test Set (2.02)	–	–	1	–	–	–	–
KS-3008 Stopwatch, or Equivalent	–	–	–	–	–	1	–
258-Type (Dummy) Plug	–	–	√	–	–	–	–
Resistor (2.03)	–	–	–	1	–	–	–
Resistor (2.04)	–	–	–	1	–	–	–
Cord (2.05)	–	–	1	–	–	–	–
Cord (2.06)	–	–	2	2	–	–	–
Cord (2.07)	–	–	–	2	–	–	–
Cord (2.08)	–	–	–	–	1	–	–
Tools (2.09)	√	–	–	–	–	√	√

√ As required.

2.02 Contact closure test set, J94724A (SD-95365-01).

2.03 12,000-ohm resistor, 145-type or equivalent.

2.04 33,000-ohm resistor, 145-type or equivalent.

2.05 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), and one 419A (test connector) tool (for connecting to fixed springs of wire-spring relays) and 624A (relay winding connector) tool (for connecting to winding terminals of wire-spring relays).

2.06 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord) and two KS-6278 connecting clips (for connecting ground to resistors).

2.07 Testing cord, W2C cord, 10 feet long, equipped with one 310 plug and two 59 cord tips (2W6A cord) (for connecting test resistors to LK jack).

2.08 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord) and two 419A (test connector) tools for connecting to wire-spring relay terminals).

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

3. PREPARATION

STEP	ACTION	VERIFICATION
All Tests		
1a	If test circuit is on automatic test cycle— At jack, key, and lamp panel— Wait until completion of test cycle before starting.	

STEP	ACTION	VERIFICATION

4. METHOD

STEP	ACTION	VERIFICATION
	A. Operation Test When Line is in Trouble (Loop Failure)	
2	Originate a call to headquarters switchboard associated with line selected for test. *Note:* When headquarters operator answers, acquaint operator with test to be performed.	At headquarters— Operator answers.
3	At jack, key, and lamp panel— Operate controller key to CONT 0.	
4	At line circuit unit— Insulate contact 4M of CO relay in line circuit under test.	
5	At jack, key, and lamp panel— Operate LT key.	LT lamp lights.
6	Operate GPC key appropriate number of times to seize proper switch	Proper G- lamp lighted.
7	Operate SPC key appropriate number of times to operate proper select magnet.	Proper SM- lamp lighted.
8	Operate HPC key appropriate number of times to operate proper hold magnet.	Proper HM- lamp lighted.
9	Momentarily operate MAN ST key.	Test circuit begins operation. TH-, H-, T-, U- lamps lighted corresponding to box number of line under test. LPF lamp lighted. Test circuit completes cycle. After approximately 5 seconds— TOA lamp lighted. ALM lamp lighted. Major alarm sounded.
10	At jack, key, and lamp panel— Momentarily operate ACO key.	Major alarm silenced. ALM lamp remains lighted.
11	After answering incoming call— Ask headquarters operator for results.	Headquarters operator should report— TBL TKT lamp lighted. Line number under test displayed. Audible tone heard in receiver. Audible alarm sounding. Trouble ticket received with line number preceded by letter T.

STEP	ACTION	VERIFICATION
12	At headquarters— Operator momentarily operates ALM CO key.	At headquarters— TBL TKT lamp extinguished. Alarm silenced.
13	At headquarters— Momentarily operate RLS key.	Incoming call to central office disconnected.
14	At jack, key, and lamp panel— Momentarily operate RN key.	All lamps extinguished except LT lamp.
15	Restore LT key.	LT lamp extinguished.
16b	If second controller circuit is provided— Operate controller key to CONT 1.	
17b	Repeat Steps 4 through 15.	
18c	If no further tests are to be performed— Originate call to headquarters and advise operator that tests have been completed.	

B. Marginal Resistance

2	Check resistance values in accordance with Table B. *Note:* To check a resistor listed in column one, set meter scale as shown in column two, and follow instructions in column three. Then connect meter clips as shown in column four, and observe resistance readings shown by limits in column five.	
3b	If test circuit is to be used on automatic test cycle— Restore all keys to normal.	Automatic test of all circuits starts at beginning of timer cycle.

C. Marginal Relay

2	At jack, key, and lamp panel— Operate controller key to CONT 0.	
3	At controller monitoring unit— Connect test cord between upper winding of CS relay and terminal 2 of LU relay.	
4	Connect contact closure test set per Section 100-138-101.	
5	Connect 587A contact closure indicator to contacts 2 and 5 of LG relay.	

STEP ACTION VERIFICATION

TABLE B

(1) RESISTOR	(2) SCALE	(3) BLOCK OR INSULATE	(4) CONNECT LEADS TO		(5) RESISTANCE (OHMS) LOW	HIGH
LS	X1		11(SR2)	−48V	7.6	8.4
TK	X10		1M(DK)	−48V	346.5	353.5
PL+PL1+R Relay	X100		(Misc D)TS Term. 56	(Misc D)TS Term. 57	2430.0	2570.0
A+AT Relay	X100		7M(TT3)	10(TKR)	2479.7	2544.3
A+A1+AT Relay	X1000	10(TSR)	7M(TT3)	10(TKR)	5212.1	5331.9
T2+R2+OC Relay	X100	(OT)0	8B(TKR)	4B(TKR)	2595.6	2684.4
TK1+TK Relay	X100		10M(LU)	−48V	4282.5	4823.5
RK+RK Relay	X100	6(RK1), 10(RK1)	6(LB)	Grd	4282.5	4823.5
A+AR	X1000	9(STT1)	10B(TSR)	1(OTK)	5362.8	5471.1
RK1	X1000	11(SK1)	6(RK1)	Grd	6836.0	6974.0
T	X1000		8M(TKR)	4M(TKR)	12474.0	12726.0

6	Connect ground to top terminal of LGO resistor. ***Note:*** This lead should connect to the side of the 210-ohm portion of the resistor not connected to the 3900-ohm portion.	Contact closure indicator lamp lighted. CS relay does not operate.
7	Remove ground from LGO resistor.	Contact closure indicator lamp extinguished.
8	Repeat Steps 6 and 7 for each LG1-19 resistor.	Same as Steps 6 and 7.
9	Place 258 (dummy) plug in LG jack.	
10	Connect ground to top of LGO resistor.	CS relay remains nonoperated.
11	Connect ground to top terminal of LG1 resistor.	CS relay operated.
12	Remove ground from LG1 resistor.	CS relay released.
13	Repeat Steps 11 and 12 for LG9 and 10 resistors.	Same as Steps 9 and 10.
14	Remove ground from LGO resistor.	
15	Repeat Steps 9 through 14 for each combination of two LG- resistors.	
16b	If second controller circuit is provided— Operate controller key to CONT 1.	
17b	Repeat Steps 3 through 15.	

STEP	ACTION	VERIFICATION
18	Remove test cord from CS and LU relays.	
19	Remove dummy plug from LG jack.	
20	Disconnect contact closure test set.	
21c	If test circuit is to be returned to automatic test cycle— Restore all keys to normal.	Automatic test of all circuits starts at beginning of timer cycle.

D. Leak Check Relay

2	Connect test cord to -48V battery and one end of a 12,000-ohm resistor.	
3	Connect test cord from other end of 12,000-ohm resistor (Step 2) to ground.	
4	Connect test cord to -48V battery and one end of a 33,000-ohm resistor.	
5	Connect test cord from other end of 33,000-ohm resistor (Step 4) to ground.	
6	At line and station test unit— Insert plug of test cord associated with 12,000-ohm resistor into LK jack.	LK2 relay operates.
7	Remove plug associated with 12,000-ohm resistor from LK jack.	LK2 relay released.
8	Insert plug of test cord associated with 33,000-ohm resistor into LK jack.	LK2 relay does not operate.
9	Remove plug associated with 33,000-ohm resistor from LK jack.	
10	Disconnect all test cords from battery, ground, and both resistors.	
11b	If test circuit is to be returned to automatic test cycle— Restore all keys to normal.	Automatic test of all circuits starts at beginning of timer cycle.

E. Trunk DF Relay Simplex

2	Set meter selection switch for DC MA-120+ scale.	
3	Connect BLACK meter lead to frame ground.	

STEP	ACTION	VERIFICATION
4	At test circuit— Connect test cord between 12 and 12M of OTK relay.	
5	At select and hold magnet control unit— Attach RED meter lead to 8M of the HLK relay.	Meter reads between 30.1 ma and 33.1 ma.
6	Remove RED meter lead from HLK relay.	
7	Remove test cord from 12 and 12M of OTK relay.	
8	Connect test cord between 10 and 10M of HLK relay.	
9	At select hold magnet control unit— Connect RED meter lead to 9M of HLK relay.	Meter reads between 30.1 ma and 33.1 ma.
10	Remove RED meter lead from HLK relay.	
11	Remove BLACK meter lead from frame ground.	
12	Remove test cord from OTK relay.	
13b	If test circuit is to be returned to automatic test cycle— Restore all keys to normal.	Automatic test of all circuits starts at beginning of timer cycle.
F. Timing		
2	At jack, key, and lamp panel— Operate controller key to CONT 0.	
3	At test circuit— Simultaneously manually operate and hold operated STT relay and start stopwatch.	At jack, key, and lamp panel— After time delay of approximately 4 to 6 seconds— TMO lamp lights.
4	When TMO lamp lights— Stop stopwatch and release STT relay.	Stopwatch reads between 3.8 and 6.1 seconds. STT relay remains operated.
5	At jack, key, and lamp panel— Momentarily operate RN key.	TMO lamp extinguished. At test circuit— STT relay released.
6	Reset stopwatch to zero.	
7	At test circuit— Insulate contact 5 SDTC relay.	
8	Block nonoperated ST relay.	

STEP	ACTION	VERIFICATION
9	Block operated AUTO relay.	
10	Simultaneously manually operate and hold operated TT3 relay and start stopwatch.	After time dely of approximately 4 to 6 seconds— TOA lamp lights. Minor alarm sounded. ALM lamp lighted.
11	When TOA lamp lights— Stop stopwatch and release TT3 relay.	Stopwatch reads between 3.5 and 5.5 seconds. TT3 relay released.
12	Reset stopwatch to zero.	
13	At jack, key, and lamp panel— Momentarily operate ACO key.	Minor alarm silenced. ALM lamp extinguished.
14	Momentarily operate RN key.	TOA lamp extinguished.
15	Simultaneously manually operate and hold operated SDT relay and start stopwatch.	After a time delay of approximately 4 to 6 seconds— TOA lamps lights. Minor alarm sounded. ALM lamp lighted.
16	When TOA lamp lights— Stop stopwatch and release SDT relay.	Stopwatch reads between 3.5 and 5.5 seconds. STD relay released.
17	Reset stopwatch.	
18	At jack, key, and lamp panel— Momentarily operate ACO key.	Minor alarm silenced. ALM lamp extinguished.
19	Momentarily operate RN key.	TOA lamp extinguished.
20	At test circuit— Simultaneously manually operate and hold operated CIA relay and start stopwatch.	After a time delay of approximately 4 to 6 seconds— TOA lamp lights. Minor alarm sounded. ALM lamp lighted.
21	When TOA lamp lights— Stop stopwatch and release CIA relay.	Stopwatch reads between 3.5 and 5.5 seconds. CIA relay released.
22	Reset stopwatch.	
23	At jack, key, and lamp panel— Momentarily operate ACO key.	Minor alarm silenced.
24	Momentarily operate RN key.	TOA lamp extinguished. ALM lamp extinguished.

STEP	ACTION	VERIFICATION
25	At test circuit— Simultaneously manually operate and hold operated DK relay and start stopwatch.	After a time delay of approximately 4 to 6 seconds— TOA lamp lights. Minor alarm sounded. ALM lamp lighted.
26	When TOA lamp lights— Stop stopwatch and release DK relay.	Stopwatch reads between 3.5 and 6.5 seconds. DK relay released.
27	At jack, key, and lamp panel— Momentarily operate ACO key.	Minor alarm silenced.
28	Momentarily operate RN key.	TOA lamp extinguished. ALM lamp extinguished.
29	Reset stopwatch.	
30	At test circuit— Remove blocking tool from AUTO relay.	
31	At jack, key, and lamp panel— Momentarily operate RN key.	AUTO relay released.
32	At test circuit— Remove blocking tool from ST relay.	
33	Remove insulation from contact 5 SDTC relay.	
34	Operate LT key.	LT lamp lighted.
35	Insulate contact 6M of LT relay.	
36	Simultaneously manually operate and hold operated CIA relay and start stopwatch.	After a time delay of approximately 4 to 6 seconds— TOA lamp lights. Minor alarm sounded. ALM lamp lighted.
37	When TOA lamp lights— Stop stopwatch and release CIA relay.	Stopwatch reads between 3.5 and 5.5 seconds. CIA relay released.
38	Reset stopwatch.	
39	At jack, key, and lamp panel— Momentarily operate ACO key.	Minor alarm silenced.
40	Momentarily operate RN key.	TOA lamp extinguished. ALM lamp extinguished.
41	At test circuit— Simultaneously manually operate and hold operated DK relay and start stopwatch.	After a time delay of approximately 4 to 6 seconds— TOA lamp lights.

STEP	ACTION	VERIFICATION
		Minor alarm sounded. ALM lamp lighted. LPF lamp lights.
42	When TOA lamp lights— Stop stopwatch and release DK relay.	Stopwatch reads between 3.5 and 5.5 seconds. DK relay released. LPF lamp extinguished.
43	Reset stopwatch to zero.	
44	Remove insulation from contact 6M of LT relay.	
45	At test circuit— Momentarily operate ACO key.	Minor alarm silenced.
46	Momentarily operate RN key.	TOA lamp extinguished. ALM lamp extinguished.
47	Restore LT key.	LT lamp extinguished.
48b	If second controller circuit is provided— At jack, key, and lamp panel— Operate controller key to CONT 1.	
49b	Repeat Steps 3 through 47.	

G. No-Voltage Alarm

2	At timer unit— Remove 24-volt A fuse.	AC and ALM lamps lighted. Major alarm sounded.
3	At jack, key, and lamp panel— Momentarily operate ACO key.	Major alarm silenced.
4	At timer unit— Replace 24-volt A fuse.	At jack, key, and lamp panel— AC and ALM lamps extinguished.
5	At test circuit— Block nonoperated HVP relay.	At jack, key, and lamp panel— 130 and ALM lamps lighted. Major alarm sounded.
6	Momentarily operate ACO key.	Major alarm silenced.
7	At test circuit— Remove blocking tool from HVP relay.	At jack, key, and lamp panel— 130 and ALM lamps extinguished.
8b	If test circuit is to be returned to automatic test cycle— Operate AUTO ST key.	Automatic test of all circuits starts at beginning of timer cycle.

STEP	ACTION	VERIFICATION
H. Manual Key Operation		
2	At jack, key, and lamp panel— Operate controller key to CONT 0.	
3	Operate LT key.	When selector completes cycle— Selector steps for automatic cycle. Major alarm sounded. ONA lamp lighted.
4	Restore LT key.	Automatic cycle begins. Major alarm silenced. ONA lamp extinguished.
5b	If second controller circuit is provided— At jack, key, and lamp panel— Operate controller key to CONT 1.	
6b	Repeat Steps 3 and 4.	