AUTOMATIC TEST CIRCUIT SD-32365-01 (J38929)

TESTS

STEP-BY-STEP COMMON CONTROL OFFICES

1. GENERAL

1.01 This section describes a method of testing the automatic test circuit SD-32365-01 used in No. 1, 350A, or 355A step-by-step common control offices.

1.02 This section is reissued to add Test E TOUCH-TONE Frequency Supply and to make corrections in Tests A and B.

1.03 The tests covered are:

A. ***Pulse Generator:*** This test checks the pulsing requirements of the pulse generator.

B. ***Timing:*** This test checks the operation of STO and LTO circuit pack timers.

C. ***Critical Components:*** This test checks resistors used to simulate marginal conditions.

D. ***Trouble Lamps:*** This test checks indicator lamps that are not frequently operated.

E. ***TOUCH-TONE Frequency Supply:*** This test checks the frequencies and signal levels of the TOUCH-TONE frequency supply circuit.

2. APPARATUS

Test A

2.01 Pulse checking test set J94723A (SD-96362-01).

2.02 Two patching cords, P3K cord, 6 feet long, equipped with two 310 plugs (3P15A cord).

Tests B and C

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

Test B

2.04 KS-3008 stopwatch, or equivalent.

2.05 Timing test set J24753A (SD-25707-01).

2.06 Patching cord, P3K cord, 6 feet long, equipped with two 310 plugs (3P15A cord) (used for connecting battery to timing test set).

2.07 Patching cord, W3M cord, 6 feet long, equipped with one 310 plug, one 360A tool, one 360B tool, and one 360C tool (3W4A cord) (used to connect circuit under test to timing test set).

2.08 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one 639A (relay contact connector) tool, and one KS-6278 connecting clip (used to apply battery to relay contact).

2.09 651D tool.

Test C

2.10 KS-14510 volt-ohm-milliammeter.

2.11 651D tool.

2.12 Two 639A tools.

Test E

2.13 Hewlett-Packard 521C electronic counter.

2.14 Patching cord, P2CT cord, 4 feet long, equipped with one KS-13737 plug and one 310 plug.

2.15 400D Hewlett-Packard vacuum tube voltmeter (VTVM).

2.16 Testing cord, W2J cord, 9 feet 6 inches long, equipped with one 310 plug and two 29 cord tips (2W9A cord).

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

3. METHOD

STEP	ACTION	VERIFICATION
	A. Pulse Generator	
→ 1	At automatic test circuit — Connect BAT G jack of pulse checking test set to 48-volt battery supply jack. *Note:* To avoid possible grounding of battery supply lead, connect cord to test set first and when disconnecting, remove cord from test set last.	
→ 2	Calibrate pulse checking test set in accordance with test set requirements or as covered in Section 100-234-101.	
3	Connect P jack of pulse checking test set to PG1 jack of automatic test circuit frame.	
4	At pulse checking test set — Operate SCALE switch to 20.	
5	At automatic test circuit — Block nonoperated ON2 relay.	
6	Block operated ON1, PTC relays.	
7	Operate DPR key.	
8	Check pulses-per-second and percent break requirements as specified in timing requirements of circuit requirements table SD-32365-01.	Circuit requirements met (10 pps nominal).
9	Operate LP key.	Circuit requirements met (12 pps loop).
10	Restore LP key.	
11	Operate LK key.	Circuit requirements met (12 pps leak).
12	Restore LK key.	
13	Block operated TTC, TTC2 relays.	
14	Operate 7 PPS key.	Circuit requirements met (7 pps TOUCH-TONE nominal).
→ 15	Restore 7 PPS key.	Circuit requirements met (11 pps TOUCH-TONE high speed).

STEP	ACTION	VERIFICATION
→ 16	Restore DPR key.	
17	Remove blocking tools from TTC, TTC2, ON1, ON2, PTC relays.	
18	Restore all keys and remove cords.	

B. Timing

STO Timer

1	At automatic test circuit — Connect 48V jack of timing test set to 48-volt battery supply jack.	
2	At timing test set — Operate BAT key to ON position and allow 10 to 15 seconds for test set to stabilize.	
3	Calibrate and adjust test set in accordance with Section 100-130-101.	
4	Connect W3M cord to TST1 jack on test set.	
5	At automatic test circuit — Connect red lead of W3M cord to U terminal of STT relay.	
→ 6	Connect white lead of W3M cord to 9M of TM1 relay.	
→ 7	Connect GRD to 9F of TM1 relay.	
8	Connect black lead of W3M cord to ground.	
9	At timing test set — Operate REC switch to OC GRD, SEND key to MK, and MCF key to NORM.	
10	Operate TST key to OPR.	Meter indicates approximately 3500 milliseconds.
11	Restore TST key.	
12	At automatic test circuit — Disconnect white lead of W3M cord.	
→ 13	Connect white lead of W3M cord to 3M of TM2 relay.	
→ 14	Connect GRD to 3F of TM2 relay.	
15	Block operated SG, PTC relays.	
16	At timing test set — Operate TST key to OPR.	Meter indicates approximately 1750 milliseconds.
17	Restore TST key.	

STEP	ACTION	VERIFICATION
18	At automatic test circuit — Block operated SG2 relay.	
19	At timing test set — Operate TST key to OPR.	Meter indicates approximately 6400 milliseconds.
20	Restore TST key.	
21	At automatic test circuit — Remove blocking tools from SG, PTC, SG2 relays.	
22	Disconnect white lead of W3M cord.	
→ 23	Connect white lead of W3M cord to 9M of TM1 relay.	
24	Block operated EWO1 relay.	
25	At timing test set — Operate TST key to OPR.	Meter indicates approximately 2600 milliseconds.
26	Restore TST key.	
27	At automatic test circuit — Operate SWT key.	
28	At timing test set — Operate TST key to OPR.	Meter indicates approximately 3500 milliseconds.
29	At automatic test circuit — Restore SWT key.	
30	Remove blocking tool from EWO1 relay.	
31	At timing test set — Disconnect white and red leads of test set W3M cord. Restore TST key.	
32	At automatic test circuit — Connect red lead of W3M cord to U terminal of Q relay.	
→ 33	Connect white lead of W3M cord to 4F of PKH relay.	
34	Insulate 1M, 2M, 8M of BAT relay.	
35	Block operated MFC, BAT relays.	

STEP	ACTION	VERIFICATION
36	At timing test set — Operate REC switch to —48 GRD, SEND key to MK, and MCF key to NORM.	
37	Operate TST key to OPR.	Meter indicates 80 to 110 milliseconds.
38	Disconnect white, red, and black leads of W3M cord.	
39	Remove blocking and insulating tools from MFC, BAT relays.	
40	At automatic test circuit — Block operated TDST, PTC relays.	
41	Block operated STT relay. Start timing.	After approximately 11 seconds — TM2 relay operated.
42	Remove blocking tools from TDST, PTC, STT relays.	TM2 relay released.
LTO Timer		
43	Apply battery to 12F of ST relay.	
→ 44	Block nonoperated TMA relay.	
→ 45	Block operated BY relay. Start timing.	After approximately 20 seconds — RI lamp not extinguished.
46	Remove blocking tool from BY relay.	
47	Operate ARB key.	
→ 48	Block operated BY relay. Start timing.	After approximately 11 seconds — RI lamp not extinguished.
→ 49	Remove blocking tools from BY, TMA relays.	RI lamp extinguished.
50	Remove battery from 12F of ST relay.	
→ 51	Restore ARB key.	

C. Critical Components

1	At automatic test circuit — Connect volt-ohm-milliammeter across DCK resistor.	Meter indicates between 31 and 33 ohms.
2	Disconnect meter leads.	
3	Remove AH, AJ fuses.	

STEP	ACTION	VERIFICATION
4	Connect volt-ohm-milliammeter across TP resistor.	Meter indicates between 607 and 645 ohms.
5	Disconnect meter leads.	
6	Connect meter leads across CN resistor.	Meter indicates between 22,310 and 23,690 ohms.
7	Disconnect meter leads.	
8	Connect meter leads across MR resistor.	Meter indicates between 970 and 1030 ohms.
9	Disconnect meter leads.	
10	Insulate 7B of MR relay.	
11	Connect meter leads across MR1 resistor.	Meter indicates between 194 and 206 ohms.
12	Remove insulating tool from MR relay.	
13	Disconnect meter leads.	
14	Replace AH, AJ fuses.	
15	Connect meter leads across LK13 resistor.	Meter indicates between 4898 and 5202 ohms.
16	Disconnect meter leads.	
17	Block operated LK relay.	
18	Connect meter leads to 8F, 9F of RC1 relay.	Meter indicates between 9942 and 10,558 ohms.
19	Disconnect meter leads.	
20	Remove blocking tool from LK relay.	
21	Block operated PG1 relay.	
22	Operate LP key.	
23	Connect meter leads to 8F, 9F of RC1 relay.	Meter indicates between 1164 and 1264 ohms.
24	Restore LP key.	Meter indicates between 242 and 258 ohms.
25	Operate LP1 key.	Meter indicates 0 ohm.
26	Disconnect meter leads.	
27	Restore LP1 key.	

STEP	ACTION	VERIFICATION
28	Remove blocking tool from PG1 relay.	
	D. Trouble Lamps	
1	At automatic test circuit — Momentarily operate MR relay.	MR lamp lighted and extinguished.
2	Momentarily operate PP relay.	PP lamp lighted and extinguished.
3	Momentarily operate VC relay.	VC lamp lighted and extinguished.
4	Momentarily operate NRC relay.	NRC lamp lighted and extinguished.
5	Momentarily operate CCT1 relay.	CCT lamp lighted and extinguished.
6	Momentarily operate MM relay.	MM lamp lighted and extinguished.
	E. TOUCH-TONE Frequency Supply	
1	Connect power cords of counter and VTVM to ac power supply; operate power switches to ON. Note: Allow at least 5 minutes for equipment warmup.	
2	Adjust counter for a 10-second gate.	
3	At automatic test circuit — Connect INPUT jack of counter to VL jack using P2CT cord.	
4	Insulate 6M, 7M of RT relay.	
5	Block operated RT, TTC, SFH relays.	Counter indicates between 1334.7 and 1337.3 cps.
6	Remove blocking tool from SFH relay.	
7	Remove insulating tool from 7M of RT relay.	
8	Insulate 4M of RT relay.	
9	Block operated SFL relay.	Counter indicates between 769.3 and 770.7 cps.
10	Remove blocking tool from SFL relay.	
11	Remove insulating tool from 6M of RT relay.	

STEP	ACTION	VERIFICATION
12	Insulate 7M of RT relay.	
13	Block operated TF relay.	Counter indicates between 1900 and 2100 cps.
14	Remove blocking tool from TF relay.	
15	At automatic test circuit — Disconnect P2CT cord from VL jack.	
16	Operate VTVM RANGE switch to 1 volt.	
17	At automatic test circuit — Connect INPUT jack of VTVM to VL jack using W2J cord.	
18	Remove insulating tool from 4M of RT relay.	
19	Insulate 6M of RT relay.	
20	Block operated HL, SFH relays.	VTVM indicates between 0.62 and 0.64 volt.
21	Remove blocking tool from SFH relay.	
22	Remove insulating tool from 7M of RT relay.	
23	Insulate 4M of RT relay.	
24	Block operated SFL relay.	VTVM indicates between 0.62 and 0.64 volt.
25	Remove blocking tool from SFL relay.	
26	Remove insulating tool from 6M of RT relay.	
27	Insulate 7M of RT relay.	
28	Block operated TF relay.	VTVM indicates between 0.70 and 0.73 volt.
29	Remove blocking tools from TF, HL relays.	
	Note: If conditions of Steps 5 through 28 are met, proceed with Step 30.	
30	Operate VTVM RANGE switch to 0.3 volt.	
31	Remove insulating tool from 4M of RT relay.	
32	Insulate 6M of RT relay.	
33	Block operated SFH relay.	VTVM indicates between 0.19 and 0.21 volt.

STEP	ACTION	VERIFICATION
34	Block operated LL relay.	
35	Operate VTVM RANGE switch to 0.1 volt.	VTVM indicates between 0.049 and 0.051 volt.
36	Disconnect VTVM.	
37	Remove blocking tools from SFH, LL relays.	
38	At automatic test circuit — Connect INPUT jack of counter to VL jack using P2CT cord.	
39	Remove insulating tool from 7M of RT relay.	
40	Insulate 4M of RT relay.	
41	Insulate 10M of SFL relay.	
42	Block operated HL, RR0, RR1, MN, SFL relays.	Counter indicates between 685.8 and 687.2 cps.
43	Remove blocking tools from RR0, MN relays.	
44	Block operated MAX, RR0 relays.	Counter indicates between 706.8 and 708.2 cps.
45	Remove blocking tools from SFL, RR0, RR1, MAX relays.	
46	Remove insulating tool from 10M of SFL relay.	
47	Block operated MN, SFL relays.	Counter indicates between 757.7 and 759.2 cps.
48	Remove blocking tools from SFL, MN relays.	
49	Block operated MAX, SFL relays.	Counter indicates between 780.8 and 782.3 cps.
50	Remove blocking tools from SFL, MAX relays.	
51	Insulate 10M of SFL relay.	
52	Block operated MN, RR0, RR7 relays.	Counter indicates between 838.4 and 840.1 cps.
53	Remove blocking tools from RR0, MN relays.	

STEP	ACTION	VERIFICATION
54	Block operated MAX, RR0 relays.	Counter indicates between 863.9 and 865.6 cps.
55	Remove blocking tools from RR0, MAX relays.	
56	Block operated MN, RR4 relays.	Counter indicates between 925.9 and 927.8 cps.
57	Remove blocking tools from RR4, MN relays.	
58	Block operated MAX, RR4 relays.	Counter indicates between 954.2 and 956.1 cps.
59	Remove blocking tools from RR4, RR7, MAX relays.	
60	Remove insulating tool from 10M of SFL relay.	
61	Remove insulating tool from 4M of RT relay.	
62	Insulate 7M of RT relay.	
63	Insulate 4M of SFH relay.	
64	Block operated MN, SFH, RR0, RR1 relays.	Counter indicates between 1189.7 and 1192.1 cps.
65	Remove blocking tools from RR0, MN relays.	
66	Block operated MAX, RR0 relays.	Counter indicates between 1225.9 and 1228.3 cps.
67	Remove blocking tools from RR0, RR1, SFH, MAX relays.	
68	Remove insulating tool from 4M of SFH relay.	
69	Block operated MN, SFH relays.	Counter indicates between 1314.6 and 1317.3 cps.
70	Remove blocking tools from SFH, MN relays.	
71	Block operated MAX, SFH relays.	Counter indicates between 1354.7 and 1357.4 cps.
72	Remove blocking tools from SFH, MAX relays.	

STEP	ACTION	VERIFICATION
73	Insulate 4M of SFH relay.	
74	Block operated MN, RR2, RR4, SFH relays.	Counter indicates between 1453.4 and 1456.3 cps.
75	Remove blocking tools from RR4, MN relays.	
76	Block operated MAX, RR4 relays.	Counter indicates between 1497.7 and 1500.6 cps.
77	Remove blocking tools from RR4, RR2, SFH, MAX, HL, TTC, RT relays.	
78	Remove insulating tool from 4M of SFH relay.	
79	Remove insulating tools from 6M, 7M of RT relay.	
80	Disconnect counter.	