CABLE PROTECTIVE DEVICE ALARM, CABLE INSULATION ALARM AND PERMANENT SIGNAL ALARM CIRCUIT SD-31912-01 OPERATION TESTS STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section describes methods of testing the cable protective device alarm, the cable insulation alarm and permanent signal alarm circuit SD-31912-01 in step-by-step and community dial offices.

1.02 This section is issued to change the title, to revise Tests A and B to cover timed closure of CI relays to cable conductors, and to include a test of the cable protective device alarm (Test D).

1.03 The tests covered are:

A. Cable Insulation Alarm: This test checks that the alarm will operate when the insulation of cable pairs connected to it breaks down below certain established values. It also checks the timed interval, if provided, for closure of CI relays to cable conductors.

B. Cable Insulation Conditions: This test checks that the alarm will not operate if the resistance of the insulation is above the established value but will operate if the resistance falls below the established value, depending upon the conditions of the particular arrangement used.

C. Permanent Signal Alarm: This test checks that the alarm is operated when a specified number of permanent signals, considered to be excessive, occur simultaneously.

D. Cable Protective Device Alarm: This test checks that the alarm operates when a cable protective device has provided a closure on the associated cable pair.

1.04 Where alarms are extended to another location, it is advisable to notify that location to disregard the alarm signals when these tests are performed.

1.05 In performing Test C as many as four first selectors might have to be made busy. Care should be exercised when making selectors busy so as not to adversely affect service.

1.06 Follow the procedure covered in Section 100-101-301 describing the use of the No. 35-type test set when using it as a variable resistor in Tests A and B.

1.07 When performing Test A in No. 356A offices in which the timing feature is provided, the timing interval used should be determined before the test is started.

1.08 Tests A, B, and D require action at the distributing frame and verification at the alarm panel.

1.09 Office records should be consulted to determine the association of cable pairs with the cable insulation and cable protective device alarms.

1.10 *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.

1.11 Local instructions should be followed for recording and reporting any register operations caused by performing these tests.

2. APPARATUS

Tests A and B

2.01 No. 35-type test set.

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

2.03 Testing cord, W2C cord, 10 feet long, equipped with a No. 310 plug and two No. 59 cord tips (No. 2W6A cord) and two No. 108 cord tips.

Test A

2.04 KS-3008 stop watch or equivalent.

Tests A (Where No. 35-type test set is not used.)

2.05 No. 18- or No. 19-type resistors, or equivalent, as required for 30,000 ohms if Fig. A is used or 50,000 ohms if Fig. B is used. One KS-13492L1 radio-type resistor of appropriate value may be substituted.

2.06 Two testing cords, No. 893 cord, each 6 feet long, equipped with No. 360A tools (No. 1W13B cord) and two KS-6278 clips (for connecting resistors to terminals).

Test C

2.07 Resistors, No. 18G, 200 ohms each, as required.

2.08 No. 477A (make busy) tools as required.

Test D

2.09 Two testing cords, No. 893 cord, each 6 feet long, equipped with two No. 360A tools (No. 1W13B cord) and two KS-6278 connecting clips (for connecting resistors to terminals) and two No. 108 cord tips.

2.10 Resistors, No. 18HC, 3000 ohms, or equivalent, to be used if U and V resistors in series with the alarm trunk relay are strapped out, or No. 18CR, 2000 ohms, or equivalent, to be used if U and V resistors are not strapped out.

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3. METHOD

STEP	ACTION	VERIFICATION
	A. Cable Insulation Alarm	
1a	If using No. 35-type test set — Adjust to obtain a resistance of approximately 50,000 ohms when Fig. B is used or 30,000 ohms when Fig. A is used (see 1.06).	
2a	Connect No. 310 plug of W2C cord to TEST T-R jack of No. 35-type test set.	
3b	If No. 35-type test set is not available — Connect sufficient No. 18- or 19-type resistors in series to obtain 50,000 ohms when Fig. B is used or 30,000 ohms when Fig. A is used and connect one end of each No. 893 cord to terminals of resistor.	
4c	If timing relays are not provided — At distributing frame — Connect clips of W2C cord or No. 893 cords to tip and ring terminals of cable pair associated with circuit under test.	Audible alarm sounds. Aisle pilot lamps (where provided) lighted. At alarm panel — MP lamp lighted.

STEP	ACTION	VERIFICATION
5d	If testing alarms in No. 1 and No. 350A offices and timing relays are provided — Wait until CP2 relay has operated and released; then, using KS-3008 stop watch, start timing.	
6d	After start of timing — At distributing frame — Connect clips of W2C cord or No. 893 cords to tip and ring terminals of cable pair associated with circuit under test.	After approximately 22 minutes — Audible alarm sounds. Aisle pilot lamps (where provided) lighted. At alarm panel — MP lamp lighted.
7e	If testing alarms in No. 355A, No. 360A and No. 356A offices and timing relays are provided — Wait until CP1 relay has operated and released; then, using KS-3008 stop watch, start timing.	
8e	After start of timing — At distributing frame — Connect clips of W2C cord or No. 893 cords to tip and ring terminals of cable pair associated with circuit under test.	After 20-30 minutes in No. 355A, No. 360A, offices and newer No. 356A offices or 2-4 minutes in earlier No. 356A offices — Audible alarm sounds. Aisle pilot lamps (where provided) lighted. MP lamp lighted.
9f	If equipped with AL (alarm) switch — Momentarily operate AL switch.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished.
10f	Dial alarm checking terminal from a convenient office telephone.	Steady tone heard.
11f	Release call.	MP lamp remains lighted.
12f	At distributing frame — Disconnect clips from cable pair terminals.	
13f	Dial alarm checking terminal and release call.	MP lamp extinguished.
14g	If not equipped with AL switch — Dial alarm checking terminal from a convenient office telephone.	Steady tone heard.
15g	Release call.	Audible alarm continues to sound. Aisle pilot lamps (where provided) remain lighted. MP lamp remains lighted.
16g	At distributing frame — Disconnect clips from cable pair terminals.	

STEP	ACTION	VERIFICATION
17g	Dial alarm checking terminal and release call.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp extinguished.
18h	If equipped with RS switch and not equipped with timing relays — At distributing frame momentarily connect clips of W2C cord or No. 893 cords to tip and ring terminals of cable pair associated with circuit under test.	Audible alarm sounds. Aisle pilot lamps (where provided) lighted. MP lamp lighted.
19h	Momentarily operate RS switch.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp extinguished.
20i	If equipped with RS switch and timing relays — Block all CP relays operated.	
21i	At distributing frame — Momentarily connect clips of W2C cord or No. 893 cords to tip and ring terminals of cable pair associated with circuit under test.	Audible alarm sounds. Aisle pilot lamps (where provided) lighted. MP lamp lighted.
22i	Remove blocking tools from all CP relays.	Audible alarm continues to sound. Aisle pilot lamps (where provided) remain lighted. MP lamp remains lighted.
23i	Momentarily operate RS switch.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp extinguished.
24	Repeat Steps 1a through 23i as required on all other Cable Insulation alarms to be tested.	

B. Cable Insulation Conditions

1	From table of working limits on SD drawing, obtain resistance values for operate and nonoperate conditions for the particular arrangement used.	
2	Using No. 35-type test set as variable resistor (see 1.06) — Set up operate value, using No. 3 key.	
3	Set up nonoperate value, using No. 4 key.	

STEP	ACTION	VERIFICATION
4	With all short-circuiting switches open and the BAT-GRD CO key operated, insert the plug of the W2C cord into TEST T-R jack of test set.	
5	At distributing frame — Isolate the cable pairs from the terminals associated with the circuit under test.	
6	Connect No. 59 cord tips of W2C cord to circuit under test.	
7a	If circuit is equipped with timing relays — Block all CP relays operated.	
8	At distributing frame — Operate short-circuiting switch associated with No. 4 telegraph key of test set.	Audible alarm does not sound. Aisle pilot lamps not lighted. At alarm panel — MP lamp not lighted.
9	Restore short-circuiting switch associated with No. 4 telegraph key of test set.	
10	Operate short-circuiting switch associated with No. 3 telegraph key of test set.	Audible alarm sounds. Aisle pilot lamps (where provided) lighted. At alarm panel — MP lamp lighted.
11	Open short-circuiting switch associated with No. 3 telegraph key of test set.	Audible alarm continues to sound. Aisle pilot lamps (where provided) remain lighted. MP lamp remains lighted.
12b	If equipped with RS switch — Momentarily operate RS switch.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp extinguished.
13c	If not equipped with RS switch — Dial the alarm checking terminal from a convenient telephone and release the call.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp extinguished.
14a	If circuit is equipped with timing relays — Remove blocking tools from all CP relays.	
15	At distributing frame — Disconnect No. 59 cord tips from circuit under test.	
16	Reconnect cable pairs.	
17	Repeat Steps 1 through 16 as required for other Cable Insulation alarms to be tested.	

STEP	ACTION	VERIFICATION
	C. Permanent Signal Alarm	
	Note: As a means of obviating the need for blocking a large amount of apparatus in order to bring in the required number of permanent signals to make this test, Table A is provided to show the resistors that should be used to simulate the non-operate and operate conditions. However, this table only provides the required resistors in multiples of 5 permanent signals. Therefore, where the required number of signals is other than a multiple of 5, it is necessary in addition to block apparatus to provide the exact number of permanent signals required. The first column of the table shows the number of permanent signals for which the circuit is arranged as given in a circuit note. The second and third columns together specify the simulated condition corresponding to a non-operate value and the fourth and fifth columns together specify the simulated operate condition. As an example, if the circuit is strapped for 23 permanent signals, it would be necessary to connect 3 No. 18G resistors in parallel, ground one side of these resistors and connect the other side to the lower terminal of the A resistor of the permanent signal circuit and in addition to bring in 4 permanent signals as outlined in Step 2. For the operate condition, it would be necessary to use 5 No. 18G resistors in parallel and in addition to bring in 1 permanent signal as outlined in Step 2.	
1	Clear all permanent signals in the office in accordance with approved procedures.	
2	Connect resistors and/or bring in permanent signals according to Table A for nonoperate condition. *Note 1:* In offices where line circuits are not provided 100 per cent for permanent signal lockout, using No. 477A tools, seize first selectors to bring in the required number of permanent signals as specified in Table A.	Audible alarm does not sound. Aisle pilot lamps (where provided) not lighted. MP lamp not lighted. *Note:* If alarms do come in it may be due to the presence of one or more permanent signals which have come in after the permanent signals were cleared at the beginning of the test. In such a case, clear all permanent signals and momentarily operate the RS switch if provided or dial the alarm checking terminal and then release the call. The alarm should clear.

STEP ACTION VERIFICATION

Note 2: In offices where line circuits are provided 100 per cent for permanent signal lockout, place on immediate lockout spare subscriber line circuits to bring in the required number of permanent signals specified in Table A.

TABLE A

NO. OF PERM. SIGS. FOR WHICH CKT. IS STRAPPED	NONOPERATE CONDITION		OPERATE CONDITION	
	REQ'D. NO. OF 18G RESISTORS	ADDITIONAL NO. OF PERM. SIGS. REQUIRED	REQ'D NO. OF 18G RESISTORS	ADDITIONAL NO. OF PERM. SIGS. REQUIRED
2	None	1	None	2
3	None	2	None	3
4	None	2	1	None
5	None	3	1	1
6	None	4	1	2
7	1	None	1	3
8	1	1	1	4
9	1	2	2	None
10	1	2	2	1
11	1	3	2	3
12	1	4	2	4
13	2	None	3	None
14	2	1	3	1
15	2	2	3	2
16	2	3	3	3
17	2	3	4	None
18	2	4	4	1
19	3	None	4	2
20	3	1	4	3
21	3	2	4	4
22	3	3	5	None
23	3	4	5	1
24	3	4	5	3
25	4	None	5	4
26	4	1	6	None
27	4	2	6	1
28	4	3	6	2
29	4	4	6	3
30	4	4	6	4
31	5	None	7	1
32	5	1	7	2
33	5	2	7	3
34	5	3	7	4
35	5	4	8	None
36	6	None	8	1
37	6	None	8	3
38	6	1	8	4
39	6	2	9	None
40	6	3	9	1
41	6	4	9	2

STEP	ACTION	VERIFICATION
3	Connect resistors and/or bring in permanent signals according to Table A for operate condition.	Audible alarm sounds. Aisle pilot lamps (where provided) lighted. MP lamp lighted.
4a	If equipped with AL switch — Momentarily operate AL switch.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp remains lighted.
5	Dial alarm checking terminal from a convenient telephone.	Steady tone heard. MP lamp remains lighted. If AL switch is not provided — Audible alarm continues to sound. Aisle pilot lamps (where provided) remain lighted.
6	Release call.	MP lamp remains lighted. If AL switch is not provided — Audible alarm continues to sound. Aisle pilot lamps (where provided) remain lighted.
7	Disconnect resistors and/or release permanent signals used in Step 3.	
8	Dial alarm checking terminal and release call.	MP lamp extinguished. If AL switch is not provided — Audible alarm silenced. Aisle pilot lamps (where provided) extinguished.
9b	If equipped with RS switch — Momentarily apply operate value as in Step 3.	Audible alarm sounds. Aisle pilot lamps (where provided) lighted. MP lamp lighted.
10b	Momentarily operate RS switch.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp extinguished.

D. Cable Protective Device Alarm

1	At distributing frame — Using No. 893 cords bridge appropriate resistor (see 2.10) across tip and ring terminals of cable pair associated with circuit to be tested.	Aisle pilot lamps (where provided) lighted. Audible alarm sounds. At alarm panel — MP lamp lighted.
2a	If equipped with AL switch — Momentarily operate AL switch.	Audible alarm silenced. Aisle pilot lamps (where provided) extinguished. MP lamp remains lighted.

STEP	ACTION	VERIFICATION
3	Dial alarm checking terminal from a convenient office telephone.	Steady tone heard. MP lamp remains lighted. If AL switch is not provided — Audible alarm continues to sound. Aisle pilot lamps (where provided) remain lighted.
4	Release call.	MP lamp remains lighted. If AL switch is not provided — Audible alarm continues to sound. Aisle pilot lamps (where provided) remain lighted.
5	At distributing frame — Disconnect resistor from cable pair terminals.	
6	Dial alarm checking terminal and release call.	MP lamp extinguished. If AL switch is not provided — Audible alarm silenced. Aisle pilot lamps (where provided) extinguished.
7b	If equipped with RS switch — Momentarily bridge appropriate resistor across tip and ring terminals of cable pair associated with circuit being tested.	Aisle pilot lamps (where provided) lighted. Audible alarm sounds. MP lamp lighted.
8b	Momentarily operate RS switch.	Aisle pilot lamps (where provided) extinguished. Audible alarm silenced. MP lamp extinguished.
9	Repeat Steps 1 through 8b as required on other circuits to be tested.	