LINE LOAD CONTROL EQUIPMENT
OPERATION TESTS
STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section describes a method of making tests of line load control equipment in No. 1, 350A, 355A, 360A, and 35-E-97 step-by-step offices at the control cabinet, from a shelter area or from a remote location.

1.02 This section is reissued to add a new Test F which covers line load control arranged for remote control and supervision of line load.

1.03 The tests and features tested are:

A. Control Circuit and Key Cabinet Features: This test checks that the overload lockout feature and the alarms and visual signals function properly when a small number of lines are removed from service.

B. Test of Frame Lamps: This test checks that the B and C lamps at switch frames light when the associated B and C relays operate.

C. Over-all Operation: This test checks that by operating a key, class B and/or C lines can be removed from service and that the associated alarms and visual signals function properly.

D. Group Busy Lamps Associated with Line Switches: This test checks that the group busy lamp associated with the master switch group under test lights satisfactorily.

E. Group Busy Lamps Associated with Line Finders: This test checks that the group busy lamp associated with the line finder group under test lights satisfactorily.

F. Remote Control and Supervision of Line Load: This test checks the continuity between the C selector and the group busy lamp cabinet and that tone is heard each time the selector steps to a terminal associated with a busy line finder or line switch group. A test is made to remove class B and C lines from service, to restore lines to service, to check which classes are removed and return proper tones to verify each condition. Also included is a test of trouble conditions when a separate cable pair is used with subset equipment at a remote location.

1.04 In performing these tests, ACTION and VERIFICATION are required at the locations indicated as follows:

(a) ***Test D*** — Relay rack and control cabinet and shelter area, if provided.

(b) ***Tests D and E*** — Switch frame and control cabinet or switchboard, depending upon the location of the group busy lamps.

(c) ***Test F:*** Line load control relay rack, remote control relay rack, group busy lamp cabinet, and remote location.

1.05 In performing Test F, it will be necessary to determine the digits required to be dialed from the remote location to gain access to the remote control circuit.

1.06 References to pilot lamp in Part 3 of this section refer to line load control pilot. In No. 1 and 350A offices, this lamp is located at the key cabinet. In community dial offices, it is usually located on the wall near the door.

1.07 References to office audible signals in Part 3 of this section also include the LOAD CONT No. 7F bell in community dial offices usually installed on the wall near the door.

1.08 In performing Test F, with subset provided, see note on SD-32108-011 for visual and audible alarm indications applicable to the type of controlling office.

1.09 The line load control equipment provides facilities for denying originating service to as much as 90 per cent of the lines in an office. It is therefore extremely important that every safeguard should be employed to guard against operations resulting in denial of service during test. In some cases, the tests described herein momentarily deny service for a few seconds. In order to avoid denying service beyond this time, the following should be observed:

(a) Tests should be made only when specific authorization is obtained in accordance with local instructions.

(b) Care must be taken that trouble clearing activities do not introduce hazards of denying service.

(c) Alarm facilities are provided to detect cases where crossed or grounded leads result in denying service on a group of lines. If trouble of this nature develops, measures should be taken to restore the affected lines to service immediately.

(d) If it is desired to discontinue testing at any time, even temporarily, restore all line load control equipment to normal and remove all relay blocking tools.

(e) The cautions which appear in the test procedures should be given special attention.

(f) Test F should be performed during a period when an all line finder or line switch busy condition will not be encountered.

1.10 The lines of an office arranged for line load control are divided into three categories which are known as class A, class B, and class C. The A lines include all lines which are considered essential to national defense and public welfare during an emergency. B and C lines include all other lines. Where the number of essential lines is less than 10 per cent, some non-essential lines may be included with the A lines. (Coin lines are usually included with class A lines, both because of the importance of having some telephone service available to the general public during emergencies and also because of the difficulty of properly disposing of coins in the hopper of the coin box at the time line load control is applied.) Approximately 10 per cent of the lines associated with a given line finder group or line switch bay are assigned to class A. The remaining 90 per cent are usually divided approximately equally between class B and C. The B and C subdivisions are made only for control reasons and the designations do not have any significance insofar as the relative importance of the lines in these classifications are concerned. The tests covered herein do not in any way affect the services from class A lines.

1.11 The No. 10A guards placed over the CLASS B and CLASS C keys in the control cabinet are to prevent an accidental operation of these keys from the normal to the REM LINES FROM SERV position. The MASTER key, where provided, in part serves the same purpose as the No. 10A guard since both MASTER and the CLASS B or CLASS C key must be operated to remove lines from service.

1.12 Local instructions should be followed with reference to recording any register operations caused by performing Tests D and E.

1.13 ***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

Tests A and E

2.01 Test receiver — No. 716C receiver (or equivalent) attached to a W2AB cord equipped with two No. 360A tools (No. 2W21A cord), one No. 365 tool, and one No. 411A tool.

Test F

2.02 Testing cord, No. 893 cord, 3 feet long, equipped with two No. 360A tools (No. 1W13A cord) and two KS-6278 connecting clips.

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

3. METHOD

STEP	ACTION	VERIFICATION
	A. Control Circuit and Key Cabinet Features	
1a	If No. 10A guard is provided — At key cabinet — Loosen handle of CLASS key associated with control circuit to be tested.	
2	Operate CLASS key to LOCK MAN OPR REL position.	Office visual and audible alarms operate. Pilot lamp lights. At relay rack — LK relay operates.
3	Operate and restore RA key.	Office visual and audible alarms retired.
4	Restore CLASS key to normal.	Pilot lamp extinguished. At relay rack — LK relay releases.
5b	If ADJ key is provided — At relay rack unit — Operate ADJ key associated with control circuit being tested.	Office visual and audible alarms operate. Pilot lamp lights.
6b	At key cabinet — Operate and restore RA key.	Office visual and audible alarms retired.
7b	At relay rack — Apply battery through test receiver to moving springs of A1 and A2 relays.	No ground present on springs other than 12B of A1 relay.
8b	At key cabinet — Operate CLASS key of control circuit being tested to REM LINES FROM SERV position and operate MASTER key, if provided.	At relay rack — A1, A2 and LK relays operate. At key cabinet — No cabinet lamps light.
9b	Restore CLASS and MASTER keys to normal.	At relay rack — A1 and A2 relays release. LK relay remains operated.
10b	At relay rack — Restore ADJ key to normal.	Control circuit restores to normal. Pilot lamp extinguished.
11b	Apply battery through test receiver to 2T spring of LK relay.	LKA and AL relays operate. Office visual and audible alarms operate. Pilot lamp lights.
12b	Remove battery from 2T spring of LK relay.	LKA and AL relays release. Office visual and audible alarms retired. Pilot lamp extinguished.
13b	Apply battery through test receiver to 5T spring of LK relay.	LKA and AL relays operate. Office visual and audible alarms operate. Pilot lamp lights.
14b	Remove battery from 5T spring of LK relay.	LKA and AL relays release. Office visual and audible alarms retired. Pilot lamp extinguished.

STEP	ACTION	VERIFICATION
15c	Where ADJ key is not provided — At relay rack — Block nonoperated G relay associated with control circuit under test.	
16c	Apply battery through test receiver to moving springs of A1 and A2 relays.	No ground present on any springs.
17c	With G relay still blocked nonoperated — At key cabinet — Operate CLASS key to REM LINES FROM SERV position and operate MASTER key, if provided.	A1 and A2 relays operate.
18c	Restore CLASS and MASTER keys to normal.	A1 and A2 relays release.
19c	At relay rack — Apply battery through test receiver to 2B spring of LK relay.	LKA and AL relays operate. Office visual and audible alarms operate. Pilot lamp lights.
20c	Remove battery from 2B spring of LK relay.	LKA and AL relays release. Office visual and audible alarms retired. Pilot lamp extinguished.
21c	Apply battery through test receiver to 4T spring of LK relay.	LKA and AL relays operate. Office visual and audible alarms operate. Pilot lamp lights.
22c	Remove battery from 4T spring of LK relay.	LKA and AL relays release. Office visual and audible alarms retired. Pilot lamp extinguished.
23c	Remove blocking tool from G relay.	
24c	Repeat Steps 1 through 23c for other control circuits to be tested.	
25d	If shelter area control circuit is provided — At relay rack — Block nonoperated A1 and A2 relays of control circuit to be tested.	
26d	Apply ground through test receiver to moving springs of A1 and A2 relays.	No battery present on any springs.
27d	Block operated LK relay of control circuit under test.	
28d	At shelter area — If No. 10A guard is provided — Loosen handle of CLASS key associated with control circuit to be tested.	
29d	Operate CL key of circuit under test.	At shelter area — CL lamp lights.
30d	Restore CL key.	CL lamp extinguished.

STEP	ACTION	VERIFICATION
31d	Lock CL key in normal position by tightening lever handle over No. 10A guard, if provided.	
32d	At relay rack — Remove blocking tool from LK relay.	
33d	Remove blocking tools from A1 and A2 relays.	
34d	At shelter area — Operate RA key.	At relay rack — ALO relay operates.
35d	Restore RA key.	ALO relay releases.
36d	Repeat Steps 25d through 35d for other control circuits to be tested.	

B. Test of Frame Lamps

1	At relay rack — Block nonoperated LK relay in control circuit associated with group of frame B or C lamps to be tested.	
2	At switch frame in group under test — Apply ground to primary winding of load control relay B or C, lead designation G, using 716C receiver.	At switch frame — B or C lamp lights for group under test. Office visual and audible alarms operate.
	Note: In line finder offices the G leads are usually terminated at terminal strip on line finder frame. In line switch offices these leads terminate directly on the relay. In the latter case it may be desirable to make test at relay rack unit using assistant to verify lamp indication.	***Caution: Originating service will be denied on lines associated with an operated B relay (usually 90 lines). To avoid this denial of service any longer than necessary, restore B relay as quickly as possible. This relay should not be operated as an aid in clearing trouble.***
3	Remove ground from G lead.	B or C lamp extinguished. Office visual and audible alarms retired.
4	Repeat Steps 2 and 3 until all B and C lamps associated with control circuit under test have been tested.	
5	At relay rack — Remove blocking tool from LK relay.	
6	Repeat Steps 1 through 5 until all B and C frame lamps and associated control circuits have been tested.	

STEP	ACTION	VERIFICATION
	C. Over-all Operation	
	Caution: Since a large portion of the subscribers of the office are denied service during this test, proper supervision of the lamp signals at the control cabinet must be maintained. This test should only be made after a thorough discussion of the details with the supervisor.	
1	At relay rack — Block nonoperated LP relay of control circuit to be tested.	
2a	Where No. 10A guard is provided — At key cabinet — Loosen lever handle of key sufficiently to permit operating CLASS key of circuit under test.	
3b	If MASTER key is provided — Operate and hold in operated position.	
4	Operate CLASS key to REM LINES FROM SERV position for approximately one second, then throw to LOCK MAN OPER REL position.	At key cabinet — All cabinet lamps associated with operated CLASS key light. Associated alarm lamps and bells function. ***Note:*** Quickly record any cabinet lamps not lighted and proceed to next step.
5b	Release MASTER key.	
6	Restore CLASS key to normal position. ***Caution: Originating service will be denied on lines associated with an operated B or C relay (usually 90 lines). This will be indicated by the associated cabinet lamp and the switch frame lamp being lighted. Cabinet lamps which can not be extinguished in Step 6 above should be investigated and the trouble cleared immediately.***	All cabinet lamps extinguished. Audible and visual signals retired.
7a	Where No. 10A guard is provided — Lock CLASS key in normal position by tightening key lever handle over guard.	
8	At relay rack — Remove blocking tool from LP relay of control circuit tested.	
9	Repeat Steps 1 through 8 for other control circuits and cabinet lamps to be tested.	

STEP	ACTION	VERIFICATION
	D. Group Busy Lamps Associated with Line Switches	
1	At relay rack — Block operated B relay of the group busy indicating circuit (SD-32097-01).	
2	At master switch in group under test — Manually operate E relay.	At location of busy lamps — G lamp lights for group under test after usual alarm delay.
3	Release E relay.	G lamp extinguished.
4	Repeat Steps 2 and 3 in other LS groups until all group busy lamps have been tested.	
5	Remove blocking tool from B relay.	
	E. Group Busy Lamps Associated with Line Finders	
1	At line finder frame in group under test — Apply ground to all finders busy (OF) lead using 716C receiver. *Note:* In No. 355A and 35-E-97 offices, all finders busy leads will be designated AB and ATB respectively.	At location of busy lamps — G lamp lights for group under test.
2	Remove ground.	G lamp extinguished.
3	Repeat Steps 1 and 2 in other LF groups until all group busy lamps have been tested.	
	F. Remote Control and Supervision of Line Load	
1	At line load control circuit relay location — Block nonoperated ***all*** A1 and A2 relays of ***all*** line load control circuits associated with remote control circuit to be tested. ***Caution: Relays A1 and A2 shall remain blocked nonoperated until all tests are completed to prevent interruption of service.***	
2	At B terminal strip of remote control circuit — Apply ground to terminal 1 top of B terminal strip, using No. 893 cord.	At location of group busy lamps — G lamp lights for group under test.
3	Remove ground.	G lamp extinguished.
4	Repeat Steps 2 and 3 on terminals 2 through 15 top terminal strip B, 1 through 15 bottom terminal strip B, and 1 through 5 top terminal strip C or until all equipped line finder and master switch groups have been tested.	

STEP	ACTION	VERIFICATION
5a	At remote location — If subset control circuit is provided — Operate LL key.	
6b	At remote location — If subset control circuit is not provided — Dial digits, as required, over local, toll, or test distributor switch train, as required, to gain access to remote control circuit.	
7	Dial groups busy code.	At remote location — Warning tone (dial tone) heard in receiver. At relay rack — C selector steps at 60 ipm over bank terminals. When C selector reaches terminal 5 — At remote location — Warning tone removed. At relay rack — C selector continues to step.
8	When warning tone is heard second time — Disconnect.	At remote location — Tone removed. At relay rack — Circuit restores to normal.
9	At remote control circuit relay location — Block nonoperated P relay.	
10	At remote location — Dial groups busy code.	Warning tone heard in receiver. At relay rack — C selector reaches terminal 5. At remote location — Tone removed. At relay rack — C selector stops on first group (terminal 8).
11	At relay rack — Apply ground to associated line finder or line switch group terminal at terminal strip B or C (see Steps 2 and 4).	C selector steps to next idle terminal. At remote location — Spurt of tone heard in receiver.
12	Repeat Step 11 until all groups have been tested.	
13	Remove blocking tool from P relay.	
14	At remote location — Disconnect.	At relay rack — Circuit restores to normal.
15	Dial first digit of groups busy code.	
16	Dial a digit other than the required digit.	At relay rack — WN relay operates indicating wrong number dialed. The A code selector does not release.

STEP	ACTION	VERIFICATION
17	Dial additional digits.	Dialing ineffective. Code selectors do not step.
18	Disconnect.	Circuit restores to normal.
19	Dial groups busy code.	
20	When warning tone is heard — Release and reseize circuit. ***Note:*** To remove lines from service or to restore service, this circuit must be reseized before circuit times out. Time-out period is governed by connection on arc 2 of B selector. (See note on SD-32108-011.)	
21	Dial class B removal code.	At line load control circuit relay location — G relay for class B lines operates.
22	At line load control circuit relay location — Block operated LK and AL relays for class B lines.	Office visual and audible alarms operate. At remote control circuit relay location — RB relay operates. At remote location — Code 1 ringing heard in receiver indicating class B lines removed.
23	At remote location — Disconnect.	At line load control circuit relay location — G relay remains operated.
24	Dial class removed check code.	Office visual and audible alarms retired. At remote location — Code 1 ringing heard in receiver.
25	Disconnect.	
26	Dial groups busy code.	
27	When warning tone is heard — Release and reseize circuit prior to time-out.	
28	Dial class C removal code.	At line load control circuit relay location — G relay for class C lines operates.
29	At line load control circuit relay location — Block operated LK and AL relays for class C lines.	Office visual and audible alarms operate. At remote control circuit relay location — RC relay operates. At remote location — Audible ringing interrupted at 60 ipm heard in receiver indicating class B and C lines removed.
30	At remote location — Disconnect.	At line load control circuit relay location — G relay remains operated.
31	Dial class removed check code.	Office visual and audible alarms retired. At remote location — Audible ringing interrupted at 60 ipm heard in receiver.

STEP	ACTION	VERIFICATION
32	Disconnect.	
33	Dial groups busy code.	
34	When warning tone is heard — Release and reseize circuit prior to time-out.	
35	Dial class B restoring code.	At remote control circuit relay location — CB relay operates. At line load control circuit relay location — G relay for class B lines releases.
36	At line load control circuit relay location — Remove blocking tools from LK and AL relays for class B lines.	At remote control circuit relay location — RB relay releases.
37	At remote location — Disconnect.	
38	Dial class removed check code.	Code 2 ringing heard in receiver indicating class C lines removed.
39	Disconnect.	
40	Dial groups busy code.	
41	When warning tone is heard — Release and reseize circuit prior to time-out.	
42	Dial class C restoring code.	At remote control circuit relay location — CC relay operates. At line load control circuit relay location — G relay for class C lines releases.
43	At line load control circuit relay location — Remove blocking tools from LK and AL relays for class C lines.	At remote control circuit relay location — RC relay releases.
44	At remote location — Disconnect.	At remote control circuit relay location — After time-out interval — D, D1, and PU relays release. Selector B releases.
45	Reseize circuit after time-out.	
46	Dial class B removal code.	At line load control circuit relay location — G relay for class B lines released.
47	Disconnect.	
48	Dial class removed check code.	At remote location — Steady ringing heard in receiver indicating no lines removed.
49	Disconnect.	At remote control circuit relay location — Circuit restores to normal.

STEP	ACTION	VERIFICATION
50a	At remote location — If subset control circuit is provided — Release LL key.	
51a	At remote control circuit relay location — Apply ground to terminal 2 top of terminal strip A, using No. 893 cord.	At remote location — At relay rack equipped with alarm relays when subset control circuit is provided — AL relay releases. AL1 relay operates. A lamp lights. Office visual and audible alarms operate. Aisle pilot lamp lights, if provided. ***Note:*** Office visual and audible alarms need be checked only once for this test.
52a	Remove ground.	AL relay operates. AL1 relay releases. A lamp extinguished. Office visual and audible alarms retired. Aisle pilot lamp extinguished.
53a	Short-circuit terminals 1 and 2 top of terminal strip A, using No. 893 cord.	AL relay releases. AL1 relay operates. A lamp lights.
54a	Remove short circuit.	AL relay operates. AL1 relay releases. A lamp extinguished.
55	At line load control circuit relay location — At relay rack — Remove blocking tools from ***all*** A1 and A2 relays of ***all*** control circuits associated with remote control circuit.	