

METHOD OF OPERATION  
LINE CIRCUIT

Testing To M.D.F. And I.D.F. - For Detection of Intermittent Trouble - Local  
Test Desk - (Small Capacity) Power Driven Machine Switching System.

GENERAL DESCRIPTION

1. This circuit is used in testing subscriber's lines for intermittent crosses or grounds which do not remain on the line long enough to be located by the usual methods. It is used only with panel line finders.
2. This circuit is attached to the line to be tested by means of plugs and cords through the line terminals on the M.D.F., and the sleeve terminals at the I.D.F. and by means of a clip to one contact of the line relay in the line finder circuit. The circuit is provided with three lamps having red, white, and green caps. The white lamp is the central office lamp, the green lamp is the subscriber's lamp, and the red lamp is the busy lamp. When the receiver at the subscriber's station is removed from the switchhook, the subscriber's lamp is lighted, then the central office lamp and finally the busy lamp lights, and other two are extinguished. When the receiver is replaced on the switchhook, the busy lamp is extinguished, and the circuit is restored to normal. When a cross or ground on the ring of the line outside of the central office occurs intermittently, so that a permanent signal alarm is not given, the operation is the same as for a regular call, unless the cross or ground is of such short duration that the line is not found by the line finder. In this case the central office lamp remains lighted, and is extinguished only when the plug of the test cord is inserted in the test jack. When the ground or a cross occurs within the central office, the central office operates correctly, the central office lamp lights, but the subscriber's lamp does not. If the central office apparatus operates correctly, the central office lamp is extinguished, and the busy lamp lights. When the ground or cross is removed from the line, the busy lamp is extinguished, and the circuit is restored to normal.
3. If trouble occurs in the central office apparatus, on a regular call, preventing the line finder from finding the calling line, the subscriber's central office lamps light.
4. The circuit is provided with three test jacks, for testing the subscriber's station, or the central office equipment, and for listening on subscriber's line before making a test. A monitoring key is provided for monitoring on busy subscriber's lines.

DETAILED DESCRIPTION

5. To test the subscriber's line, a 88 clip must be attached to the moving spring of the top spring combination of the line relay and the associated 207 plug inserted in the 159 jack box on the line finder frame. The 205 plug must be attached to the line sleeve terminal on the I.D.F. and the associated 47 plug inserted in the 152 jack box of the I.D.F. The 206 plug must be attached to the line terminals on the M.D.F., and the associated 152 plug inserted in the jack of the jack box on the M.D.F. The 152 plug must be inserted in the jack with the knurled edge up and to the left. The 206 plug splits the line, bridging the winding of the L relay across the line side, and making it possible to observe or test the line toward a subscriber's set, or test towards the central office. The



248-A key must be normal when the line under test is an individual line, or the last line of a P.B.X. group, and must be operated when the line under test is a P.B.X. line, other than the last line of a group.

6. If the receiver is removed from the switchhook, or a ground occurs on the ring of the line, or a short circuit occurs on the line between the subscriber's station and the M.D.F., the L relay operates through its windings in series. The operation of the L relay lights the subscriber's lamp, and closes the bridge across the tip and ring of the central office side of the line, operating the line relay in the subscriber's line circuit. The operation of the line relay in the subscriber's line circuit, closes a circuit from battery, through the winding of the relay in the trip circuit, 88 clip, break contact of the LFS relay to ground, through winding of the LR relay, operating the latter relay. The LR relay operated, closes a circuit for 48 volt battery, 2 18-Q resistances in series, break contact of the FB and SL relays, break contacts of the LR relay to 24 volt battery through the winding of the LFS relay, operating the LFS relay. The LFS relay operated, connects battery through the 18-AC resistance, in series with the LR relay, to hold it operated, and opens the lead to the contact of the L relay in the line circuit, so that the LR relay, does not interfere with the marginal conditions on the hunting lead at the time the line finder is hunting. The operation of the LFS relay also lights the white lamp.

7. When a line finder connects to the line and to an idle district, a circuit is closed from battery, through a resistance in the district circuit, over lead S, operating the SLB relay through one winding, or windings in series, depending upon the position of the P.B.X. key. The operation of the SLB relay operates the BA relay, which in turn operates the FB relay from ground on its make contact, and connects ground through the 18-A resistance, to the sleeve of the test jack, opening the operating circuit of the SL relay. If the plug of the test cord should be inserted in listening test jacks at this time, the test line circuit would not be disturbed. The operation of the FB relay, (a) connects the line half of the circuit through to the central office, in order that the call may be completed, if the operation of the FB relay is due to the removal of a receiver from the switchhook, (b) releases the L relay, extinguishing the green lamp, (c) opens the circuit through the LFS relay, releasing it, and (d) lights the red lamp as a busy signal. The release of the LFS relay releases the LR relay, and extinguishes the white lamp. When the receiver at the calling station is replaced on the switchhook, or the short circuit is removed, the SLB relay releases, due to the removal of battery from the S lead, in turn releasing the BA and FB relays, extinguishing the red lamp, and restoring the circuit to normal.

8. Should the cross or ground occur in the central office, the L relay will not operate, and the white lamp will not light. The line relay in the subscriber's line circuit will operate, however, and the test circuit operates as described in paragraph 7, lighting the white and red lamps.

9. If the ground or short circuit is of such short duration that the L relay in the subscriber's line circuit is operated, but releases before the line finder has found the line, the LR and LFS relays operate and lock up under control of the SL and FB relays, as described in paragraph 7, and the white lamp lights. It is necessary to insert the plug of the test cord in one of the test jacks, operating the SL relay, to release the LR and LFS relays, extinguishing the lamp and restoring the circuit to normal.



10. If the line is selected by a final circuit, battery from the final circuit over lead S, operates the SLB relay. The operation of the SLB relay functions as described in paragraph 7, and the busy lamp lights.

11. If the plug of a testing cord is inserted in either of the test jacks to test the line, battery on the sleeve of the cord circuit operates the SL relay. The SL relay operated, (a) opens the operating circuit for the LFS and SLB relays, (b) connects battery through the 2 18-Q resistances in series to the sleeve terminal of the line, holding it busy, to the hunting line finder, and (c) lights the red lamp.

12. The testing operator may monitor on a busy line by operating the monitoring key.

CIRCUIT REQUIREMENTS

THE READJUST REQUIREMENTS SHOWN BELOW ARE FOR MAINTENANCE USE ONLY.

	<u>OPERATE</u>	<u>NON-OPERATE</u>	<u>RELEASE</u>
B135 (LR)	Readj. .0010 amp. Test .0016 amp. W.C.C. .0021 amp.		Readj. .0003 amp. Test .0001 amp.
B244 (SLB) Wdgs. in Series	Readj. .001 amp. Test .0013 amp. W.C.C. .0015 amp.		Readj. .0002 amp. Test .0001 amp.
Secondary Winding (8000 ohms)	Test .0014 amp. W.C.C. .0015 amp.		
E106 (FB)	Readj. .030 amp. Test .035 amp. W.C.C. .040 amp.	Readj. .015 amp. Test .014 amp.	
E200 (LFS)	Readj. .016 amp. Test .022 amp. W.C.C. .028 amp.		Readj. .003 amp. Test .0028 amp.
E200 (BA)	Readj. .016 amp. Test .028 amp. W.C.C. .040 amp.		Readj. .003 amp. Test .0028 amp.
E1010 (SL)	Readj. .069 amp. Test .099 amp. W.C.C. .128 amp.	Readj. .047 amp. Test .044 amp.	
E1344 (L) Wdgs. in ser. aiding	Readj. .013 amp. Test .015 amp. W.C.C. .0158 amp.		Readj. .005 amp. Test .0046 amp. W.C.C. .0042 amp.

ENG.--RAF-JO.  
10/28/21

CHK'D.--WCD-CWP.

APPROVED - C.L.SLUYTER, G.M.L.