

CIRCUIT DESCRIPTION
SYSTEMS DEVELOPMENT DEPARTMENT
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Issue 3-D
Appendix 1-D
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COMMON SYSTEMS
TEST LINE CIRCUIT
IN PANEL OR CROSSBAR OFFICE
FOR USE WITH
CALL THROUGH TEST SET

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The cross-connections have been changed.

D.2 Fig. B is rated "A&M Only".

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3340

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COMMON SYSTEMS
TEST LINE CIRCUIT
IN PANEL OR CROSSBAR OFFICE
FOR USE WITH
CALL THROUGH TEST SET

CHANGES

B. CHANGES IN APPARATUS

B.1	Superseded	Superseded by
	U497 Relay (W)	U168 Relay (W)
	U165 Relay (Z)	U299 Relay (Z)
	18AC Res. (D)	

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 The (W) relay is changed to add one set of make contacts.
- D.2 The (Z) relay is changed to add one set of break contacts.
- D.3 Fig. F shows wiring and apparatus arrangement of (W) & (Z) relays prior to issue 3-D.
- D.4 Fig. G shows wiring and apparatus arrangement, using the additional make contact for (W) relay and the additional break contact for (Z) relay wired in parallel. This new circuit arrangement flashes the supervisory relay in the originating circuits after the test line circuit completes its cycle, instead of removing the bridge circuit from the loop. Fig. G wiring also arranges for a constant tone while flashing the supervisory relay instead of clicks.
- The arrangement shown by Fig. G will minimize the possibility of the originating circuits, timing out and dropping the connection after the test line circuit has completed its cycle, and removed the bridge which simulates a subscriber's answer.
- D.5 A strap wire is added at 3B contact of (SL1) relay on issue 3-D.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

- 1.1 This test line is used to provide a termination for calls from the call through test set and a means for setting up a subscriber answer condition without requiring the assistance of a second test man.
- 1.2 In Panel System offices the circuit appears at the Final Mult. and in Crossbar System offices, at the vertical of the primary line switch, and is reached by dialing an assigned test code.
- 1.3 The test line when started automatically applies to the tip and ring a series of timed closures and tone signals, with sufficient variety in these applications to test the supervisory, transmission, signaling, charging, and other features of the different circuits in the connection. Progress in the test is indicated by the tones.

2. WORKING LIMITS

- 2.1 None.

3. FUNCTIONS

- 3.1 In Panel or Crossbar offices where semi-selective ringing is used and the assigned number to be dialed makes use of the "two ring code", this circuit awaits the ringing current before the sleeve closure is effective to start the circuit.
- 3.2 In Panel or Crossbar offices where semi-selective ringing is used and the assigned number to be dialed makes use of the "one ring code", the sleeve closure is effective immediately due to "Z" wiring.
- 3.3 In Panel or Crossbar offices where ringing, other than the semi-selective type is used, the sleeve closure is effective immediately due to the use of Fig. D instead of Fig. E.
- 3.4 There is a delay in starting the closures and tone for a short interval after sleeve closure to synchronize with a full closure of the interrupter.
- 3.5 The first closure of the tip and ring will trip the ringing.
- 3.6 The loop is opened for short intervals (.535 sec.) and closed for short intervals (.525 sec.) with high tone superimposed on same, in an effort to cause a subscriber who may call this line in error, to disconnect before being falsely charged.
- 3.7 The tone superimposed on the loop during the closed intervals of the loop will simulate a transmission test.
- 3.8 The loop is closed for an average of 7.43 sec. to cause the charge feature of the originating circuits to function.

- 3.9 With Fig. F and after the charge feature functions, the D.C. loop is changed to a condenser loop with a superimposed, repeated click on this loop, to indicate that the circuit is ready for disconnection.
- 3.10 With Fig. G and after the charge feature functions, the D.C. loop is changed to a flashing circuit with a continuous tone superimposed on the loop, this flashing circuit is a long closure and short opening to release "timing feature" of "District release circuit" or "District junctor circuit".

4. CONNECTING CIRCUITS

- 4.1 For Panel Offices.
 - 4.11 Final Circuit.
 - 4.12 Miscellaneous Circuit, for Mis. Int. Frame.
 - 4.13 Tone Supply Circuit.
- 4.2 For Crossbar Offices.
 - 4.21 Line Choice Connector Circuit or Number Group Connector Circuit.
 - 4.22 Interrupter Frame Circuit.
 - 4.23 Tone Supply Circuit.
 - 4.24 Sub. Line Circuit.

DESCRIPTION OF OPERATION

5. SEIZURE

- 5.1 The test line circuit is seized by a terminating marker circuit which connects ground to the "NS" lead when the test line is located at a crossbar office. (Fig. C.)
- 5.2 The test line circuit is seized by a final circuit which connects battery to the "S" lead, when the test line is located at a panel office arranged for ground cut-off relays (Fig. B).
- 5.3 The test line circuit is seized by a final circuit which connects ground to the "S" lead, when the test line is located at a panel office arranged for battery at cut-off relays. (Fig. A.)

6. ROUTING OF TEST CALL

- 6.1 The test line circuit is reached by dialing an assigned code over selected channels preselected and connected to the "Call Through Test Circuit".

7. START OF CALL

- 7.1 When the final circuit or the terminating marker circuit causes a closure to the "S" or "ANS" lead, the (SL) relay will operate, making the line busy to all other incoming calls. In crossbar offices the ground closure to "ANS" lead operates (SL) relay, which extends this ground closure over "ALS" lead to the line hold magnet, the (SL) relay locks to the "ALS" lead. When the (SL) relay operates the (SLL) relay will operate immediately if Fig. D or Fig. E with "Z" wiring is provided. When Fig. E without "Z" wiring is provided the operation of (SLL) relay is delayed until after ringing has been started in order that the test line shall not advance until after termination of the pickup interval. (L) relay (Fig. E) is used in offices where semi-selective ringing is used and where a two-ring number has been assigned as a code for calling this test line.
- 7.2 After the (SLL) relay operates, (FL) int. causes the (F) relay to operate and release, operated for .525 second and released for .535 second. The complete cycle is 1.06 second.
- 7.3 The first closure of (FL) int. causes the (F) relay to operate in turn operating (W) relay.
- 7.4 The first opening of (FL) int. causes the (F) relay to release in turn causing (Z) relay to operate and (W) relay to hold operated.

8. TRIPPING

- 8.1 After the (F) relay releases the (RC) relay will operate which locks and closes the tripping circuit through the primary winding of (A) repeating coil and (E) res.
- 8.2 The (RC) relay, when operating, opens circuit of (L) relay, when Fig. E is used or cond. and res. bridge, when Fig. D is used, closes grd. when either Fig. "F" or "G" is used to the top transfer spring of (W) relay to function (W1) and (W2) relays, it also closes (A) cond. circuit, shunted by (D) relay.
- 8.3 Tone is connected to the secondary winding of (A) repeating coil, by the operation of (SLL) relay, and is interrupted by every release of the (F) relay until the (D) relay operates. See Paragraph 11. The (F) relay will also open the (A) repeating coil bridge for each succeeding release of (FL) interrupter, until the (CH1) relay operates.
- 8.4 The second closure of (FL) int. causes the (F) relay to operate a second time in turn causing the (W) relay to release by shunting same, and holds the (Z) relay operated, in turn causing the (W1) relay to operate.
- 8.5 The second opening of (FL) int. causes (Z1) relay to operate, holding (W1) relay operated and releasing (Z) relay.

8.6 High tone is used during the tripping and flashing interval, to assist the test man to recognize a difference between the test line and a subscribers line, which would have standard busy tone or ringing induction. After the (D) relay operates the tone is continued on a steady high tone when Fig. G is used but when Fig. F is used the tone is changed to a click. See Paragraph 11.

9. TONE SIGNAL PRIOR TO CHARGE CLOSURE

- 9.1 The operation and release of (F) relay will cause pulses of high tone on the basis of .525 second closed and .535 second open in an effort to cause a subscriber who may call this line in error to disconnect before being falsely charged. Seven closures and openings take place before the (CH) relay operates to prevent the opening of the loop by the (F) relay.
- 9.2 The third closure of (FL) int. will cause (F) relay to operate in turn causing (W) relay to operate.
- 9.3 The third opening of (FL) int. causes (F) relay to release in turn causing (Z) relay to operate, the (W) relay remains operated, in parallel with (Z) relay.
- 9.4 The fourth closure of (FL) intr. causes (W) relay to release in turn causing (W1) relay to release and (W2) relay to operate.
- 9.5 The fourth opening of (FL) intr. releases (F) relay in turn releasing (Z1) relay which causes (Z2) relay to operate holding (W2) relay operated.
- 9.6 The fifth closure of (FL) intr. operates (F) relay in turn operating (W) relay.
- 9.7 The fifth opening of (FL) intr. releases (F) relay in turn causing (Z) relay to operate holding (W) relay operated.
- 9.8 The sixth closure of (FL) intr. operates (F) relay in turn releasing (W) relay which operates (W1) relay.
- 9.9 The sixth opening of (FL) intr. releases (F) relay in turn causing (Z) relay to release which causes the (Z1) relay to operate holding (W1) relay operated.
- 9.10 The seventh closure of (FL) intr. operates (F) relay in turn operating (W) relay.
- 9.11 The seventh opening of (FL) intr. releases (F) relay in turn causing (Z) relay to operate holding (W) relay operated.
- 9.12 The eighth closure of (FL) intr. operates (F) relay in turn releasing (W) relay in turn releasing (W1) relay in turn releasing (W2) relay; the (Z), (Z1) and (Z2) relays remain operated, the (CH) relay is operated with (W2) relay released and (Z2) relay operated, the (CH) relay locks.

- 9.13 The eighth opening of (FL) intr. releases (F) relay in turn releasing (Z) relay in turn releasing (Z1) relay in turn releasing (Z2) relay.

10. CHARGING

- 10.1 The ninth closure of (FL) intr. operates (F) relay in turn operating (W) relay in turn operating (CH1) relay.
- 10.2 The operation of (CH1) relay closes the loop through (A) repeating coil and (E) resistance by the shunt across 3B and 4B contacts of (F) relay and maintains this closure for 7.42 seconds, in order to cause the charging apparatus of originating circuits to function.
- 10.3 The timing of this charging period is accomplished in exactly the same manner as was described under paragraph 9 by the operation and release of (F) relay until the (D) relay operates. When the sixteenth closure of (FL) intr. is made and (F) relay operates, the (W) relay releases, in turn releasing (W1) relay in turn releasing (W2) relay, the (Z) and (Z2) relays, being held operated, with the (Z2) relay operated and (W2) relay released, the (D) relay will operate and lock.

11. AWAIT DISCONNECTION

- 11.1 The operation of (D) relay causes the (Z) relay to release, in turn releasing (Z1) relay in turn releasing (Z2) relay opening the operating circuit of (D) relay.
- 11.2 When Fig. F is used the operation of (D) relay removes shunt across (A) condenser which will be connected in series with the loop, and connects a 500 ohm battery circuit to the secondary winding of (A) repeating coil, which is opened and closed by (F) relay following the (FL) intr.
- 11.3 When Fig. G is used the operation of (D) relay removes shunt circuit across (A) condenser which will be connected in series with the loop and connects permanent tone to the secondary winding of (A) repeating coil. The (F) relay will follow the interrupter, causing (W) & (Z) relays to function as described under paragraph 9. The (W) relay has a make contact wired in parallel with a break contact of (Z) relay and the combination of these make and break contacts, causes the loop to open for .535 sec. and close for 1.585 sec. for each cycle of operation of the (W) and (Z) relays, the (W1), (W2), (Z1) and (Z2) relays will follow in the regular sequence of operation but they do not serve any useful function at this time.

The long loop closure and short loop opening is provided so as to give time for the relays in timing feature of the "district release circuit" or "District Junctor Circuit" to release, when the loop is closed, so as to minimize the possibility of the originating circuit, timing out and dropping the connection.

11.4 This interrupter signal with Fig. F or flash with tone signal with Fig. G, is continued until the test man disconnects or until the auto. release feature of originating circuit functions by breaking down the connection.

12. DISCONNECTION

12.1 When the sleeve circuit is opened the (SL) relay releases in turn releasing (SL1) relay in turn releasing all locked relays.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

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