

CIRCUIT DESCRIPTION
BELL TELEPHONE LABORATORIES, INC.
SYSTEMS DEVELOPMENT DEPT., NEW YORK
PRINTED IN U.S.A.

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Issue 4-B
Appendix 1-D
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PANEL SYSTEM
TROUBLE DESK
HOLDING LINE FOR PERMANENT SIGNALS

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 No change.

B. CHANGES IN APPARATUS

B.1 None.

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLY-
ING TO ADDED OR REMOVED APPARATUS

C.1 None.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The circuit rating has been changed from "Standard"
to "A & M Only".

D.2 "Machine Switching" has been removed from the cir-
cuit title.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

1.1 No change.

2. WORKING LIMITS

2.1 No change.

OPERATION

3. FUNCTIONS

3.1 No change.

4. CONNECTING CIRCUITS

4.1 No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332-A

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CIRCUIT DESCRIPTION
BELL TELEPHONE LABORATORIES, INC.
SYSTEMS DEVELOPMENT DEPT., NEW YORK.
PRINTED IN U.S.A.

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Issue 4-B
March 21, 1928
(5 Pages) Page 1

PANEL MACHINE SWITCHING SYSTEM
TROUBLE DESK
HOLDING LINES FOR PERMANENT SIGNALS

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 None.

B. CHANGES IN APPARATUS

B.1 None.

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE
APPLYING TO ADDED OR REMOVED APPARATUS

C.1 None.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Figure E is provided to supersede Figures C and D.
To prevent the release of (MB) relay due to chatter
of (L) relay, and to prevent a plug in (HOLD) jack
from holding the circuit busy prior to seizure.

D.2 Note 110 is added.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

1.1 To provide access at the trouble desk to subscribers'
lines on which there are permanent signals and to
provide means of talking, testing and applying a
howler tone to these lines.

- 1.2 To provide lamp indications of the condition of the line.
- 1.3 To apply tone to subscribers' lines for quickly identifying cable pairs affected by cable failures.

2. WORKING LIMITS

- 2.1 This circuit functions with howler cords having sleeves with a rated resistance at 220 ohms to 21-25 volt battery, and the sender monitor's voltmeter cords, and test lines of local test desk having sleeves with rated resistance of 286 ohms to 45-50 volt battery.
- 2.2 The maximum external circuit loop is 1025 ohms. The minimum insulation resistance is 10,000 ohms.

OPERATION

3. FUNCTIONS

- 3.1 Flashes lamp slowly when selector is caused to seize this circuit.
- 3.2 Gives steady lamp when trouble desk operator answers.
- 3.3 Closes ground to auxiliary signal circuit.
- 3.4 Figure A: district selector is automatically released when the subscriber's line is cleared.
- 3.5 Figure A; connection with district selector can be held by inserting a make busy plug in the (HOLD) jack.
- 3.6 Figure B; connection with district selector is held until trouble desk operator depresses the (DISC) key.
- 3.7 For operating the (PST) key tone is applied for identifying cable pairs.

4. CONNECTING CIRCUITS

- 4.1 District or office selector.
- 4.2 Sender monitor talking or voltmeter cord.
- 4.3 Test line from local test desk.
- 4.4 Sender monitor howler cord with sleeve connected to 21-25 volt battery thru a rated resistance of 220 ohms.

4.5 Trouble desk auxiliary signal circuit.

4.6 Miscellaneous tone interrupter circuit.

DETAILED DESCRIPTION

5. SELECTION OF PERMANENT SIGNAL LINE - When the district selector is caused to seize the permanent signal holding line, the direction of battery and ground in the holding line causes the district selector to be started toward the overflow position. As the talking positions are passed, the (L) relay operates in series with a relay in the district, connects ground to the sleeve when Figure B is used and in turn operates the (Ll) relay which places ground on the sleeve. A ground on the sleeve causes the district to stop in the "talking to operator" position. The (Ll) relay is made slow release to insure holding the ground on the sleeve while the district is advancing to the "talking to operator" position. The (L) relay is now connected through to the subscriber's line. The (L) relay closes the circuit from ground through the lamp, its make contact, break contact of the (MB) relay, to battery through the contact of the slow interrupter, causing the lamp to flash. A circuit is closed from ground to the auxiliary signal circuit thru make contacts of (L) relay when Figure E is used and of (Ll) relay when Figure C or D is used.

6. TROUBLE DESK OPERATOR ANSWERS (FIGURE A) - When the plug of the voltmeter or test cord is inserted in the answering jack, the (CO) relay operates. The (CO) relay operated, (a) connects the tip and ring of the cord through to the subscriber's line, (b) closes a circuit from ground thru its make contact to hold the (L) relay operated, and (c) closes a circuit from ground thru its make contact to battery thru the winding of the (MB) relay, which operates. The (MB) relay operated, (a) disconnects interrupted battery from the lamp and connects battery through the make contact of the (L) relay to the lamp causing it to burn steadily; (b) when Figure C is used disconnects ground from the (Ll) relay which releases, (c) when Figure C is used connects ground to the sleeve of the district or office selector circuit, (d) locks to ground through its make contact under control of the (L) relay when Figure C is used and under control of the (Ll) relay when Figure D or E is used, and (e) when the make busy plug is in the (HOLD) jack, locks to ground through its make contact under the control of the (HOLD) jack. The (Ll) relay released disconnects ground from the auxiliary signal

circuit when Figure C or D is used and (L) relay released disconnects ground from the auxiliary signal circuit when Figure E is used.

When Figure D or E is used (LL) relay remains operated as long as (L) relay is operated and (MB) relay locks through front contacts of (LL) relay and disconnects ground from the auxiliary signal circuit. When Figure D is used ground is held connected to the sleeve through the hold jack when there is a make busy plug in it.

7. TROUBLE DESK OPERATOR ANSWERS (FIGURE B) - The operation is the same as given in paragraph 6 for Figure C or E except that the (MB) relay locks to ground through its own make contacts under control of the (DISC) key.

8. DISCONNECTION - PLUG IN HOLD JACK (FIGURE A) - When the receiver is replaced on the switchhook at the subscriber's station or when the trouble on the line is cleared and the trouble desk operator has withdrawn the plug from the (ANS) jack, the (L) and (CO) relays release. The (L) relay released causes the lamp to flash rapidly from ground through the interrupter and the make contact of the (MB) relay. The auxiliary signal circuit also is closed at this time. The trouble desk operator withdraws the plug from the (HOLD) jack which disconnects ground from the (MB) relay which releases. The (MB) relay released extinguishes the lamp and when Figure C or E is used disconnects ground from the "S" lead, restoring the circuit to normal. When Figure D is used the removal of the plug disconnects ground from the sleeve.

9. DISCONNECTION - PLUG NOT IN HOLD JACK (FIGURE A) - When the receiver is replaced on the switchhook at the subscriber's station or when the trouble is cleared and the trouble desk operator has withdrawn the plug from the (ANS) jack, the (L), (CO) and (MB) relays and also (LL) relay when Figure D or E is used, release and the circuit is normal.

10. DISCONNECTION (FIGURE B) - The operation is the same as described in paragraph 8 for Figure C or D except that the operator disconnects ground from the (MB) relay by operating the (DISC) key.

11. TRACING TONE - To identify cable pairs at the main distributing frame on line affected by cable failures, the (PST) key is operated for applying tone to the ring conductors

Of all subscribers' lines routed to the holding lines. At the main distributing frame, a receiver, in series with a one or two mf condenser is connected, one side to ground and the other side to a lead used for making contact with the ring side of the protector springs of the cable affected. The (PST) key operated, closes tone circuit through the high winding of output transformer (PST) in miscellaneous tone and interrupter circuit. The tone path to the ring side of a subscriber's line is as follows: 48 volt battery, low windings of output transformer (PST), condenser (T), relay (CO) break contact to ring of district or office multiple. Lead "I" is a common tone lead to the (T) condensers of all holding lines.

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