PANEL SYSTEMS
COIN CONTROL CIRCUIT
FOR INCOMING SELECTORS OR INCOMING TRUNKS FROM TOLL OFFICE AND FOR RECORDING COMPLETING TRUNKS FOR USE WITH COIN CONTROL CIRCUIT AT CENTRAL SWITCHBOARD NO. 13C, 13D, 15C OR 15D BATTERY CUT OFF RELAY OFFICE

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Cross-connection Fig. 52 was changed.

D.2 The first line of the title formerly read, "Panel System."

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3350

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PANEL SYSTEM
COIN CONTROL CIRCUIT
FOR INCOMING SELECTORS OR INCOMING TRUNKS FROM TOLL OFFICE AND FOR RECORDING COMPLETING TRUNKS
FOR USE WITH COIN CONTROL CIRCUIT AT CENTRAL SWITCHBOARD NO. 13C, 13D, 15C, OR 15D
BATTERY CUT-OFF RELAY OFFICE

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 This circuit has been changed to adapt it for use in crossbar offices.

B. CHANGES IN APPARATUS

B.1 Added

12L Resistance Lamp (CC) or (CR)
13L Resistance Lamp (CC) or (CR)

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Leads "E", "D" and "N" connecting to crossbar incoming trunk circuit have been added in Figs. 2 and 3.

D.2 Leads "TG" and "AG" are also shown connecting to floor alarm frame, miscellaneous and auxiliary alarm circuit.

D.3 Interrupter frame circuit is also shown as a connecting circuit for Figs. 2 and 3.

D.4 In Fig. 1 the "C" lead has been added connecting to crossbar incoming trunk circuit.

D.5 Note 107 has been added.

D.6 Prior to issue 5-D the working limits for the (C) & (R) relays were as follows:

Max. Conductor Resistance - 1850Ω
Max. E. P. - ±20V
Min. Insulation Resistance - 10,000Ω

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

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PANEL SYSTEM
COIN CONTROL CIRCUIT
FOR TOLL INCOMING SELECTORS AND RECORDING COMPLETING TRUNKS
FOR USE WITH COIN CONTROL CIRCUIT
AT CENTRAL "A" SWITCHBOARD
FOR USE IN BATTERY CUT OFF RELAY OFFICE

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 "X" wiring is superseded by "Y" wiring to keep normal coin battery from the relay frames.

D.2 A strap indicating a number of Fig. 3 per CF interrupter was removed to show one Figure 3 per interrupter.

D.3 Circuit note 106 was added.

D.4 Miscellaneous changes are made in the cross connections.

All other headings, No Change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

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CIRCUIT DESCRIPTION
AMERICAN TELEPHONE & TELEGRAPH CO.,
DEPT. OF DEVELOPMENT & RESEARCH.
BELL TELEPHONE LABORATORIES, INC.
PRINTED IN U.S.A.

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PANEL SYSTEM
COIN CONTROL CIRCUIT
FOR TOLL INCOMING SELECTORS AND RECORDING COMPLETING TRUNKS
FOR USE WITH COIN CONTROL CIRCUIT
AT CENTRAL "A" SWITCHBOARD
FOR USE IN BATTERY CUT-OFF RELAY OFFICE

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 Circuit changed to provide an alarm on the common leads for the (CN) relays in order to indicate tr ground conditions on these leads.

B. CHANGES IN APPARATUS

B.1	Removed	Added	Repla
	Fig. 2		
	Relay (CP) R1058		Relay (
		Relay (TA) R1314	
		Relay (TB) R1061	
		Relay (TG) R82	
		Relay (TG1) E721	
	Fig. 3		
	Relay (CP) R1042		Relay (
	Relay (R1) R652	Relay (TA) R1314	
		Relay (TB) R1061	
		Relay (TG) R82	
		Relay (TG1) E721	

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

C.1 No change.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Figure 2 has been changed to change the (CP) rel add relay (TG), (TG1), (TA) and (TB) and interru and to provide leads to the floor alarm board mi ous and aux. alarm circuit.

D.2 Figure 3 has been changed to remove the (R1) relay, change the (CP) relay, add relays (TG), (TG1), (TA) and (TB) and interrupter (TG) and provide leads to the floor alarm board miscellaneous and aux. alarm circuit.

D.3 The lead designation for the locking circuit for the (CN) relay formerly designated (SR) has been changed to (E) and a separate lead provided for odd and even circuits.

D.4 Separate lead designations (SR) have been shown opposite the leads mentioned as (E) in the above item and are for use with the recording completing trunks.

D.5 Note 105 has been added.

D.6 The above changes were made to separate the locking circuit leads for the (CN) relay so as not to have all circuits connected to one common lead in case a trouble ground should occur on this lead. An alarm circuit has also been provided to indicate a trouble ground condition.

D.7 Changes have been made in the cross-connecting information and note 201 has been added.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

1.1 This circuit provides a means for applying coin collect and return current on subscriber lines from interconnected toll incoming selectors and recording completing trunks under control of a distant central "A" switchboard operator.

2. WORKING LIMITS

2.1 (L), (LC) and (LR) relays.

Maximum conductor resistance	1500 ohms
Maximum earth potential	± 50 volts
Minimum insulation resistance	30,000 ohms

2.2 (C) and (R) relays

Maximum external circuit loop ground return	1850 ohms
Maximum earth potential	± 20 volts
Minimum insulation resistance	10,000 ohms

OPERATION

3. FUNCTIONS

3.1 Furnishes positive and negative potential for controlling the subscriber station coin magnet.

3.2 Provides a distinctive tone to the distant operator when either positive or negative coin potential is connected to a subscriber line and the line test indicates that a coin magnet is connected thereto.

3.3 Causes an auxiliary signal lamp at the distant central "A" switchboard to be lighted when either positive or negative coin potential is connected to a subscriber line and the line test indicates the coin magnet is connected thereto.

3.4 Provides a timing arrangement for use in offices where the difference in earth potential between the office and subscriber station ground is 8 volts or more to insure the release of the coin magnet.

3.5 Provides an arrangement for discharging the subscriber line circuit after the coin potential has been removed but before the talking circuit is reclosed.

3.6 Provides a visual and audible alarm in case the common locking leads "E" or "SR" are grounded for a sufficient length of time.

4. CONNECTING CIRCUITS

4.1 Coin control circuit.

4.2 Recording completing trunk circuit.

4.3 Incoming selector circuit from Toll or Long Distance offices.

4.4 Miscellaneous circuits for miscellaneous interrupter frame.

4.5 Floor alarm board miscellaneous and alarm circuit.

DETAILED DESCRIPTION

5. OPERATION WITH GROUND POTENTIAL LESS THAN 8 VOLTS BETWEEN OFFICE AND SUBSCRIBER STATION

When a coin control key of a trunk is depressed at the distant office relay (L) is operated thru its primary and secondary windings in series with resistances (B) and (C) to ground. This operates relay (LA) which trans-

fers resistance (C) from ground to the windings of relays (LC) and (LR), connects the primary and secondary windings of relay (L) to a contact of relay (TG) and operates relay (CN) ~~of Figure 4~~ or a relay of the associated recording completing trunk. Relay (CN) connects lead "CR" of Figure 4 to the subscriber line, provides a locking path for itself to relay (TG) and connects the "TO" lead to the trunk end of the circuit. Similar functions are performed in the recording completing trunks. When relay (LA) is operated relay (LC) or (LR) is operated depending upon the polarity of the current from the originating office. These relays connect positive or negative coin potential thru relay (C) or (R) to the subscriber line. If a coin magnet is connected to the line or if it has a trouble ground of approximately 1100 ohms or less relay (C) or (R) will operate and connect either low or high tone to the distant operator as a collect or refund signal and operate relay (CP). The latter operates the (TG) relay which operates the (TG1) relay and provides a locking ground for relay (CN) or a relay of the associated recording completing trunk and short-circuits resistances (B) and (C) and the secondary winding of relay (L) which causes the auxiliary signal to function in the distant office.

When the key is released at the distant office relays (L), (LA), (LC) or (LR), (C) or (R), (CN), (CP), (TG) and (TG1) are released and the circuit is restored to normal. When relay (LC) or (LR) is released the coin potential is removed from the circuit and resistance (A) and condenser (CN) are left connected to the subscriber line during the release time of relays (CP), (TG) and (CN) or the relay of the recording completing trunk. This discharges the line before the talking battery is reconnected.

With this arrangement the associated auxiliary signal when lighted remains in this condition until the key is released. If the same key is again depressed the lamp will not relight unless the station coin magnet failed to restore or the line circuit is in trouble. The functions of relays (TG) and (TG1) will be described in a later paragraph.

6. OPERATION WITH GROUND POTENTIAL 8 VOLTS OR MORE BETWEEN OFFICE AND SUBSCRIBERS STATION

When a coin control key of a trunk is depressed at the distant office relay (L) is operated thru its primary and secondary windings in series with resistances (B) and (C) to ground. This operates relay (LA) which transfers resistances (B) and (C) from ground to the windings of relays (LC) and (LR), connects the primary and secondary windings of relay (L) to a contact of relay (TG) and operates relay (CN) of Figure 4 or a relay of the associ-

ated recording completing trunk. Relay (CN) operated connects lead "CR" of Figure 4 to the subscriber line, provides a locking path for itself to relay (TG) and connects the "TO" lead to the trunk end of the circuit. Similar functions are performed in the recording completing trunks. When relay (LA) is operated relay (LC) or (LR) is operated depending upon the polarity of the current from the originating office. These relays connect positive or negative coin control potential through relays (C) or (R) to the subscriber line. If a coin magnet is connected to the line or it has a trouble ground of approximately 1100 ohms or less relay (C) or (R) will operate and connect either high or low tone to the distant operator as a collect or refund signal and operate relay (CP). Relay (CP) operated will operate relay (TG) which will in turn provide a locking circuit for relay (B) and relay (CN) or a relay in the associated recording completing trunk, operates relay (TG1) and short-circuits resistances (B) and (C) and the secondary winding of relay (L) which causes the auxiliary signal to function in the distant office and closes the primary winding of relay (A) to the interrupter. When the interrupter is closed relay (A) is operated in turn operating relay (B). The latter locks through its secondary winding to relay (CP) and provides a locking circuit for its primary winding before it opens the operating path of relay (A). Relay (A) in parallel with the primary winding of relay (B), locks under control of the contacts of relay (B) and the interrupter. When the interrupter is opened relay (A) is released and when the interrupter is reclosed relay (CC) is operated thru the contacts of relay (A) normal and relay (B) operated. Relay (CC) is operated in unison with the closure of interrupter (CF) and removes the coin control potential from the leads to the subscriber line. This causes the release of relay (C) or (R) which removes the tone signal from the circuit to the distant operator and releases relay (CP). Relay (CP) releases relay (TG) and opens the secondary winding of relay (B) which releases if interrupter (CF) is open or when it is opened. Relay (B) releases relay (CC). This reconnects coin control potential to the subscriber line and if the line magnet failed to function or if there is a trouble ground on the line the sequence of operation will be repeated. When the key is released at the distant office relays (L), (LA), and (LC) or (LR) are released and the circuit is restored to normal. When relay (LC) or (LR) is released or relay (CC) is operated the coin potential is removed from the circuit but resistance (A) and condenser (CN) are left connected to the subscriber line during the release time of relays (CP), (TG) and (CN) or the relay of the recording completing trunk. This discharges the line before the talking battery is reconnected. With this arrangement the associated auxiliary signal is lighted when coin potential is applied to the subscriber line. After a

sufficient period of time has elapsed to insure operation of the line coin magnet the coin control potential is removed from the line and the auxiliary signal will be extinguished.

7. GROUNDS ON THE "E" OR "SR" LEADS - FIGS. 2 AND 3

The (TG1) relay connects ground to the (TG) interrupter and when the front contact closes the (TA) relay is operated and locks. When the back contact of the interrupter closes the (TB) relay operates and locks. The (TB) relay operated connects ground to light a lamp in the floor alarm board over the "TG" lead, and actuates an audible alarm over the "AG" lead. For normal operation the (TG1) relay is operated only for the period when the collect or return keys are depressed at the distant office. The interrupter time intervals, which are approximately 14 to 29 seconds, are such that for normal operation the alarms would not be effective. However, if a ground occurs on one of the "E" or "SR" leads, and is maintained for a sufficient length of time, the (TG1) relay would be continuously operated and when the interrupter time interval has elapsed both a visual and an audible alarm will be given.

AMERICAN TELEPHONE & TELEGRAPH CO.,
DEPT. OF DEVELOPMENT & RESEARCH.
BELL TELEPHONE LABORATORIES, INC.

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CIRCUIT DESCRIPTION
SYSTEMS DEVELOPMENT DEPARTMENT

PANEL SYSTEMS
COIN CONTROL CIRC
FOR INCOMING SELECTORS OR I
FROM TOLL OFFICE AN
RECORDING COMPLETING
FOR USE WITH COIN CONTROL ,UIT
CENTRAL SWITCHBOARD NO. 13C, 15C
BATTERY CUT OFF RELAY

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3350-EDJ-RSW

CIRCUIT DESCRIPTION
AMERICAN TELEPHONE &
DEPT. OF DEVELOPMENT
BELL TELEPHONE LABOR
PRINTED IN

FOR

CHANGES

A. CHANGED AND ADDED

A.1 Circuit change
leads for the
ground conditi

B. CHANGES IN APPARAT

B.1 Removed

Fig. 2
Relay (CP) R10

Fig. 3
Relay (CP) R104
Relay (R1) R652

C. CHANGES IN CIRCUIT
ADDED OR REMOVED AP

C.1 No change.

D. DESCRIPTION OF CIRCU

D.1 Figure 2 has bee
add relay (TG),
and to provide
ous and aux. ala