COMMON SYSTEMS
OUTGOING TRUNK CIRCUIT
FOR NON-COIN SPECIAL SERVICE
FROM CROSSBAR NO. 1 OR PANEL
TO CENTRAL "A" SWITCHBOARD
COMMON TIMING CIRCUIT
FOR 4 PARTY SELECTIVE RINGING OFFICE

CHANGES

B. CHANGES IN APPARATUS

B.1 Superseded	Superseded By
(MG) W option U508 relay	(MG) V option U1251 relay
(GA) S option U156 relay	(GA) R option U1228 relay
(ST) U option U458 relay	(ST) T option U1248 relay

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

C.1 The adjustment for

		Soak	Opr.	Hold	Rel.	
(H1)(H2) relay Y50 was	Test	31.5	18.5	2.3	1.0	
	Readj.	31.5	17.5	2.1	1.4	
(MB) relay Y119	Test	18	10.5	1.1	0.5	
	Readj.	18	10.0	1.0	0.6	
(ST) relay U458	Test		7.2			
	Readj.		6.8			
(GA) relay U156	Test		5.6			)Rel. Wdg.
	Readj.		5.3			)alone
	Test		12.4			)Comb. of (A)
	Readj.		11.8			)and (GA) Rel.

C.2 Added Test Note 2 page 3 LRT.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The S, R, W, Y, U and T options were added to relays (GA), (MG), and (ST).

D.2 Circuit notes 107 and 108 added.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3340-HCM-FJS

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CHANGES

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

C.1 The release adjustment for relay H1 was, readj. 1.1
H2 " " 1.1

C.2 Added test note "Adjacent relays shall not be energized. See B.S.P." for Y type relays on circuit requirements table.

C.3 Added insulate inf. for relay H2 on ckt req. tables.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3340 AR-FJS

COMMON SYSTEMS
OUTGOING TRUNK CIRCUIT
FOR NON-COIN SPECIAL SERVICE
FROM CROSSBAR NO. 1 OR PANEL
TO CENTRAL "A" SWITCHBOARD

COMMON TIMING CIRCUIT
FOR 4 PARTY SELECTIVE RINGING OFFICE

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The connecting information for leads "T", "R" and "S" of Fig. 5 formerly read "to outgoing trunk test board test and make busy jack circuit".

D.2 Leads "T", "R" and "S" to outgoing trunk test frame test and make busy jack circuit are added to provide means for testing the incoming trunk conductors when this circuit is used in a panel office.

D.3 Connecting information is added in Fig. 7 to the audible and visual alarm circuit.

D.4 Working limits are added for this circuit when used with a PBX trunk.

D.5 Changes in cross-connection Figs. 51, 55, 56 and 58.

All other headings under "Changes", no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is designed for use in a crossbar or panel office to extend originating non-coin special service calls to the distant central "A" switchboard. It is used for all calls when a subscriber dials zero and also for all calls originated by non-dial subscribers whose lines terminate on line switch circuits.

2. WORKING LIMITS

2.1 Subscriber Supervision

Max. Ext. Ckt. Loop - 1500 ohms
Min. Ins. Res. - 10,000 ohms
Max. Earth Pot ± 20 V

2.2 Trunk Supervision

Max. Ext. Ckt. Loop - 3000 ohms
Min. Ins. Res. - 30,000 ohms
Max. Ext. Ckt. Res. to 48 V Battery for relays (RC), (HD) and (MG)-3595 ohms
Min. Ext. Ckt. Res. to Non-operate relay (MG) - 28,265 ohms

2.3 PBX Trunk

Max. Ext. Ckt. Loop - 1500 ohms
Min. Ins. Res. 20,000 ohms
Max. Earth Pot ± 10 V
Min. Rated PBX Trunk Rel. Ckt. 6000 ohms

3. FUNCTIONS

3.1 To hold the associated circuits busy until both the subscriber and the operator have disconnected.

3.2 To signal the distant operator upon seizure of this trunk.

3.3 To provide an audible ringing tone to the originating subscriber until the operator answers.

3.4 To provide talking battery to the originating subscriber.

3.5 To provide a means for reringing on the originating subscriber line.

3.6 To provide switchhook supervision to the distant operator.

3.7 To provide means for associating this circuit with testing equipment and for making this circuit test busy during association.

3.8 To provide means for giving an audible and a visual alarm if interrupters (GA) and (RB) become permanently grounded.

4. CONNECTING CIRCUITS

4.01 Office Link and Connector Circuit

4.02 District Selector Circuit

4.03 Office Selector Circuit

4.04 Incoming Special Service Trunk to Central "A" Switchboard.

4.05 Outgoing Trunk Circuit for Coin Service

4.06 Non-dial Subscriber Line Switch Circuit

4.07 Floor Alarm Frame Miscellaneous and Auxiliary Alarm Circuit

4.08 Floor Alarm Board Miscellaneous and Auxiliary Alarm Circuit

4.09 Outgoing Trunk Test Frame Test and Make Busy Circuit

4.10 Trunk Make Busy Circuit

4.11 Interrupter Frame Circuit

4.12 Miscellaneous Circuits for Miscellaneous Interrupter Frame

4.13 Test Set for Trunk Circuits to Recording Completing and Central "A" Special Service Operator

4.14 Audible and Visual Alarm Circuit

DESCRIPTION OF OPERATION

5. SEIZURE

When this circuit is seized by an office link and connector circuit or by a district or office selector or by a nondial subscriber line switch circuit leads "S" and "S1" are grounded by the associated circuit and relay (L) is operated. Relay (L) operates relay (L1). The operation of relay (L1), (a) closes ground to leads "S" and "S1" as a busy indication, (b) closes a low resistance shunt involving the primary windings of relays (RC) and (HD) to the "T" and "R" leads of the incoming special service trunk circuit, (c) closes an operating circuit for relay (H1) and (d) closes in part an operating circuit for relay (RT). The operation of relay (H1),(a) closes supplementary grounds to leads "S" and "S1" as busy conditions, (b) closes an operating path for relay (MB), and (c) closes an operating path for relay (RT) under control of relay (TR). The operation of relay (RT), (a) replaces the momentary shunt toward the central "A" board and with battery and ground through the windings of relay (MG), (b) closes ringing tone toward the calling subscriber, and (c) closes an operating path for relay (H2). Battery and ground through the windings of relay (MG) causes the incoming trunk circuit at the central "A" switchboard to function and signal the operator.

6. OPERATOR ANSWERS

When the central "A" operator answers, battery and ground are closed by the incoming trunk circuit at the central "A" switchboard towards this circuit in a direction aiding the battery and ground through the windings of relay (MG), thus causing relay (MG) to operate. The operation of relay (MG) closes operating ground under control of relays (H1) and (H2) to the winding of relay (TR) which operates and locks under control of these relays. The operation of relay (TR), (a) opens the operating circuit for relay (RT) which releases and opens in part the holding circuit for relay (H2) and also recloses a low resistance bridge involving the primary windings of relays (RC) and (HD) across the incoming trunk, (b) closes the secondary windings of relays (RC) and (HD) in series with the primary windings of these relays but shunted by relay (L1), and (c) reverses the battery and ground through the windings of relay (L) toward the calling subscriber, Relay (HD) operates on its primary winding from battery and ground over the incoming trunk when relay (RT) releases. The operation of relay (HD) provides a supplementary holding circuit for relay (H1).

7. CHANGING CORDS

Should it become necessary for transmission or other reasons, for the operator to change cords the circuit operation is as follows: When the plug is removed from the answering jack at the central "A" switchboard battery and ground is removed from the answering jack at the central "A" switchboard battery and ground is removed from leads "T" and "R" causing relay (HD) to release. The release of relay (HD) causes relay (H2) to release and (a) release relay (TR) and (b) open one holding circuit for relay (H1). Relay (H1), however, does not release since relay (L1) remains operated under control of relay (L) and the calling subscriber thus providing a holding circuit for relay (H1). The release of relay (TR), (a) reverses the direction of battery and ground toward the originating subscriber, (b) opens the high resistance windings of relays (RC) and (H) which have been shunted by relay (L1) and (c) closes an operating circuit for relay (RT). The operation of relay (RT) recloses battery and ground through the windings of winding (MG) to leads "T" and "R" toward the incoming special service trunk circuit at the central "A" switchboard. Reclosure of this battery and ground causes the incoming special service trunk circuit to function and relight the trunk lamp. When the operator picks up the call the lamp is extinguished and the talking circuit to the originating subscriber is reestablished.

8. RINGBACK

8.1 Ringback in Offices Having Individual Lines (Fig 2)

When the distant operator rings back, relay (RC) is operated, operating relay (RB). The operation of relay (RB) connects ringing current through the "MR" lamp to the subscriber's lines. When the operator

restores a ringing key, relays (RC) and (RB) release.

8.2 Ringback in Offices Having Individual and 2 Party Selective or 4 Party Semi-Selective Lines (Fig. 3)

When the distant operator rings back, relay (RC) is operated operating relay (RB). Relay (RB) connects ringing current through the "MR" lamp to the (R) interrupter. The application of this current is reversed between the tip and ring leads toward the calling station, by interrupters (G) and (R) closing and opening their "F" and "B" contacts with relay (RB) operated, thus ringing the stations on both sides of the line. Condensers (C) and (D) and retardation coil (A) are provided to reduce clicks to the calling station should the subscriber or PBX operator answer before ringing is completed. When the operator restores the ringback key, relays (RC) and (RB) release.

8.3 Ringback in Offices Having Individual and 4-Party Selective Lines (Figs. 4 and 7)

When the distant operator rings back, relay (RC) is operated, operating relay (RB). Relay (RB) connects ringing current through the contacts of relay (R1) to the contacts of relay (R) and operates relay (ST). Relay (RB) connects negative superimposed ringing current to the ring and ringing ground to the tip of the line with relays (R) and (R1) normal. Relays (ST) grounds lead "G" and connects the windings of relays (R) and (R1) to leads "F" and "E" to the common timing circuit. Ground on lead "G" operates relay (W) when the contacts of interrupter (RB) are closed. Relay (W) prepares an operating path for relay (Z) and operates relay (R1) causing positive superimposed ringing current to be connected to the ring and ringing ground to the tip of the line. When interrupter (RB) opens its contacts, relay (Z) operates preparing a future path for short-circuiting relay (W) and operating relay (R) which reverses the ringing to the line. When the interrupter again closes its contacts relay (W) releases, releasing relay (R1), thereby causing negative superimposed ringing to be connected to the tip and ringing ground to the ring of the line. When the interrupter again opens its contacts, relays (Z) and (R) release, and the ringing cycle is started again. With this arrangement positive and negative superimposed ringing current will be connected to the tip and ring of the line in rotation as long as the operator holds the ringback key operated, thus ringing all the stations on the line. Condensers (C) and (D) and retardation coil (A) are provided to reduce clicks to the calling end should the subscriber or PBX operator answer before ringing is completed. When the operator restores the ringback key, relays (RC), (RB) and (ST) release, also relays (R) and (R1) and (W) and (Z) if operated. Relays (A) and (GA) are used to provide an alarm if the leads from interrupter (RB) become permanently grounded. Relay (A) may operate momentarily on the operation and release of relay (W), but will release in the intervening periods unless the interrupter lead is permanently grounded. Interrupter (GA) provides a time interval such that if relay (A) is operated for more than 5 or 6 seconds, relay (GA) will operate and lock to the grounded lead, grounding leads "DL" or "CT" and "G" or "DR" to bring in an audible alarm and a visible signal. When the trouble is cleared, relays (A) and (GA) release.

9. DIVERTED TOLL TRAFFIC

Battery and ground through the windings of relay (L) are connected to the tip and ring toward the subscriber's station in such a direction as to operate the polarized relay in PBX trunk circuits where calls from stations are to be restricted on toll service.

10. DISCONNECT

When a subscriber disconnects, relay (L) releases in turn releasing relay (L1). Relay (L1) removes the shunt from the high resistance winding of relays (RC) and (HD) which causes the supervisory signal to be relighted in the distant operator's cord circuit and open in part the holding circuit for relay (H1). When the circuit is disconnected by the operator, relay (HD) is released, in turn releasing relay (H2). Relay (H2) opens the holding circuit for relays (H1) and (TR) which release. Relay (H1) removes the busy ground from leads "S" and "S1" and the holding ground from relay (MB) which releases, restoring the circuit to normal.

11. TESTING

11.1 Crossbar Office

Testing equipment located on the outgoing trunk test frame is associated with this trunk by patching the trunk jack to the jack associated with the testing equipment.

The connecting leads to these trunk jacks are shown on the office link and connector circuit.

Access is gained for testing the incoming trunk from the outgoing trunk test frame test and make busy jack circuit.

11.2 Panel Office

Jack (T) is provided to permit patching a test set to this circuit. When a plug is inserted in the (T) jack this circuit is made busy at the district office and line switch multiple banks and the "T", "R" and "S" leads are connected through to the test set to permit tests to be made.

Access is gained for testing the incoming trunk from the outgoing trunk test frame test and make busy jack circuit.

12. MAKE BUSY

12.1 Crossbar Office

This trunk circuit may be removed from service by inserting a plug in the jack at the "Outgoing Trunk Test and Make Busy Jack Circuit". The insertion of a make busy plug closes ground over lead "S1" from the office secondary multiple toward this trunk circuit as well as toward the marker sleeve appearance of this trunk. This ground imposes a busy condition on the trunk when subjected to test by the marker circuit.

12.2 Panel Office

This trunk may be removed from service at the panel office by inserting a plug in the trunk make busy circuit. The insertion of a plug in the trunk make busy circuit closes ground to lead "S" toward the district or office multiple, subscriber's line switch multiple and toward the office secondary multiple if used in common with a crossbar office. The presence of ground on lead "S" toward the panel multiple and on lead "S1" toward the crossbar multiple imposes a busy condition on the trunk when subjected to test.

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