

JUN 22 1956

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

CHANGES

B. CHANGES IN APPARATUS

B.1	Superseded	Superseded By
(LD)	"W" option Y51 relay	(LD) "V" option Y252 relay
(CC)	"U" option Y116 relay	(CC) "T" option Y272 relay
(CR)		(CR)
(MG)	"S" option U508 relay	(MG) "R" option U1251 relay
(ST)	"Q" option U458 relay	(ST) "P" option U1248 relay

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

C.1 The adjustment for

	Soak	Opr.	N.O.	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
LD relay Y51	Test 31.5	16		2.6	0.6
	Readj. 31.5	15		2.4	1.7
CC, CR relay Y116	Test 40	28		3.4	0.9
	Readj. 40	26.5		3.2	1.0
MB relay Y119	Test 18	10.5		1.1	0.5
	Readj. 18	10		1.0	0.6
L1 relay B1163 P/S	Test 150				6.3
	Readj.				6.7
ST relay U458	Test	1.2			
	Readj.	6.8			
CN relay S530 (P	Test 135	33	26		
(wdg.	Readj. 135	31	27.5		
(P/S	Test 14	3.2			
(wdg.	Readj. 14	2.4			

C.2 Added test notes 3 and 4 page 2.

D.2 The options tested in Par. B have been added to the relay

C.3 Test clip data for the (IS) relay formerly connected bat. to 4T (RR).

D.3 Circuit note 107 added.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The W, V, U, T, S, R, Q and P options were added to the option and to added circuit note 105.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3340 HCM-FJS

COMMON SYSTEMS
OUTGOING TRUNK CIRCUIT
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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
LD 0.7

C.2 Added test note "Adjacent relays
shall not be energized. See
B.S.P." for Y type relays on pages 1,
2 and 3.

C.3 Added insulate inf. for relays
(CG), (CR), (H2) on ckt. req.
tables.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3340-WCJ-FJS

CIRCUIT DESCRIPTION
SYSTEMS DEVELOPMENT DEPARTMENT
PRINTED IN U.S.A.

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COMMON SYSTEMS
OUTGOING TRUNK CIRCUIT
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CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Fig. 51 and Fig. 55 of Sheet -012, cross-connections, are revised.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3340

LBS)
FJS)MT

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

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 The resistance of the windings of the B1163 (L1) relay has been changed as follows:

Primary - from 21 to 23 ohms
Secondary - from 40 to 44 ohms

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

AB)
FJS)C

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

CHANGES

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

- C.1 Armature travel for relay (MG) is shown as "SPL" in the
"Armature Travel" column and "ARM. TRVL 71" is added under
"Remarks" column.
- C.2 The current flow requirements for relay (MG) are changed
as follows:

		From		To	
		Test	Readj.	Test	Readj.
P/S	0	6.8	6.4	12.6	12
P/S	NO	4.4	4.7	8.5	9

Arm. Travel 29

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 The circuit rating is changed from "A.T.&T.Co. Provisional
Standard" to "A.T.&T.Co. Standard".
- D.2 In the circuit title the word "System" is changed to
"Systems".

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

IHH)
FJS)OI

COMMON SYSTEM
OUTGOING TRUNK CIRCUIT
FOR COIN SPECIAL SERVICE TO
CROSSBAR OR PANEL
CENTRAL "A" SWITCHBOARD

1. PURPOSE OF CIRCUIT

- 1.1 This circuit is for use in crossbar or panel offices to extend originating coin special service calls to the distant central "A" switchboard. It is used for all calls when the subscriber dials zero and also for all calls originated by nondial subscribers.

2. WORKING LIMITS

2.1 Subscriber Supervision

2.11 Crossbar and Panel Office

Maximum External Circuit Loop	1500 ohms
Minimum Insulation Resistance	10,000 ohms
Earth Potential	± 20 volts

2.12 (CS) Relay

Maximum External Circuit Loop	1,820 ohms
Minimum Insulation Resistance	10,000 ohms
Earth Potential	± 20 volts

2.2 Trunk Supervision

2.21 Maximum External Circuit Loop	3,595 ohms
Maximum External Circuit Resistance	
To operate (RC) and (HD) relays	3,595 ohms to 48V bat.
To operate (CN) relay	3,110 ohms to 158V bat.
To operate (MG) relay	3,595 ohms to 48V bat.
Minimum External Circuit Resistance	
To non-operate (MG) relay	14,555 ohms bridge
To non-operate (CN) relay	3,025 ohms to 48V bat.
Minimum Insulation Resistance	30,000 ohms

3. FUNCTIONS

- 3.01 To hold the associated circuit busy until both the subscriber and the operator have disconnected.
- 3.02 To signal the distant operator when this trunk is seized.
- 3.03 To provide an audible ringing tone to the originating subscriber until the operator answers.
- 3.04 To provide talking battery to the originating subscriber.
- 3.05 To provide switchhook supervision to the distant operator.
- 3.06 To provide a means of reringing on the calling subscriber line.
- 3.07 To provide a means for collecting or refunding deposited coins.
- 3.08 To signal the operator when coin battery is connected to the subscriber line.
- 3.09 To relight the line lamp if the operator disconnects prematurely.
- 3.10 To provide means for associating this circuit with a test circuit and for making this circuit test busy during such association.

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 coin trunk circuit.
- 4.05 Outgoing trunk circuit for noncoin service (common timing circuit).
- 4.06 Nondial subscriber line switch circuit.
- 4.07 Miscellaneous and auxiliary alarm circuit for floor alarm frame.
- 4.08 Floor alarm board miscellaneous and auxiliary alarm circuit.
- 4.09 Outgoing trunk test frame test and make busy jack 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 operators.

DESCRIPTION OF OPERATION

5. SEIZURE

5.1 Crossbar Subscriber

When this circuit is seized by the office link and connector circuit or by a district or office selector or by a dial terminating manual line or by a nondial subscriber line switch circuit the associated circuit closes ground to leads "S" and "S1" as a busy condition. Relay (L), if operated on trunk guard test made by the subscriber sender, will hold over the bridge closed by the district junctor circuit on calls from crossbar offices but may momentarily flash the trunk lamp at the central "A" switchboard on calls from panel offices. If relay (L) does not operate on trunk guard test by the subscriber sender it will operate when the district junctor or manual line circuit closes a bridge across the "T" and "R" leads. The operation of relay (L) operates relay (L2) which functions as follows: (a) closes a low resistance bridge involving the primary windings of relays (CN), (RC) and (HD) across the tip and ring of the trunk toward the central "A" switchboard which serves no useful function at this time, (b) closes a supplementary ground to lead "S", (c) closes a supplementary ground to lead "S" of the district or office selector circuit, subscriber line switch circuit and lead "S1" to the office link and connector circuit, (d) closes a ground for operating relay (H1) and (e) closes in part an operating circuit for relay (RT). The operation of relay (H1) closes supplementary grounds to leads "S" and "S1" and completes the operating circuit for relay (RT). The operation of relay (RT) replaces the low resistance bridge across the tip and ring toward the central "A" switchboard with battery and ground through the windings of relay (MG). The operation of relay (RT) also closes ringing induction toward the originating subscriber and operates relay (H2). The operation of relay (H2) closes a holding circuit for relay (H1) and closes in part an operating circuit for relay (TR). Battery and ground through the windings of relay (MG) cause the operation of a relay in the incoming trunk circuit at the central "A" office which in turn signals the central "A" operator.

5.2 Dial Terminating Manual Line Circuit

When the call is originated by a Dial Terminating Manual Line subscriber the circuit functions as described above. Ground is closed to leads "S" and "Sl" by the office link and connector circuit and supplementary grounds are closed to these leads by the operation of relay (L2).

5.3 Panel Subscriber

When the call is originated by a subscriber in a panel office the circuit functions as described above with the exception that ground from the district or office selector circuit or from the panel line switch circuit is closed over lead "S" to lead "Sl" ("X" wiring) and supplementary ground is closed to lead "S" and "Sl" by the operation of relay (L2).

6. OPERATOR ANSWERS

When the distant operator answers the dry relay bridge at the central "A" incoming trunk circuit is replaced by battery and ground connected to aid the battery and ground through the windings of relay (MG) in this circuit operating relay (MG). The operation of relay (MG) closes ground under control of relays (H1) and (H2) which operates and locks relay (TR). The operation of relay (TR), (a) removes relay (L) from the "T" and "R" leads toward the originating subscriber, (b) removes the short circuit around the input windings of the repeating coil, (c) closes transmission battery and ground to leads "R" and "T" respectively toward the originating subscriber, (d) opens the operating circuit for relay (RT) which releases and (e) closes a high resistance bridge shunted by contacts on relays (L2) and (RR) across the "T" and "R" leads toward the central "A" switchboard. The release of relay (RT) recloses a low resistance bridge involving the primary windings of relays (CN), (RC) and (HD) across the "T" and "R" leads toward the central "A" switchboard. Battery and ground from the incoming special service trunk operates relay (HD) on its primary winding. Relay (HD) in turn 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 after a call has been answered, 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 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 (L2) remains operated under control of relay (L) which reoperates over

the subscriber line. 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), (HD) and (CN) which have been shunted by relays (L2) and (RR) and (c) closes an operating circuit for relay (RT). The operation of relay (RT) recloses battery and ground through the windings of relay (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 re-established.

8. RINGBACK

8.1 Ringback in Offices Having Individual Lines (Fig. 2)

When the central "A" operator finds it necessary to ringback the subscriber on a calling line the ringing key associated with the answering cord is operated. This causes the incoming trunk to the central "A" switchboard to function and reverse the battery over the trunk toward the originating office. This reverse battery causes relay (RC) to operate and may cause relay (HD) to momentarily release. Relay (HD) however will reoperate before relay (HL) releases. The operation of relay (RC) causes relay (CB) to operate. The operation of relay (CB) opens transmission battery and ground toward the calling subscriber and closes an operating circuit for relay (RB). Relay (CB) also closes a short circuit across the input windings of the repeating coil. The primary function of this short circuit however is to provide a path for closing coin potential to the subscribers line. Relay (CB) removes battery and ground from the circuit at the mid-point of the repeating coil in order to reduce inductive disturbances to the calling subscriber if his receiver is off the hook. The operation of relay (RB), (a) opens the tip and ring toward the repeating coil and (b) closes ringing current to the tip and ring of the subscribers line. When the operator restores her ringing key relays (RC), (CB) and (RB) release.

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

The circuit operation under this condition is the same as described for individual lines except that the application of ringing current is reversed between the tip and ring lead by interrupters G and R as long as relay (RB) remains operated, thus ringing the stations on both sides of the line. Condensers C and D and retardation coil (A) are provided to filter out acoustic disturbances to the calling

end should the subscriber or PBX operator answer before ringing is completed. When the operator restores her ringing key relays (RC), (CB) and (RB) release.

8.3 Ringback in Offices Having Individual and Four-Party Selective Lines (Fig. 4)

The circuit operates the same under this condition as described for individual lines except that in addition to the functions previously described for relay (RB) a circuit is closed for operating relay (ST). The operation of relay (ST) grounds lead "G" and connects the windings of relays (R) and (RL) over leads "F" and "E" to the common timing circuit. Ground over lead "G" causes the common timing circuit to function and operate relay (RL) which closes positive superimposed ringing current and ringing ground to the ring and tip, respectively, of the subscribers line. After a predetermined interval relay (R) operates reversing the ringing current and ground to the subscriber line. The common timing circuit again functions causing relay (RL) to release, thereby closing negative superimposed ringing to the tip and ringing ground to the ring of the line. Relay (R) is caused to release in the next operation of the common timing circuit again changing the direction of ringing current closed to the subscribers line. 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 ringing key operated, thus ringing all the stations on the line. Condensers C and D and retardation coil (A) are provided to filter out acoustic disturbances to the calling end should the subscriber or PBX operator answer before ringing is completed. When the operator restores the ringing key relays (RC), (CB), (RB) and (ST) release and also relays (R) and (RL) if operated.

9. COIN COLLECT

Assuming an established connection and a coin collect condition with relays (HD), (RC) and (CN) operated relay (HD) holds relay (H2) and relay (CN) operates relay (RR). When relay (RC) operates it closes an operating circuit for relay (CC) which holds under control of relay (RR). The operation of relay (RR), (a) opens a low resistance bridge around the secondary windings of relays (CN), (RC) and (HD) to prepare this circuit for signalling the distant operator if the coin magnet has been tripped, (b) opens in part the operating circuit for relay (RB), (c) closes a holding circuit for relays (CC), (d) closes in part an operating circuit for relay (CC), (e) opens in part the operating circuit for relay (CB) and (f) closes in part an operating circuit

for relay (CR). The operation of relay (CC), (a) opens in part the operating circuit for relay (CR), (b) closes an operating circuit for relay (LD), (c) locks under control of relay (RR) and (d) closes coin collect potential under control of relay (RR) through the winding of relay (CS) to contacts of relay (CB) and to the calling subscribers line when relay (CB) operates. The operation of relay (LD) (a) closes a holding circuit for relay (H1), (b) closes in part a discharge path for condenser (E), (c) opens in part the operating circuit for relay (RB) and (d) closes an operating circuit for relay (CB). The operation of relay (CB) removes battery and ground from the subscribers line at the mid-point of the repeating coil causing the release of relays (L1) and (L2). The release of relay (L2) opens the shunting bridge around the secondary windings of relays (CN), (RC) and (HD) in another place. The remaining functions performed by relay (L2) are maintained by relay (H1) except that the operating circuit for relay (RT) is opened. With this condition coin collect battery is connected through the winding of relay (CS) to the subscribers line and if the coin magnet is tripped relay (CS) will operate and short circuit the high resistance windings of relays (CN), (RC) and (HD) causing a coin auxiliary lamp signal at the central "A" switchboard to be operated. When the coin condition is removed by the operator or by collection of the coin relays (CN) and (RC) will release in turn restoring relays (RR), (CC), (LD), (CB) and (CS) to normal. With relay (CB) normal relays (L1) and (L2) will reoperate.

10. COIN RETURN

Assuming an established connection and a coin return condition with relays (HD) and (CN) operated relay (HD) holds relay (H2) and relay (CN) operates relay (RR). The operation of relay (RR) closes an operating circuit for relay (CR) which holds under control of relay (RR). The circuit functions as described for coin collect with the exception that coin return potential instead of coin collect potential is applied to the subscribers line and relay (CR) instead of relays (RC) and (CC) is used.

11. DIVERTED TOLL TRAFFIC

Battery and ground through the windings of relay (L) are connected to the "T" and "R" leads respectively toward the subscribers station in such a direction as to operate a polarized relay in P.B.X. trunk circuits where the stations are to be restricted on toll calls.

12. DISCONNECT

When the calling subscriber disconnects relay (L1) releases in turn releasing relay (L2). The release of relay

(L2) opens the shunt from the high resistance winding of relays (CN), (RC) and (HD) causing a supervisory disconnect signal in the distant operators cord circuit to be lighted. The release of relay (L2) opens one holding path for relay (H1) which remains operated until the operator disconnects at the central "A" switchboard. When the operator at the distant end disconnects relay (HD) releases and in turn releases relays (H1) and (TR) restoring the circuit to normal.

If the operator disconnects first relay (HD) releases and in turn releases relay (H2) but relay (H1) remains operated until the subscriber hangs up releasing relays (L1) and (L2). The release of relay (H2) opens the operating and locking ground from relay (TR). When the subscriber disconnects relays (L2) and (H1) release and the circuit is restored to normal. However should there be a coin undisposed of, the (L) relay will operate to the coin ground on the tip of the line and operate relay (L2) resignalling the central "A" operator.

13. TESTING

13.1 Crossbar Office

Access is gained to this circuit for testing by associating the testing equipment with the jack provided on the office link and connector circuit provided for testing. Connection to the incoming special service trunk circuit at the central "A" switchboard is obtained by means of the testing equipment at the outgoing trunk test frame test and make busy jack circuit.

13.2 Panel Office

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

14. MAKE BUSY

14.1 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 to 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 tested by a marker circuit.

14.2 Panel Office

This trunk may be removed from service at 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 line switch multiple and towards 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 this trunk when subjected to test.

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DEPT. 332

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