

PBX SYSTEMS
NO. 555 OR 557A
RINGDOWN TIE TRUNK CIRCUIT
2 WAY

Drawings for SD-66522-01 have been converted to 8-1/2 by
11 inch handbook size.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5336-LEVD-EVDL

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P.B.X. SYSTEMS
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CHANGES

B. CHANGES IN APPARATUS

B.1	Superseded	Superseded By
	"A" 15A resistance lamp "ZA" option Fig. 3	"A" 15B resistance lamp "ZB" option Fig. 3
	"D" 15A resistance lamp "ZA" option Fig. 5	"D" 15B resistance lamp "ZB" option Fig. 5

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 In Figs. 3 and 5, the 15A resistance lamp "A" and "D" were designated as "ZA" option and rated (Mfr. Disc.). A new 15B resistance lamp was added as "ZB" option and rated as Standard.

D.2 Circuit note 104 was changed to reflect Issue 7-D.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is used for terminating ringdown tie trunk circuits of all types in the 555 or 557A PBX. It may also be used for terminating toll lines equipped with standard 20 cycle composite ringers, a toll subscriber's line arranged for full period talking service, code ringing manual party lines and trunks to magneto central offices.

When this circuit is used with a condenser type ringdown tie trunk the tie trunk at the distant PBX should be modified to prevent surges upon disconnection in order to prevent false line signals at this PBX.

2. WORKING LIMITS

See Range Chart.

3. FUNCTIONS

3.1 To provide a locked-in line lamp signal on incoming calls.

3.2 To signal the distant PBX on originating calls, when the manual ringing key is operated.

3.3 To discriminate between the trunk and station end of the cord circuit in order to supply transmitter battery to the station when the trunk end of the cord is in the tie trunk jack.

3.4 To provide nonlocking rering line signals on all connections.

3.5 To provide for terminating railroad company telephone lines equipped, with train dispatching signalling apparatus.

3.6 To provide a nonlocking line signal when required.

3.7 To provide a pad control circuit.

4. CONNECTING CIRCUITS

When this circuit is listed on a key-sheet, the connecting information thereon is to be followed. The following circuits are typical:

4.1 555 PBX cord, telephone, dial, central office trunk, station line, buzzer ringing and battery circuits - SD-66520-01.

4.2 Ringdown tie trunk circuit in which ringing current is connected to the line through blocking condensers - SD-66401-01 typical.

4.3 Ringdown tie trunk circuit arranged to by-pass or relay ringing current - SD-66470-01 typical.

4.4 Through and terminating and terminating tie trunk circuit - SD-66115-01 typical.

4.5 Standard 20 cycle composite ringers - SD-61385-01, SD60213-01.

4.6 Toll lines with or without voice repeaters arranged to by pass 20 cycle ringing current - SD-63837-01.

4.7 Toll subscriber's line circuit arranged for full period talking service - SD-63387-01, SD-62442-01 typical.

4.8 Code ringing magneto party lines.

4.9 Magneto central office trunk circuit - SD-12187-01.

4.10 557A cord, telephone and buzzer circuit - SD-65714-01.

DESCRIPTION OF OPERATION

5. GENERAL

This circuit employs a full wave varistor associated with the ringup relay which converts the incoming 20 cycle alternating current into direct current through the relay. With this arrangement it is possible to obtain a close nonoperate adjustment on the (L) relay which ordinarily will prevent false signals on interference from the line.

The circuit is arranged to supply talking battery to the station on tie trunk to station connections. On central office connections the tie trunk remains dry with no dc bridge across it.

Incoming rering signals are received on the line lamp and are normally locked in. An optional nonlocking line signal is provided for cases where this circuit is used to terminate a code ringing magneto party line.

The repeating coil is provided to prevent the shunt of the cord circuit, station and other tie trunks from affecting the ringing range.

Through connections, that is connections between two ringdown tie trunk circuits, are established with the cord circuit by operating the night and through dial key on the cord circuit. Under this condition the cord circuit is dry (in Fig. 6 the transmission pad is by-passed whenever the cord circuit is dry) because both sleeves are open, both tie trunks are dry and the repeating coils are "in." The repeating coils at this time provide a splitting means so that the ringing signal from either tie trunk will light only the respective tie trunk lamp.

6. INCOMING SIGNAL FIGS. 1 AND 6 (FIG. 1 MFR. DISC.)

On an incoming ring from the distant end of the line, relay (L) operates on the ringing current, locks up and lights the line lamp if "X" wiring is provided. If "X" wiring is not provided, relay (L) does not lock up, and the line lamp will be lighted and extinguished as the (L) relay follows the ringing. If the buzzer key is in the "on" position, the auxiliary signal will also operate with "X" wiring.

7. ANSWERING INCOMING CALLS FIGS. 2 OR 4 AND 1 OR 6 (FIG. 1 MFR. DISC.)

Incoming calls are answered by inserting the trunk end of the cord circuit in the jack associated with the lighted line lamp.

The closing of the local contract under control of the ring spring connects battery through resistance lamp (A) and relay (S) to the sleeve of the jack then through the cord sleeve relay to ground. Relay (S) operates closing the circuit to relay (S1) and the cord sleeve relay (1) operates with Fig. 6, (2) may or may not operate with Fig. 1.

When the local contact, under control of the tip spring is closed, ground is connected directly to relay (C) and the operated contact of relay (S) to relay (S1). Relay (S1), Fig. 1 operated (1) locks to the jack spring ground, (2) connects battery and ground from resistance lamp (B) through retardation coil (A), repeating coil (A), the tip and ring of the jack, and the cord circuit to furnish battery supply for the station transmitter and signaling, (3) with "M" option partially closes the circuit for short circuiting relay (S).

Relay (S1), Fig. 6 operated (1) connects battery and ground from resistance lamp (B) through retardation coil (A), repeating coil (A), the tip and ring of the jack and the cord circuit to furnish battery supply for the station transmitter and signaling, (2) removes the short circuit from the series legs of the pad, (3) closes the shunt leg of the pad. Relay (C) operated (1) opens the locking circuit for relay (L), (2) opens the line termination consisting of resistance (A) bridged across the tip and ring of the circuit, (3) grounds the (SL) lead, (4) in Fig. 1 short circuits relay (S) to insure sufficient current for reoperating the cord circuit sleeve relay which disconnects battery and ground from the cord circuit. Relay (S), Fig. 1, when short circuited releases slowly, and with "N" option insures sufficient time for relay (S1) to operate and lock up. Relay (L) releases when its locking circuit is opened by relay (C) and extinguishes the line lamp.

8. COMPLETING CONNECTION TO STATION

If the incoming call is for a station, the station end of the cord is inserted in the desired station line jack and the associated cord circuit ringing key is operated in the usual manner. When the

station answers, the supervisory relay in the cord circuit operates on battery supplied by the tie trunk circuit.

9. COMPLETED CONNECTIONS TO CENTRAL OFFICE

If the incoming call is to be completed to a central office, the attendant removes the trunk end of the cord from the jack, inserts the station end of the cord in the tie trunk jack and inserts the trunk end of the cord in an idle outgoing central office trunk jack. If desired this may be done by means of another cord circuit as no special sequence is involved.

Under this condition, when the trunk cord is removed from the jack, relays (S) and (S1) release and when the station cord is inserted in the jack relay (C) alone operated from the auxiliary contact on the tip spring of the jack. Relay (S) does not operate at this time because there is battery on the sleeve of the station end of the cord circuit.

10. OUTGOING CALLS FROM A STATION

Outgoing calls from a station are completed to the tie trunk circuit with the station end of the cord circuit in the station jack and the trunk end of the cord circuit in the tie trunk jack. The operation of the tie trunk and cord circuit relays are as described in Paragraph 7.

The distant PBX is signaled by the operation of the ringing key associated with the tie trunk jack. When the key is operated relay (R) operates, disconnects the repeating coil and connects ringing current directly to the line.

11. OUTGOING CALLS FROM THE CENTRAL OFFICE TRUNK

Calls are completed from the central office trunk to the tie trunk with the trunk end of the cord circuit in the central office jack and the station end in the tie trunk jack. Relay (C) operates when the plug is inserted in the tie trunk jack but relays (S) and (S1) do not operate as there is battery on the sleeve of the cord circuit. The distant PBX is signaled by the operation of the ringing key in the usual manner.

12. OUTGOING CALL FROM ANOTHER TIE TRUNK

12.1 With Night and Through Dial Key Normal

Connections may be established from any type of tie trunk circuit to this

ringdown tie trunk circuit. The operating conditions are as described for outgoing calls from central office trunks except that talking battery is supplied from the tie trunk circuit to which the trunk end of the cord circuit is connected. This battery performs no useful function. In Fig. 6 the LC pad will be in the circuit adding an additional loss. There is a low resistance bridge connected across the cord circuit. The combination of the two repeating coils and the bridge in the cord circuit introduces a slight transmission loss. This loss may be reduced by operating the night key as follows:

12.2 With Night and Through Dial Key Operated

When the transmission loss caused by the cord bridge is undesirable it can be avoided by operating the "night and through dial key" in the cord circuit. This opens the sleeves of both the trunk and station ends of the cord circuit. Relay (S), in the tie trunk connected to the trunk end of the cord, releases, and the cord circuit is dry leaving only the two repeating coils, associated condensers and the series supervisory relay in the cord circuit in series with the two tie trunk circuits.

13. RERING SIGNALS

The rering signals in this circuit are nonlocking. On the ring from the distant PBX relay (L) operates, and lights the line lamp as long as ringing continues.

14. USE WITH CODE RINGING MAGNETO PARTY LINES

When this circuit is used to terminate a code ringing party line in a PBX, the line signal is arranged to be nonlocking by omitting "X" option. Relay (L) then only operates as long as rering current is on the line.

15. USE WITH TOLL SWITCHBOARD SUBSCRIBER LINE CIRCUIT ARRANGED FOR FULL PERIOD TALKING CIRCUITS OR WITH TOLL LINES EQUIPPED WITH VOICE REPEATERS

Resistance (A) is provided as a balancing network resistance in this circuit so as to reduce the possibility of repeaters in toll lines "singing" while the plug is out of the jack. This resistance is connected to the drop side

of the repeating coil to avoid interference with the ringing circuit.

16. USE WITH CONDENSERS TYPE TIE TRUNK WITH LONG LOOPS

"Z" wiring Fig. 1 or "G" wiring Fig. 1 or 6 is provided to extend the

range of this circuit when it is used with condenser type tie trunks with long loops. The ringing combination is connected from the midpoint of the repeating coil to ground. Ringing on either side of the line will operate relay (L) in the usual manner.

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