STEP BY STEP SYSTEMS
NO. 350A OR 355A
RECORDING COMPLETING TRUNK
WITH OR WITHOUT COIN WITH RINGBACK
COMPOSITE SIGNALING TYPE B
OR SIMPLEX SIGNALING

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The 458B jack is changed to the 458 type jack to conform with the general program of eliminating the frame type letter from the code number of jacks which do not have the proper code for use with the 252A jack mounting.

D.2 J33013D is added as equipment information.

All other headings under Changes, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 2353-CHC-EWO-FW

STEP-BY-STEP SYSTEM
NO. 350A OR 355A
RECORDING COMPLETING TRUNK
WITH OR WITHOUT COIN WITH RINGBACK
COMPOSITE SIGNALING TYPE B
OR SIMPLEX SIGNALING

CHANGES

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

C.1 Information to insulate 6T (CN) relay when adjusting primary winding is added to the (CN) relay of Fig. 5.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Note 101 is changed to show fusing when connecting to Misc. Alm. Ckt. (Alm. Sdr.).

D.2 Note 102 is changed to show trunk is accessible to rotary out trk. switch optionally.

D.3 Options "A" & "B" are added to note 103 2nd options used table.

D.4 The connecting information at the B, A, S, R & T leads of Fig. 1 is changed. It formerly read "To sub. line with rotary line switch."

D.5 Leads B, S, R & T connecting to the intercepting trunk are added.

D.6 Cross connection Fig. 51 is revised and Fig. 54 is added.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit provides a subscriber or alarm sender access to the toll operator over an SX or CX signaling trunk. Operator controlled means are provided for ringback and coin control.

2. WORKING LIMITS

2.1 Supervision - (S) Relay

	Individual	2-Party & Coin	P.B.X.
Max. Ext. Ckt. Loop	1500 ohms	1500 ohms	2170 ohms
Min. Ins. Res.	15000 ohms	15000 ohms	30000 ohms
Max. Earth Potential		±20V	
Min. Ext. Ckt. Res. for Non-Operate			8270 ohms

3. FUNCTIONS

3.01 When seized at any outgoing appearance to make other appearances test busy and to hold the preceding circuit.

3.02 When seized to signal the operator at the toll switchboard.

3.03 To hold the connection under control of the operator and subscriber.

3.04 When arranged for coin operation, to return the initial coin deposit when the operator answers.

3.05 To provide access to the trunk for coin control when arranged for coin operation.

3.06 To provide means for the operator to ring back on an established connection.

3.07 To provide motor start when required.

3.08 To provide for class of service tones.

3.09 To provide ringing induction tone to the calling subscriber until the operator answers.

3.10 To provide type A talking battery supply.

3.11 To provide hook switch supervision to the operator.

3.12 To provide means for making trunk tests and for busying the trunk.

3.13 To provide for group busy registration.

3.14 To provide fuse failure make busy and group busy registration when required.

3.15 To provide for operation with non-coin lines, coin lines, or both when required.

3.16 To provide an idle circuit termination for telephone repeaters.

4. CONNECTING CIRCUITS

When this circuit is listed on a key sheet, the connecting information thereon shall be followed.

4.01 SD-95004-01 - Composite sets and repeating coils circuit.

4.02 SD-95032-01 - Composite signaling circuit type B with complete set and phantom coil group.

4.03 SD-95028-01 - Composite signaling circuit type B (Typical).

4.04 SD-95051-01 - Simplex signaling circuit.

4.05 SD-95031-01 - Trunk coin control circuit.

4.06 SD-31933-01 - No. 350A 4-wire selector circuit.

4.07 SD-31259-01 - No. 350A subscribers line with rotary line switch.

4.08 SD-31606-01 - No. 350A 60 and 120 IPM interrupter and alarm circuit.

4.09 SD-31109-01 - No. 350A traffic register circuit.

4.10 SD-30232-01 - No. 350A coin control selector.

4.11 SD-31521-01 - No. 350A miscellaneous tone and tone alarm circuit.

4.12 - No. 350A coin control supply.

4.13 - No. 350A ringing supply.

4.14 SD-31825-01 - No. 350A and 355A tone interrupter circuit.

4.15 SD-31733-01 - No. 355A 4-wire selector (typical).

4.16 SD-31980-01 - No. 355A alarm control and sender circuit.

4.17 SD-31898-01 - No. 355A subscribers line with rotary line switch.

4.18 SD-80727-01 - No. 355A power ring circuit.

4.19 SD-80634-01 - No. 355A power coin control circuit.

4.20 SD-31976-01 - No. 355A miscellaneous alarm circuit - registers.

4.21 SD-31974-01 - No. 355A miscellaneous alarm circuit - key circuit.

4.22 SD-31853-01 - No. 355A coin control selector.

4.23 SD-55381-01 - Toll switchboard No. 3 or 3C toll switching trunk.

4.24 SD-64903-01 - Application schematic for V2 Telephone Repeaters.

4.25 SD-31771-01 - Intercepting Trunk

DESCRIPTION OF OPERATION

5. SEIZURE

When this circuit is seized at any multiple appearance, the bridge connected on leads T and R or T2 and R2 operates relay S which connects ground to lead S, except when accessible to rotary out trunk switch, and operates S1 and SR. S1 removes ground and connects battery through lamp S to lead M, prepares a locking circuit for itself if the operator rings back with the receiver off the hook and opens the repeater termination. SR connects a supplementary ground to lead S, disconnects ground from lead BR, connects ringing induction tone toward the calling subscriber, connects ground to lead MS when provided and prepares the operating and locking circuits of P1 and the operating circuit of A2. Class of service indication is received over lead A from the selector or line switch multiple and consists of either open, direct ground or resistance ground. If Fig. 3 or 4 is furnished, H operates to prepare the class of service tone indication and to ground lead IS or MS as required.

6. OPERATOR ANSWERS

6.1 Non-coin or Postpay Coin Access Only (Fig. 1 and 3, W option)

When the operator answers, ground is received over lead E from the signaling circuit which operates A. A opens the original operating circuit of SR and provides a supplementary ground to hold SR, operates A1 and A2 and closes in part the

operating circuit of P1. A2 operated prepares the operating circuit of P and P1. A1 operated, connects resistance G in multiple with the winding of A so that it will hold over momentary opens of the CX relay contacts due to line surges, opens lead MS, connects ground to lead A to the alarm sender and to lead B of the rotary line switch multiple, disconnects ringing induction tone from lead R and connects the lead through a make on H, if provided to steady or interrupted tone. A1 also opens the circuit to H which is slow release and holds tone on the trunk for an interval. The operator may restart the class of service tone by disconnecting and repluging. To restart tone the operator should remove the plug for at least .5 second to permit A2 to release and open the circuit to P1 and thereby prevent starting a false ringback when replugging. A and A1 release and operate, operating and releasing H which again connects a spurt of class of service tone to the trunk.

6.2 Coin Access Only (Figs. 1 and 5)

When the operator answers, the circuit functions as in 6.1 except that when A1 operates it closes ground through contacts on E if a tone indication is required, or through T option if a tone is not required through a break on EC and IN to operate CT and ground is maintained on lead MS by a break on EC. CT locks on its secondary winding to the sleeve, reverses the tip and ring to cause the coin box trunk to cut through, prepares the operating, and locking circuits of EC and W, closes the break contacts of (EC) through a make on CT and continuity contacts on W to the primary winding of W and connects 60 IPM grd. to the winding of IN. When IN operates on the closed period of the interrupter, ground through a make on IN operates W which locks to CT. W connects coin return battery through the lamp to front contacts on Z. The ground which operated W is also connected to both sides of the winding of Z which does not operate. Approximately .5 second later IN releases and opens ground from the W winding thereby removing the short on the primary winding of Z which permits it to operate from battery through its primary and secondary winding in series to ground through contacts of W and CT operated. Z operated operates CN, connects coin return battery to the line shorting contacts on CN, prepares the circuit for shunting of W down, closes contacts in multiple with break contacts on EC to maintain the W shunting path when EC operates and connects ground to lead MS. CN operated disconnects continuous ringing and generator ground from the contacts of T1 and connects its operating ground through to operate T, opens the circuit for holding S1 operated, short circuits the R retardation coil and locks to T. T operated, provides a holding ground for SR to insure returning the coin, disconnects the P2 winding of S from the calling line and connects the network consisting of the D and E condensers, R retardation coil and E resistance to the calling line, operates TA and connects the operating ground on CN and T to operate T1. T1 operated connects the tip and ring of the calling line thru contacts of CN to coin return battery. When IN operates approximately .5 second later it connects ground to shunt down W which disconnects coin battery from the line, closes the operating circuit of EC and transfers the holding circuit of Z from ground on CT to ground on the IN break contact. Z holds to the IN and discharges the line through the C condenser and C resistance. EC operated locks to CT, disconnects its ground from lead MS and opens the operating circuits of W and CT. When IN releases approximately .5 second later Z releases which disconnects the discharge path from the line, opens the operating ground circuit from CN, T and T1 and removes ground from lead MS. However, T and CN do not release immediately but are held by T1 which holds T and which in turn holds CN. When T1 releases it recloses the tip and ring of the line to the repeating coil, disconnects the leads from the front contacts of CN from the discharge network and opens the holding circuit of T. T is slow releasing to hold the discharge network across the tip and ring of the calling line to reduce the potential which may be on the line and when T releases it reconnects the transmitter battery supply through S to the calling line. T released opens the locking circuit of CN which reconnects ringing current and ground to the make contacts of T1, opens the short on the R retardation coil and recloses the operating and holding circuit for S1. During the time S1 was released, the operator was given an on-hook signal. TA is slow release and holds the operating circuit of the S1 open for an interval since, if the calling subscriber has disconnected, the S may operate momentarily due to the charging of the line capacity. TA also provides a motor start ground.

6.3 Prepay Coin and Non-Coin Figs. 4 and 5. V or T Option Postpay Coin and Non-Coin (2 Class of Service Tones) Fig. 4

Where prepay coin, non-coin or postpay coin lines have access to this trunk, the class of service indication received over lead A from the selector or line switch multiple determines whether the circuit will function to return the initial coin deposit for prepay coin lines. Relay E in Fig. 4 is a two-step relay and will operate to close only its 4-5T and 4-5B contacts when a resistance ground is connected to lead A. It will operate

completely thru a direct ground. Ground from A1 operated, when the operator answers, is connected thru contacts of E and with V option it is closed to the CT winding when the coin class of service indication is a resistance ground. With T option, it is connected when the coin indication is a direct ground. The initial coin return feature is therefore only effective on calls originated by coin lines. The circuit operation, except as described above, is as stated in paragraph 6.1 and 6.2 depending upon the type of line originating the call. As Fig. 5 is not required for postpay or non-coin lines, 2 classes of service tone can be obtained by using Fig. 4 alone where prepay lines are not used.

6.4 Alarm Control and Sender Circuit Access

When this circuit is seized by an alarm sender circuit, S and S1 operate to transmit a seizure to the operator office. When the operator answers, A1 connects ground to lead A of the alarm sender circuit causing it to function. Where coin and non-coin lines have access to the trunk, the initial coin return feature will not function since there is no class of service indication to operate E. Where coin lines only have access to this trunk, the circuit will function to return the initial coin, however, the reversal and coin battery are not applied to the alarm sender since the alarm sender tip and ring multiple is connected beyond the T1 relay.

7. RINGBACK

If the toll operator desires to ring back the calling subscriber the toll operator operates the ringing key which causes the incoming trunk at the toll switchboard to send a momentary on-hook pulse which allows A to release and operate P. At the termination of the pulse, A reoperates and closes ground through makes on P and A2 to operate P1 which locks to SR. P1 operates TA which provides a locking circuit for S1 if the latter operated, operates T and connects 120 IPM ground to the rotary magnet of the A selector which steps under control of the interrupter. T operated disconnects the P2 winding of S from the repeating coil, connects a supplementary ground to hold TA, connects the network consisting of the D and E condensers, E resistance and R retardation coil to the tip and ring of the line, and connects its operating ground to operate T1. T1 operated disconnects the repeating coil and A condenser from the line, connects continuous ringing and ringing ground through the network described above to the tip and ring of the line and holds T operated. T1 is sufficiently slow in operating to permit the network to discharge any potential on the line before ringing current is connected to the line thereby reducing acoustic shock and the network serves to reduce the harmonics of the ringing current so that the minimum disturbance possible will occur in the receiver at the calling station if it is off hook. T will remain operated until selector A has been stepped to terminal 4 where ground will be connected to resistance A to shunt down P1. P1 released closes the releasing circuit of selector A through its off-normal springs, opens 120 IPM ground from the ROT magnet, and opens the operating circuit of T and T1. T will not release since it is being held by T1. T1 releases disconnects ringing current from the above described network and recloses the repeating coil and A condenser to the calling subscribers line. T is slow release and holds the network across the line in order to provide a discharge path for any potential that may be on the line due to ringing current. When T releases it reconnects S across the A condenser to the line for talking battery supply.

8. COIN CONTROL

When this circuit is accessible to coin lines, Fig. 5 and V option are provided which provides means for collecting or returning the coin at the calling station. When a coin control selector is dialed to the terminals associated with this trunk or the trunk coin control circuit is seized by the operator, ground is connected over lead CO to operated CN, T and T1 in cascade. These relays then function as described under "Operator Answers" to provide for connecting coin battery to the calling line and to provide a discharge network to reduce acoustic shock.

9. DISCONNECT

When the calling subscriber disconnects or the alarm sender releases S releases and releases S1. S1 released disconnects battery and connects ground to lead M to give the toll operator an on-hook signal. No other action takes place in this circuit until the toll operator disconnects. If the toll operator disconnects first the circuit is held when A releases by ground from S thru a break contact on A to hold SR. When the toll operator disconnects ground is removed from lead E by the signaling circuit and A releases. If the subscriber has disconnected, SR will release which will momentarily operate P through a make on SR. However, since A will not reoperate within the releasing time of SR and P, P1 will not operate and lock to reset ringing. When SR releases it removes ground from lead S, reconnects ground to lead BR and permits the preceding switches to release and thereby restore the circuit to normal.

10. IDLE CIRCUIT TERMINATION

With "J" option, a condenser and series resistance are normally connected across the "T" and "R" leads and serves to terminate the line when used in connection with a telephone repeater. When a station is connected to this circuit and relays (S), and (S1) operate, the termination, thru condenser (G) and resistance (H), is opened.

11. FUSE FAILURE MAKE BUSY RELAY CKT.

Should the 45-50 V. supply fuse blow, relay (MB) releases, disconnecting ground from lead BR and connects ground to sleeve lead making trunk busy. When trunk is made busy for test purposes by plugging into the test jack, ground is removed on (MB) relay. Relay (MB) releases and makes trunk busy as before.

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