

2173

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

295 NORTH MAPLE AVENUE
BASKING RIDGE, NEW JERSEY 07920

DRAWING NOTICE

TITLE
STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

SD-31592-01
CD ISSUE 7D APPX 2A ADD.
RATING MFR DISC
SYSTEM STEP-BY-STEP
ISSUE 26A
DATE MAY 02 1983
DRAWING DISTRIBUTION CODE: 3D99
CLEI BASIC CODE:

DESCRIPTION

6.1 COIN BOX TRUNK CIRCUIT

(a) FUNCTIONAL DESCRIPTION OF CHANGE: The figure 1 of this circuit schematic is changed on a Class A basis to agree with AT&T IL 79-05-360 dated May 25, 1979.

No field change should be required as a result of this Class A change.

(b) EXTENT OF CHANGE: One resistor is added and a minor wiring change made.

(c) COORDINATING CIRCUIT CHANGES: none

(d) EQUIPMENT INFORMATION: job basis

(e) EQUIPMENT DESIGN REQUIREMENTS: not affected

(f) TRANSMISSION: not affected

(g) TRAFFIC: not affected

6.2 SUPPLEMENTARY INFORMATION

(a) DIRECT CURRENT DRAIN DATA: is not affected

(b) ALTERNATING CURRENT DRAIN DATA: is not affected

6.3 AFFECTED SHEETS

(a) REISSUED: 1 (TOTAL REISSUED: 1)

CIRCUIT DESCRIPTION

CD-31592-01
ISSUE 7D
APPENDIX 2A
DWG ISSUE 26A
DISTN CODE 3D99

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CHANGES

B. Changes in Apparatus

B.01 Added

Resistor L, KS-20289 L6C, 348, Fig. 1

D. Description of Changes

D.01 The location of the option YK ground
moved from 2M to 3M of relay L and
resistor L is added on a class A basis.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 55212-NAR

WE DEPT 62810-RWH-JCR-AJN

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1 Page

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CIRCUIT DESCRIPTION

CD-31592-01
ISSUE 17D
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STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
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WITH OR WITHOUT DELAYED CHARGE

CHANGES

D. Description of Changes

D.01 Option YK has been added to Fig. 1 and
rated Standard.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 55213-DAJ

WE DEPT 45230-RWH-JTT-AJN

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AMERICAN TELEPHONE AND TELEGRAPH COMPANY
195 BROADWAY, NEW YORK, N.Y. 10007

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DRAWING NOTICE

SD-31592-01	ISSUE 24D
CD 7D	APP.
RATING	Manufacture Discontinued
SYSTEM	Step-By-Step
DATE	December 9, 1969
DWG DIST CODE D99	

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use
 Preceding A First Selector - Serving Prepayment Coin Lines - With Or
 Without Delayed Charge

EM/EL is not required.

DESCRIPTION

- 6.1 Project: Coin Service Improvement
- 6.2 Reissued sheets: 01-1, 01-2, 01-3. Total reissued sheets 3
- 6.3 This change requires coordination with another circuit, Auxiliary Coin Trunk SD-32538-01.
- 6.4 This change for TELCo consideration, is to add feature. This change will permit loop operation for coin service when under control of the new auxiliary coin trunk SD-32538-01. Five new leads are added to provide interconnection with the auxiliary coin trunk.
- 6.5 D changes. Does not require WECO notification to TELCo.
- 6.6 Transmission is not affected by changes in this issue.
- 6.7 Direct Current Drain Data is not affected by this issue.
- 6.8 Equipment information is not affected.
- 6.9 Equipment Design Requirements are not affected.

CIRCUIT DESCRIPTION

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STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

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<u>SECTION I - GENERAL DESCRIPTION</u>	
1. <u>PURPOSE OF CIRCUIT</u>	
1.01 This circuit is used to provide dial service to coin stations from a step-by-step central office. It is arranged to automati- cally collect or return the coin deposited as required, after each call. When Fig. B is used, it is arranged to delay setting up the charge condition until 2 to 5 seconds after the called party answers.	
<u>SECTION II - DETAILED DESCRIPTION</u>	
1. <u>ORIGINATING A CALL (S WIRING)</u>	
1.01 When a prepayment coin station is connected to this circuit by a preceding circuit, relay L operates over the subscriber loop, in turn operating N and DD. The operated N relay operates NN. The operated NN relay closes the circuit to the associated first selector, provides a holding circuit	

for DD, removes the short circuit from the 6,000 ohms in series with the primary winding of L, and changes from battery to the ring through the noninductive winding of the RT relay to battery through the operating winding of RT, and (with L wiring) the primary winding of BT. The operated DD relay connects ground to the sleeve lead to hold the line finder and (with Z wiring and apparatus) closes in part the circuit for dial tone to the calling subscriber. When this circuit is connected to a TOUCH-TONE® converter or common control originating register, the return of dial tone is under control of these circuits. When X wiring is provided, the ground is connected to the sleeve through the CL inductor to permit a number checking tone which may be connected to the sleeve of the subscriber line to be transmitted over the sleeve lead through capacitor C to a selector level trunk to indicate to the operator the class of service. The B and C resistors are used to prevent a transient current flow through the B capacitor from operating RT falsely when the C inductor is connected across the tip and ring by the operation of NN, and dial tone is received from the selector. When Z wiring and apparatus are omitted, the dial tone path is not closed to the calling subscriber until the coin is deposited, as described in 2. below.

2. COIN DEPOSITED

K AND S WIRING

2.01 When the coin is deposited by the calling subscriber, RT operates which operates S. The operated S relay short-circuits L, releasing it; locks to battery through its front contact; operates H and HH; short-circuits the B resistor (Z wiring only); supplies dial tone to the calling subscriber (Z wiring omitted); connects relay R to the ring of the line; and removes battery from RT, which releases. Relay R operates, in turn closing a path for holding the first selector when NN releases and also operating D. The operated D relay holds DD operated. The operated H relay takes over the control of HH from S. The operated HH relay releases NN, separates the sleeves of the line finder and first selector, and supplements the ground on the sleeve from DD to the line finder. L released releases N. The NN relay released short-circuits the D resistor (Z wiring only). Relays N and NN are slow in releasing in order to insure that R is fully operated before NN releases and opens the bridge to the first selector, in case L releases when the coin is deposited.

L AND S WIRING AND APPARATUS

2.02 When the coin is deposited by the calling subscriber, RT operates, operating S. The operated S relay locks to battery through its front contacts, operates H and HH, short-circuits the B resistor (Z wiring only), supplies dial tone to the calling subscriber

(Z wiring omitted), connects R to the ring of the line, and removes battery from RT, which releases. The operated R relay closes a path for holding the first selector when NN releases and operates D. The operated D relay holds DD operated. The operated H relay takes over the control of HH from S. The operated HH relay releases N and NN, separates the sleeves of the line finder and first selector, and supplements the ground on the sleeve from DD to the line finder. The released NN relay (Z wiring only), short-circuits the C resistor. Relay N released short-circuits L, releasing it. The N and NN relays are slow in releasing in order to insure that R is fully operated before NN releases and opens the bridge to the first selector in case L releases when the coin is deposited.

2.03 The purpose of BT is to block the operation of the coin trunk in case of an irregular condition on the line. The operated BT relay locks to the sleeve; opens the circuit to S, preventing its operation; and removes battery from the line by connecting direct ground on the ring, releasing L. The released L relay releases N and it in turn releases NN. The released NN relay releases DD and opens the bridge towards the selector, which removes ground from the sleeve, releasing ET and RT, and restores the circuit to normal.

3. PULSING (S WIRING)

ROTARY DIAL CALLING

3.01 Relay R repeats pulses from the subscriber dial to the first selector. Relay D is slow in operating, releases on the first dial pulse, and remains released during the pulsing of each digit. This releases DD which connects the F and D resistors to the tip and ring and shorts the C inductor to aid pulsing.

3.02 On TOUCH-TONE calls, the R relay remains operated during transmission of tones and does not operate and release as in the case of rotary dialing. The TOUCH-TONE signals are translated into dial pulses by the converter or originating register and then transmitted to the selector.

4. CALL CHARGED

NO DELAY INTERVAL

4.01 If the call is one on which a charge should be made, the line current is reversed, operating P and releasing P1 which was previously operated. With P1 released and P operated, relays J and C operate and lock. Relay J operates K, short-circuits P which releases, and reverses the tip and ring leads from the first selector, causing P1 to operate. Relay K operates K1 through the back contact of P. The operated K1 relay locks and removes the short circuit from P. The

operated C relay locks and operates A, sets the circuit so as to collect the coin when the calling subscriber disconnects, or transfers this function to relay T1, Fig. 2. The operated A relay disconnects the tip and ring of the calling line from the T inductor and the R relay, releases R, and connects the tip and ring through P and P1 to the first selector. The released R relay releases relays D and DD. The released DD relay performs no useful function at this time. The reversal of the line by the operation of J is necessary to keep P always connected to the ground side of the connection.

WITH DELAYED CHARGING, FIG. 2

4.02 With Fig. 2 the operation is as described in 4.01 except that the operation of C, instead of connecting positive coin battery to relay I, connects that relay to T1, and the relays of Fig. 2 function as follows.

4.03 When the called subscriber answers, P2 operates, in turn closing the circuit of T to lead PKU. This lead is grounded for 1/2 second once every 3 seconds (except that when the interrupter circuit is not in use, lead PKU is grounded). When T operates, it grounds lead ST to start the interrupter or to keep it operating. Relay T locks to P2 through T1 2 seconds after lead PKU is opened, and ground is connected to lead INT, operating T1. The operated T1 relay locks to off-normal ground, releases T, and connects positive coin battery to relay I. If relay P2 releases before T operates, T1 is released and the above sequence of operations will be repeated when P2 again operates. Fig. 2 thus insures against false charging when busy flashes or other transient conditions operate P2.

5. CALL NOT CHARGED (S WIRING)

5.01 If the call is one on which no charge is to be made, the line current is not reversed. Relays P, K, and K1 will, therefore, not operate and the circuit remains in a condition to return the coin when the calling party disconnects. On this type of call, A does not operate and the A and B capacitors in the tip and ring leads provide the transmission circuit.

6. DISCONNECT

CALL CHARGED (C RELAY OPERATED) (S OR T WIRING)

6.01 When the calling subscriber disconnects, the preceding circuit is still held by ground at the contacts of the HH relay. Relay S releases when ground is removed from the selector sleeve and causes Y to operate under control of a ground interruption on lead P of the coin control alarm circuit, lighting the green alarm lamp A. The coin

control alarm circuit is arranged so that ground is intermittently and alternately connected to leads P and I for an interval of 1/2 second duration. This feature is used to cause the coin control battery of this circuit, as described later, to be connected to the subscriber line for 1/2 second duration and thereby insure sufficient time for proper operation of the coin box magnet. The operated Y relay locks under control of HH and connects battery to the winding of B. Relay B operates when ground is received on the I lead. If the called subscriber should hang up before the calling subscriber, the line current is reversed when the called station disconnects, operating P and releasing P1. The operated P relay and released P1 relay short-circuit the winding of J, causing it to release. Relay J releases K and short-circuits P. The released P and K relays release K1. The released J relay places the P relay again on the ground side of the line. If the calling party disconnects first, J, K, and K1, and, with Fig. 2, T1 release when ground is removed by the release of HH.

NONCHARGE CALL (C RELAY NORMAL) (S WIRING)

6.02 When the calling station disconnects R releases, releasing D and DD, and opening the loop to the succeeding switches. After an interval, ground is removed from the sleeve of the selector. From this point on, the circuit functions as described in 6.01 except that J, K, and K1 will not be operated.

7. COIN CONTROL (S OR T WIRING)

7.01 The operation of relay B connects 110 volts positive or negative battery to the line to dispose of the coin. If the coin is to be collected, 110 volts positive battery is connected to the winding of I through the front contact of relay C and, with Fig. 2, the front contact of T1. If the coin is to be returned, the 110-volt negative battery is connected to the line through the front contact of B and the back contact of C, through the winding of I. Relay I operates in series with the coin magnet and remains operated during the time that the battery is connected to the line. The operation of I connects battery to hold H operated since the operating circuit for this relay is opened when B operates. When the I lead ground is removed, B releases, removing the coin collect or return current, releasing I, and holding H operated. At the next closure of ground to the I lead, B reoperates, connecting coin disposal current to the line. The coin should have been disposed of on the first application of the potential which, upon the removal of the potential, restores the coin magnet to normal; no current should flow through I on the subsequent application of the coin potential.

RELEASE OF CIRCUIT, ZF OPTION

7.02 With relay B operated and I normal, H releases, releasing HH which: (a) removes ground from the line finder sleeve; (b) releases B, Y, and also C, K, K1, and T1 if operated; and (c) connects battery to RB1 of RT. The release of B connects the incoming tip and ring to relay L, thus restoring the circuit to normal.

RELEASE OF CIRCUIT, ZG OPTION

7.03 The circuit functions are described in the preceding paragraph except that when HH releases, B remains locked to lead I, and HH removes the coin return battery from 5B(C). Thus, B remains operated for approximately 1/2 second until ground is removed from lead I. This insures sufficient time for the line finder cut-through relay to release before the incoming tip and ring are connected to relay L.

8. STUCK COINBB AND S OR T WIRING

8.01 If the coin is not disposed of, relay I will reoperate each time coin potential is applied to the line and will hold H each time B operates, thereby preventing the release of HH. This will hold the trunk to the line. After an interval, the battery through the A lamp over the A lead will bring in an alarm.

BA AND S OR T WIRING

8.02 Battery for holding relay H operated under control of relay I is obtained from the IB lead in the associated Coin Box Trunk Release Circuit. Continued attempts of the coin trunk circuit to dispose of the coin are limited by the timing of the release circuit. At the end of the time period, battery is removed from the IB lead and the circuit functions as though the coin had been disposed of, restoring to normal as described in 7.01.

9. CALLS TO SPECIAL SERVICE OPERATOR (S WIRING)

9.01 On calls to a special operator, the selector level trunk is so arranged that the battery and ground are reversed immediately when the operator answers. This causes relay P to operate and P1 to release, operating J and C. Relay J locks, operates K, short-circuits P, which releases and reverses the line leads, causing P1 to operate. Relay K operates K1 after P releases. The operated K1 relay locks and removes the short-circuit from P. If coin collect current is supplied to the line from the trunk, P remains released and P1 releases. If coin return current is applied to the line from the

trunk, P operates and P1 remains operated. The function of P1 is to make the operation of P ineffective at this time, thereby preventing a buzzer action between J, K, and K1 which might result in acoustic shocks due to the momentary short-circuits of the tip and ring at the J contacts. On a rering by the special service operator, P may operate on ringing current. If relay P remains operated due to ground potential with P1 released, it shunts down J. Relay J releases K and short-circuits P. P releases and shunts down K1. Relay K1 in this case prevents a buzzer action between J, K, and K1, P1 being released under this condition. The ground potential, which may have held P, will not operate it after the short-circuit is removed. When Fig. 2 is provided, relays P2, T, and T1 function as described in 4.02 and 4.03.

10. TEST JACKST JACK

10.01 If a plug is inserted into the T jack of the trunk, ground will be connected to the S lead to the line finder by the operation of the test jack spring.

TT JACK - W WIRING AND A OR B WIRING AND APPARATUS

10.02 The TT jack, in conjunction with the T jack, provides means for applying pulse repeating requirements to the R relay. By connecting a source of pulses to the T jack and a percent break meter to the TT jack, the output of the R relay can be read on the percent break meter. When A apparatus is used, ground must be connected to the S lead from the selector in order to hold relays in this circuit while testing. With B apparatus, inserting a plug into the TT jack connects ground to the S lead. Momentary operation of the SC key, in all but the earliest pulse repeating test sets, operates the RT relay, in turn operating relay S. Where the pulse repeating test set is not so arranged, the RT relay must be momentarily operated manually.

11. FIRST SELECTOR MADE BUSY

11.01 When the first selector associated with this circuit is made busy by connecting ground to the sleeve lead, this ground is extended through the back contacts of HH to the sleeve of the preceding circuit. This causes a relay in the preceding circuit to busy the circuit so that it will not then be used on an incoming call.

12. CONTACT PROTECTION

12.01 Resistors D and F at the DD relay are connected to the A and B capacitors during the application of coin battery to the

line, and, in this connection, are used to protect the contacts which control the application of this battery to the coin magnet. Capacitor D and resistor E are used to protect the pulsing contacts of the R relay.

13. OPERATION WHEN T WIRING IS USED WITH LINE FINDER

13.01 The T wiring is used only when a part of the lines in the associated line finder group are equipped with long line circuits. The line finders are then equipped with normal post springs that operate on the multiple bank levels on which all the working lines are provided with long line circuits. When the normal post springs on the line finder operate, leads E and F, which are connected together when the finder is normal for the purpose of making the finder busy when the sleeve of the associated first selector is grounded, are opened and lead F is connected to lead A. When a call is originated, the long line circuit closes a bridge across the tip and ring, operating L. Relay L operates N and DD. Relay N operates NN. Relay NN closes a bridge across the tip and ring toward the first selector. The only useful function of DD at this time is that it grounds the sleeve so as to hold the line finder until HH operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the S lead. When ground is returned over the S lead from the first selector, A and S operate (A operating over the A and F leads). The operation of relay A closes the tip and ring through from the long line circuit to the first selector and allows L, N, NN, and DD to release. The operation of relay S operates H and HH. The test for the presence of the coin at the substation is made in the long line circuit and, therefore, RT and BT do not enter into the circuit operation on this call; similarly, the dial pulses are repeated in the long line circuit so that R is not used. When the call is answered, P operates and the circuit functions as described in 4., except that A has been operated by the NP springs instead of by C. However, the only useful function in the operation of P and release of P1 is the operation of C from a ground on HH which sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects, the circuit functions as described in 6.01. If the call is answered, C is operated, causing coin collect current to be applied to the line and, if the call is not answered, C is normal and coin return current is then applied to the line. On calls to the special service operator, P operates and P1 releases, operating C and setting the circuit in a position to collect the coin when the subscriber disconnects. The operation of J, K, and K1 serves no useful function on this type of

call because the transformer in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

14. OPERATION WHEN FIG. 4 AND T OPTION ARE USED WITH ROTARY LINE SWITCH

14.01 Fig. 4 and T wiring are used when this circuit is associated with a subscriber rotary line switch and preceded by a long line circuit. When this circuit is seized by a subscriber rotary line circuit, ground is advanced on lead A to operate relay LL of Fig. 4. The operated LL relay connects lead F to lead A, opening lead E. When a call is originated, the long line circuit closes a bridge across the tip and ring which operates L. Relay L operates N and DD. Relay N operates NN. Relay NN closes a bridge across the tip and ring toward the first selector. The only useful function of DD at this time is that it grounds the sleeve so as to hold the subscriber rotary line switch until HH operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the S lead. When ground is returned over the S lead from the first selector, A and S operate (A operating over the A and F leads). The operation of A closes the tip and ring through from the long line circuit to the first selector and allows L, N, NN, and DD to release. The operation of the S relay operates H and HH. Relay H locks under control of B. Relay HH separates the S lead between the subscriber rotary line circuit and first selector, and grounds the S lead to the subscriber rotary line circuit. The test for the presence of a coin at the substation is made at the long line circuit; therefore, RT and BT do not enter into the circuit operation on this call. Similarly, the dial pulses are repeated in the long line circuit so that R is not used. When the call is answered P operates and the circuit functions as described in 4., except that A has been operated by LL in Fig. 4 instead of by C. However, the only useful function in the operation of P and release of P1 is the operation of C from a ground on HH, which sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects, the circuit functions as described in 6.01, except that instead of a line finder circuit, a subscriber rotary line circuit is used. When the line circuit disconnects, ground is removed from lead A, releasing LL. If the call is answered, C is operated, causing coin collect current to be applied to the line; if the call is not answered, C is normal and coin return current is then applied to the line. On calls to the special service operator, P operates and P1 releases, which operates C and sets the circuit in a position to collect the coin when the subscriber disconnects. The operation of J, K, and K1 serves no useful function on this type of call because the transformer in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

15. USED IN OFFICES EQUIPPED WITH CAMA TRUNKS - FIG. 3

15.01 Direct ground is required on lead A to restrict coin lines from CAMA trunks.

16. LINE IDENTIFICATION

16.01 Capacitor C allows an identifying tone or pulse to pass over the sleeve lead from the selector circuit to the line finder circuit where the identification of coin lines is required in offices employing number checking, ANI-type B, or ANI-type C. Inductor CL maintains a low resistance ground to the line finder sleeve and provides a high impedance to the transmission of identifying tone over the sleeve lead in offices with number checking or ANI-type B. Diode D1 also maintains a low resistance holding ground on the line finder sleeve, and is used to provide a high impedance to identifying pulses over the sleeve lead in offices with ANI-type C.

17. LINE GROUP EQUIPPED WITH AUXILIARY COIN TRUNKS (ZQ OPTION)

LINE FINDER AND LINE SWITCH OFFICE

17.01 Option ZQ is used when this circuit is preceded by an auxiliary coin trunk. When this circuit is seized, ground is placed on the A lead from the auxiliary coin trunk to operate the A relay. The operated A relay closes the tip and ring leads through to the associated first selector. The subscriber loop across the tip and ring causes relays in the selector to operate, which in turn supplies dial tone to the calling subscriber and returns ground on the S lead. Ground on the S lead operates the S relay to battery on the contacts of the operated A relay. The operation of relay S operates relays H and HH. Relays L, D, DD, N, and NN do not enter into the circuit operation when this circuit is connected to an auxiliary coin trunk. The test for the presence of coin at the substation is made in the auxiliary coin trunk; therefore, the RT and BT relays are not used. Similarly, the dial pulses are repeated in the auxiliary coin trunk so that the R relay is not used. When the call is answered, relay P operates and the circuit functions as described in 4. and 5., except that the A relay has been operated and is controlled by the auxiliary coin trunk instead of by the C relay or DLL circuit. Also, the R, D, and DD relays will not be involved as mentioned above. If the call is to a free number, the auxiliary coin trunk will disable operation of the J relay via the J and J1 leads. An example of this type of call would be from a TOUCH-TONE coin station to an operator. When the operator answers, the tip and ring are reversed. By disabling the J relay, this reversal passes positive battery on the ring and ground on the tip from the recording completing trunk back to the coin station to disable the TOUCH-TONE dial.

17.02 Upon disconnect of the call, the circuit will function as described in 6., with one exception. If the call was directed to an announcement in the auxiliary coin trunk, the subscriber loop to this circuit and the first selector would be disconnected. The A relay and the first selector will release. However, this circuit will be held busy by the battery applied to the C lead in the auxiliary coin trunk, which will hold the H and HH relays operated. The operated HH relay will maintain a supervisory ground on this circuit and on the S lead towards the line finder until the calling subscriber disconnects. On disconnect, coin potential is applied through the I relay winding towards the coin station on the tip side of the line.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 See Table A for maximum external circuit loop resistance for subscriber pulsing and supervision.

1.02 Minimum insulation resistance: 20,000 ohms.

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

3.01 To provide for connecting a prepayment coin station to a first selector.

3.02 To provide for transmitting dial tone from the selector, TOUCH-TONE converter or originating register circuit to the calling subscriber.

3.03 To test for the presence of a coin in the coin box.

3.04 To repeat dial pulses after the coin is deposited.

3.05 To return the coin automatically on all uncompleted calls and on completed calls on which there is no charge.

3.06 To collect the coin automatically on completed calls to stations on which a charge is to be made.

3.07 To collect the coin automatically on completed calls to an operator unless the operator otherwise disposes of the coin before disconnecting.

3.08 To busy the associated line finder automatically when a ground is connected to the sleeve of the associated first selector.

TABLE A
GROUND POTENTIAL LIMITS

Limits	206N Relay P		280U or 239GU Relay P	
Negative	Maximum 10 Volts		Maximum 10 Volts	
	Minimum	Maximum	Minimum	Maximum
	Conductor	Positive	Conductor	Positive
	Loop	Ground	Loop	Ground
		Potential		Potential
	Ohms	Volts	Ohms	Volts
	0	7.5	0	9.5
	105	8.0	105	10.0
Positive	240	8.5	220	10.5
	370	9.0	320	11.0
	500	9.5	425	11.5
			530	12.0

3.09 To cut out the coin test and pulse repeating features when the calling station line is equipped with a long line circuit.

3.10 To provide means for making trunk operation and pulse repeating tests.

3.11 To provide means for indicating a trunk that has failed to dispose of a coin.

3.12 With Fig. 2, to defer setting up the charge condition until 2 to 5 seconds after the called party answers.

3.13 To provide direct ground to the A lead in Fig. 3 in offices equipped with CAMA trunks.

3.14 To permit identification of calling number where ANI-type B or ANI-type C is provided.

3.15 To provide for loop operation when an auxiliary coin trunk precedes this circuit and the coin stations are arranged for dial-tone-first operation.

3.16 To eliminate the pulse repeating and coin test features when an auxiliary coin trunk precedes this circuit, since these functions are performed in the auxiliary coin trunk.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed.

- (a) Line Finder Circuit - SD-31530-01 (typical).
- (b) Selector Circuit - SD-30200-01 (typical).
- (c) Interrupter and Alarm Circuit for Pre-pay Box Trunks - SD-30852-01 (typical).
- (d) Coin Box Trunk Release Circuit - SD-31861-01.
- (e) Pulse Repeating Test Set - SD-31667-01.
- (f) Interrupter and Alarm Circuit Arranged To Provide a Delay Interval - SD-31494-01 (typical).
- (g) Subscriber Circuit Equipped With Rotary Line Switch - SD-31259-01.
- (h) Miscellaneous Alarm Circuit for Pre-payment Coin Box Trunks - SD-31978-01.
- (i) Timing Circuit for Coin Trunks - SD-31893-01.

- (j) Pulsing Test Set - SD-90469-02 (typical).
- (k) Converter Trunk TOUCH-TONE Calling - SD-32326-01.
- (l) Register Trunk and Link (Trunk Portion) - SD-32353-01.
- (m) Auxiliary Coin Trunk - SD-32538-01.

control of the auxiliary coin trunk during the coin return function.

D.4 Two new leads designated J and J1 (option ZQ) are added. This places the operation of the J relay under control of the auxiliary coin trunk when a noncharge type of call is made.

D.5 A C lead (option ZQ) is added to hold this circuit busy by the auxiliary coin trunk when a call is routed to an announcement.

D.6 The S1 lead (option ZQ) is added to permit the auxiliary coin trunk to monitor the S lead toward the first selector on a noncharge type of call.

D.7 Option ZQ designates that the A lead is cross-connected to the auxiliary coin trunk instead of the line finder or Fig. 4 when an auxiliary coin trunk precedes this circuit.

D.8 Circuit Note 111 is added.

D.9 Fig. K is rated Mfr Disc. on this issue.

D.10 Fig. 51, 52, and 53 are added on this issue to reflect cross-connection information to the auxiliary coin trunk.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 This circuit is changed to function with an auxiliary coin trunk which is required when the coin stations are arranged for dial-tone-first operation.

D. Description of Changes

D.1 In Fig. 1, at leads T, R, and S, "TO AUX COIN TRUNK OR" is added to the connecting information.

D.2 Option ZP is added to reflect the fact that in dial-tone-first operation the ring side of the line is open when coin potentials are applied to the tip side.

D.3 The BC lead (option ZQ) is added to place the alarm relays for this circuit under

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DEPT 5823-CRH-MR

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

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SD-31592-01

ISSUE 23D

CD 6D

APP. 4D

DRAWING NOTICE

RATING Mfr. Disc.

SYSTEM Step-By-Step

DATE December 9, 1969

DWG DIST CODE D99

TITLE

Step-By-Step Systems - No.1 Or 350A - Coin Box Trunk Circuit - For Use
 Preceding A First Selector - Serving Prepayment Coin Lines - With Or
 Without Delayed Charge

EM/EL is not required.

DESCRIPTION

- 6.1 Project: (CLI) Calling Line Identification.
- 6.2 This change for TELCo consideration, is to remove the feature which provides for operation with the (CLI) Calling Line Identification equipment. This is in accordance with a modification in design of the CLI System. This change restores the circuit to its status prior to issue 22D which is in agreement with WECO's drawings.
- 6.21 Option "ZN" is removed and former wiring designated "ZM" option is restored as fixed wiring. This involves elimination of the T, R and S lead multiple to the CLI Scanner Access Circuit and removal of the 426 F diode from the S lead.
- 6.22 This change is made on a D no-record basis per agreement with WECO.
- 6.23 Changes shown on issue 22D are cancelled by this change.
- 6.3 The Current Drain Data for this circuit is not affected by changes in this issue.
- 6.4 D change. Requires WECO notification to Telco.
- 6.5 Equipment information is on a job basis.
- 6.6 Equipment Design Requirements are on a job basis.

Sept. 13, 1966
Jm

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
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DRAWING NOTICE

SD-31592-01
 CD 6D
 RATING Mfr. Disc.
 SYSTEM Step-By-Step
 DATE April 21, 1966

ISSUE 21D
 APP. 2D

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use
 Preceding A First Selector - Serving Prepayment Coin Lines - With Or
 Without Delayed Charge

DESCRIPTION

- 6.1 This circuit is arranged to provide operation with Non-Common Control TOUCH-TONE Calling Equipment and Step-By-Step Common Control Equipment.
- 6.12 This change involves additional cross-connecting information only. No circuit changes are required.
- 6.2 The Current Drain Data for this circuit is not affected by changes in this issue.
- 6.3 D change. Does not require WECO notification to Tel. Co.
- 6.4 Equipment information is not affected.
- 6.5 Equipment Design Requirements are not affected.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
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JUN 3 1968

ISSUE 22D
APP. 3D

DRAWING NOTICE

SD-31592-01
CD 6D
RATING Mfr. Disc.
SYSTEM Step By Step
DATE March 28, 1968

TITLE

Step By Step Systems - No. 1 or 350A - Coin Box Trunk Circuit - For Use
Preceding a First Selector - Serving Prepayment Coin Lines - With or Without
Delayed Charge

DESCRIPTION

- 6.1 A feature is added to allow the circuit to function with Calling Line Identification equipment.
- 6.11 The feature provides access leads to the tip, ring, and sleeve and ground decoupling of the sleeve holding ground.
- 6.12 The access leads are used by CLI scanning equipment. The sleeve decoupling provides for the use of ANI tones prior to calling party disconnect.
- 6.13 The feature requires the addition of a 426F diode and a wiring change.
- 6.2 The Current Drain Data for this circuit is not affected by changes in this issue.
- 6.3 D change. Requires WECO. notification to Telco.
- 6.4 Equipment information is on a job basis.
- 6.5 Equipment Design Requirements are not affected.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
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JUN 25 1964
BP

SD-31592-01	ISSUE	20D
CD 6D	APP.	1D
RATING Mfr. Disc.		
SYSTEM Step-By-Step		
DATE April 9, 1964		

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use Preceding
A First Selector - Serving Prepayment Coin Lines - With Or Without Delayed Charge

DESCRIPTION

- 6.1 A circuit requirement test for relay D is revised in order to improve the reliability of the pulse repeating function of this circuit.
 - 6.11 The revised test calls for observing relay D while an additional pulsing requirement of zero loop at 6 P.P.S. is applied to relay R. If D tends to follow the pulses, it should be stiffened within its test requirement.
 - 6.2 A feature is added to permit line identification in offices employing ANI TYPE B.
 - 6.21 This feature, designated "ZL" option, utilizes existing wiring and apparatus options previously specified for number checking only.
 - 6.3 A feature is added to permit line identification in offices employing ANI TYPE C.
 - 6.31 This feature, designated "ZK" option, requires minor wiring changes and the addition of one 426F diode and one 2 M.F. capacitor (C), previously shown as part of the number checking option.
 - 6.4 The Current Drain Data for this circuit is not affected by changes on this issue.
 - 6.5 D change. Does not require WECO notification to Tel Co.
 - 6.6 Equipment Design Requirements are on a job basis.
- No engineering letter will be issued.

SD-31592-011-013 ISSUE 19D
CD 6D APP.
RATING Mfr. Disc.
SYSTEM Step-By-Step
DATE October 13, 1961

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use
Preceding A First Selector - Serving Prepayment Coin Lines With - Or
Without Delayed Charge

DESCRIPTION

- 6.1 To permit the operation of this circuit with a Subscribers Rotary Line Circuit preceded by a Dial Long Line Circuit, Figure 4 was added.
- 6.2 Figure 4, consisting of one U type relay controls the A, E and F leads in this circuit. This figure in effect replaces the function the line finder normal post springs had on these leads.
- 6.3 Connection to Subscribers Rotary Line Circuit SD-31259-01 is now shown.
- 6.4 The Current Drain Data for this circuit is not affected by changes on this issue.
- 6.5 Equipment information is on a job basis. Also is affected and will be covered by drawing ED-30273-01.
- 6.6 Equipment Design Requirements are on a job basis.

No engineering letter will be issued.

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195 BROADWAY, NEW YORK 7

RS

SD-31592-011-013 ISSUE 18
CD 5B APP. 4B
RATING Mfr. Disc.
SYSTEM Step-By-Step
DATE February 28, 1961

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use Preceding
A First Selector - Serving Prepayment Coin Lines - With Or Without Delayed Charge

DESCRIPTION

- 6.1 The operate current flow values and the spring gauging requirements are changed on the "S" relay to prevent the false operation of the "BT" relay due to the high inductance of the relay in the 233 type coin station.
 - 6.2 The Current Drain Data for this circuit is not affected by changes on this issue.
 - 6.3 Equipment information is not affected.
 - 6.4 Equipment Design Requirements are not affected.
- No engineering letter will be issued.

SD-31592-011-013

ISSUE 17D

CD 5B

APP. 3D

RATING Mfr. Disc.

SYSTEM Step-By-Step

DATE December 2, 1959

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk
Circuit - For Use Preceding A First Selector - Serving
Prepayment Coin Lines - With Or Without Delayed Charge

(CB TRK)

DESCRIPTION

- 6.1 Circuit is reissued to provide a grounded "A" lead for restricting coin lines from CAMA trunks.
- 6.2 A non-operate and a stiffer operate current flow requirement is specified for the (B) relay to prevent false operation of the relays.
- 6.3 A K2 lamp is provided for the "A" lamp to provide greater brilliancy when used with coin box trk. release ckt.
- 6.4 Current Drains are not affected.
- 6.5 Equipment information is on a job basis.
- 6.6 Equipment Design Requirements are on a job basis.

No engineering letter will be issued.

MAY 24 1954
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SD-31592-011-013 ISSUE 16-B
CD 5-B APP. 2-B
RATING Mfr. Disc.
SYSTEM Step-By-Step - Ckt.
DATE March 22, 1954

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use Preceding
A First Selector - Serving Prepayment Coin Lines - With Or Without Delayed Charge

DESCRIPTION

1.1 It was observed in the field that occasionally after a completed call, coins remain on the collector trap with the trigger in the normal position. This causes coins to be collected or returned on a subsequent call.

1.11 This occurs because of the false operation of relay (Y) during the charging of the spark suppression condenser in the interrupter circuit, following disconnect by the originating subscriber.

1.12 This condition is corrected by increasing the operate requirement and adding non-operate requirements to the E1357 (Y) relay thus making the relay less sensitive. This change in adjustment prevents the (Y) relay from operating falsely.

Current drain is not affected.

Equipment Information is not affected.

Engineering Requirements are not affected.

Previous rating was the same.

No engineering letter will be issued.

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SD-31592-011-013 ISSUE 15-D
CD 5-B APP. 1-D
RATING Mfr. Disc.
SYSTEM Step-By-Step - Ckt.
DATE January 27, 1954

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use Preceding
A First Selector - Serving Prepayment Coin Lines - With Or Without Delayed Charge

DESCRIPTION

The use of relays E589, E626, B500, and 149CG is rated "Manufacture Discontinued"
for this circuit. This is in furtherance of a general program of rerating
obsolescent apparatus to carry realistic ratings.

Current drain is not affected.

Equipment Information is not affected.

An engineering letter will be issued.

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

CHANGES

A. Changed and Added Functions

A.1 To permit identification of calling number where ANI-TYPE B or ANI-TYPE C is provided.

B. Changes in Apparatus

B.1 ADDED

D1 Diode - 426F
ZK Option

C. Changes in Circuit Requirements Other Than Those Caused by Changes in Apparatus

C.1 Information previously shown in Test Note 4, Page 1 and Test Note 5, Page 4 is changed to specify an improved test procedure for relay D. These notes formerly read: When operating on Leak A, relay DD should remain normal. If it tends to operate, stiffen relay D within present limits. Prior to Issue 4D, BSP pulse repeating requirement A-4 was not shown for relay R.

D. Description of Changes

D.1 A feature and option table is added to consolidate circuit information. Thus, Circuit Notes 101, 102, 103, 104, 107, 108, 111, 113, and 115 through 120 are replaced by new Notes 101 and 102; Notes 109, 110, 112, and 114 are renumbered 107, 104, 108, and

109 respectively; and information concerning Issues 2 through 5 is added to new Note 104. Corresponding reference changes are made on the circuit figures.

D.2 Options ZJ and ZL are designated, and option ZK is added to arrange this circuit to operate with ANI-TYPE B or ANI-TYPE C offices respectively. Reference to these options is added to Notes 102, 104, and the Options Used Table.

F. Changes in Description of Operation

F.1 Add the following paragraph.

20. LINE IDENTIFICATION

Capacitor C allows an identifying tone or pulse to pass over the sleeve lead from the selector circuit to the line finder circuit where the identification of coin lines is required in offices employing Number Checking, ANI-TYPE B, or ANI-TYPE C. Inductor CL maintains a low resistance ground to the line finder sleeve and provides a high impedance to the transmission of identifying tone over the sleeve lead in offices with Number Checking or ANI-TYPE B. Diode D1 also maintains a low resistance holding ground on the line finder sleeve and is used to provide a high impedance to identifying pulses over the sleeve lead in offices with ANI-TYPE C.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2363-JLL-RJJ

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

Figure 4
U 114 (LL) Relay

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Figure 4 is added to facilitate the use of this circuit with a Subscriber Rotary Line Ckt. equipped with a Dial Long Line Ckt.

D.2 Connection to Subscriber Rotary Line Ckt. SD-31259-01 is now shown.

2.2 Earth potential limits:

206N Relay (P)			
Neg. Limit	Maximum 10V		
	Min. Conduc. Lp.	Max. E. P.	Pos. P.
Positive Limits	0 Ohms.	7.5V	
	105 "	8 "	
	240 "	8.5 "	
	370 "	9 "	
	500 "	9.5 "	

1. PURPOSE OF CIRCUIT

1.1 This circuit is used to provide dial service to prepayment coin stations from a step by step central office. It is arranged to automatically collect or return the coin deposited as required, after each call. When Fig. B is used it is arranged to delay setting up the charge condition until 2 to 5 seconds after the called party answers.

2. WORKING LIMITS

2.1 Maximum external circuit loop resistance for subscriber's pulsing and supervision. See Range Chart.

280U or 239GU Relay (P)			
	Maximum 10V		
	Min. Conduc. Lp.	Max. E. P.	Pos. P.
	0 Ohms	9.5V	
	105 "	10 "	
	220 "	10.5 "	
	320 "	11 "	
	425 "	11.5 "	
	530 "	12 "	

2.3 Minimum insulation resistance - 20,000 ohms.

3. FUNCTIONS

3.01 To provide for connecting a prepayment coin station to a first selector.

3.02 To provide for transmitting dial tone from the selector circuit to the calling subscriber.

3.03 To test for the presence of a coin in the coin box.

3.04 To repeat dial pulses after the coin is deposited.

3.05 To automatically return the coin on all uncompleted calls and on completed calls on which there is no charge.

3.06 To automatically collect the coin on completed calls to stations on which a charge is to be made.

3.07 To automatically collect the coin on completed calls to an operator unless the operator otherwise disposes of the coin before disconnecting.

3.08 To automatically busy the associated line finder when a ground is connected to the sleeve of the associated first selector.

- 3.09 To cut out the coin test and pulse repeating features when the calling station line is equipped with a long line circuit.
- 3.10 To provide means for making trunk operation and pulse repeating tests.
- 3.11 To provide means for indicating a trunk that has failed to dispose of a coin.
- 3.12 With Fig. 2 to defer setting up the charge condition until 2 to 5 seconds after the called party answers.
- 3.13 To provide direct ground to the "A" lead in Fig. 3 in offices equipped with CAMA trunks.

4. CONNECTING CIRCUITS

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

- 4.01 Line Finder Circuit - SD-31530-01*.
- 4.02 Selector Circuit - SD-30200-01*.
- 4.03 Interrupter and Alarm Circuit for Prepay Box Trunks - SD-30852-01*.
- 4.04 Coin Box Trunk Release Circuit - SD-31861-01.
- 4.05 Pulse Repeating Test Set - SD-31667-01.
- 4.06 Interrupter and Alarm Circuit Arranged to Provide a Delay Interval - SD-31494-01*.
- 4.07 Sub. Line Ckt. Equipped With Rotary Line Switch - SD-31259-01.
- 4.08 Misc. Alm. Ckt. for Prepayment Coin Box Trks. - SD-31978-01.
- 4.09 Timing Ckt. for Coin Trks. - SD-31893-01.
- 4.10 Pulsing Test Set - SD-90469-02*.

*Typical Circuits.

DESCRIPTION OF OPERATION

5. ORIGINATING A CALL ("S" WIRING)

When a prepayment coin station is connected to this circuit by a preceding Ckt. (L) operates over the subscriber's loop in turn operating (N) and (DD). (N) operated operates (NN). (NN) operated closes the circuit to the associated first selector, provides a holding circuit for (DD), removes the short circuit from the 6,000 ohms in series with the primary winding of (L) and changes from battery to the ring through the

non-inductive winding of the (RT) to battery through the operating winding of the (RT), and (with "L" wiring) the primary winding of (BT). (DD) operated, connects ground to the sleeve lead to hold the line finder and (with "Z" wiring and apparatus) closes in part the circuit for dial tone to the calling subscriber. When "X" wiring is provided the ground is connected to the sleeve through the (CL) retard coil to permit a number checking tone which may be connected to the sleeve of the subscriber's line to be transmitted over the sleeve lead through condenser (C) to a selector level trunk to indicate to the operator the class of service. The (B) and (C) resistances are used to prevent a transient current flow through the (B) condenser from operating (RT) falsely when the (C) retard coil is connected across the tip and ring by the operation of (NN), and dial tone is received from the selector. When "Z" wiring and apparatus are omitted, the dial tone path is not closed to the calling subscriber until the coin is deposited, as described in Paragraph 6 below.

6. COIN DEPOSITED

6.1 ("K" and "S" Wiring,

When the coin is deposited by the calling subscriber (RT) operates which operates (S). (S) operated, short-circuits (L), releasing it, locks to battery through its front contact, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted) connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operates, in turn closing a path for holding the first selector when (NN) releases and also operating (D). (D) operated, holds (DD) operated. (H) operated, takes over the control of (HH) from (S). The (HH) operated releases (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (L) released, releases (N). (NN) released short-circuits the (D) resistance ("Z" wiring only). (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

6.2 ("L" and "S" Wiring and Apparatus)

When the coin is deposited by the calling subscriber, (RT) operates which operates (S). (S) operated, locks to battery through its front contacts, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted), connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operated closes a path for holding the first selector when (NN) releases

and operates (D). (D) operated holds (DD) operated. (H) operated, takes over the control of the (HH) from (S). (HH) operated, releases (N) and (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (NN) released ("Z" wiring only), short-circuits the (C) resistance. (N) released short-circuits (L) releasing it. (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

The purpose of (BT) is to block the operation of the coin trunk in case of an irregular condition on the line. (BT) operated locks to the sleeve, opens the circuit to (S) preventing its operation and removes battery from the line by connecting direct ground on the ring, releasing (L). (L) released releases (N) and it turn (NN). (NN) released releases (DD) and opens the bridge towards the selector, which removes ground from the sleeve, releasing (BT) and (RT) and restores the circuit to normal.

7. DIALING ("S" WIRING)

(R) repeats pulses from the subscriber's dial to the first selector. (D) is slow in operating and releases on the first dial pulse, and remains released during the pulsing of each digit. This releases (DD) which connects the (F) and (D) resistances to the tip and ring and shorts the (C) retard coil to aid pulsing.

8. CALL CHARGED

8.1 No Delay Interval

If the call is one on which a charge should be made, the line current is reversed, operating (P) and releasing (P1) which was previously operated. With (P1) released and (P) operated, (J) and (C) operate and lock. (J) operates (K), short-circuits (P) which releases, and reverses the tip and ring leads from the first selector which causes (P1) to operate. (K) operates (K1) through the back contact of (P). (K1) operated locks and removes the short circuit from (P). (C) operated locks and operates (A) and also sets the circuit so as to collect the coin when the calling subscriber disconnects, or transfers this function to relay (T1) Fig. 2. (A) operated disconnects the tip and ring of the calling line from the (T) retard coil and the (R) relay, releasing (R), and connects the tip and ring through (P) and (P1) to the first selector. (R) released releases (D) and (DD). (DD) released performs no useful function at this time. The reversal of the line by the operation of (J) is necessary to keep (P) always connected to the ground side of the connection.

8.2 With Delayed Charging, Fig. 2

With Fig. 2 the operation is as described in par. 8.1 except that the operation of (C), instead of connecting positive coin battery to relay I connects that relay to T1, and the relays of Fig. 2 function as follows.

When the called subscriber answers (P2) operates, in turn closing the circuit of (T) to lead PKU. This lead is grounded for 1/2 second once every 3 seconds, (except that when the interrupter circuit is not in use, lead PKU is grounded,) when (T) operates, it grounds lead "ST" to start the interrupter or to keep it operating. (T) locks to (P2) thru (T1), 2 seconds after lead PKU is opened, ground is connected to lead INT, operating (T1). (T1) operated locks to off normal ground, releases (T), and connects positive coin battery to relay (I) instead of negative. If (P2) releases before (T) operates, (T1) is released and the above sequence of operations will be repeated when (P2) again operates. Fig. 2 thus insures against false charging when busy flashes or other transient conditions operate (P2).

9. CALL NOT CHARGED ("S")

If the call is one on which no charge is to be made, the line current is not reversed. (P), (K) and (K1) will, therefore, not operate and the circuit remains in a condition to return the coin when the calling party disconnects. On this type of call, (A) does not operate and the (A) and (B) condensers in the tip and ring leads provide the transmission circuit.

10. DISCONNECT

10.1 Call charged ((C) Relay Operated) ("S" or "T" Wiring)

When the calling subscriber disconnect, the preceding Ckt. is still held by ground at the contacts of the (HH). (S) releases when ground is removed from the selector sleeve and causes (Y) to operate under control of a ground interruption on lead "P" of the coin control alarm circuit, and lighting the green alarm lamp (A). The coin control alarm circuit is arranged so that ground is intermittently and alternately connected to leads "P" and "I" for an interval of 1/2 second duration. This feature is used to cause the coin control battery of this circuit, as described later, to be connected to the subscriber's line for 1/2 second duration and thereby insure sufficient time for proper operation of the coin box magnet. (Y) operated locks under control of (HH) and connects battery to the winding of (B). (B) operates when ground is received on the "I" lead. If the called subscriber should hang up before the calling subscriber, the line current is reversed when the called station disconnects,

operating (P) and (Pl) releases. (P) operated and (Pl) released short-circuits the winding of (J) causing it to release. (J) releases (K) and short-circuits (P). (P) and (K) released release (Kl). (J) released places the (P) relay again on the ground side of the line. If the calling party disconnects first, (J), (K) and (Kl) and with Fig. 2, (Tl) release when ground is removed by the release of (HH).

10.2 Non-Charge Call ((C) Relay Normal) ("S" Wiring).

When the calling station disconnects (R) releases, releasing (D) and (DD), and opens the loop to the succeeding switches. After an interval, ground is removed from the sleeve of the selector. From this point on, the circuit functions as described in the preceding paragraph, except that (J), (K) and (Kl) will not be operated.

11. COIN CONTROL ("S" OR "T" WIRING)

The operation of (B) connects 110 volts positive or negative battery to the line to dispose of the coin. If the coin is to be collected, 110 volts positive battery is connected to the winding of (I) through the front contact of relay (C) and, with Fig. 2, the front contact of (Tl). If the coin is to be returned, the 110 volt negative battery is connected to the line through the front contact of (B) and the back contact of (C), thru the winding of (I). (I) operates in series with the coin magnet and remains operated during the time that the battery is connected to the line. The operation of (I) connects battery to hold (H) operated since the operating circuit for this relay is opened when (B) operates. When the "I" lead ground is removed (B) releases, removing the coin collect or return current, releasing (I) and holding (H) operated. At the next closure of ground to the "I" lead (B) reoperates connecting coin disposal current to the line. The coin should have been disposed of on the first application of the potential which upon the removal of the potential restores the coin magnet to normal and no current should flow through (I) on the subsequent application of the coin potential.

11.1 Release of circuit, "ZF" Option

With (B) operated and (I) normal (H) releases, releasing (HH) which (a) removes ground from the line finder sleeve, (b) releases (B), (Y), and also (C), (K), (Kl) and (Tl) if operated, and (C) connects battery to RBl of (RT). The release of (B) connects the incoming tip and ring to relay (L) thus restoring the circuit to normal.

11.2 Release of Circuit, "ZG" Option

The circuit functions are described in the preceding paragraph except that when (HH) releases (B) remains locked to lead "I", and (HH) removes the coin return battery from 5B(C). Thus (B) remains operated for approximately 1/2 second until ground is removed from lead "I". This insures sufficient time for the line finder cut through relay to release before the incoming tip and ring are connected to relay (L).

12. STUCK COIN

12.1 "BB" and "S" or "T" Wiring

If the coin is not disposed of, (I) will reoperate each time coin potential is applied to the line and will hold (H) each time (B) operates thereby preventing the release of (HH). This will hold the trunk to the line. After an interval the battery thru the (A) lamp over the "A" lead will bring in an alarm.

12.2 "BA" and "S" or "T" Wiring

Battery for holding (H) operated under control of (I) is obtained from the "IB" lead in the associated "Coin Box Trunk Release Circuit." Continued attempts of the coin trunk circuit to dispose of the coin are limited by the timing of the Release Circuit. At the end of the time period, battery is removed from the "IB" lead and the circuit functions as though the coin had been disposed of, restoring to normal as described in Paragraph 11.

13. CALLS TO SPECIAL SERVICE OPERATOR ("S" WIRING)

On calls to a special operator, the selector level trunk is so arranged that the battery and ground are reversed immediately when the operator answers. This causes (P) to operate and (Pl) to release, operating (J) and (C). (J) locks, operates (K), short-circuits (P), which releases and reverses the line leads which causes (Pl) to operate. (K) operates (Kl) after (P) releases. (Kl) operated locks and removes the short circuit from (P). If coin collect current is supplied to the line from the trunk, (P) remains released and (Pl) releases. If coin return current is applied to the line from the trunk, (P) operates and (Pl) remains operated. The function of (Pl) is to make the operation of (P) ineffective at this time, thereby preventing a buzzer action between (J), (K) and (Kl) which might result in acoustic shocks due to the momentary short-circuits of the tip and ring at the (J) contacts. On a ringing by the special service operator, (P)

may operate on ringing current. If (P) remains operated due to earth potential with (P1) released, it shunts down (J). (J) releases (K) and short-circuits (P). (P) releases and shunts down (K1). (K1) in this case prevents a buzzer action between (J), (K) and (K1), (P1) being released under this condition. The earth potential which may have held (P), will not operate it after the short-circuit is removed. When Fig. 2 is provided, relays (P2), (T) and (T1) function as described in Paragraph 8.2.

14. TEST JACKS

14.1 (T) Jack

If a plug is inserted into the (T) jack of the trunk ground will be connected to the "S" lead to the line finder by the operation of the test jack spring.

14.2 (TT) Jack - "W" Wiring and "A" or "B" Wiring and Apparatus

The (TT) jack in conjunction with the (T) jack provides means for applying pulse repeating requirements to the (R) relay. By connecting a source of pulses to the (T) jack and a per cent break meter to the (TT) jack the output of the (R) can be read on the per cent break meter. When "A" apparatus is used ground must be connected to the "S" lead from the selector in order to hold relays in this circuit while testing. With "B" apparatus inserting a plug into the (TT) jack connects ground to the "S" lead. Momentary operation of the "SC" key in all but the earliest pulse repeating test sets operates the (RT) relay, in turn operating relay (S). Where the pulse repeating test set is not so arranged the (RT) relay must be momentarily operated manually.

15. FIRST SELECTOR MADE BUSY

When the first selector associated with this circuit is made busy by connecting ground to the sleeve lead, this ground is extended through the back contacts of (HH) to the sleeve of the preceding circuit. This causes a relay in the preceding circuit to busy the circuit so that it will not then be used on an incoming call.

16. CONTACT PROTECTION

Resistances (D) and (F) at the (DD) relay are connected to the (A) and (B) condensers during the application of coin battery to the line and in this connection are used to protect the contacts which control the application of this battery to the coin magnet. Condenser "D" and "E" resistance are used to protect the pulsing contacts of the (R) relay.

17. OPERATION WHEN "T" WIRING IS USED WITH LINE FINDER

The "T" wiring is used only when a part of the lines in the associated line finder group are equipped with long line circuits. The line finders are then equipped with normal post springs that operate on the multiple bank levels on which all the working lines are provided with long line circuits. When the normal post springs on the line finder operate leads "E" and "F", which are connected together when the finder is normal for the purpose of making the finder busy when the sleeve of the associated first selector is grounded, are opened and lead "F" is connected to lead "A". When a call is originated the long line circuit closes a bridge across the tip and ring which operates (L). (L) operates (N) and (DD). (N) operates (NN). (NN) closes a bridge across the tip and ring toward the first selector. The only useful function of (DD) at this time is that it grounds the sleeve so as to hold the line finder until (HH) operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the "S" lead. When ground is returned over the "S" lead from the first selector (A) and (S) operate, ((A) operating over the "A" and "F" leads). The operation of (A) closes the tip and ring through from the long line circuit to the first selector and allows (L), (N), (NN) and (DD) to release. The operation of (S) operates (H) and (HH). The test for the presence of the coin at the substation is made in the long line circuit and therefore (RT) and (BT) do not enter into the circuit operation on this call, similarly, the dial pulses are repeated in the long line circuit so that (R) is not used. When the call is answered (P) operates and circuit functions as described in paragraph 8 except that (A) has been operated by the NP springs instead of by (C). However the only useful function in the operation of (P) and release of (P1) is to operate (C) from a ground on (HH) and sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects the circuit functions as described under paragraph 10.1. If the call is answered (C) is operated causing coin collect current to be applied to the line and if the call is not answered (C) is normal and coin return current is then applied to the line. On calls to the special service operator (P) operates and (P1) releases which operates (C) and sets the circuit in a position to collect the coin when the subscriber disconnects. The operation of (J), (K) and (K1) serves no useful function on this type of call because the repeating coil in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

18. OPERATION WHEN FIGURES 4 AND "T" OPTION ARE USED WITH ROTARY LINE SWITCH

Figure 4 and "T" wiring are used when this circuit is associated with a subscriber rotary line switch, and preceded by a long line circuit. When this circuit is seized by a subscribers rotary line circuit ground is advanced on lead "A" to operate (LL) of Figure 4. Operated (LL) connects lead "F" to lead "A" opening lead "E". When a call is originated the long line circuit closes a bridge across the tip and ring which operates (L). (L) operates (N) and (DD). (N) operates (NN). (NN) closes a bridge across the tip and ring toward the first selector. The only useful function of (DD) at this time is that it grounds the sleeve so as to hold the subscribers rotary line switch until (HH) operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the "S" lead. When ground is returned over the "S" lead from the first selector (A) and (S) operate, ((A) operating over the "A" and "F" leads). The operation of (A) closes the tip and ring through from the long line circuit to the first selector and allows (L), (N), (NN) and (DD) to release. The operation of (S) operates (H) and (HH). (H) locks under control of (B). (HH) separates the "S" lead between the subscribers rotary line circuit and first selector, and grounds the "S" lead to the subscribers rotary line circuit. The test for the presence of a coin at the substation is made at the long line circuit and therefore (RT) and (BT) do not enter into the circuit operation on this call,

similarly, the dial pulses are repeated in the long line circuit so that (R) is not used. When the call is answered (P) operates, and the circuit functions as described in paragraph 8, except that (A) has been operated by (LL) in Figure 4 instead of by (C). However the only useful function in the operation of (P) and release of (Pl) is to operate (C) from a ground on (HH) and sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects the circuit functions as described under paragraph 10.1, except instead of a line finder circuit a subscribers rotary line circuit is used. When the line circuit disconnects ground is removed from lead "A" releasing (LL). If the call is answered (C) is operated causing coin collect current to be applied to the line and if the call is not answered (C) is normal and coin return current is then applied to the line. On calls to the special service operator (P) operates and (Pl) releases which operates (C) and sets the circuit in a position to collect the coin when the subscriber disconnects. The operation of (J), (K) and (Kl) serves no useful function on this type of call because the repeating coil in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

19. USED IN OFFICES EQUIPPED WITH CAMA TRUNKS - FIG. 3

Direct ground is required on lead "A" to restrict coin lines from cama trunks.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 2363-CEH-FBB-SA

CIRCUIT DESCRIPTION

CD-31592-01
ISSUE 6D
APPENDIX 3D
DWG ISSUE 22D

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

CHANGES

A. Changed and Added Functions

A.1 Permits immediate ANI identification of calling line when calling line identification is provided.

B. Changes in Apparatus

B.1 Added

Diode D2, 426F, Fig. 1, Option ZN
Wire Option ZM and Zn, Fig. 1

D. Description of Changes

D.1 Option ZN is added to give calling line identification equipment access to the coin box trunk tip, ring, and sleeve leads.

D.2 Diode D2 is added to decouple all sleeve holding grounds from the point at which the ANI tone is applied.

F. Changes in Description of Operation

F.1 Under Description of Operation, add:

20. Calling Line Identification (CLI)

Option ZN is added to give the CLI scanner access to the tip, ring, and sleeve leads.

Diode D2 provides for ANI identification of the coin station before disconnect. The CLI equipment applies a sufficient dc potential to the scanner sleeve access lead to back-bias diode D2. This decouples all sleeve holding grounds from the ANI circuit during the identification process.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5643-GHP-MR

kept 1141

CIRCUIT DESCRIPTION

CD-31592-01
ISSUE 6D
APPENDIX 4D
DWG ISSUE 23D

STEP BY STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

CHANGES

A. Changed and Added Functions

A.1 The feature that provides for operation with calling line identification (CLI) equipment is removed from the circuit in accordance with a change in design of the CLI system. The circuit is restored without record to its condition prior to Issue 22D per agreement with WECO.

B. Changes in Apparatus

B.1 Removed

Diode D2, 426F, Option ZN

D. Description of Changes

D.1 Option ZN is removed and the former wiring designated ZM is restored as fixed wiring. This involves elimination of the T-, R-, and S-lead multiple to the CLI Scanner Access Circuit and removal of the D2 diode in the S lead to the first selector.

D.2 Reference to options ZM and ZN is removed from Circuit Note 102, the Record Note 104, and the Options Used table.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5823-JLB-MR

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
195 BROADWAY, NEW YORK 7

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SD-31592-011-013 ISSUE 19D
CD 6D APP.
RATING Mfr. Disc.
SYSTEM Step-By-Step
DATE October 13, 1961

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use
Preceding A First Selector - Serving Prepayment Coin Lines With - Or
Without Delayed Charge

DESCRIPTION

- 6.1 To permit the operation of this circuit with a Subscribers Rotary Line Circuit preceded by a Dial Long Line Circuit, Figure 4 was added.
- 6.2 Figure 4, consisting of one U type relay controls the A, E and F leads in this circuit. This figure in effect replaces the function the line finder normal post springs had on these leads.
- 6.3 Connection to Subscribers Rotary Line Circuit SD-31259-01 is now shown.
- 6.4 The Current Drain Data for this circuit is not affected by changes on this issue.
- 6.5 Equipment information is on a job basis. Also is affected and will be covered by drawing ED-30273-01.
- 6.6 Equipment Design Requirements are on a job basis.

No engineering letter will be issued.

SD-31592-011-013

ISSUE 17D

CD 5B

APP. 3D

RATING Mfr. Disc.

SYSTEM Step-By-Step

DATE December 2, 1959

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk
Circuit - For Use Preceding A First Selector - Serving
Prepayment Coin Lines - With Or Without Delayed Charge

(CB TRK)

DESCRIPTION

- 6.1 Circuit is reissued to provide a grounded "A" lead for restricting coin lines from CAMA trunks.
- 6.2 A non-operate and a stiffer operate current flow requirement is specified for the (B) relay to prevent false operation of the relays.
- 6.3 A K2 lamp is provided for the "A" lamp to provide greater brilliancy when used with coin box trk. release ckt.
- 6.4 Current Drains are not affected.
- 6.5 Equipment information is on a job basis.
- 6.6 Equipment Design Requirements are on a job basis.

No engineering letter will be issued.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

195 BROADWAY, NEW YORK 7

RS

SD-31592-011-013

ISSUE 18B

CD 5B

APP. 4B

RATING Mfr. Disc.

SYSTEM Step-By-Step

DATE February 28, 1961

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use Preceding
A First Selector - Serving Prepayment Coin Lines - With Or Without Delayed Charge

DESCRIPTION

- 6.1 The operate current flow values and the spring gauging requirements are changed on the "S" relay to prevent the false operation of the "BT" relay due to the high inductance of the relay in the 233 type coin station.
- 6.2 The Current Drain Data for this circuit is not affected by changes on this issue.
- 6.3 Equipment information is not affected.
- 6.4 Equipment Design Requirements are not affected.

No engineering letter will be issued.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

195 BROADWAY, NEW YORK 7

SD-31592-011-013 ISSUE 16-B
CD 5-B APP. 2-B
RATING Mfr. Disc.
SYSTEM Step-By-Step - Ckt.
DATE March 22, 1954

DRAWING NOTICE

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use Preceding
A First Selector - Serving Prepayment Coin Lines - With Or Without Delayed Charge

DESCRIPTION

1.1 It was observed in the field that occasionally after a completed call, coins remain on the collector trap with the trigger in the normal position. This causes coins to be collected or returned on a subsequent call.

1.11 This occurs because of the false operation of relay (Y) during the charging of the spark suppression condenser in the interrupter circuit, following disconnect by the originating subscriber.

1.12 This condition is corrected by increasing the operate requirement and adding non-operate requirements to the E1357 (Y) relay thus making the relay less sensitive. This change in adjustment prevents the (Y) relay from operating falsely.

Current drain is not affected.

Equipment Information is not affected.

Engineering Requirements are not affected.

Previous rating was the same.

No engineering letter will be issued.

MAR 31 1954
5 B

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
195 BROADWAY, NEW YORK 7

DRAWING NOTICE

SD-31592-011-013 ISSUE 15-D
CD 5-B APP. 1-D
RATING Mfr. Disc.
SYSTEM Step-By-Step - Ckt.
DATE January 27, 1954

TITLE

Step-By-Step Systems - No. 1 Or 350A - Coin Box Trunk Circuit - For Use Preceding
A First Selector - Serving Prepayment Coin Lines - With Or Without Delayed Charge

DESCRIPTION

The use of relays E589, E626, B500, and 149CG is rated "Manufacture Discontinued" for this circuit. This is in furtherance of a general program of rerating obsolescent apparatus to carry realistic ratings.

Current drain is not affected.

Equipment Information is not affected.

An engineering letter will be issued.

the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (NN) released ("Z" wiring only), short-circuits the (C) resistance. (N) released short-circuits (L) releasing it. (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

The purpose of (BT) is to block the operation of the coin trunk in case of an irregular condition on the line. (BT) operated locks to the sleeve, opens the circuit to (S) preventing its operation and removes battery from the line by connecting direct ground on the ring, releasing (L). (L) released releases (N) and in turn (NN). (NN) released releases (DD) and opens the bridge towards the selector, which removes ground from the sleeve, releasing (BT) and (RT) and restores the circuit to normal.

7. DIALING ("S" WIRING)

(R) repeats pulses from the subscriber's dial to the first selector. (D) is slow in operating and releases on the first dial pulse, and remains released during the pulsing of each digit. This releases (DD) which connects the (P) and (D) resistances to the tip and ring and shorts the (C) retard coil to aid pulsing.

8. CALL CHARGED

8.1 No Delay Interval

If the call is one on which a charge should be made, the line current is reversed, operating (P) and releasing (P1) which was previously operated. With (P1) released and (P) operated, (J) and (C) operate and lock. (J) operates (K), short-circuits (P) which releases, and reverses the tip and ring leads from the first selector which causes (P1) to operate. (K) operates (K1) through the back contact of (P). (K1) operated locks and removes the short circuit from (P). (C) operated locks and operates (A) and also sets the circuit so as to collect the coin when the calling subscriber disconnects, or transfers this function to relay (T1) Fig. 2. (A) operated disconnects the tip and ring of the calling line from the (T) retard coil and the (R) relay, releasing (R), and connects the tip and ring through (P) and (P1) to the first selector. (R) released releases (D) and (DD). (DD) released performs no useful function at this time. The reversal of the line by the operation of (J) is necessary to keep (P) always connected to the ground side of the connection.

8.2 With Delayed Charging, Fig. 2

With Fig. 2 the operation is as described in par. 8.1 except that the operation of (C), instead of connecting positive coin battery to relay I connects that relay to T1, and the relays of Fig. 2 function as follows.

When the called subscriber answers (P2) operates, in turn closing the circuit of (T) to lead PKU. This lead is grounded for 1/2 second once every 3 seconds, (except that when the interrupter circuit is not in use, lead PKU is grounded,) when (T) operates, it grounds lead "ST" to start the interrupter or to keep it operating. (T) locks to (P2) thru (T1), 2 seconds after lead PKU is opened, ground is connected to lead INT, operating (T1). (T1) operated locks to off normal ground, releases (T), and connects positive coin battery to relay (I) instead of negative. If (P2) releases before (T) operates, (T1) is released and the above sequence of operations will be repeated when (P2) again operates. Fig. 2 thus insures against false charging when busy flashes or other transient conditions operate (P2).

9. CALL NOT CHARGED ("S")

If the call is one on which no charge is to be made, the line current is not reversed. (P), (K) and (K1) will, therefore, not operate and the circuit remains in a condition to return the coin when the calling party disconnects. On this type of call, (A) does not operate and the (A) and (B) condensers in the tip and ring leads provide the transmission circuit.

10. DISCONNECT

10.1 Call Charged ((C) Relay Operated) ("S" or "T" Wiring)

When the calling subscriber disconnects, the line finder is still held by ground at the contacts of the (HH). (S) releases when ground is removed from the selector sleeve and causes (Y) to operate under control of a ground interruption on lead "P" of the coin control alarm circuit, and lighting the green alarm lamp (A). The coin control alarm circuit is arranged so that ground is intermittently and alternately connected to leads "P" and "I" for an interval of 1/2 second duration. This feature is used to cause the coin control battery of this circuit, as described later, to be connected to the subscriber's line for 1/2 second duration and thereby insure sufficient time for proper operation of the coin box magnet. (Y) operated locks under control of (HH) and connects battery to the winding of (B).

(B) operates when ground is received on the "I" lead. If the called subscriber should hang up before the calling subscriber, the line current is reversed when the called station disconnects, operating (P) and (Pl) releases. (P) operated and (Pl) released short-circuits the winding of (J) causing it to release. (J) releases (K) and short-circuits (P). (P) and (K) released release (Kl). (J) released places the (P) relay again on the ground side of the line. If the calling party disconnects first, (J), (K) and (Kl) and with Fig. 2, (Tl) release when ground is removed by the release of (HH).

10.2 Non-Charge Call (C) Relay Normal ("S" Wiring).

When the calling station disconnects (R) releases, releasing (D) and (DD), and opens the loop to the succeeding switches. After an interval, ground is removed from the sleeve of the selector. From this point on, the circuit functions as described in the preceding paragraph, except that (J), (K) and (Kl) will not be operated.

11. COIN CONTROL ("S" OR "T" WIRING)

The operation of (B) connects 110 volts positive or negative battery to the line to dispose of the coin. If the coin is to be collected, 110 volts positive battery is connected to the winding of (I) through the front contact of relay (C) and, with Fig. 2, the front contact of (Tl). If the coin is to be returned, the 110 volt negative battery is connected to the line through the front contact of (B) and the back contact of (C), thru the winding of (I). (I) operates in series with the coin magnet and remains operated during the time that the battery is connected to the line. The operation of (I) connects battery to hold (H) operated since the operating circuit for this relay is opened when (B) operates. When the "I" lead ground is removed (B) releases, removing the coin collect or return current, releasing (I) and holding (H) operated. At the next closure of ground to the "I" lead (B) reoperates connecting coin disposal current to the line. The coin should have been disposed of on the first application of the potential which upon the removal of the potential restores the coin magnet to normal and no current should flow through (I) on the subsequent application of the coin potential.

11.1 Release of circuit, "ZF" Option

With (B) operated and (I) normal (H) releases, releasing (HH) which (a) removes ground from the line finder sleeve, (b) releases (B), (Y), and also (C), (K), (Kl) and (Tl) if operated,

and (C) connects battery to RBl of (RT). The release of (B) connects the incoming tip and ring to relay (L) thus restoring the circuit to normal.

11.2 Release of Circuit, "ZG" Option

The circuit functions are described in the preceding paragraph except that when (HH) releases (B) remains locked to lead "I", and (HH) removes the coin return battery from 5B(C). Thus (B) remains operated for approximately 1/2 second until ground is removed from lead "I". This insures sufficient time for the line finder cut through relay to release before the incoming tip and ring are connected to relay (L).

12. STUCK COIN

12.1 "BB" and "S" or "T" Wiring

If the coin is not disposed of, (I) will reoperate each time coin potential is applied to the line and will hold (H) each time (B) operates thereby preventing the release of (HH). This will hold the trunk to the line. After an interval the battery thru the (A) lamp over the "A" lead will bring in an alarm.

12.2 "BA" and "S" or "T" Wiring

Battery for holding (H) operated under control of (I) is obtained from the "IB" lead in the associated "Coin Box Trunk Release Circuit." Continued attempts of the coin trunk circuit to dispose of the coin are limited by the timing of the Release Circuit. At the end of the time period, battery is removed from the "IB" lead and the circuit functions as though the coin had been disposed of, restoring to normal as described in Paragraph 11.

13. CALLS TO SPECIAL SERVICE OPERATOR ("S" WIRING)

On calls to a special operator, the selector level trunk is so arranged that the battery and ground are reversed immediately when the operator answers. This causes (P) to operate and (Pl) to release, operating (J) and (C). (J) locks, operates (K), short-circuits (P), which releases and reverses the line leads which causes (Pl) to operate. (K) operates (Kl) after (P) releases. (Kl) operated locks and removes the short circuit from (P). If coin collect current is supplied to the line from the trunk, (P) remains released and (Pl) releases. If coin return current is applied to the line from the trunk, (P) operates and (Pl) remains operated. The function of (Pl) is to make the operation of (P) ineffective at this time, thereby preventing a buzzer action between (J), (K) and (Kl) which

might result in acoustic shocks due to the momentary short-circuits of the tip and ring at the (J) contacts. On a re-ring by the special service operator, (P) may operate on ringing current. If (P) remains operated due to earth potential with (P1) released, it shunts down (J). (J) releases (K) and short-circuits (P). (P) releases and shunts down (K1). (K1) in this case prevents a buzzer action between (J), (K) and (K1), (P1) being released under this condition. The earth potential which may have held (P), will not operate it after the short-circuit is removed. When Fig. 2 is provided, relays (P2), (T) and (T1) function as described in Paragraph 8.2.

14. TEST JACKS

14.1 (T) Jack

If a plug is inserted into the (T) jack of the trunk ground will be connected to the "S" lead to the line finder by the operation of the test jack spring.

14.2 (TT) Jack - "W" Wiring and "A" or "B" Wiring and Apparatus

The (TT) jack in conjunction with the (T) jack provides means for applying pulse repeating requirements to the (R) relay. By connecting a source of pulses to the (T) jack and a per cent break meter to the (TT) jack the output of the (R) can be read on the per cent break meter. When "A" apparatus is used ground must be connected to the "S" lead from the selector in order to hold relays in this circuit while testing. With "B" apparatus inserting a plug into the (TT) jack connects ground to the "S" lead. Momentary operation of the "SC" key in all but the earliest pulse repeating test sets operates the (RT) relay, in turn operating relay (S). Where the pulse repeating test set is not so arranged the (RT) relay must be momentarily operated manually.

15. FIRST SELECTOR MADE BUSY

When the first selector associated with this circuit is made busy by connecting ground to the sleeve lead, this ground is extended through the back contacts of (HH) to the sleeve of the line finder circuit. This causes a relay in the line finder to busy the circuit so that it will not then be used on an incoming call.

16. CONTACT PROTECTION

Resistances (D) and (F) at the (DD) relay are connected to the (A) and (B) condensers during the application of coin battery to the line and in this connection are used to protect the contacts which control the application of this battery to the coin magnet. Condenser "D" and "E" resistance are used to protect the pulsing contacts of the (R) relay.

17. OPERATION WHEN "T" WIRING IS USED

The "T" wiring is used only when a part of the lines in the associated line finder group are equipped with long line circuits. The line finders are then equipped with normal post springs that operate on the multiple bank levels on which all the working lines are provided with long line circuits. When the normal post springs on the line finder operate leads "E" and "F", which are connected together when the finder is normal for the purpose of making the finder busy when the sleeve of the associated first selector is grounded, are opened and lead "F" is connected to lead "A". When a call is originated the long line circuit closes a bridge across the tip and ring which operates (L). (L) operates (N) and (DD). (N) operates (NN). (NN) closes a bridge across the tip and ring toward the first selector. The only useful function of (DD) at this time is that it grounds the sleeve so as to hold the line finder until (HH) operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the "S" lead. When ground is returned over the "S" lead from the first selector (A) and (S) operate, ((A) operating over the "A" and "F" leads). The operation of (A) closes the tip and ring through from the long line circuit to the first selector and allows (L), (N), (NN) and (DD) to release. The operation of (S) operates (H) and (HH) which locks to the sleeve. The test for the presence of the coin at the substation is made in the long line circuit and therefore (RT) and (BT) do not enter into the circuit operation on this call, similarly, the dial pulses are repeated in the long line circuit so that (R) is not used. When the call is answered (P) operates and circuit functions as described in paragraph 8 except that (A) has been operated by the NP springs instead of by (C). However the only useful function in the operation of (P) and release of (P1) is to operate (C) which

locks to the sleeve and sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects the circuit functions as described under paragraph 10.1. If the call is answered (C) is operated causing coin collect current to be applied to the line and if the call is not answered (C) is normal and coin return current is then applied

to the line. On calls to the special service operator (P) operates and (P1) releases which operates (C) and sets the circuit in a position to collect the coin when the subscriber disconnects. The operation of (J), (K) and (K1) serves no useful function on this type of call because the repeating coil in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

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DEPT. 3310-OCH-RLL-WV

STEP BY STEP SYSTEMS
NO. 1, OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

CHANGES

D.3 Note 117 is added.

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

All other headings under Changes, no change.

C.1 Note 5 page 1 was added for relay (B)

1. PURPOSE OF CIRCUIT

D. DESCRIPTION OF CIRCUIT CHANGES

1.1 This circuit is used to provide dial service to prepayment coin stations from a step by step central office. It is arranged to automatically collect or return the coin deposited as required, after each call. When Fig. B is used it is arranged to delay setting up the charge condition until 2 to 5 seconds after the called party answers.

D.1 Option ZG is added replacing option ZF, to provide for locking relay (B) to 60 IPM lead I to hold this relay after (HH) releases, and thus prevent reoperation of (L) and (DD) before the associated line finder has had time to release.

2. WORKING LIMITS

D.2 Reference to options ZF and ZG is added in note 110 and the options used table.

2.1 Maximum external circuit loop resistance for subscriber's pulsing and supervision. See Range Chart.

2.2 Earth potential limits:

Neg. Limit	206N Relay (P)		Maximum 10V	280U or 239GU Relay (P)	Maximum 10V	
	Min. Conduc. Lp.	Max. Pos. E. P.			Min. Conduc. Lp.	Max. Pos. E. P.
Positive Limits	0 Ohms	7.5V		0 Ohms	9.5V	
	105 "	8 "		105 "	10 "	
	240 "	8.5 "		220 "	10.5 "	
	370 "	9 "		320 "	11 "	
	500 "	9.5 "		425 "	11.5 "	
				530 "	12 "	

Line relay is limiting factor - 885' cond loop. max.

2.3 Minimum insulation resistance - 20,000 ohms.

3.04 To repeat dial pulses after the coin is deposited.

3. FUNCTIONS

3.05 To automatically return the coin on all uncompleted calls and on completed calls on which there is no charge.

3.01 To provide for connecting a prepayment coin station to a first selector.

3.06 To automatically collect the coin on completed calls to stations on which a charge is to be made.

3.02 To provide for transmitting dial tone from the selector circuit to the calling subscriber.

3.03 To test for the presence of a coin in the coin box.

3.07 To automatically collect the coin on completed calls to an operator

unless the operator otherwise disposes of the coin before disconnecting.

- 3.08 To automatically busy the associated line finder when a ground is connected to the sleeve of the associated first selector.
- 3.09 To cut out the coin test and pulse repeating features when the calling station line is equipped with a long line circuit.
- 3.10 To provide means for making trunk operation and pulse repeating tests.
- 3.11 To provide means for indicating a trunk that has failed to dispose of a coin.
- 3.12 With Fig. 2 to defer setting up the charge condition until 2 to 5 seconds after the called party answers.

4. CONNECTING CIRCUITS

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

- 4.1 Line Finder Circuit - SD-31530-01*
- 4.2 Selector Circuit - SD-30200-01*
- 4.3 Interrupter and Alarm Circuit for prepay box trunks - SD-30852-01*
- 4.4 Coin box trunk release circuit - SD-31861-01.
- 4.5 Pulse Repeating Test Set - SD-31667-01.
- 4.6 Interrupter and Alarm Circuit arranged to provide a delay interval - SD-31494-01.

*Typical Circuits.

DESCRIPTION OF OPERATION

5. ORIGINATING A CALL ("S" WIRING)

When a prepayment coin station is connected to this circuit by a line finder, (L) operates over the subscriber's loop in turn operating (N) and (DD). (N) operated operates (NN). (NN) operated closes the circuit to the associated first selector, provides a holding circuit for (DD), removes the short circuit from the 6,000 ohms in series with the primary winding of (L) and changes from battery to the ring through the non-inductive winding of the (RT) to battery through the operating winding of the (RT), and (with "L" wiring) the primary winding of (BT). (DD) operated, connects ground to the sleeve lead to hold the line finder and (with "Z" wiring and apparatus) closes in part the circuit

for dial tone to the calling subscriber. When "X" wiring is provided the ground is connected to the sleeve through the (CL) retard coil to permit a number checking tone which may be connected to the sleeve of the subscriber's line to be transmitted over the sleeve lead through condenser (C) to a selector level trunk to indicate to the operator the class of service. The (B) and (C) resistances are used to prevent a transient current flow through the (B) condenser from operating (RT) falsely when the (C) retard coil is connected across the tip and ring by the operation of (NN), and dial tone is received from the selector. When "Z" wiring and apparatus are omitted, the dial tone path is not closed to the calling subscriber until the coin is deposited, as described in Paragraph 6 below.

6. COIN DEPOSITED

6.1 ("K" and "S" Wiring)

When the coin is deposited by the calling subscriber (RT) operates which operates (S). (S) operated, short-circuits (L), releasing it, locks to battery through its front contact, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted) connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operates, in turn closing a path for holding the first selector when (NN) releases and also operating (D). (D) operated, holds (DD) operated. (H) operated, takes over the control of (HH) from (S). The (HH) operated releases (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (L) released, releases (N). (NN) released short-circuits the (D) resistance ("Z" wiring only). (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

6.2 ("L" and "S" Wiring and Apparatus)

When the coin is deposited by the calling subscriber, (RT) operates which operates (S). (S) operated, locks to battery through its front contacts, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted), connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operated closes a path for holding the first selector when (NN) releases and operates (D). (D) operated holds (DD) operated. (H) operated, takes over the control of the (HH) from (S). (HH) operated, releases (N) and (NN), separates

might result in acoustic shocks due to the momentary short-circuits of the tip and ring at the (J) contacts. On a ringing by the special service operator, (P) may operate on ringing current. If (P) remains operated due to earth potential with (P1) released, it shunts down (J). (J) releases (K) and short-circuits (P). (P) releases and shunts down (K1). (K1) in this case prevents a buzzer action between (J), (K) and (K1), (P1) being released under this condition. The earth potential which may have held (P), will not operate it after the short-circuit is removed. When Fig. 2 is provided, relays (P2), (T) and (T1) function as described in Paragraph 8.2.

14. TEST JACKS

14.1 (T) Jack

If a plug is inserted into the (T) jack of the trunk ground will be connected to the "S" lead to the line finder by the operation of the test jack spring.

14.2 (TT) Jack - "W" Wiring and "A" or "B" Wiring and Apparatus

The (TT) jack in conjunction with the (T) jack provides means for applying pulse repeating requirements to the (R) relay. By connecting a source of pulses to the (T) jack and a per cent break meter to the (TT) jack the output of the (R) can be read on the per cent break meter. When "A" apparatus is used ground must be connected to the "S" lead from the selector in order to hold relays in this circuit while testing. With "B" apparatus inserting a plug into the (TT) jack connects ground to the "S" lead. Momentary operation of the "SC" key in all but the earliest pulse repeating test sets operates the (RT) relay, in turn operating relay (S). Where the pulse repeating test set is not so arranged the (RT) relay must be momentarily operated manually.

15. FIRST SELECTOR MADE BUSY

When the first selector associated with this circuit is made busy by connecting ground to the sleeve lead, this ground is extended through the back contacts of (HH) to the sleeve of the line finder circuit. This causes a relay in the line finder to busy the circuit so that it will not then be used on an incoming call.

16. CONTACT PROTECTION

Resistances (D) and (F) at the (DD) relay are connected to the (A) and (B) condensers during the application of coin battery to the line and in this connection are used to protect the contacts which control the application of this battery to the coin magnet. Condenser "D" and "E" resistance are used to protect the pulsing contacts of the (R) relay.

17. OPERATION WHEN "T" WIRING IS USED DIAL LONG LINES

The "T" wiring is used only when a part of the lines in the associated line finder group are equipped with long line circuits. The line finders are then equipped with normal post springs that operate on the multiple bank levels on which all the working lines are provided with long line circuits. When the normal post springs on the line finder operate leads "E" and "F", which are connected together when the finder is normal for the purpose of making the finder busy when the sleeve of the associated first selector is grounded, are opened and lead "F" is connected to lead "A". When a call is originated the long line circuit closes a bridge across the tip and ring which operates (L). (L) operates (N) and (DD). (N) operates (NN). (NN) closes a bridge across the tip and ring toward the first selector. The only useful function of (DD) at this time is that it grounds the sleeve so as to hold the line finder until (HH) operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the "S" lead. When ground is returned over the "S" lead from the first selector (A) and (S) operate, ((A) operating over the "A" and "F" leads). The operation of (A) closes the tip and ring through from the long line circuit to the first selector and allows (L), (N), (NN) and (DD) to release. The operation of (S) operates (H) and (HH) which locks to the sleeve. The test for the presence of the coin at the substation is made in the long line circuit and therefore (RT) and (BT) do not enter into the circuit operation on this call, similarly, the dial pulses are repeated in the long line circuit so that (R) is not used. When the call is answered (P) operates and circuit functions as described in paragraph 8 except that (A) has been operated by the NP springs instead of by (C). However the only useful function in the operation of (P) and release of (P1) is to operate (C) which

locks to the sleeve and sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects the circuit functions as described under paragraph 10.1. If the call is answered (C) is operated causing coin collect current to be applied to the line and if the call is not answered (C) is normal and coin return current is then applied

to the line. On calls to the special service operator (P) operates and (Pl) releases which operates (C) and sets the circuit in a position to collect the coin when the subscriber disconnects. The operation of (J), (K) and (Kl) serves no useful function on this type of call because the repeating coil in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

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the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (NN) released ("Z" wiring only), short-circuits the (C) resistance. (N) released short-circuits (L) releasing it. (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

The purpose of (BT) is to block the operation of the coin trunk in case of an irregular condition on the line. (BT) operated locks to the sleeve, opens the circuit to (S) preventing its operation and removes battery from the line by connecting direct ground on the ring, releasing (L). (L) released releases (N) and in turn (NN). (NN) released releases (DD) and opens the bridge towards the selector, which removes ground from the sleeve, releasing (BT) and (RT) and restores the circuit to normal.

7. DIALING ("S" WIRING)

(R) repeats pulses from the subscriber's dial to the first selector. (D) is slow in operating and releases on the first dial pulse, and remains released during the pulsing of each digit. This releases (DD) which connects the (F) and (D) resistances to the tip and ring and shorts the (C) retard coil to aid pulsing.

8. CALL CHARGED

8.1 No Delay Interval

If the call is one on which a charge should be made, the line current is reversed, operating (P) and releasing (Pl) which was previously operated. With (Pl) released and (P) operated, (J) and (C) operate and lock. (J) operates (K), short-circuits (P) which releases, and reverses the tip and ring leads from the first selector which causes (Pl) to operate. (K) operates (Kl) through the back contact of (P). (Kl) operated locks and removes the short circuit from (P). (C) operated locks and operates (A) and also sets the circuit so as to collect the coin when the calling subscriber disconnects, or transfers this function to relay (Tl) Fig. 2. (A) operated disconnects the tip and ring of the calling line from the (T) retard coil and the (R) relay, releasing (R), and connects the tip and ring through (P) and (Pl) to the first selector. (R) released releases (D) and (DD). (DD) released performs no useful function at this time. The reversal of the line by the operation of (J) is necessary to keep (P) always connected to the ground side of the connection.

8.2 With Delayed Charging, Fig. 2

With Fig. 2 the operation is as described in par. 8.1 except that the operation of (C), instead of connecting positive coin battery to relay I connects that relay to Tl, and the relays of Fig. 2 function as follows.

When the called subscriber answers (P2) operates, in turn closing the circuit of (T) to lead PKU. This lead is grounded for 1/2 second once every 3 seconds, (except that when the interrupter circuit is not in use, lead PKU is grounded,) when (T) operates, it grounds lead "ST" to start the interrupter or to keep it operating. (T) locks to (P2) thru (Tl), 2 seconds after lead PKU is opened, ground is connected to lead INT, operating (Tl). (Tl) operated locks to off normal ground, releases (T), and connects positive coin battery to relay (I) instead of negative. If (P2) releases before (T) operates, (Tl) is released and the above sequence of operations will be repeated when (P2) again operates. Fig. 2 thus insures against false charging when busy flashes or other transient conditions operate (P2).

9. CALL NOT CHARGED ("S")

If the call is one on which no charge is to be made, the line current is not reversed. (P), (K) and (Kl) will, therefore, not operate and the circuit remains in a condition to return the coin when the calling party disconnects. On this type of call, (A) does not operate and the (A) and (B) condensers in the tip and ring leads provide the transmission circuit.

10. DISCONNECT

10.1 Call Charged ((C) Relay Operated) ("S" or "T" Wiring)

When the calling subscriber disconnects, the line finder is still held by ground at the contacts of the (HH). (S) releases when ground is removed from the selector sleeve and causes (Y) to operate under control of a ground interruption on lead "p" of the coin control alarm circuit, and lighting the green alarm lamp (A). The coin control alarm circuit is arranged so that ground is intermittently and alternately connected to leads "p" and "I" for an interval of 1/2 second duration. This feature is used to cause the coin control battery of this circuit, as described later, to be connected to the subscriber's line for 1/2 second duration and thereby insure sufficient time for proper operation of the coin box magnet. (Y) operated locks under control of (HH) and connects battery to the winding of (B).

(B) operates when ground is received on the "I" lead. If the called subscriber should hang up before the calling subscriber, the line current is reversed when the called station disconnects, operating (P) and (Pl) releases. (P) operated and (Pl) released short-circuits the winding of (J) causing it to release. (J) releases (K) and short-circuits (P). (P) and (K) released release (Kl). (J) released places the (P) relay again on the ground side of the line. If the calling party disconnects first, (J), (K) and (Kl) and with Fig. 2, (Tl) release when ground is removed by the release of (HH).

10.2 Non-Charge Call (C) Relay Normal ("S" Wiring).

When the calling station disconnects (R) releases, releasing (D) and (DD), and opens the loop to the succeeding switches. After an interval, ground is removed from the sleeve of the selector. From this point on, the circuit functions as described in the preceding paragraph, except that (J), (K) and (Kl) will not be operated.

11. COIN CONTROL ("S" OR "T" WIRING)

The operation of (B) connects 110 volts positive or negative battery to the line to dispose of the coin. If the coin is to be collected, 110 volts positive battery is connected to the winding of (I) through the front contact of relay (C) and, with Fig. 2, the front contact of (Tl). If the coin is to be returned, the 110 volt negative battery is connected to the line through the front contact of (B) and the back contact of (C), thru the winding of (I). (I) operates in series with the coin magnet and remains operated during the time that the battery is connected to the line. The operation of (I) connects battery to hold (H) operated since the operating circuit for this relay is opened when (B) operates. When the "I" lead ground is removed (B) releases, removing the coin collect or return current, releasing (I) and holding (H) operated. At the next closure of ground to the "I" lead (B) reoperates connecting coin disposal current to the line. The coin should have been disposed of on the first application of the potential which upon the removal of the potential restores the coin magnet to normal and no current should flow through (I) on the subsequent application of the coin potential.

11.1 Release of circuit, "ZF" Option

With (B) operated and (I) normal (H) releases, releasing (HH) which (a) removes ground from the line finder sleeve, (b) releases (B), (Y), and also (C), (K), (Kl) and (Tl) if operated,

and (C) connects battery to RBl of (RT). The release of (B) connects the incoming tip and ring to relay (L) thus restoring the circuit to normal.

11.2 Release of Circuit, "ZG" Option

The circuit functions are described in the preceding paragraph except that when (HH) releases (B) remains locked to lead "I", and (HH) removes the coin return battery from 5B(C). Thus (B) remains operated for approximately 1/2 second until ground is removed from lead "I". This insures sufficient time for the line finder cut through relay to release before the incoming tip and ring are connected to relay (L).

12. STUCK COIN

12.1 "BB" and "S" or "T" Wiring

If the coin is not disposed of, (I) will reoperate each time coin potential is applied to the line and will hold (H) each time (B) operates thereby preventing the release of (HH). This will hold the trunk to the line. After an interval the battery thru the (A) lamp over the "A" lead will bring in an alarm.

12.2 "BA" and "S" or "T" Wiring

Battery for holding (H) operated under control of (I) is obtained from the "IB" lead in the associated "Coin Box Trunk Release Circuit." Continued attempts of the coin trunk circuit to dispose of the coin are limited by the timing of the Release Circuit. At the end of the time period, battery is removed from the "IB" lead and the circuit functions as though the coin had been disposed of, restoring to normal as described in Paragraph 11.

13. CALLS TO SPECIAL SERVICE OPERATOR ("S" WIRING)

On calls to a special operator, the selector level trunk is so arranged that the battery and ground are reversed immediately when the operator answers. This causes (P) to operate and (Pl) to release, operating (J) and (C). (J) locks, operates (K), short-circuits (P), which releases and reverses the line leads which causes (Pl) to operate. (K) operates (Kl) after (P) releases. (Kl) operated locks and removes the short circuit from (P). If coin collect current is supplied to the line from the trunk, (P) remains released and (Pl) releases. If coin return current is applied to the line from the trunk, (P) operates and (Pl) remains operated. The function of (Pl) is to make the operation of (P) ineffective at this time, thereby preventing a buzzer action between (J), (K) and (Kl) which

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

C.1 Note 5 page 1 was added for relay (B)

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Option ZG is added replacing option ZF, to provide for locking relay (B) to 60 IPM lead I to hold this relay after (HH) releases, and thus prevent reoperation of (L) and (DD) before the associated line finder has had time to release.

D.2 Reference to options ZF and ZG is added in note 110 and the options used table.

D.3 Note 117 is added.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is used to provide dial service to prepayment coin stations from a step by step central office. It is arranged to automatically collect or return the coin deposited as required, after each call. When Fig. B is used it is arranged to delay setting up the charge condition until 2 to 5 seconds after the called party answers.

2. WORKING LIMITS

2.1 Maximum external circuit loop resistance for subscriber's pulsing and supervision. See Range Chart.

2.2 Earth potential limits;

206N Relay (P)				280U or 239GU Relay (P)			
Neg. Limit		Maximum 10V		Maximum 10V		Maximum 10V	
	Min. Conduc. Lp.	Max. Pos. E. P.		Min. Conduc. Lp.	Max. Pos. E. P.		
Positive Limits	0 Ohms	7.5V		0 Ohms	9.5V		
	105 "	8 "		105 "	10 "		
	240 "	8.5 "		220 "	10.5 "		
	370 "	9 "		320 "	11 "		
	500 "	9.5 "		425 "	11.5 "		
				530 "	12 "		

2.3 Minimum insulation resistance - 20,000 ohms.

3. FUNCTIONS

3.01 To provide for connecting a prepayment coin station to a first selector.

3.02 To provide for transmitting dial tone from the selector circuit to the calling subscriber.

3.03 To test for the presence of a coin in the coin box.

3.04 To repeat dial pulses after the coin is deposited.

3.05 To automatically return the coin on all uncompleted calls and on completed calls on which there is no charge.

3.06 To automatically collect the coin on completed calls to stations on which a charge is to be made.

3.07 To automatically collect the coin on completed calls to an operator

unless the operator otherwise disposes of the coin before disconnecting.

3.08 To automatically busy the associated line finder when a ground is connected to the sleeve of the associated first selector.

3.09 To cut out the coin test and pulse repeating features when the calling station line is equipped with a long line circuit.

3.10 To provide means for making trunk operation and pulse repeating tests.

3.11 To provide means for indicating a trunk that has failed to dispose of a coin.

3.12 With Fig. 2 to defer setting up the charge condition until 2 to 5 seconds after the called party answers.

4. CONNECTING CIRCUITS

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

4.1 Line Finder Circuit - SD-31530-01*

4.2 Selector Circuit - SD-30200-01*

4.3 Interrupter and Alarm Circuit for prepay box trunks - SD-30852-01*

4.4 Coin box trunk release circuit - SD-31861-01.

4.5 Pulse Repeating Test Set - SD-31667-01.

4.6 Interrupter and Alarm Circuit arranged to provide a delay interval - SD-31494-01.

*Typical Circuits.

DESCRIPTION OF OPERATION

5. ORIGINATING A CALL ("S" WIRING)

When a prepayment coin station is connected to this circuit by a line finder, (L) operates over the subscriber's loop in turn operating (N) and (DD). (N) operated operates (NN). (NN) operated closes the circuit to the associated first selector, provides a holding circuit for (DD), removes the short circuit from the 6,000 ohms in series with the primary winding of (L) and changes from battery to the ring through the non-inductive winding of the (RT) to battery through the operating winding of the (RT), and (with "L" wiring) the primary winding of (BT). (DD) operated, connects ground to the sleeve lead to hold the line finder and (with "Z" wiring and apparatus) closes in part the circuit

for dial tone to the calling subscriber. When "X" wiring is provided the ground is connected to the sleeve through the (CL) retard coil to permit a number checking tone which may be connected to the sleeve of the subscriber's line to be transmitted over the sleeve lead through condenser (C) to a selector level trunk to indicate to the operator the class of service. The (B) and (C) resistances are used to prevent a transient current flow through the (B) condenser from operating (RT) falsely when the (C) retard coil is connected across the tip and ring by the operation of (NN), and dial tone is received from the selector. When "Z" wiring and apparatus are omitted, the dial tone path is not closed to the calling subscriber until the coin is deposited, as described in Paragraph 6 below.

6. COIN DEPOSITED

6.1 ("K" and "S" Wiring)

When the coin is deposited by the calling subscriber (RT) operates which operates (S). (S) operated, short-circuits (L), releasing it, locks to battery through its front contact, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted) connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operates, in turn closing a path for holding the first selector when (NN) releases and also operating (D). (D) operated, holds (DD) operated. (H) operated, takes over the control of (HH) from (S). The (HH) operated releases (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (L) released, releases (N). (NN) released short-circuits the (D) resistance ("Z" wiring only). (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

6.2 ("L" and "S" Wiring and Apparatus)

When the coin is deposited by the calling subscriber, (RT) operates which operates (S). (S) operated, locks to battery through its front contacts, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted), connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operated closes a path for holding the first selector when (NN) releases and operates (D). (D) operated holds (DD) operated. (H) operated, takes over the control of the (HH) from (S). (HH) operated, releases (N) and (NN), separates

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CHANGES

B. CHANGES IN APPARATUS

B.1 Superseded Superseded By

E589 Relay	E1446 Relay
E626 Relay	E888 Relay
E500 Relay	B36 Relay
149CG Relay	149AR Relay

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The use of relays E589, E626, B500 and 149CG is rated "Mfr. Disc." to show realistic ratings for obsolescent apparatus.

D.2 Relays E589, E1446, E626, E888, B500, B36, 149CG and 149AR are added to Note 110.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3440-MRG-EWO-F1

STEP BY STEP SYSTEMS
NO. 1, OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES
WITH OR WITHOUT DELAYED CHARGE

CHANGES

A. CHANGED OR ADDED FUNCTIONS

A.1 The circuit is arranged for delayed charging.

B. CHANGES IN APPARATUS

B.1	Superseded	Superseded by	Added
	206N Rel. (P1)	280U Rel. (P1)	206GG Rel. (P2) (MD)
	239GU Rel. (P)	280U Rel. (P)	280H Rel. (P2)(Std.) U851 Rel. (T) U564 Rel. (T1)

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

C.1 For the (P) and (P1) relays, the circuit preparation was formerly as described in Test note 2, page 3 and for the 239GU relay P, the BSP Fig. was 3 and the current flow requirements were:

	Soak	Test	Readj.
0	-.080	.0205	.0195
NO	.080	.0095	.010

C.2 The tables were redrawn to arrange all relays alphabetically, thus requiring that all test notes be renumbered. Note 4 p.5 is added.

C.3 "Block (S) O" was removed for relay R, and note 6, p.4, formerly read: "Apply pulse up, req. A-4 54-88% Bk. Conn Test Set to Jack (J) for input and Jack (TJ) for output. When W opt. and Jack (TT) are not furnished connect grd. to 2T(C), insulate 4J and 4B(J) and conn output of pulse repeat set to 4T and 4B (J)."

C.4 For Relay (S) the contact pressure was formerly "SPL" per test note 7, which formerly read "Min. 8 Grams on the 6T spring and the specified tension of "I" contact pressure on all other springs." The operate current flow requirements were Test 41, Readj. 39.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Fig. 2 was added to provide a delay after the called party answers, before setting the circuit for charging.

D.2 Information at multiple taps was added.

D.3 Notes 114 to 116 were added, and in note 110 the information for issue 13-D was added.

D.4 280 type relays were added to supersede 206 and 239 type relays. The 206 and 239 relays were designated options E, F, and ZA, on this issue, and are superseded by options D and ZB.

D.5 Option ZC was formerly part of Fig. 1, not designated, and option ZE was not shown. This was set off since leads CT and CT1 should be removed if the associated Coin Trunk Alarm Circuit SD-31227-01 is modified per SD-30852-01, and the contact thus released is used for ZE option to improve circuit operation.

D.6 Cross-connection Fig. K is revised to show leads ST, PKU and INT., and to add information to agree with that shown at the multiple relays.

D.7 Note 201 formerly read: "The relays (P) and (P1) shall be mounted on not less than 3-1/2" centers. Horizontally or vertically with respect to themselves as well as with respect to all other inductive apparatus."

D.8 The last line of the title was added.

E. CHANGES IN TRANSMISSION REQUIREMENTS

E.1 Requirements for the (P2) relay were added.

All other headings under Changes, No change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is used to provide dial service to prepayment coin stations from a step by step central office. It is arranged to automatically

collect or return the coin deposited as required, after each call. When Fig. B is used it is arranged to delay setting up the charge condition until 2 to 5 seconds after the called party answers.

2. WORKING LIMITS

2.1 Maximum external circuit loop resistance for subscriber's pulsing and supervision. See Range Chart.

2.2 Earth potential limits:

Neg. Limit	206N Relay (P)		280U or 239GU Relay (P)	
	Minimum Conduc. Lp.	Maximum 10V Pos. E. P.	Minimum Conduc. Lp.	Maximum 10V Pos. E. P.
Positive Limits	0 Ohms	7.5V	0 Ohms	9.5V
	105 "	8 "	105 "	10 "
	240 "	8.5 "	220 "	10.5 "
	370 "	9 "	320 "	11 "
	500 "	9.5 "	425 "	11.5 "
			530 "	12 "

2.3 Minimum insulation resistance - 20,000 ohms.

3.12 With Fig. 2 to defer setting up the charge condition until 2 to 5 seconds after the called party answers.

3. FUNCTIONS

4. CONNECTING CIRCUITS

3.01 To provide for connecting a prepayment coin station to a first selector.

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

3.02 To provide for transmitting dial tone from the selector circuit to the calling subscriber.

4.1 Line Finder Circuit - SD-31530-01*

3.03 To test for the presence of a coin in the coin box.

4.2 Selector Circuit - SD-30200-01*

3.04 To repeat dial pulses after the coin is deposited.

4.3 Interrupter and Alarm Circuit for prepay box trunks - SD-30852-01*

3.05 To automatically return the coin on all uncompleted calls and on completed calls on which there is no charge.

4.4 Coin box trunk release circuit - SD-31861-01.

3.06 To automatically collect the coin on completed calls to stations on which a charge is to be made.

4.5 Pulse Repeating Test Set - SD-31667-01.

3.07 To automatically collect the coin on completed calls to an operator unless the operator otherwise disposes of the coin before disconnecting.

4.6 Interrupter and Alarm Circuit arranged to provide a delay interval - SD-31494-01.

*Typical Circuits.

3.08 To automatically busy the associated line finder when a ground is connected to the sleeve of the associated first selector.

DESCRIPTION OF OPERATION

5. ORIGINATING A CALL ("S" WIRING)

3.09 To cut out the coin test and pulse repeating features when the calling station line is equipped with a long line circuit.

When a prepayment coin station is connected to this circuit by a line finder, (L) operates over the subscriber's loop in turn operating (N) and (DD). (N) operated operates (NN). (NN) operated closes the circuit to the associated first selector, provides a holding circuit for (DD), removes the short circuit from the 6,000 ohms in series with the primary winding of (L) and changes from battery to the ring through the non-inductive winding of the (RT) to battery through the operating winding of the (RT), and

3.10 To provide means for making trunk operation and pulse repeating tests.

3.11 To provide means for indicating a trunk that has failed to dispose of a coin.

(with "L" wiring) the primary winding of (BT). (DD) operated, connects ground to the sleeve lead to hold the line finder and (with "Z" wiring and apparatus) closes in part the circuit for dial tone to the calling subscriber. When "X" wiring is provided the ground is connected to the sleeve through the (CL) retard coil to permit a number checking tone which may be connected to the sleeve of the subscriber's line to be transmitted over the sleeve lead through condenser (C) to a selector level trunk to indicate to the operator the class of service. The (B) and (C) resistances are used to prevent a transient current flow through the (B) condenser from operating (RT) falsely when the (C) retard coil is connected across the tip and ring by the operation of (NN), and dial tone is received from the selector. When "Z" wiring and apparatus are omitted, the dial tone path is not closed to the calling subscriber until the coin is deposited, as described in Paragraph 6 below.

6. COIN DEPOSITED

6.1 ("K" and "S" Wiring)

When the coin is deposited by the calling subscriber (RT) operates which operates (S). (S) operated, short-circuits (L), releasing it, locks to battery through its front contact, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted) connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operates, in turn closing a path for holding the first selector when (NN) releases and also operating (D). (D) operated, holds (DD) operated. (H) operated, takes over the control of (HH) from (S). The (HH) operated releases (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (L) released, releases (N). (NN) released short-circuits the (C) resistance ("Z" wiring only). (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

6.2 ("L" and "S" Wiring and Apparatus)

When the coin is deposited by the calling subscriber, (RT) operates which operates (S). (S) operated, locks to battery through its front contacts, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted), connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operated closes a path for holding the

first selector when (NN) releases and operates (D). (D) operated holds (DD) operated. (H) operated, takes over the control of the (HH) from (S). (HH) operated, releases (N) and (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (NN) released ("Z" wiring only), short-circuits the (C) resistance. (N) released short-circuits (L) releasing it. (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

The purpose of (BT) is to block the operation of the coin trunk in case of an irregular condition on the line. (BT) operated locks to the sleeve, opens the circuit to (S) preventing its operation and removes battery from the line by connecting direct ground on the ring, releasing (L). (L) released releases (N) and in turn (NN). (NN) released releases (DD) and opens the bridge towards the selector, which removes ground from the sleeve, releasing (BT) and (RT) and restores the circuit to normal.

7. DIALING ("S" WIRING)

(R) repeats pulses from the subscriber's dial to the first selector. (D) is slow in operating and releases on the first dial pulse, and remains released during the pulsing of each digit. This releases (DD) which connects the (F) and (D) resistances to the tip and ring and shorts the (C) retard coil to aid pulsing.

8. CALL CHARGED

8.1 No Delay Interval

If the call is one on which a charge should be made, the line current is reversed, operating (P) and releasing (Pl) which was previously operated. With (Pl) released and (P) operated, (J) and (C) operate and lock. (J) operates (K), short-circuits (P) which releases, and reverses the tip and ring leads from the first selector which causes (Pl) to operate. (K) operates (Kl) through the back contact of (P). (Kl) operated locks and removes the short circuit from (P). (C) operated locks and operates (A) and also sets the circuit so as to collect the coin when the calling subscriber disconnects, or transfers this function to relay (Tl) Fig. 2. (A) operated disconnects the tip and ring of the calling line from the (T) retard coil and the (R) relay, releasing (R), and connects the tip and ring through (P) and (Pl) to the first selector. (R) released releases (D) and (DD). (DD) released performs no useful function at this time. The reversal of the line by

the operation of (J) is necessary to keep (P) always connected to the ground side of the connection.

8.2 With Delayed Charging, Fig. 2

With Fig. 2 the operation is as described in par. 8.1 except that the operation of (C), instead of connecting positive coin battery to relay I connects that relay to T1, and the relays of Fig. 2 function as follows.

When the called subscriber answers (P2) operates, in turn closing the circuit of (T) to lead PKU. This lead is grounded for 1/2 second once every 3 seconds, (except that when the interrupter circuit is not in use, lead PKU is grounded,) when (T) operates, it grounds lead "ST" to start the interrupter or to keep it operating. (T) locks to (P2) thru (T1), 2 seconds after lead PKU is opened, ground is connected to lead INT, operating (T1). (T1) operated locks to off normal ground, releases (T), and connects positive coin battery to relay (I) instead of negative. If (P2) releases before (T) operates, (T1) is released and the above sequence of operations will be repeated when (P2) again operates. Fig. 2 thus insures against false charging when busy flashes or other transient conditions operate (P2).

9. CALL NOT CHARGED ("S")

If the call is one on which no charge is to be made, the line current is not reversed. (P), (K) and (K1) will, therefore, not operate and the circuit remains in a condition to return the coin when the calling party disconnects. On this type of call, (A) does not operate and the (A) and (B) condensers in the tip and ring leads provide the transmission circuit.

10. DISCONNECT

10.1 Call Charged ((C) Relay Operated) ("S" or "T" Wiring)

When the calling subscriber disconnect, the line finder is still held by ground at the contacts of the (HH). (S) releases when ground is removed from the selector sleeve and causes (Y) to operate under control of a ground interruption on lead "P" of the coin control alarm circuit, and lighting the green alarm lamp (A). The coin control alarm circuit is arranged so that ground is intermittently and alternately connected to leads "P" and "I" for an interval of 1/2 second duration. This feature is used to cause the coin control battery of this circuit, as described later, to be connected to the subscriber's line for 1/2 second duration and thereby insure sufficient time for proper operation

of the coin box magnet. (Y) operated locks under control of (HH) and connects battery to the winding of (B). (B) operates when ground is received on the "I" lead. If the called subscriber should hang up before the calling subscriber, the line current is reversed when the called station disconnects, operating (P) and (P1) releases. (P) operated and (P1) released short-circuits the winding of (J) causing it to release. (J) releases (K) and short-circuits (P). (P) and (K) released release (K1). (J) released places the (P) relay again on the ground side of the line. If the calling party disconnects first, (J), (K) and (K1) and with Fig. 2, (T1) release when ground is removed by the release of (HH).

10.2 Non-Charge Call ((C) Relay Normal) ("S" Wiring).

When the calling station disconnects (R) releases, releasing (D) and (DD), and opens the loop to the succeeding switches. After an interval, ground is removed from the sleeve of the selector. From this point on, the circuit functions as described in the preceding paragraph, except that (J), (K) and (K1) will not be operated.

11. COIN CONTROL ("S" OR "T" WIRING)

The operation of (B) connects 110 volts positive or negative battery to the line to dispose of the coin. If the coin is to be collected, 110 volts positive battery is connected to the winding of (I) through the front contact of relay (C) and, with Fig. 2, the front contact of (T1). If the coin is to be returned, the 110 volt negative battery is connected to the line through the front contact of (B) and the back contact of (C), thru the winding of (I). (I) operates in series with the coin magnet and remains operated during the time that the battery is connected to the line. The operation of (I) connects battery to hold (H) operated since the operating circuit for this relay is opened when (B) operates. When the "I" lead ground is removed (B) releases, removing the coin collect or return current, releasing (I) and holding (H) operated. At the next closure of ground to the "I" lead (B) reoperates connecting coin disposal current to the line. The coin should have been disposed of on the first application of the potential which upon the removal of the potential restores the coin magnet to normal and no current should flow through (I) on the subsequent application of the coin potential. With (B) operated and (I) normal, (H) releases in turn releasing (HH). (HH) released, removes ground from the sleeve of the line finder, which releases and also restores the circuit to normal.

12. STUCK COIN

12.1 "BB" and "S" or "T" Wiring

If the coin is not disposed of, (I) will reoperate each time coin potential is applied to the line and will hold (H) each time (B) operates thereby preventing the release of (HH). This will hold the trunk to the line. After an interval the battery thru the (A) lamp over the "A" lead will bring in an alarm.

12.2 "BA" and "S" or "T" Wiring

Battery for holding (H) operated under control of (I) is obtained from the "IB" lead in the associated "Coin Box Trunk Release Circuit." Continued attempts of the coin trunk circuit to dispose of the coin are limited by the timing of the Release Circuit. At the end of the time period, battery is removed from the "IB" lead and the circuit functions as though the coin had been disposed of, restoring to normal as described in Paragraph 11.

13. CALLS TO SPECIAL SERVICE OPERATOR ("S" WIRING)

On calls to a special operator, the selector level trunk is so arranged that the battery and ground are reversed immediately when the operator answers. This causes (P) to operate and (Pl) to release, operating (J) and (C). (J) locks, operates (K), short-circuits (P), which releases and reverses the line leads which causes (Pl) to operate. (K) operates (K1) after (P) releases. (K1) operated locks and removes the short circuit from (P). If coin collect current is supplied to the line from the trunk, (P) remains released and (Pl) releases. If coin return current is applied to the line from the trunk, (P) operates and (Pl) remains operated. The function of (Pl) is to make the operation of (P) ineffective at this time, thereby preventing a buzzer action between (J), (K) and (K1) which might result in acoustic shocks due to the momentary short-circuits of the tip and ring at the (J) contacts. On a ringing by the special service operator, (P) may operate on ringing current. If (P) remains operated due to earth potential with (Pl) released, it shunts down (J). (J) releases (K) and short-circuits (P). (P) releases and shunts down (K1). (K1) in this case prevents a buzzer action between (J), (K) and (K1), (Pl) being released under this condition. The earth potential which may have held (P), will not operate it after the short-circuit is removed. When Fig. 2 is provided, relays (P2) (T) and (T1) function as described in Paragraph 8.2.

14. TEST JACKS

14.1 (T) Jack

If a plug is inserted into the (T) jack of the trunk ground will be connected to the "S" lead to the line finder by the operation of the test jack spring.

14.2 (TT) Jack - "W" Wiring and "A" or "B" Wiring and Apparatus

The (TT) jack in conjunction with the (T) jack provides means for applying pulse repeating requirements to the (R) relay. By connecting a source of pulses to the (T) jack and a per cent break meter to the (TT) jack the output of the (R) can be read on the per cent break meter. When "A" apparatus is used ground must be connected to the "S" lead from the selector in order to hold relays in this circuit while testing. With "B" apparatus inserting a plug into the (TT) jack connects ground to the "S" lead. Momentary operation of the "SC" key in all but the earliest pulse repeating test sets operates the (RT) relay, in turn operating relay (S). Where the pulse repeating test set is not so arranged the (RT) relay must be momentarily operated manually.

15. FIRST SELECTOR MADE BUSY

When the first selector associated with this circuit is made busy by connecting ground to the sleeve lead, this ground is extended through the back contacts of (HH) to the sleeve of the line finder circuit. This causes a relay in the line finder to busy the circuit so that it will not then be used on an incoming call.

16. CONTACT PROTECTION

Resistances (D) and (F) at the (DD) relay are connected to the (A) and (B) condensers during the application of coin battery to the line and in this connection are used to protect the contacts which control the application of this battery to the coin magnet. Condenser "D" and "E" resistance are used to protect the pulsing contacts of the (R) relay.

17. OPERATION WHEN "T" WIRING IS USED

The "T" wiring is used only when a part of the lines in the associated line finder group are equipped with long line circuits. The line finders are then equipped with normal post springs that operate on the multiple bank levels on which all the working lines are provided with long line circuits. When the normal post springs on the line finder operate

leads "E" and "F", which are connected together when the finder is normal for the purpose of making the finder busy when the sleeve of the associated first selector is grounded, are opened and lead "F" is connected to lead "A". When a call is originated the long line circuit closes a bridge across the tip and ring which operates (L). (L) operates (N) and (DD). (N) operates (NN). (NN) closes a bridge across the tip and ring toward the first selector. The only useful function of (DD) at this time is that it grounds the sleeve so as to hold the line finder until (HH) operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the "S" lead. When ground is returned over the "S" lead from the first selector (A) and (S) operate, ((A) operating over the "A" and "F" leads). The operation of (A) closes the tip and ring through from the long line circuit to the first selector and allows (L), (N), (NN) and (DD) to release. The operation of (S) operates (H) and (HH) which locks to the sleeve. The test for the presence of the coin at the substation is made in the long line circuit and therefore (RT) and (BT) do not enter

into the circuit operation on this call, similarly, the dial pulses are repeated in the long line circuit so that (R) is not used. When the call is answered (P) operates and circuit functions as described in paragraph 8 except that (A) has been operated by the NP springs instead of by (C). However the only useful function in the operation of (P) and release of (Pl) is to operate (C) which locks to the sleeve and sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects the circuit functions as described under paragraph 10.1. If the call is answered (C) is operated causing coin collect current to be applied to the line and if the call is not answered (C) is normal and coin return current is then applied to the line. On calls to the special service operator (P) operates and (Pl) releases which operates (C) and sets the circuit in a position to collect the coin when the subscriber disconnects. The operation of (J), (K) and (Kl) serves no useful function on this type of call because the repeating coil in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3310-OCH-RLL-BY

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES

CHANGES

B. CHANGES IN APPARATUS

B.1 Superseded

Superseded By

Option U
54C retard coil
54K retard coil

Option J
274C retard coil
274K retard coil

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Options U and J are added to the options used table and to ckt. note 110.

D.2 Cross connection change is made in fig. K.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-MHK-FJS-SI

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES

CHANGES

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

C.1 A non-operate requirement was added for relay (S) and the operate requirement was changed from test .047, readjust .033 to test .041, readjust .039.

C.2 The method of showing pulse repeating requirements for relay (R) was changed to separate the pulse repeating requirements from the current flow requirements used with pulse repeating requirements. "Block (S) operated" was added as preparation for pulse repeating requirements.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The above change in the (S) relay requirements was made to facilitate meeting the operate test of the (BT)

relay, by slowing the operation of the (S) relay, and thus giving (BT) more time to operate before its circuit is opened at 4T(S). This occurred because (BT) and (RT) operate in series, (RT) in turn operating (S).

D.2 Lead "A" is added to the common number and class circuit to provide for the use of this circuit in offices arranged for automatic ticketing.

D.3 Reference to "S" and "T" options, first shown on Issue 8D, is included in note 110.

D.4 The rating of this drawing is changed from AT&TCO. STANDARD to MFR. DISC. and the replacement note "Replaced by SD-31592-02 is added.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-OCH-FJS-XB

STEP-BY-STEP SYSTEMS
NO. 1 OR 350A
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES

CHANGES

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

- C.1 Test clip data for relay (R) formerly was conn. lat. and
grd. to "TST. JKS. (T) and (TT)" and test note 5 page 2
was not shown.
- C.2 Test clip data for relay (A), "R" apparatus, was changed
from conn. lat. to "RT (A)" to conn. grd. to "RT (A)".

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 "M" wiring replaces "N" wiring to show the battery con-
nection to the winding of relay (A) through normal contacts
of relay (Y) instead of direct.

All other headings, "No change".

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3350

PWW) IK
RSW)

STEP-BY-STEP SYSTEM
 NO. 1 OR 350A
 COIN BOX TRUNK CIRCUIT
 FOR USE PRECEDING A FIRST SELECTOR
 SERVING PREPAYMENT COIN LINES

CHANGES

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

- C.1 (I) relay. The adjustment formerly shown has been designated for use with "S" wiring and a new adjustment for use with "T" wiring has been added. Test Note 5 referring thereto has been added.

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 Circuit Note 113 has been revised to include reference to Test Note 5, Page 1.
 D.2 The working limits table has been revised.
 D.3 Reference to Note 113 has been added at the (I) relay.

2. WORKING LIMITS

- 2.1 The working limits have been revised to refer to the "Range Chart".

- 2.2 Working Limits:

Pulsing, Supervision
 and Coin Control

Max. Ext. Ckt. Loop
 Min. Ins. Res.
 Earth Potential

See Range Chart
 20000 ω
 See Range Chart

Supervision
 (P) Relay

206N		239GU	
Min. Conduc. Loop	Max. E.P.	Min. Conduc. Loop	Max. E.P.
0 ω	+7.5V	0 ω	+9.5V
105 ω	+8.0V	105 ω	+10.0V
240 ω	+8.5V	220 ω	+10.5V

Supervision (P) Relay	206N Min. Conduc. Loop	Max. E.P.	239GU Min. Conduc. Loop	Max. E.P.
	370 ω	+9.0V	320 ω	+11.0V
	500 ω	+9.5V	425 ω	+11.5V
	0 ω	-10.0V	530 ω	+12.0V
			0 ω	-10V

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3350

JGW)
RSW) JD

Neg. Limit	206N Relay (P)		239GU Relay (P)	
	Maximum 10 V		Maximum 10 V	
	Min. Conduc. Lp.	Max. Pos. E. P.	Min. Conduc. Lp.	Max. Pos. E. P.
Positive Limits	0 Ohms	7.5 V	0 Ohms	9.5 V
	105 "	8 "	105 "	10 "
	240 "	8.5 "	220 "	10.5 "
	370 "	9 "	320 "	11 "
	500 "	9.5 "	425 "	11.5 "
			530 "	12 "

2.3 Minimum insulation resistance - 20,000 ohms.

3. FUNCTIONS

- 3.01 To provide for connecting a prepayment coin station to a first selector.
- 3.02 To provide for transmitting dial tone from the selector circuit to the calling subscriber.
- 3.03 To test for the presence of a coin in the coin box.
- 3.04 To repeat dial pulses after the coin is deposited.
- 3.05 To automatically return the coin on all uncompleted calls and on completed calls on which there is no charge.
- 3.06 To automatically collect the coin on completed calls to stations on which a charge is to be made.
- 3.07 To automatically collect the coin on completed calls to the special service operator unless the operator otherwise disposes of the coin before disconnecting.
- 3.08 To automatically busy the associated line finder when a ground is connected to the sleeve of the associated first selector.
- 3.09 To cut out the coin test and pulse repeating features when the calling station line is equipped with a long line circuit.
- 3.10 To provide means for making trunk operation and pulse repeating tests.
- 3.11 To provide means for indicating a trunk that has failed to dispose of a coin.

4. CONNECTING CIRCUITS

- 4.1 Line Finder circuit.
- 4.2 Selector circuit.
- 4.3 Alarm circuit for coin box trunks.
- 4.4 Coin box trunk release circuit.
- 4.5 Pulsing Test set.

DESCRIPTION OF OPERATION

5. ORIGINATING A CALL ("S" WIRING)

When a prepayment coin station is connected to this circuit by a line finder, (L) operates over the subscriber's loop in turn operating (N) and (DD). (N) operated operates (NN). (NN) operated closes the circuit to the associated first selector, provides a holding circuit for (DD), removes the short circuit from the 6,000 ohms in series with the primary winding of (L) and changes from battery to the ring through the noninductive winding of the (RT) to battery through the operating winding of the (RT), and (with "L" wiring) the primary winding of (BT). (DD) operated, connects ground to the sleeve lead to hold the line finder and (with "Z" wiring and apparatus) closes in part the circuit for dial tone to the calling subscriber. When "X" wiring is provided the ground is connected to the sleeve through the (CL) retard coil to permit a number checking tone which may be connected to the sleeve of the subscriber's line to be transmitted over the sleeve lead through condenser (C) to a selector level trunk to indicate to the operator the class of service. The (B) and (C) resistances are used to prevent a transient current flow through the (B) condenser from operating (RT) falsely. When the (C) retard coil is connected across the tip and ring by the operation of (NN), and dial tone is received from the selector. When "Z" wiring and apparatus are omitted, the dial tone path is not closed to the calling subscriber until the coin is deposited, as described in Paragraph 6 below.

6. COIN DEPOSITED

6.1 ("K" and "S" Wiring)

When the coin is deposited by the calling subscriber (RT) operates which operates (S). (S) operated, short-circuits (L), releasing it, locks to battery through its front contact, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted) connects (R) to the ring of the line and removes battery from (RT) which releases.

(R) operates, in turn closing a path for holding the first selector when (NN) releases and also operating (D). (D) operated, holds (DD) operated. (H) operated, takes over the control of (HH) from (S). The (HH) operated releases (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (L) released, releases (N). (NN) released short-circuits the (C) resistance ("L" wiring only). (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

6.2 ("L" and "S" Wiring and Apparatus)

When the coin is deposited by the calling subscriber, (RT) operates which operates (S). (S) operated, locks to battery through its front contacts, operates (H) and (HH), short-circuits the (B) resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted), connects (R) to the ring of the line and removes battery from (RT) which releases. (R) operated closes a path for holding the first selector when (NN) releases and operates (D). (D) operated holds (DD) operated. (H) operated, takes over the control of the (HH) from (S). (HH) operated, releases (N) and (NN), separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from (DD) to the line finder. (NN) released ("Z" wiring only), short-circuits the (C) resistance. (N) released short-circuits (L) releasing it. (N) and (NN) are slow in releasing in order to insure that (R) is fully operated before (NN) releases and opens the bridge to the first selector in case (L) releases when the coin is deposited.

The purpose of (BT) is to block the operation of the coin trunk in case of an irregular condition on the line. (BT) operated locks to the sleeve, opens the circuit to (S) preventing its operation and removes battery from the line by connecting direct ground on the ring, releasing (L). (L) released releases (N) and in turn (NN). (NN) released releases (DD) and opens the bridge towards the selector, which removes ground from the sleeve, releasing (BT) and (RT) and restores the circuit to normal.

7. DIALING ("S" WIRING)

(R) repeats pulses from the subscriber's dial to the first selector. (D) is slow in operating and releases on the first dial pulse, and remains released during the pulsing of each digit. This releases (DD) which connects the (D) and (F) resistances to the tip and ring and shorts the (C) retard coil to aid pulsing.

8. CALL CHARGED

If the call is one on which a charge could be made, the line current is reversed, operating (P) and releasing (Pl) which was previously operated. With (Pl) released and (P) operated, (J) and (C) operate and lock. (J) operates (K), short-circuits (P) which releases and reverses the tip and ring leads from the first selector which causes (Pl) to operate. (K) operates (Kl) through the back contact of (P). (Kl) operated locks and removes the short circuit from (P). (C) operated locks and operates (A) and also sets the circuit so as to collect the coin when the calling subscriber disconnects. (A) operated disconnects the tip and ring of the calling line from the (T) retard coil, (R) relay releasing (R), and connects the tip and ring through (P) and (Pl) to the first selector. (R) released releases (D) and (DD). (DD) released performs no useful function at this time. The reversal of the line by the operation of (J) is necessary to keep (P) always connected to the ground side of the connection.

9. CALL NOT CHARGED ("S")

If the call is one on which no charge is to be made, the line current is not reversed. (P), (K) and (Kl) will, therefore, not operate and the circuit remains in a condition to return the coin when the calling party disconnects. On this type of call, (A) does not operate and the (A) and (B) condensers in the tip and ring leads provide the transmission circuit.

10. DISCONNECT

10.1 Call Charged ((C) Relay Operated) ("S" or "T" Wiring)

When the calling subscriber disconnects, the line finder is still held by ground at the contacts of the (HH). (S) releases when ground is removed from the selector sleeve and causes (Y) to operate under control of a ground interruption on lead "P" of the coin control alarm circuit, and lighting the green alarm lamp (A). The coin control alarm circuit is arranged so that ground is intermittently and alternately connected to leads "P" and "I" for an interval of 1/2 second duration. This feature is used to cause the coin control battery of this circuit, as described later, to be connected to the subscriber's line for 1/2 second duration and thereby insure sufficient time for proper operation of the coin box magnet. (Y) operated locks under control of (HH) and connects battery to the winding of (B). (B) operates when ground is received on the "I" lead. If the called subscriber should hang up before the calling subscriber, the line current is reversed when the called station disconnects, operating (P) and the (Pl) releases. (P) operated and (Pl) released short-circuits the winding of (Jl) causing it to release. (J) releases (K) and short-circuits (Pl). (P) and

(K) released releases (K1). (J) released places the (R) relay again on the ground side of the line. If the calling party disconnects first, (J), (K) and (K1) release when ground is removed from the selector sleeve.

10.2 Non-Charge Call ((C) Relay Normal) ("S" Wiring).

When the calling station disconnects (R) releases, releasing (D) and (DD), and opens the loop to the succeeding switches. After an interval, ground is removed from the sleeve of the selector. From this point on, the circuit functions as described in the preceding paragraph, except that (J), (K) and (K1) will not be operated.

11. COIN CONTROL ("S" OR "T" WIRING)

The operation of (B) connects 110 volts positive or negative battery to the line to dispose of the coin. If the coin is to be collected, 110 volts positive battery is connected to the winding of (I) through the front contact of relay (C). If the coin is to be returned, the 110 volt negative battery is connected to the line through the front contact of (B) and the back contact of (C), through the winding of (I). (I) operates in series with the coin magnet and remains operated during the time that the battery is connected to the line. The operation of (I) connects battery to hold (H) operated since the operating circuit for this relay is opened when (B) operates. When the "I" lead ground is removed (B) releases, removing the coin collect or return current, releasing (I) and holding (H) operated. At the next closure of ground to the "I" lead (B) reoperates connecting coin disposal current to the line. The coin should have been disposed of on the first application of the potential which upon the removal of the potential restores the coin magnet to normal and no current should flow through (I) on the subsequent application of the coin potential. With (B) operated and (I) normal, (H) releases, in turn releasing (HH). (HH) released, removes ground from the sleeve of the line finder, which releases and also restores the circuit to normal.

12. STUCK COIN

12.1 "BB" and "S" OR "T" Wiring

If the coin is not disposed of, (I) will reoperate each time coin potential is applied to the line and will hold (H) each time (B) operates thereby preventing the release of (HH). This will hold the trunk to the line. After an interval the battery thru the (A) lamp over the "A" lead will bring in an alarm.

12.2 "BA" and "S" or "T" Wiring

Battery for holding (H) operated under control of (I) is obtained from the "IB" lead in the associated "Coin Box Trunk Release Circuit." Continued attempts of the "Coin Box Trunk Release Circuit" to dispose of the coin are limited by the timing of the Release Circuit. At the end of the time period, battery is removed from the "IB" lead and the circuit functions as though the coin had been disposed, restoring to normal as described in Paragraph 11.

13. CALLS TO SPECIAL SERVICE OPERATOR ("S" WIRING)

On calls to a special operator, the selector level trunk is so arranged that the battery and ground are reversed immediately when the operator answers. This causes (P) to operate and (Pl) to release, operating (J) and (C). (J) locks, operates (K), short-circuits (P), which releases and reverses the line leads which causes (Pl) to operate. (K) operates (Kl) after (P) releases. (Kl) operated locks and removes the short circuit from (P). If coin collect current is supplied to the line from the trunk, (P) remains released and (Pl) releases. If coin return current is applied to the line from the trunk, (P) operates and (Pl) remains operated. The function of (Pl) is to make the operation of (P) ineffective at this time, thereby preventing a buzzer action between (J), (K) and (Kl) which might result in acoustic shocks due to the momentary short-circuits of the tip and ring at the (J) contacts. On a rering by the special service operator, (P) may operate on ringing current. If (P) remains operated due to earth potential with (Pl) released, it shunts down (J). (J) releases (K) and short-circuits (P). (P) releases and shunts down (Kl). (Kl) in this case prevents a buzzer action between (J), (K) and (Kl), (Pl) being released under this condition. The earth potential which may have held the (P), will not operate it after the short-circuit is removed.

14. TEST JACKS

14.1 (T) Jack

If a plug is inserted into the (T) jack of the trunk ground will be connected to the "S" lead to the line finder by the operation of the test jack spring.

14.2 (TT) Jack - "W" Wiring and "A" or "B" Wiring and Apparatus

The (TT) jack in conjunction with the (T) jack provides means for applying pulse repeating requirements to the (R) relay. By connecting a source of pulses to the (T) jack and a per cent break meter to the (TT) jack the output of the (R) can be read on the per cent break meter. When "A" apparatus is used ground must be connected to the "S" lead from the selector in order to hold relays in circuit.

while testing. With "B" apparatus inserting a plug into the (TF) jack connects ground to the "S" lead.

15. FIRST SELECTOR MADE BUSY

When the first selector associated with this circuit is made busy by connecting ground to the sleeve lead, this ground is extended through the back contacts of (HH) to the sleeve of the line finder circuit. This causes a relay in the line finder to busy the circuit so that it will not then be used on an incoming call.

16. CONTACT PROTECTION

Resistances (D) and (F) at the (DD) relay are connected to the (A) and (B) condensers during the application of coin battery to the line and in this connection are used to protect the contacts which control the application of this battery to the coin magnet. Condenser "D" and "E" resistance are used to protect the pulsing contacts of the (R) relay.

17. OPERATION WHEN "T" WIRING IS USED

The "T" wiring is used only when a part of the lines in the associated line finder group are equipped with long line circuits. The line finders are then equipped with normal post springs that operate on the multiple bank levels on which all the working lines are provided with long line circuits. When the normal post springs on the line finder operate leads "E" and "F", which are connected together when the finder is normal for the purpose of making the finder busy when the sleeve of the associated first selector is grounded, are opened and lead "F" is connected to lead "A". When a call is originated the long line circuit closes a bridge across the tip and ring which operates (L). (L) operates (N) and (DD). (N) operates (NN). (NN) closes a bridge across the tip and ring toward the first selector. The only useful function of (DD) at this time is that it grounds the sleeve so as to hold the line finder until (HH) operates. The bridge across the tip and ring causes the operation of relays in the first selector that supply a holding ground over the "S" lead. When ground is returned over the "S" lead from the first selector (A) and (S) operate (A) operating over the "A" and "F" leads). The operation of (A) closes the tip and ring through from the long line circuit to the first selector and allows (L), (N), (NN) and (DD) to release. The operation of (S) operates (H) and (HH) which locks to the sleeve. The test for the presence of the coin at the substation is made in the long line circuit and therefore (RT) and (BT) do not enter into the circuit operation on this call; similarly, the dial pulses are repeated in the long line circuit so that (R) is not used. When the call is answered (P) operates and circuit functions

as described in paragraph 8 except that the (A) has been operated by the NF springs instead of by the (C). However the only useful function in the operation of (P) and release of (Pl) is to operate (C) which locks to the sleeve and sets the circuit in a position to collect the coin when the subscriber disconnects. When the calling subscriber disconnects the circuit functions as described under paragraph 10.1. If the call is answered (C) is operated causing coin collect current to be applied to the line and if the call is not answered (C) is normal and coin return current is then applied to the line. On calls to the special service operator (P) operates and (Pl) releases which operates (C) and sets the circuit in a position to collect the coin when the subscriber disconnects. The operation of (J), (K) and (K1) serves no useful function on this type of call because the repeating coil in the long line circuit prevents the coin ground from grounding the tip conductor in this circuit.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

JGW) YF
RSW)

STEP-BY-STEP SYSTEM
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES

CHANGES

B. CHANGES IN APPARATUS

- B.1 The 8E resistance lamp has been rated "Manufacture Discontinued" replaced by the 12L lamp for additions and maintenance and by the 13L lamp for new circuits.

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 Circuit Note 110 is added to record the change in apparatus.

All other headings, No Change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

MCG)
RSW) TI

*This is an
old issue
JEE*

STEP-BY-STEP SYSTEM
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES

CHANGES

B. CHANGES IN APPARATUS

B.1	Superseded	Superseded By
	239B Jack (TT)	240 Type Jack (TT)

D. DESCRIPTION OF CIRCUIT CHANGES

- D.1 The change in types of jacks (TT) is made to provide improved maintenance by making it unnecessary to block relays operated during per cent break meter test.
- D.2 Circuit note 109 is added.
- D.3 The word "control" is changed to the word "box" in the designation of leads at bottom of sheet 1 and in Fig. K.

All other headings, No Change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

RLQ)
RSW) OW

STEP-BY-STEP SYSTEM
COIN BOX TRUNK CIRCUIT
FOR USE PRECEDING A FIRST SELECTOR
SERVING PREPAYMENT COIN LINES

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

R2010 Relay (BT)

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

C.1 Requirements are added for the (RT) relay to be used with
"L" wiring and the requirements formerly shown are design-
ated for use with "K" wiring.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 "L" wiring and apparatus are added replacing "K" wiring.

D.2 Circuit Note 107 and the references thereto are added.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

1.1 This circuit is used to provide dial service to prepayment
coin stations from a step-by-step central office. It is
arranged to automatically collect or return the coin de-
posited as required, after each call.

2. WORKING LIMITS

2.1 Maximum external circuit loop resistance for subscriber's
pulsing and supervision - 750 ohms.

2.2 Earth potential limits:

Neg. Limit	206N Relay (P)		239GU Relay (P)	
	Maximum 10 V		Maximum 10 V	
	Min. Conduc. Lp.	Max. Pos. E. P.	Min. Conduc. Lp.	Max. Pos. E. P.
Positive Limits	0 Ohms	7.5 V	0 Ohms	9.5 V
	105 "	8 "	105 "	10 "
	240 "	8.5 "	220 "	10.5 "
	370 "	9 "	320 "	11 "
	500 "	9.5 "	425 "	11.5 "
			530 "	12 "

2.3 Minimum insulation resistance - 20,000 ohms.

OPERATION

3. FUNCTIONS

- 3.1 To provide for connecting a pre-payment coin station to a first selector.
- 3.2 To provide for transmitting dial tone from the selector circuit to the calling subscriber.
- 3.3 To test for the presence of a coin in the coin box.
- 3.4 To repeat dial pulses after the coin is deposited.
- 3.5 To automatically return the coin on all uncompleted calls and on completed calls on which there is no charge.
- 3.6 To automatically collect the coin on completed calls to stations on which a charge is to be made.
- 3.7 To automatically collect the coin on completed calls to the special service operator unless the operator otherwise disposes of the coin before disconnecting.
- 3.8 To automatically busy the associated line finder when a ground is connected to the sleeve of the associated first selector.

4. CONNECTING CIRCUITS

- 4.1 Line Finder circuit.
- 4.2 Selector circuit.
- 4.3 Alarm circuit for coin box trunks.

5. ORIGINATING A CALL

When a pre-payment coin station is connected to this circuit by a line finder, relay (L) operates over the subscriber's loop in turn operating the (N) and (DD) relays. The (N) relay operated operates the (NN) relay. The (NN) relay operated closes the circuit to the associated first selector, provides a holding circuit for the (DD) relay, removes the short circuit from the 6,000 ohms in series with the primary winding of the (L) relay and changes from battery to the ring through the non-inductive winding of the (RT) relay to battery through the operating winding of the (RT) relay, and (with "L" wiring) the primary winding of the (BT) relay. The (DD) relay operated, connects ground to the sleeve lead to hold the line finder or line switch and (with "Z" wiring and apparatus) closes in part the circuit for dial tone to the calling subscriber. When "X" wiring is provided the ground is connected to the sleeve through the CL retardation coil to permit a number checking tone which may be connected to the sleeve of the subscriber's line to be transmitted over the sleeve lead through condenser (C) to a selector level trunk to indicate to the operator the class of service. The "B" and "C" resistances are used to prevent a transient current flow through the (B) condenser from operating the (RT) relay falsely. When the "C" retardation coil is connected across the tip and ring leads by the operation of the (NN) relay, the (A) relay in the first selector operates and an associated common shelf relay completes the dial tone path to the line through a winding of the (A) relay of the selector. When "Z" wiring and apparatus are omitted, the dial tone path is not closed to the calling subscriber until the coin is deposited, as described in Paragraph 6 below.

6. COIN DEPOSITED

6.1 ("K" Wiring)

When the coin is deposited by the calling subscriber the (RT) relay operates. The (RT) relay operated, operates the (S) relay. The (S) relay operated, short-circuits the (L) relay, releasing it, locks to battery through its front contact, operates the (H) and (HH) relays, short-circuits the "B" resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted) connects the (R) relay to the ring of the line and removes battery from the (RT) relay, which releases. The (R) relay operates, in turn closing a path for holding the (A) relay of the first selector when the (NN) relay releases and also operating the (D) relay. The (D) relay operated, holds the (DD) relay operated. The (H) relay operated, takes over the control of the (HH) relay from the (S) relay. The

(HH) relay operated releases the (NN) relay, separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from the (DD) relay to the line finder. The (L) relay released, releases the (N) relay. The (NN) relay released short-circuits the "C" resistance ("Z" wiring only). Relays (N) and (NN) are slow in releasing in order to insure that relay (R) is fully operated before relay (NN) releases and opens the bridge to the first selector in case the (L) relay releases when the coin is deposited.

6.2 ("L" Wiring and Apparatus)

When the coin is deposited by the calling subscriber, the (RT) relay operates. The (RT) relay operated, operates the (S) relay. The (S) relay operated, locks to battery through its front contacts, operates the (H) and (HH) relays, short-circuits the "B" resistance ("Z" wiring only), supplies dial tone to the calling subscriber ("Z" wiring omitted), connects the (R) relay to the ring of the line and removes battery from the (RT) relay which releases. The (R) relay operated closes a path for holding the (A) relay of the first selector when the (NN) relay releases and operates the (D) relay. The (D) relay operated holds the (DD) relay operated. The (H) relay operated, takes over the control of the (HH) relay from the (S) relay. The (HH) relay operated, releases the (N) and (NN) relays, separates the sleeves of the line finder and first selector and supplements the ground on the sleeve from the (DD) relay to the line finder. The (NN) relay released ("Z" wiring only), short-circuits the "C" resistance. The (N) relay released short-circuits the (L) relay releasing it. Relays (N) and (NN) are slow in releasing in order to insure that relay (R) is fully operated before relay (NN) releases and opens the bridge to the first selector in case the (L) relay releases when the coin is deposited.

The purpose of the (BT) relay is to block the operation of the coin trunk in case of an irregular condition on the line. The (BT) relay operated locks to the sleeve, opens the circuit to the (S) relay preventing its operation and removes battery from the line by connecting direct ground on the ring, releasing the (L) relay. The (L) relay released releases the (N) and in turn the (NN) relays. The (NN) relay released releases the (DD) relay and the (A) relay of the selector, which in turn releases the (B) relay of the selector, removing ground from the sleeve, releasing the (BT) and (RT) relays, restoring the circuit to normal.

7. DIALING

Relay (R) functions to repeat pulses from the subscriber's dial to the first selector. Relay (D) is slow in

operating and releases on the first dial pulse, and remains released during the pulsing of each digit. This causes the (DD) relay to remain normal during the pulsing of each digit to aid the pulsing condition.

8. CALL CHARGED

If the call is one on which a charge should be made, the line current is reversed, operating the (P) relay and releasing the (Pl) relay which was previously operated. With the (Pl) relay released and the (P) relay operated, the (J) and (C) relays operate and lock. The (J) relay operated operates the (K) relay, short-circuits the (P) relay which releases and reverses the tip and ring leads from the first selector which causes the (Pl) relay to operate. The (K) relay operated operates the (Kl) relay through the back contact of the (P) relay. The (Kl) relay operated locks and removes the short circuit from the (P) relay. The (C) relay operated locks and operates the (A) relay and also sets the circuit so as to collect the coin when the calling subscriber disconnects. The (A) relay operated disconnects the tip and ring of the calling line from the "T" retardation coil and (R) relay, releasing the (R) relay, and connects the tip and ring through the (P) and (Pl) relays to the first selector. The (R) relay released releases the (D) and in turn the (DD) relay. The (DD) relay released performs no useful function at this time. The reversal of the line by the operation of the (J) relay is necessary to keep the (P) relay always connected to the ground side of the connection.

9. CALL NOT CHARGED

If the call is one on which no charge is to be made, the line current is not reversed. Relays (P), (K) and (Kl) will, therefore, not operate and the circuit remains in a condition to return the coin when the calling party disconnects. On this type of call, relay (A) does not operate and the "A" and "B" condensers placed in the tip and ring leads provide the talking circuit.

10. DISCONNECT

10.1 Call Charged ((C) Relay Operated)

When the calling subscriber disconnects, the line finder is still held operated by ground at the contacts of the (HH) relay. Relay (S) releases when ground is removed from the selector sleeve and causes relay (Y) to operate under control of a ground interruption on lead (P) of the coin control alarm circuit, and lighting the green alarm lamp (A). The coin control alarm circuit is arranged so that ground is intermittently and alternately connected to leads "P" and "I" for an interval of 1/2 second duration. This feature is used to cause the coin

control battery of this circuit, as described later, to be connected to the subscriber's line for 1/2 second duration and thereby insure sufficient time for proper operation of the coin box magnet. The (Y) relay operated locks under control of the (HH) relay and connects battery to the winding of the (B) relay. The (B) relay operates when ground is received on the "I" lead. If the called subscriber should hang up before the calling subscriber, the line current is reversed when the called station disconnects, operating the (P) relay and the (Pl) relay releases. The (P) relay operated with the (Pl) relay released short-circuits the winding of the (Jl) relay causing it to release. The (J) relay released releases the (K) relay and short-circuits the (P) relay. The (P) relay and the (K) relay released releases the (Kl) relay. The (J) relay released places the (P) relay again on the ground side of the line. If the calling party disconnects first, the (J), (K) and (Kl) relays release when ground is removed from the selector sleeve.

10.2 Non-Charge Call ((C) Relay Normal)

When the calling station disconnects the (R) relay releases, releasing the (D) and (DD) relays, and opens the loop to the succeeding switches. After an interval, ground is removed from the sleeve of the selector. From this point on, the circuit functions as described in the preceding paragraph, except that the (J), (K) and (Kl) relays will not be operated.

11. COIN CONTROL

The operation of the (B) relay connects 110 volts positive or negative battery to the line to dispose of the coin. If the coin is to be collected, 110 volts positive battery is connected to the winding of relay (I) through the front contact of relay (C). If the coin is to be returned, the 110 volt negative battery is connected to the line through the front contact of relay (B) and the back contact of relay (C), through the winding of relay (I). The (I) relay now operates in series with the coin magnet and remains operated during the time that the battery is connected to the line. The operation of relay (I) connects battery to hold relay (H) operated since the operating circuit for this relay is opened when the (B) relay operates. When the (I) lead ground is removed the (B) relay releases, removing the coin collect or return current, releasing the (I) relay and holding the (H) relay operated. At the next closure of ground to the "I" lead the (B) relay reoperates connecting coin disposal current to the line. The coin should have been disposed of on the first application of the potential which upon the removal of the potential restores the coin magnet to normal and no current should flow through the (I) relay on the subsequent application of the coin potential.

With the (B) relay operated and the (I) relay normal, the (H) relay releases, in turn releasing the (HH) relay. The (HH) relay released, removes ground from the sleeve of the line finder, which releases and also restores the circuit to normal.

12. STUCK COIN

If, for any reason the coin is not properly disposed of, relay (B) continues to function under control of the "I" lead ground. After an interval of time, the associated alarm circuit will indicate a trouble condition by audible and visual alarms.

13. CALLS TO SPECIAL SERVICE OPERATOR

On calls to a special operator, the selector level trunk is so arranged that the battery and ground are reversed immediately when the operator answers. This causes relay (P) to operate and (Pl) to release, operating relays (J) and (C). The (J) relay operated locks, operates the (K) relay, short-circuits the (P) relay, which releases and reverses the line leads which causes the (Pl) relay to operate. The (K) relay operated operates the (Kl) relay after the (P) relay releases. The (Kl) relay operated locks and removes the short circuit from the (P) relay. If coin collect current is supplied to the line from the trunk, the (P) relay remains released and the (Pl) relay releases. If coin return current is applied to the line from the trunk, the (P) relay operates and the (Pl) relay remains operated. The function of the (Pl) relay is to make the operation of the (P) relay ineffective at this time, thereby preventing a buzzer action between the (J), (K) and (Kl) relays which might result in acoustic shocks due to the momentary short circuits of the tip and ring at the (J) relay contacts. On a rering by the special service operator, the (P) relay may operate on ringing current, if the (P) relay remains operated due to earth potential with the (Pl) relay released, it shunts down the (J) relay. The (J) relay released releases the (K) relay and short-circuits the (P) relay. The (P) relay releases and shunts down the (Kl) relay. The (Kl) relay in this case prevents the buzzer action between the (J), (K) and (Kl) relays, the (Pl) relay being released under this condition. The earth potential which may have held the (P) relay, will not operate it after the short circuit is removed.

14. TEST PLUG INSERTED IN TEST JACK

If a test plug is inserted into the test jack of an idle trunk or into the test jack of the trunk on which a call is in progress, ground will be maintained on the "S" lead to the line finder by the operation of the test jack spring.

15. FIRST SELECTOR MADE BUSY

When the first selector associated with this circuit is made busy by connecting ground to the sleeve lead, this ground is extended through the back contacts of the (HH) relay to the sleeve of the line finder circuit. This causes a relay in the line finder to busy this circuit so that it will not then be used on an incoming call.

16. CONTACT PROTECTION

Resistances 18AE and 19BF at the (DD) relay are connected to the "A" and "B" condensers during the application of coin battery to the line and in this connection are used to protect the contacts which control the application of this battery to the coin magnet. Condenser "D" and 19HE resistance are used to protect the pulsing contacts of the (R) relay.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 332

MCG) HC
WLF)