

SWITCHING SYSTEM NO. 307
4-WIRE CO LINE CIRCUIT UNIT
DESCRIPTION

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B. Voice Station	3	1.01 This is one of a series of sections describing the station control equipment associated with the No. 307 Switching System. This section describes the function and operation of the J53037A 4-wire CO line circuit (SD-69506-01).	
C. High Speed Send/Receive Station	5	1.02 This section is reissued to include facsimile and alarm circuit information. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.	
D. 100-WPM Teletype Station	6	1.03 The No. 307 Switching System (Fig. 1) is a communications control system designed for installation on a customer's premise. The system performs such functions as switching voice or data locally or intercity over switched networks. The switching functions may be initiated either manually or automatically, depending upon the application.	
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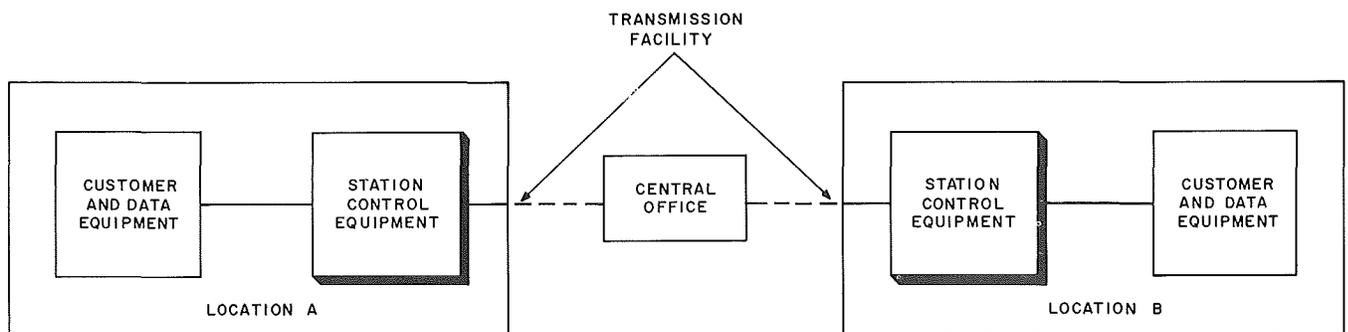


Fig. 1—No. 307 Switching System

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1.04 A block diagram of the station control equipment is shown in Fig. 2. The function of this equipment is to provide the station switching and control required to originate outgoing calls to a 4-wire central office and to complete incoming calls from the central office.

1.05 The 2626A1 telephone set allows a station attendant to establish voice contact with attendants at other station locations and to initiate data transmission between stations. The transfer circuit provides the switching required to transfer a communication path to customer and data equipment. The dual access switch provides a means of completing a connection to one of two central offices or to another dual access switch. The sequence circuit provides automatic control of the synchronization required between 205C2 data sets. The alarm circuits detect the failure of the following: dc power (open fuses), ringing power supply, 205C2 data set carrier signal, 205C2 data set ready signal, and 110V ac power supply. When an alarm is detected, the alarm circuits provide signals to the 2626A1 telephone set.

1.06 The line circuit provides:

- (a) Termination of a 4-wire central office line
- (b) A transmission path from a 4-wire telephone set to the 4-wire central office line
- (c) 1C pads to adjust the level of signals
- (d) Impedance matching of the telephone set receiver to the line
- (e) Means for working with a line transfer circuit and providing transfer of the line to data equipment
- (f) Idle circuit terminating resistors for the transmission pairs
- (g) Transmission test jacks
- (h) A sidetone network to provide sidetone for the 4-wire telephone set
- (i) Hold
- (j) Means for connecting the line to low-speed teletype equipment in place of the 4-wire telephone set
- (k) A talk battery relay to supply talking battery to the telephone set and to repeat dial pulses to the central office on an M lead

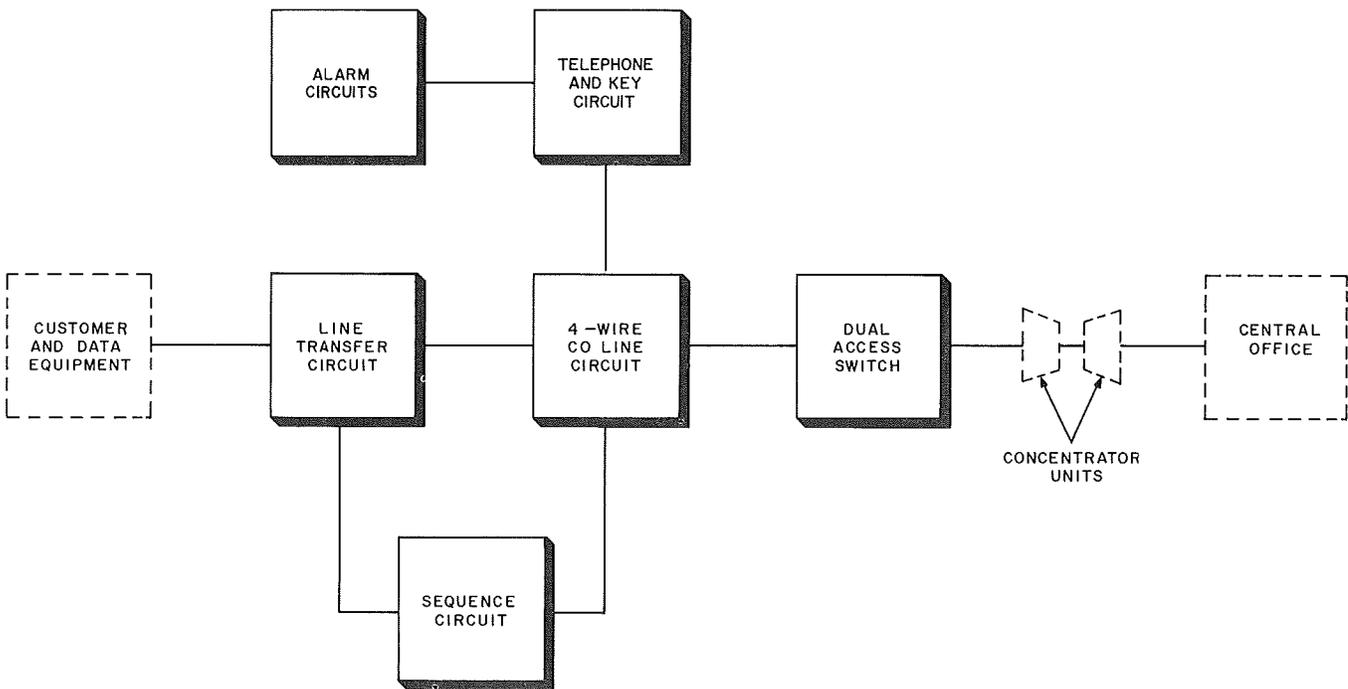


Fig. 2—Station Control Equipment

- (l) E and M lead supervision
- (m) Loop back of the transmission pairs
- (n) Visual and audible signals to the telephone set
- (o) Optional pickup relays to provide multiple line appearances
- (p) An optional high-precedence preempt circuit
- (q) An interrupter for providing proper interruption of the visual and audible signals
- (r) A -48 volt power supply
- (s) Regulating diodes for providing ± 6 volts needed on control leads
- (t) Indication to alarm circuits for failure of $\pm 105V$ power supply, failure of $\pm 6V$ applied to sequence circuit (except during facsimile broadcast calls), failure of $\pm 10V$ power supply, or failure of lamp wink supply

2. EQUIPMENT DESCRIPTION

2.01 The J53037A 4-wire CO line circuit unit (Fig. 3) contains relays, termination pads, an interrupter, transmission test jacks, a J87241A, L1 power supply, and four terminal strips. This equipment is attached to a 228A mounting plate which is 6 inches high and 23 inches wide. The unit is factory-wired and may be mounted on a sliding panel in a control cabinet along with other

station control equipment. In systems where more than one telephone set is connected to a particular line circuit, an additional equipment panel is required. The J53037H line pickup unit (Fig. 4) provides mounting space for up to three additional APU relays. This panel is 2 inches high and 23 inches wide.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 The J53037A 4-wire CO line circuit unit is required at all stations in the No. 307 Switching System. The description of circuit operation will differ according to the mode of operation. The following discussion describes the operation of the line circuit at voice stations, high speed send/receive stations, stations equipped with a 100-wpm teletype machine, and facsimile stations. Also described are specific operations such as loop back tests, preemptive/precedence operation, and remote tests. References are made in the descriptions to sequence charts (SC) to aid in understanding circuit operation.

B. Voice Station

Initiating a Call—Clear Mode (See SC1)

3.02 When the attendant at the telephone set wishes to initiate a call, the attendant removes the handset from the switch hook, momentarily operates a LINE key, and waits for dial tone from the central office. Picking up the handset and operating a LINE key applies ground to the A lead

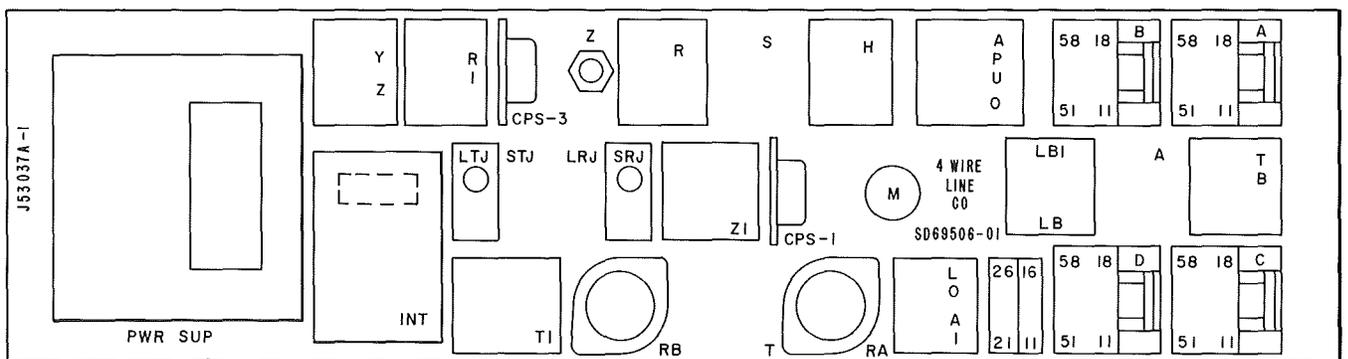


Fig. 3—J53037A Line Circuit Unit

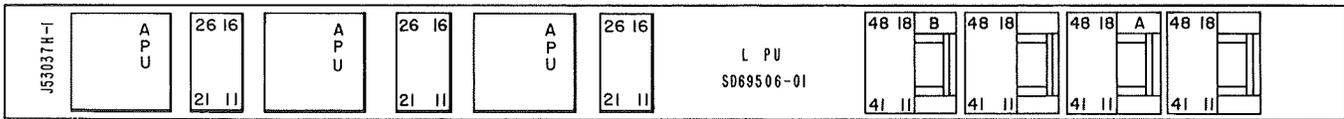


Fig. 4—J53037H Line Pickup Unit

at the line circuit. This ground operates APU0, LO, and A relays.

3.03 When operated, the APU0 (pickup) relay closes transmit and receive tip and ring paths between the line circuit and the telephone set, causing the TB (talking battery) relay to operate. Operation of the APU0 relay also applies a 4064A sidetone network to the paths. In addition, paths are closed between the telephone set precedence keys and the dual access switch, and between various keys of the telephone set to the transfer circuit. When the APU0 relay is operated, a -24 volt signal is applied to the telephone set over the FW (4-wire) lead to switch from 2-wire to 4-wire circuit operation at the telephone set.

3.04 The LO (lockout) relay, when operated, opens leads LF (lamp flash) and RN (ringing) to prevent lamp flash and audible ringing at the telephone set when it is in use.

3.05 When the A relay operates, it extends transmit and receive paths to the dual access switch. Another function of the operated A relay is to close a path from ground over the DSL (data speed lock) lead to the transfer circuit. The A relay also enables the ground on the A lead from the telephone set to operate the A1 relay through either the V or T option (3.44).

3.06 The primary function of the A1 relay is to connect ± 10 volts via the T option or V option to the L lead to light the LINE lamp steadily on the telephone set and lock a ground on the A relay.

3.07 Operation of the TB relay switches the M lead from ground to -48 volts. This signal is transmitted to the central office and dial tone is returned when a circuit is available. Before returning the dial tone, the central office connects ground to the R relay via the E lead for a minimum of 300 msec (via SF signaling). The function of the R relay, when initiating a call, is to close paths

from -24 volts via the W option to operate the S relay. Also, -24 volts is applied from the transfer circuit (or directly via S option), via the RTS lead, to lock the S relay operated.

3.08 The S relay, when operated, provides locking ground to the loop back circuit and the WZ circuit in the transfer circuit via the RTL lead; it also starts operation of the interrupter and completes paths for audible and visual signals to the telephone set.

3.09 When dial tone is received at the telephone set, the attendant dials the desired station code. The central office recognizes the dialed code and signals the called station. The called station answers, if not already busy, and the stations proceed with a normal telephone call. To terminate the call, the handset is simply placed on the switch hook.

Receiving a Call—Clear Mode (See SC2)

3.10 When an incoming call is received from the central office, ground from the dual access switch circuit is placed on the E lead, operating the R relay. Operation of the R relay operates the S relay through the W option. Operation of the S relay starts the interrupter, which applies a ringing signal via the R1 lead to the telephone set and a lamp flashing signal via the L lead to the telephone set LINE key.

3.11 When the handset is picked up and the flashing LINE key is momentarily operated, the APU0, LO, A, and A1 relays operate, connecting a transmission path and supplying battery as described in 3.03 through 3.07. The LO relay operates to stop audible ringing and lamp flashing at the telephone set. To terminate the call, the handset is placed on the switch hook.

Secure Voice Call (See SC3)

3.12 Once a clear voice contact is made, as discussed in 3.02 through 3.09 or in 3.10 and 3.11, agreement may be reached to talk in a secure mode. To do this, the attendants at each station will momentarily operate the SEC VCE (T1) key on the telephone set, replace the handset on the switch hook, and continue their conversation via secure voice equipment.

3.13 Momentarily operating the T1 key enables a ground to be applied from the transfer circuit via the COH (control off-hook) lead to hold the A, A1, and LO relays in the line circuit operated. Momentarily operating this key also initiates switching functions within the transfer circuit which transfer the transmitting and receiving pairs to the secure voice data equipment when the telephone set handset is placed on-hook. The TT2 and TT3 leads in the line circuit will be shorted together at the transfer circuit to hold the TB relay operated. This maintains the off-hook signal to the central office. Momentarily operating the T1 key also enables the sequence circuit to apply a winking signal to the T1 key lamp. Placing the telephone set on-hook disconnects ground from the A lead, releasing the APU0 relay. When sequencing is completed, the winking signal becomes steady when the RDY relay operates (SEQ CKT), indicating that the secure voice conversation can begin.

3.14 When secure voice transmission is completed, the secure voice equipment is placed on-hook; release of the connection can be accomplished by removing the telephone set handset from the switch hook and momentarily operating the T1 key. This will cause the transfer circuit to release. When the telephone set handset is placed on-hook, the line circuit will also release. Disconnect sequences of a clear voice call are shown in SC4. Disconnect sequences of a secure voice call are shown in SC 5.

C. High Speed Send/Receive Station**General**

3.15 At a station equipped with a 2400-bps send/receive set (HS S/R), calls may be initiated and received manually via the telephone set or automatically at the HS S/R set. The following paragraphs describe the various modes of operation.

Initiating a Call—Manual Operation

3.16 Contact with the desired station is first made as described in 3.02 through 3.09 or in 3.10 and 3.11, except that the W option for operation of the S relay is removed. Once a clear voice connection is made and it is decided to switch operation to the HS S/R set, attendant procedures will be the same as described in 3.12 through 3.14, except the SEND DATA (T1) key is momentarily operated at the transmitting station, and the REC DATA (T2) key is momentarily operated at the receiving station.

Receiving a Call—Manual Operation

3.17 The operation of the line circuit for receiving manually initiated HS S/R calls proceeds as described in 3.10 and 3.11 (see SC2). Since the incoming call is to be routed to the telephone set to establish a clear voice connection prior to transmitting data, 404A data set TOUCH-TONE® signaling is not received by the HS S/R set. After 3 seconds, the transfer circuit will release and short leads RN3 and RN4 in the line circuit, providing a path for audible ringing current to be transmitted to the telephone set via the R1 lead. At approximately the same time, LF2 lead from the transfer circuit will allow lamp flash voltage to be transmitted via the L lead to the telephone set LINE key. The telephone set attendant will pick up the handset and momentarily operate the flashing LINE key, supplying ground to operate the APU0, LO, A1, and A relays. Operation of the line circuit from this point is the same as described in 3.03 through 3.07. The telephone set attendant may switch the connection to the HS S/R set for receiving data by momentarily operating The REC DATA (T2) key, or for sending data by momentarily operating the SEND DATA (T1) key. The connection can be released without receiving or sending data by replacing the handset on the switch hook.

3.18 Once a clear voice connection is made and it is decided to switch operation to the HS S/R set, operation of the line circuit is the same as described in 3.12 through 3.14 (see SC3), except the REC DATA (T2) key, instead of the SEC VCE (T1) key, is operated at the telephone set.

Initiating a Call—Automatic Operation (See SC6)

3.19 When an HS S/R call is to be transmitted automatically, the attendant at the HS S/R

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set momentarily operates appropriate keys on the equipment. This causes the transfer circuit to connect the transmit and receive pairs from the line circuit to the HS S/R set. Key operation at the HS S/R set also causes the transfer circuit to ground the COH lead in the line circuit, operating the A, A1, and LO relays, and -24 volts dc to be applied via the SO lead to operate the S relay. Operation of the A1 relay applies ± 10 volts via the L lead which steadily lights the LINE lamp on the telephone set, indicating that an automatic HS S/R call is in process. In addition, the transfer circuit connects the TT2 lead to the TT3 lead. Connecting these leads and operation of the A relay operates the TB relay. Operation of the TB relay applies an off-hook signal via the M lead to the central office. The central office in turn momentarily grounds the E lead through the dual access switch. The R relay operates and switches -6 volts on the 3 lead to +6 volts. When the momentary ground on the E lead is removed for 300 milliseconds (minimum), R relay releases, and the -6 volts is returned to the 3 lead. This momentary application of voltage instructs the HS S/R equipment to send the necessary station code or codes to the central office.

3.20 When the called station answers, the central office returns continuous ground via the E lead to hold the R relay operated for the duration of the call. The HS S/R set may now proceed with the call. When transmission is complete, the call is terminated automatically by the HS S/R set. The transfer circuit opens the TT2 and TT3 path to the TB relay and removes ground from the COH lead. All operated relays in the line circuit now release.

Receiving a Call—Automatic Operation (See SC7)

3.21 To receive a call at a station equipped with an HS S/R set, the central office must first apply a ground via the E lead to the R relay. The R relay operates and applies ground via the TM lead to a transistorized timing circuit in the transfer circuit. As a result, T1 and T2 relays in the transfer circuit operate, connecting the line to data equipment; in addition, a -24 volt signal is returned from the transfer circuit via the SO lead to the S relay, causing it to operate. When S relay operates, a locking path is provided through its own contacts and contacts of the operated R relay. Operation of the S relay starts the interrupter, completes paths from the RN3 lead to the R1 lead,

opens ground from the TM lead, and connects ground to the RTL lead of the transfer circuit.

3.22 If proper TOUCH-TONE signaling is received by the 404A data set within 3 seconds, the HS S/R set goes off-hook and the transfer circuit places ground on the COH lead of the line circuit, operating the A and LO relays. Operation of the A relay operates the TB relay via the TT2 and TT3 leads from the transfer circuit which in turn switches the M lead to -48 volts, indicating to the central office that the station is connected. Operation of the A relay also operates A1 relay. Operation of the A1 relay enables ± 10 volts from the interrupter to be applied to the telephone set via the L lead. The LO relay, when operated, enables -24 volts dc to hold the S relay operated via the RTS lead. The line circuit is now ready for transmission. When transmission is complete, the call is terminated in the manner discussed in 3.20. The disconnect sequence from an automatic send or receive mode is shown in SC8.

D. 100-WPM Teletype Station

3.23 The line circuit unit, when used in conjunction with a 100-wpm teletype machine, functions, with few exceptions, like a line circuit used at a voice station in the clear mode. The differences are as follows.

- (a) When the machine goes off-hook, an operating ground for relays A, A1, and LO is applied via the COH lead in the line circuit, rather than via the A lead as in voice stations.
- (b) The station ringer at the teletype machine may be activated by another teletypewriter. Upon receipt of an alternate mode V signal from a remotely located connected teletypewriter, the local machine will remove -24 volts dc from the LO relay to enable station ringing.
- (c) The teletypewriter is informed of preemption via the PE lead in the line circuit.
- (d) An automatic disconnect feature is provided if the machine fails to go on-hook within 60 seconds after preemption. Release of the R relay connects -24 volts dc to the AD lead. Connection of this voltage starts a disconnect timer in the teletypewriter. After 60 seconds, ground is automatically removed from the COH lead.

E. Facsimile Station

Clear Facsimile Calls

3.24 A clear facsimile call is initiated by establishing a clear voice call first (SC1 or SC2) and then momentarily operating the CLEAR FAX (T1) key on the telephone set. A clear facsimile **broadcast** call is first established by originating a clear voice broadcast call in the usual manner. When all possible stations have been connected to the bridge in the central office, the originating station polls the called stations by voice and listens for a tone response from each station in turn. When the attendant is satisfied that he has sufficient knowledge regarding the connected stations, he instructs all stations to transfer to the clear data mode. The attendant at each receiving station momentarily operates the T1 key at the telephone set. The attendant at the transmitting station momentarily operates the BDCST FAX (T3) key at the telephone set. The sequence of operation for the line circuit in establishing either a single or a multiple addressed facsimile call and disconnect is similar to that for the clear voice call (SC1 or SC2, and SC3 through SC5), except that in order to disconnect the facsimile equipment from the 4-wire central office line, either the T1 or the T3 key is momentarily operated **again** at the telephone set.

Secure Facsimile Calls

3.25 A secure facsimile call is established in the same manner as a secure voice call as far as the 4-wire line circuit is concerned, except that the SEC FAX (T2) key is momentarily operated at the telephone set instead of the SEC VCE (T1) key as used for the secure voice call (SC3). The line transfer circuit, however, connects the 205C2 data set to operate in a half-duplex mode for secure facsimile calls instead of the full-duplex mode as used for the secure voice station call.

F. Loop Back Tests (See SC9)

3.26 To make line transmission tests between the central office and a voice station, an HS S/R station, a low-speed TTY station, or a facsimile station, a clear voice connection is made with the central office, as discussed in previous paragraphs. The central office will request that the LOOP BACK key on the telephone set be momentarily operated. The attendant momentarily operates the key and replaces the handset on the

switch hook. Operation of this key will apply ground via the S lead from the telephone set to the LB and LB1 relays (-24 volts dc is on LBB lead). These relays will lock on ground provided by a closed contact of the operated S relay. Operation of the LB and LB1 relays connects the transmit path to the receive path and enables the central office to make transmission checks over the line. The LB1 relay also opens a locking path to the S relay. The S relay is now held operated by only the R relay. When the central office desires to terminate loop back tests, ground is removed from the R relay (via E lead) for at least 425 milliseconds, causing it to release. Release of R relay releases the S relay; the station is now in an on-hook condition. The attendant at the telephone set may release the connection by removing the handset from the switch hook, momentarily operating the LOOP BACK key, and replacing the handset on the switch hook.

G. Preemption (See SC10)

3.27 When a station is in use and another station places a call of higher precedence to the busy station or requires use of the trunk the busy station is using, preemption will occur. Preemption will cause continuous ringing and line lamp flashing, at a busy telephone set, or if an HS S/R set is in use, will automatically terminate the operation of the HS S/R set. The following paragraphs discuss preemptive circuit operation common to both voice and high speed send/receive stations and preemptive circuit operation peculiar to each of these stations.

3.28 Lamp flashing and continuous ringing or automatic HS S/R set shutdown is produced at the busy station as a result of the central office removing ground from the line circuit E lead for approximately 350 milliseconds. This ground normally keeps the R relay operated.

3.29 Removal of the E lead ground causes the R relay to release. When R relay releases, it applies ground to a timer in the line circuit. In approximately 275 milliseconds the timing circuit operates the Y relay. Ground should now (after 350 milliseconds) be **returned** to the R relay from the central office, causing it to reoperate. The operated Y and R relays close a path enabling R1 relay to operate. The ground path for the R1 relay is established by the operated A1 relay. The R1 relay locks through its own contacts to battery. Reoperation of the R relay applies -24 volts via

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the Z1 diode and causes a delayed release of the Y relay, thereby breaking the initial operating path of the R1 relay. The R1 relay locks ground to the A relay. The A1 relay does not release at this time because the A relay is operated. The R1 relay also breaks a path for steady lamp voltage via the L lead to the telephone set LINE lamp and connects lamp flash to the L lead.

3.30 If ground is not returned to the R relay before 425 milliseconds have elapsed, Z relay will operate and open the operating path of the R1 relay. In this case, with the R relay not operated, -24 volts is applied to the timing circuit, causing the Y relay to release, which in turn causes the Z relay to release. This keeps the R1 relay nonoperated and sets the timing circuit for the next preemptive call. Thus, a winking ground on the E lead is a preemptive signal if the time involved is between the 275 and 425 milliseconds.

3.31 Further operation of the preemptive circuit is peculiar to the stations being preempted and its mode of operation. For operation at a voice station, refer to 3.32; for a high speed send/receive station operating in the manual mode, refer to 3.33; for a high speed send/receive station operating automatically, refer to 3.34; for a facsimile station, refer to 3.35.

3.32 If the preemptive signal is being transmitted to a voice station (W and T option), operation of the R1 relay enables ± 105 volts to be applied via the R1 lead to the station ringer. Continuous ringing is now heard at the telephone set. At the same time via the W option, R1 relay will close a path from the LF lead at the interrupter through the L lead to the LINE lamp at the telephone set. The attendant then terminates the connection in a normal manner whether in a clear or secure mode. Normal termination of the connection removes ground from the A lead. The A1 relay will release, but the A relay will remain operated by a ground supplied via the R1 relay. Release of the A1 relay will cause R1 relay to release. Relay R1 will cause relay A to release and provide an enabling ground to the R1 relay. The preemptive and high-precedence circuit is released. The remaining relays of the line circuit release; the line circuit is now available for another call. At this time, the preemptive telephone set is on-hook and may expect no call, a normal call (interrupted ringing and lamp flash), or a

high-precedence call (continuous ringing and lamp flash).

3.33 If the preemptive signal is being transmitted to a high speed send/receive station (X and T option), operation of the R1 relay allows ± 105 volts to be applied via the RN2 lead to the transfer circuit. If the station is operating in the manual mode, the transfer circuit will return this voltage via the RN3 lead. The voltage on the RN3 lead is applied to the R1 lead and continuous ringing begins at the telephone set. At the same time, a path is closed from the LF lead at the interrupter through the transfer circuit and back to the line circuit via the LF2 lead through the L lead to the telephone set, producing lamp flash on the LINE lamp. The attendant at the telephone set proceeds to terminate the connection in a normal manner. The line circuit will release in the manner discussed in 3.32.

3.34 If a high speed send/receive station is operating in the automatic mode, operation of the R1 relay will apply +6 volts to lead 31 via a path established by the operated A1 relay. This voltage is applied to the HS S/R set, causing it to terminate operation. As a result, the transfer circuit removes the ground on the COH lead to the line circuit. The line circuit will release in the manner described in 3.32.

3.35 If the preemptive signal is being transmitted to a facsimile station, the signal indications received at the telephone set and disconnect are similar to those of the voice station described in 3.32.

H. High-Precedence Calls (See SC11)

3.36 When a call of high precedence is to be received by a station, the called station may either be on-hook or off-hook. When the called station is off-hook, preemption will occur as described in 3.27 through 3.35. In the following discussion, it is assumed that the called station is on-hook.

3.37 When the incoming call is a high-precedence call, continuous ringing and lamp flash will occur. The only exception is when the high-precedence call is to be received by the HS S/R set automatically. In this case, the line circuit supplies steady lamp voltage via the L lead to the telephone set to indicate to the attendant that the HS S/R set is in use.

3.38 The preemptive and high-precedence portion of the line circuit will be activated even though the called station is on-hook. Since the R relay is nonoperated, the central office will apply a momentary ground via the E lead to operate the R relay. When R relay operates, S relay operates. The operation of the high-precedence and preemptive circuit will function as described in 3.29 through 3.35. The called station will answer in the manner described in 3.10 and 3.11.

I. Hold Operation (See SC12)

3.39 A HOLD key is available on the telephone set for use when it is desired to hold one line and use the telephone set on another line.

3.40 Momentary operation of the HOLD key on the telephone set will release the A1 and A relays. The APU0 relay will be held operated momentarily by an RC network. This enables -24 volts from the TB relay to operate the H relay (ground is applied via the T and R leads from the telephone set to the TB relay). Operation of the H relay provides a shunt across the TB relay, ensuring that TB remains operated. Since the TB relay remains operated, the central office will continue to sense an off-hook condition on that particular line. The A and S relay contacts prevent pulsing the H relay whenever the station goes off-hook and the line is not in a hold condition. Operation of the H relay closes a path for a lamp wink signal via the LW lead (V or T option) through the L lead to the telephone set LINE lamp. The telephone set attendant may now momentarily operate another LINE key while holding the original line. To release the H relay, the attendant momentarily operates the LINE key associated with the held line. Operation of the LINE key operates the A relay, which in turn releases the H relay. Release of the H relay removes lamp wink from the associated telephone set LINE lamp. The attendant telephone set is now connected in a normal manner to the far station.

J. Remote Tests

3.41 To test the 205C2 and 404A data sets, a clear voice connection is made to a remote test center, and the telephone set attendant momentarily operates the desired remote test key. This key switches the connection to the secure voice mode as did the transfer key discussed in

previous paragraphs. As a result, -24 volts on the RTS lead from the transfer circuit is removed. This removes the locking path to the S relay. When remote tests are completed, the central office may terminate the tests in the same manner discussed in Loop Back Tests (3.26). The attendant at the telephone set may release the connection by removing the handset, momentarily operating the remote test key, and replacing the handset on the switch hook. The line circuit then releases in a normal manner.

K. Definitions

3.42 The *lamp wink* signals referred to in this practice consist of interrupted lamp voltage occurring at the rate of 120 interruptions per minute (ipm). During one cycle of interruption, voltage is supplied for 475 milliseconds and then removed for 25 milliseconds.

3.43 The *lamp flash* signals referred to in this practice consist of interrupted lamp voltage occurring at the rate of 60 ipm. During one cycle of interruption, voltage is supplied for 500 milliseconds and then removed for 500 milliseconds.

3.44 Wiring options referred to in this practice are defined as follows:

- (a) S option: Used at stations *not* requiring line transfer.
- (b) R option: Used at stations requiring line transfer.
- (c) T option: Used at any station requiring preemptive/precedence circuit.
- (d) V option: Used at any station that does *not* require preemptive/precedence circuit.
- (e) W option: Used at a station that is *not* a high speed send/receive station.
- (f) X option: Used only at high speed send/receive stations.
- (g) Y option: Used only at 100-wpm teletype stations.
- (h) Z option: Used at all but 100-wpm teletype stations.

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- (i) W and T option: Used only at voice stations.
- (j) X and T option: Used only at HS S/R stations.

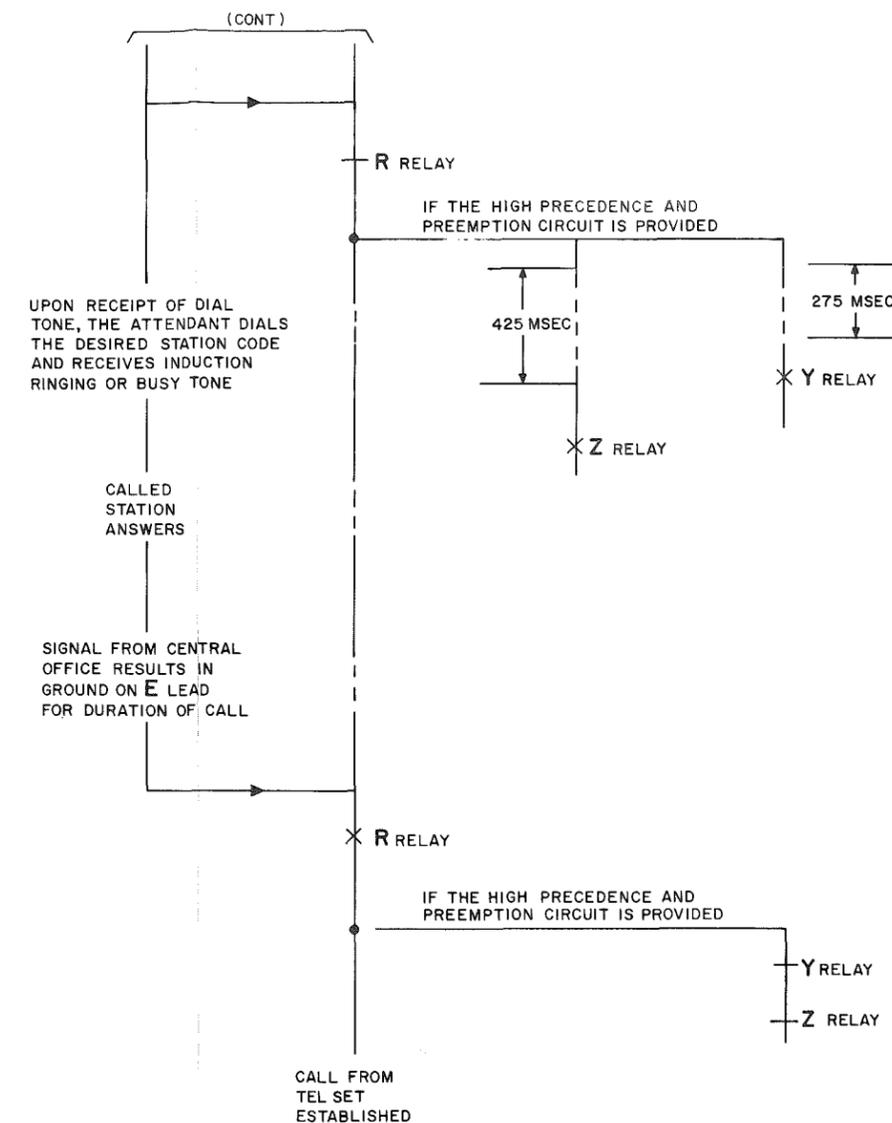
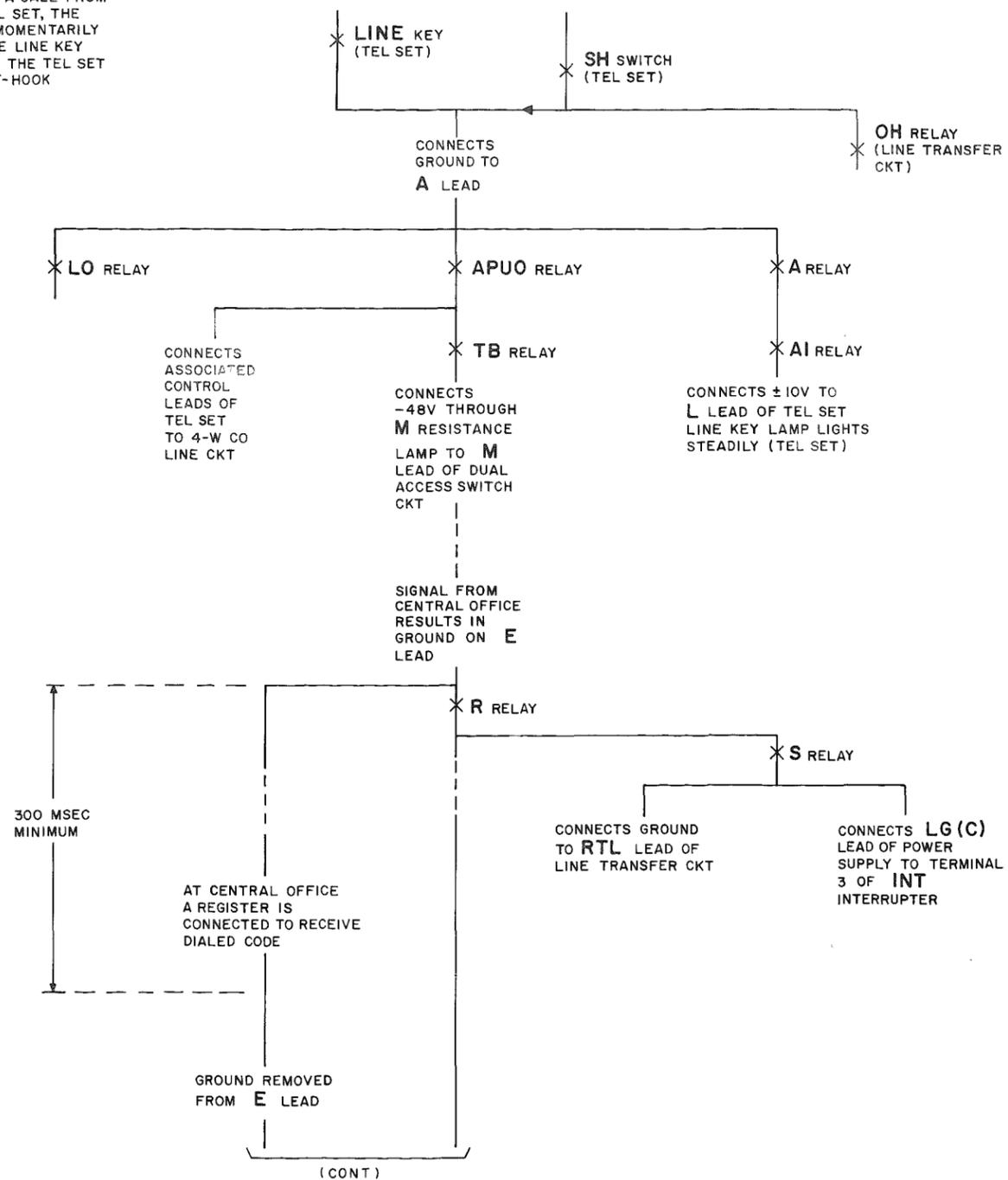
SECTION	TITLE
480-714-102	Line Transfer Circuit Unit, Description
480-714-103	Sequence Circuit Unit, Description
480-714-104	Dual Access Switch, Description
480-714-105	2626A1 Telephone Set, Description
480-714-106	Alarm Circuit Description

4. REFERENCES (NOT ATTACHED)

4.01 The following drawings and sections provide additional information.

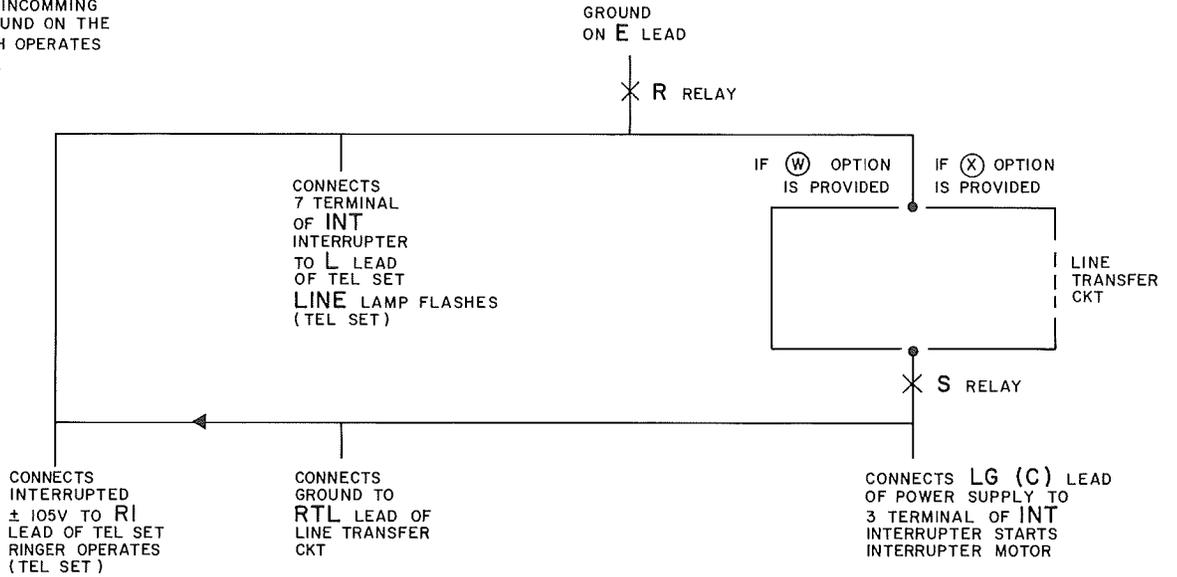
DRAWING	TITLE	SECTION	TITLE
SD-69504-01	Switching System No. 307, Block Diagram	480-714-301	4-Wire CO Line Circuit Unit, Maintenance Tests
SD-69505-01	Telephone and Key Circuit	480-714-302	Line Transfer Circuit Unit, Maintenance Tests
SD-69506-01	4-Wire CO Line Circuit	480-714-303	Sequence Circuit Unit, Maintenance Tests
SD-69507-01	Line Transfer Circuit	480-714-304	Dual Access Switch, Maintenance Tests
SD-69508-01	Sequence Circuit	480-714-305	2626A1 Key Telephone Set, Maintenance Tests
SD-69509-01	Dual Access Switch Circuit	480-714-306	Alarm Circuit, Maintenance Tests
SD-69510-01	Alarm Circuit	981-209-100	Switching System No. 307 General Description

TO ORIGINATE A CALL FROM A 2626A1 TEL SET, THE ATTENDANT MOMENTARILY OPERATES THE LINE KEY AND REMOVES THE TEL SET HANDSET OFF-HOOK

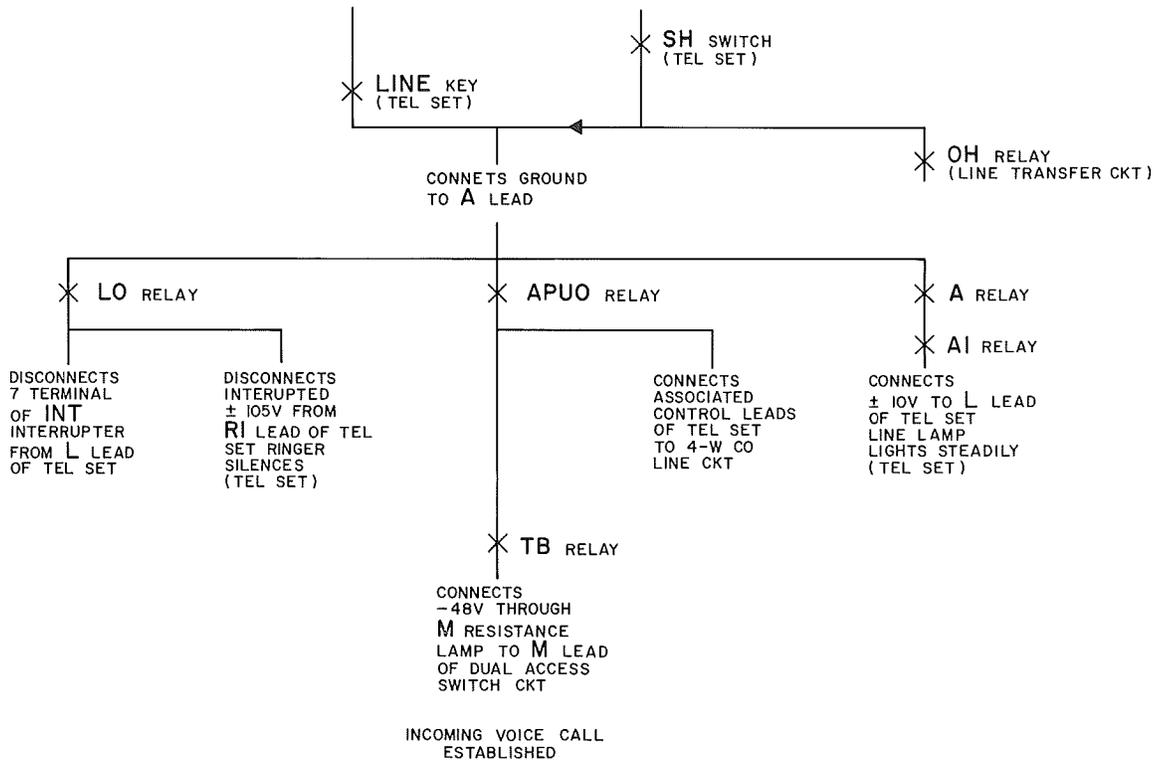


SC1—J53037A Line Circuit Unit—Originating a Voice Call From a 2626A1 Telephone Set

THE INDICATION TO THE LINE CIRCUIT OF AN INCOMING CALL IS A GROUND ON THE E LEAD WHICH OPERATES THE R RELAY.



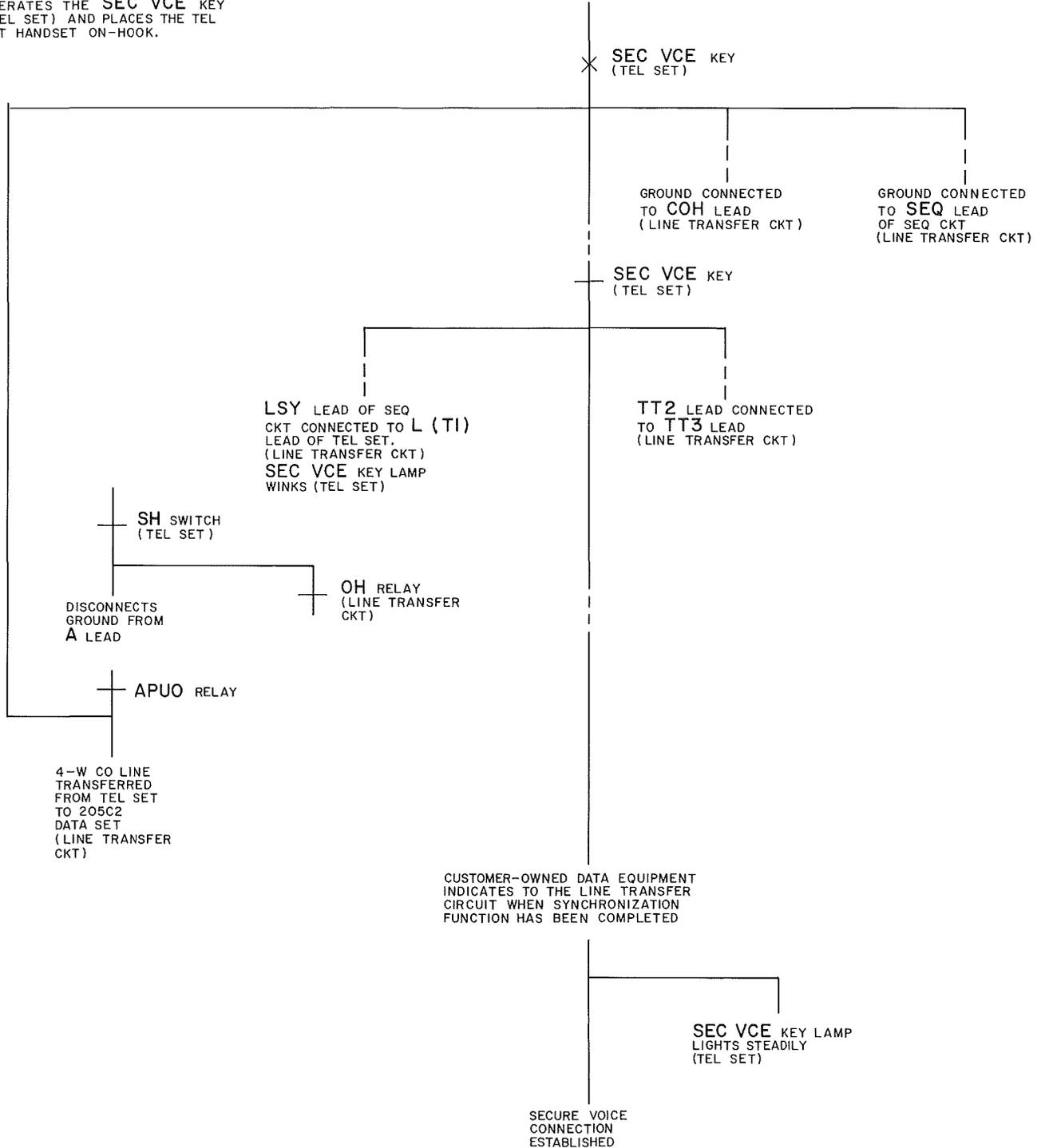
THE ATTENDEANT, UPON RECOGNIZING INCOMING CALL SIGNALS, TAKES THE TEL SET HANDSET OFF-HOOK AND MOMENTARILY OPERATES THE ASSOCIATED LINE KEY. (TEL SET)



SC2—J53037A Line Circuit Unit—Incoming Voice Call to 2626A1 Telephone Set

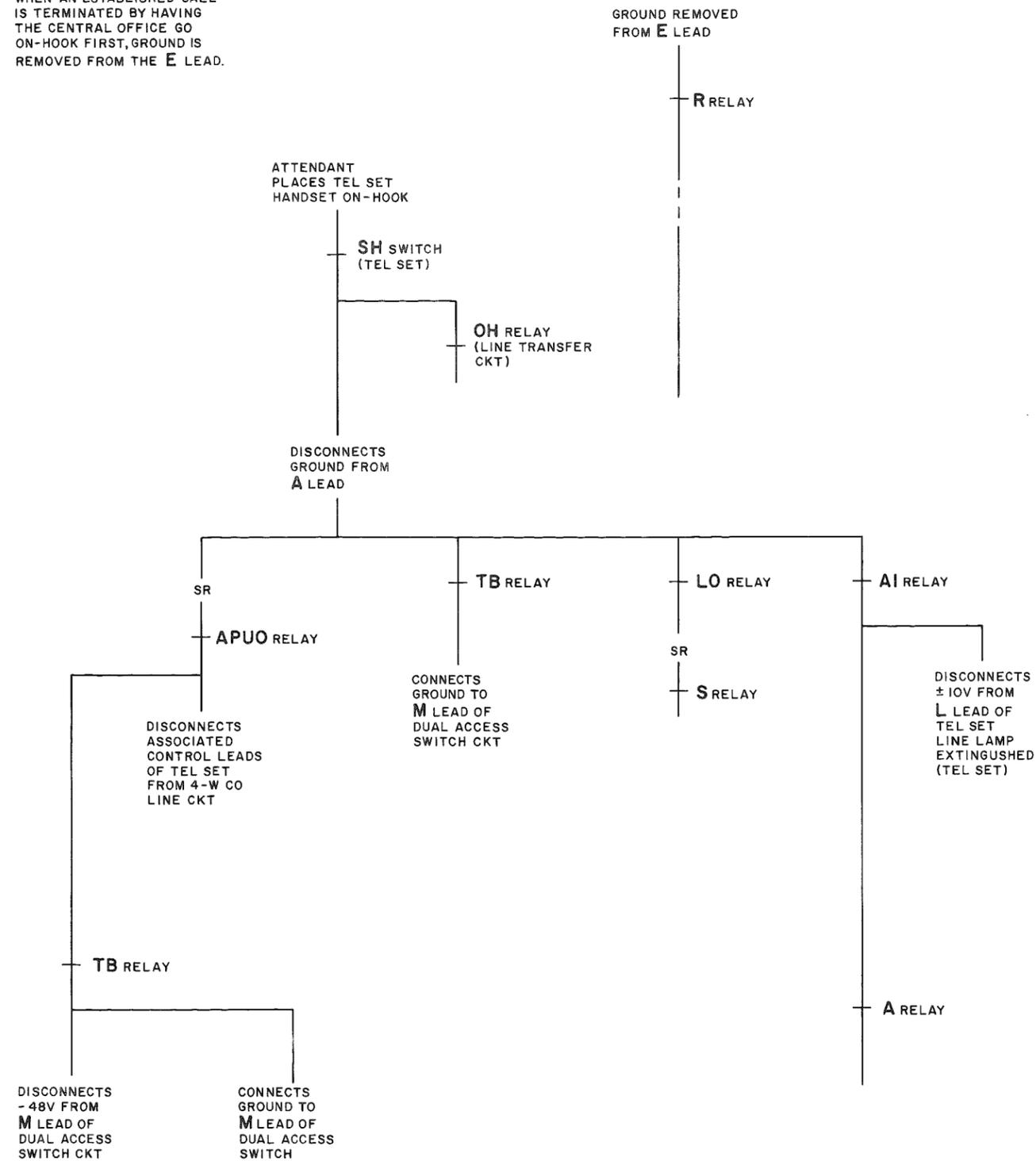
TO TRANSFER FROM A TEL SET CALL TO THE SECURE VOICE MODE, THE ATTENDANT MOMENTARILY OPERATES THE SEC VCE KEY (TEL SET) AND PLACES THE TEL SET HANDSET ON-HOOK.

(CONTINUED FROM SC1 OR SC2)



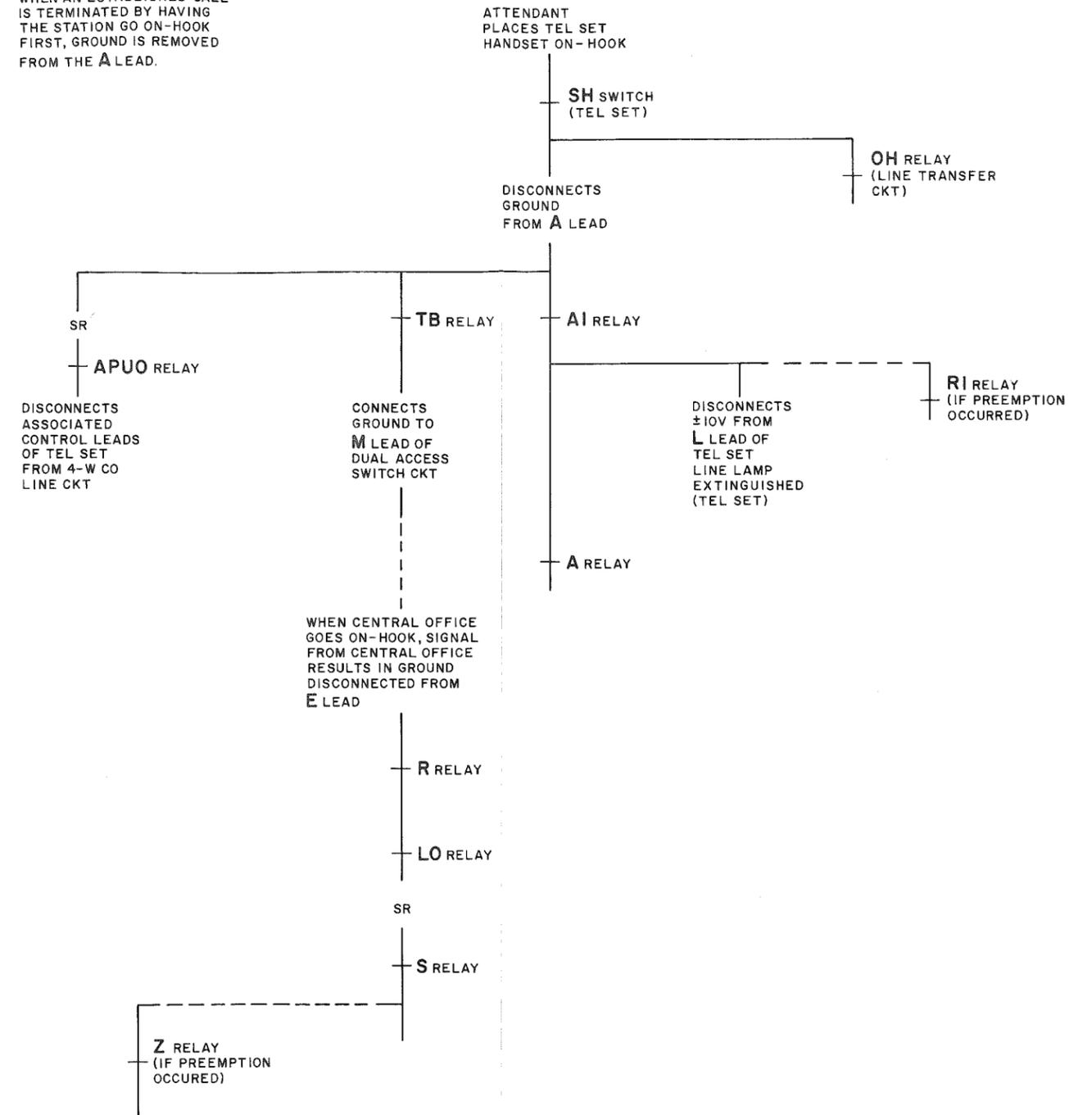
SC3—J53037A Line Circuit Unit—Secure Voice Call

WHEN AN ESTABLISHED CALL IS TERMINATED BY HAVING THE CENTRAL OFFICE GO ON-HOOK FIRST, GROUND IS REMOVED FROM THE E LEAD.



THE CIRCUIT IS NOW IN AN IDLE CONDITION

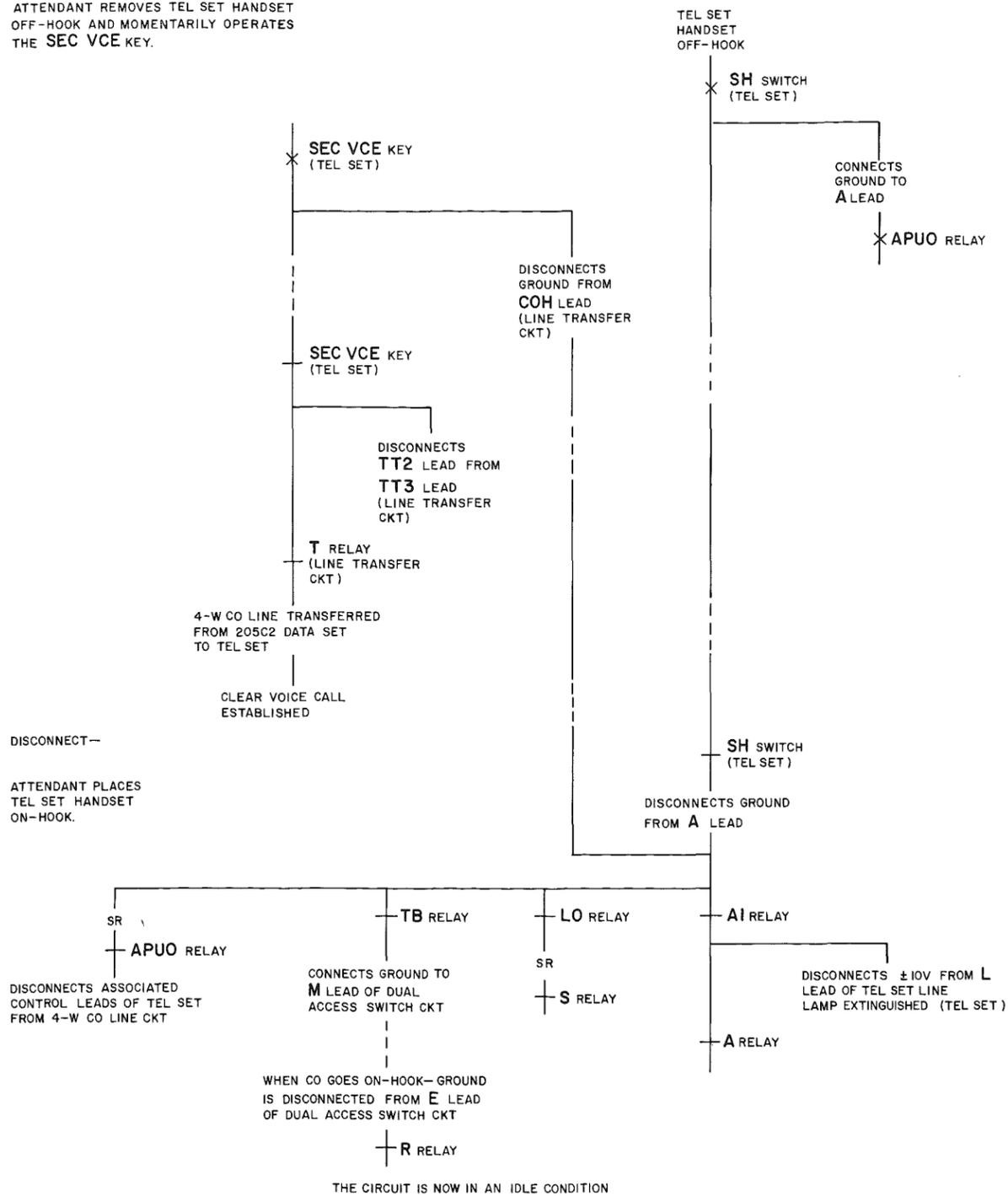
WHEN AN ESTABLISHED CALL IS TERMINATED BY HAVING THE STATION GO ON-HOOK FIRST, GROUND IS REMOVED FROM THE A LEAD.



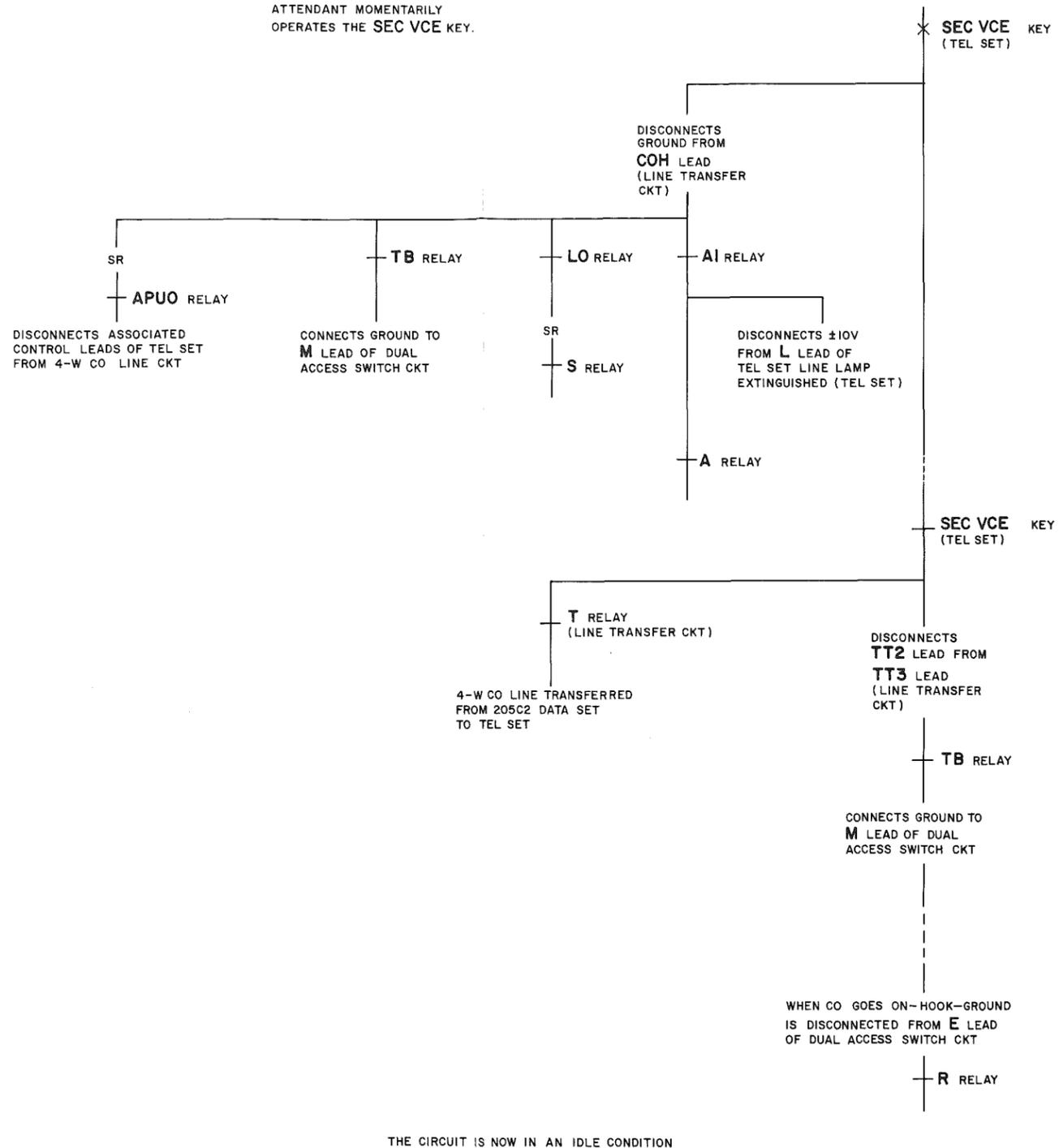
THE CIRCUIT IS NOW IN AN IDLE CONDITION

SC4—J53037A Line Circuit Unit—Disconnect of Clear Voice Call

THE ATTENDANT MUST INITIATE A TRANSFER FROM THE SECURE VOICE MODE BEFORE THE STATION CAN DISCONNECT FROM THE CENTRAL OFFICE.
 SECURE VOICE TO CLEAR VOICE—
 ATTENDANT REMOVES TEL SET HANDSET OFF-HOOK AND MOMENTARILY OPERATES THE SEC VCE KEY.

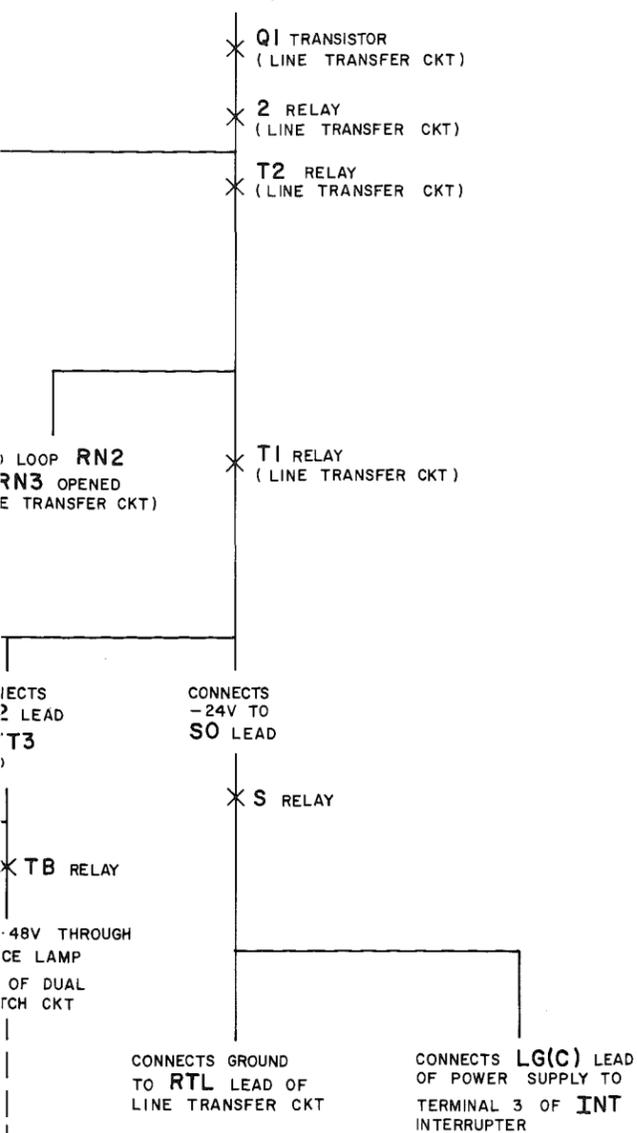


SECURE VOICE TO DISCONNECT—
 ATTENDANT MOMENTARILY OPERATES THE SEC VCE KEY.

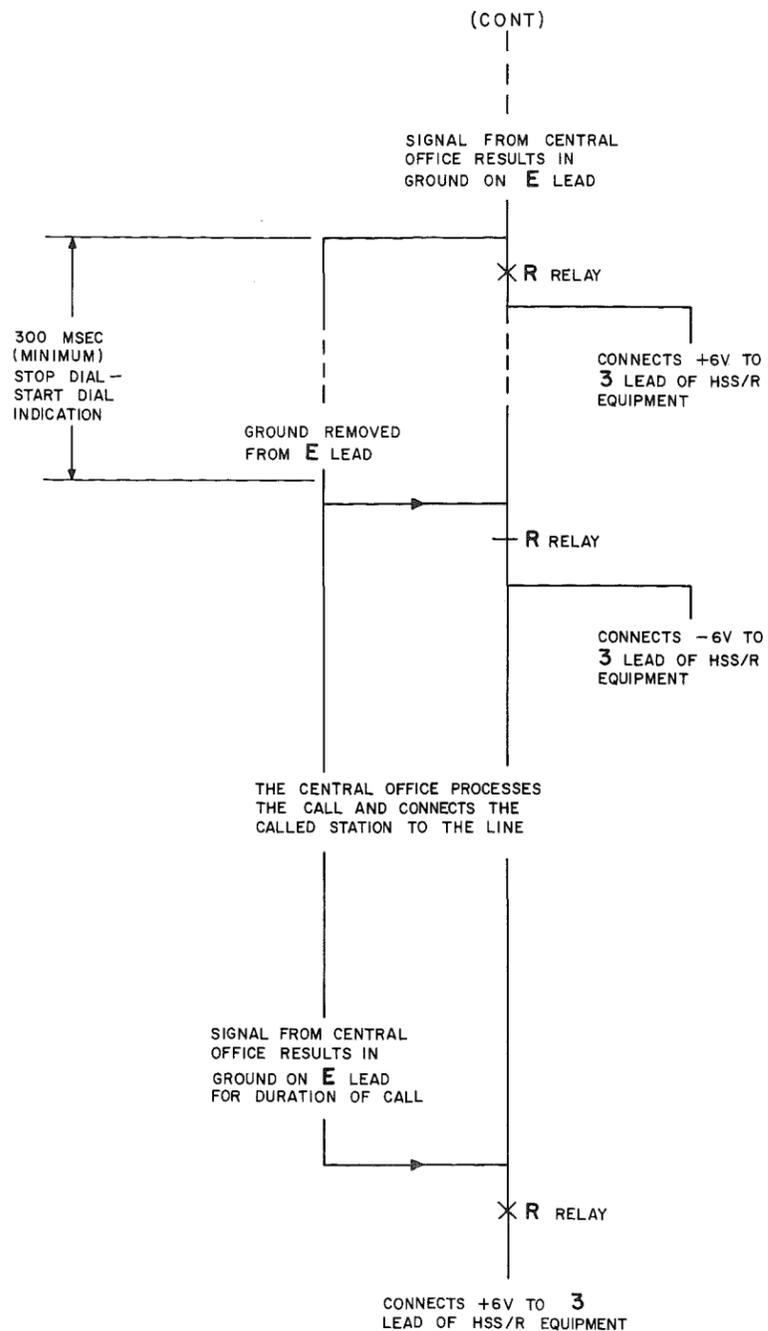


SC5—J53037A Line Circuit Unit—Disconnect of Secure Voice Call

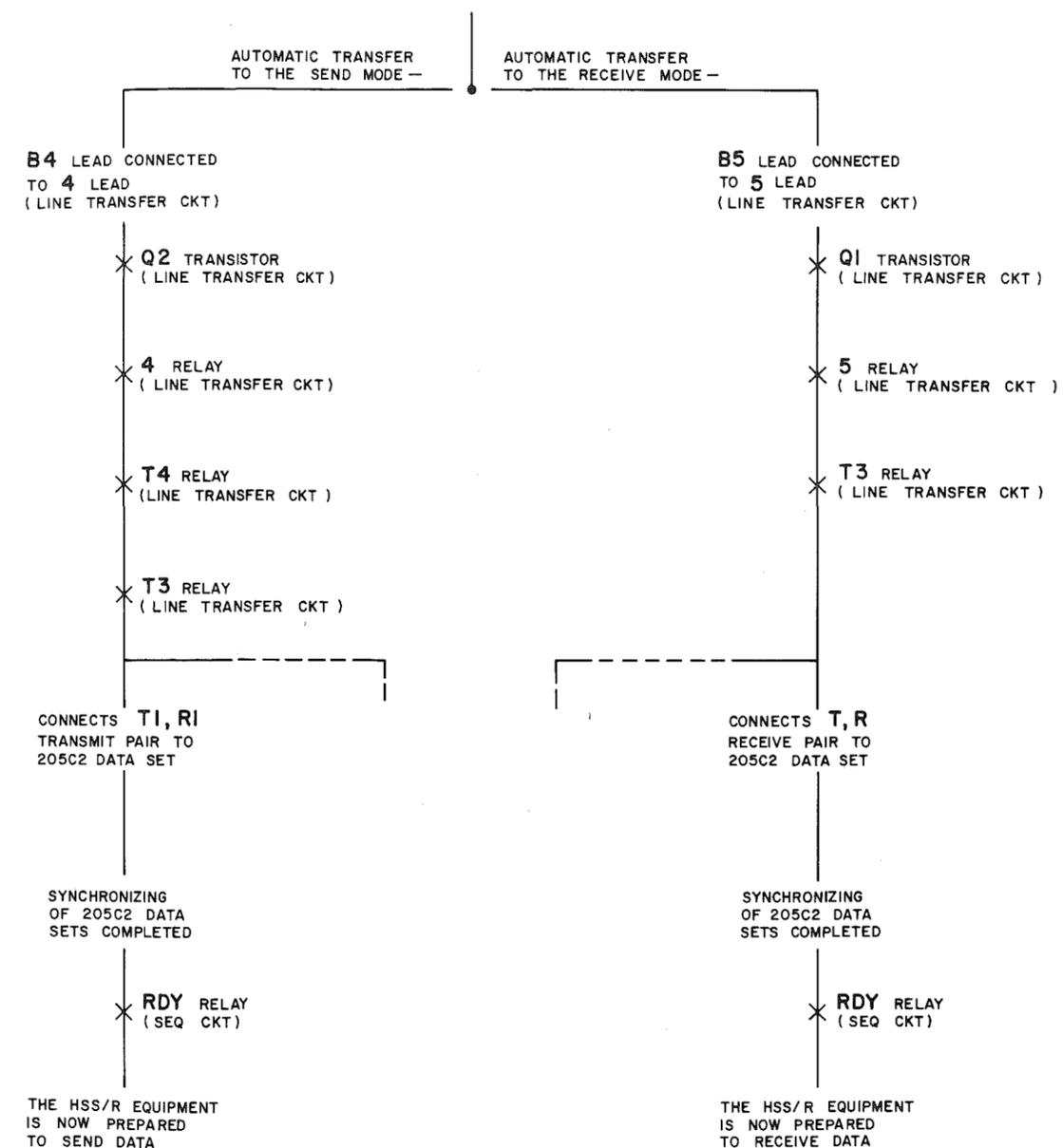
WHEN STARTED, THE HSS/R EQUIPMENT
CONNECTS THE B2 LEAD TO THE 2
LEAD, WHICH APPLIES -6V TO THE
BASE OF Q1 TRANSISTOR
(LINE TRANSFER CKT)



(CONT)



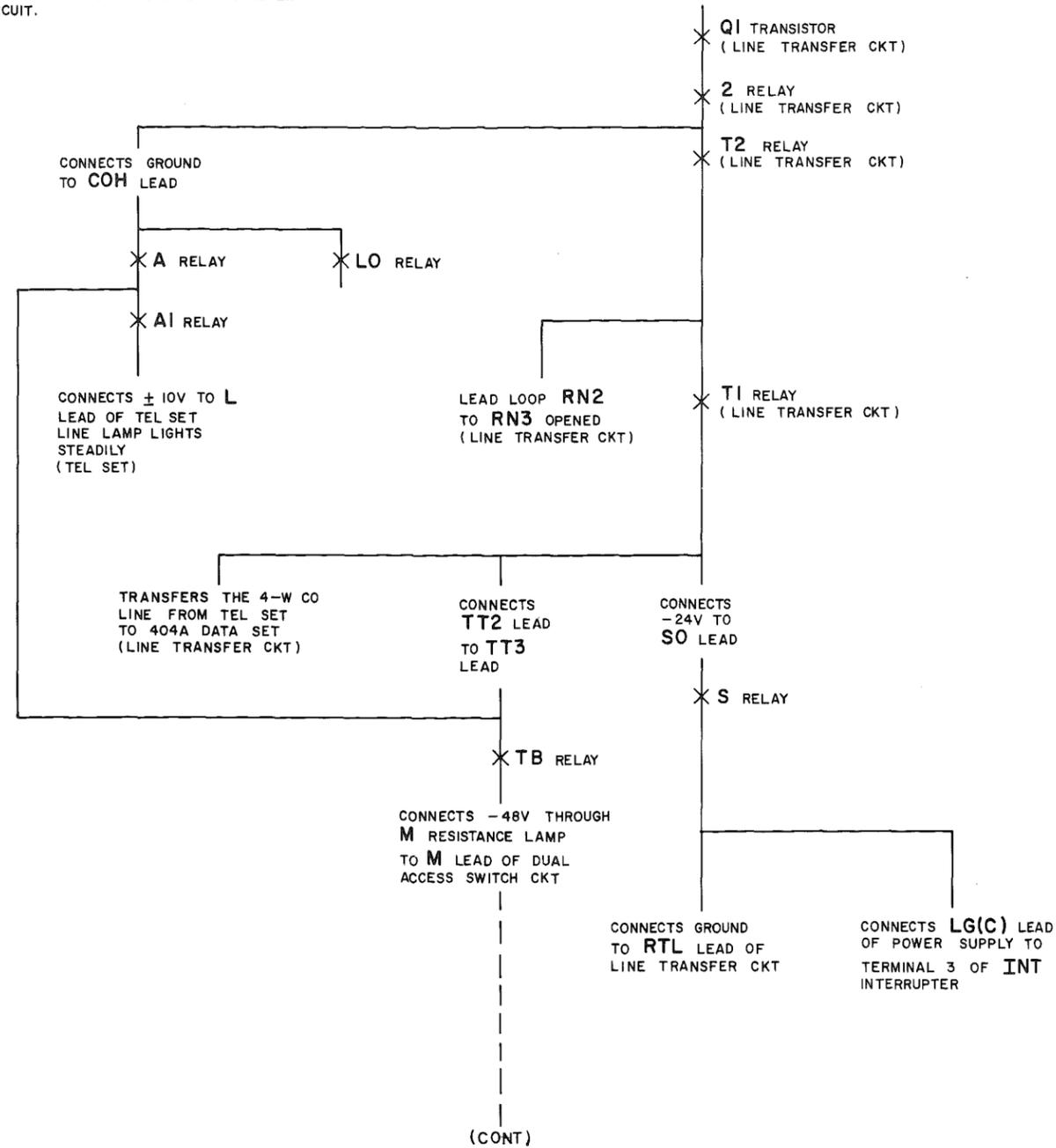
THE 404A DATA SETS PERFORM THE
REQUIRED SIGNALING FUNCTIONS,
UNDER CONTROL OF THE HSS/R
EQUIPMENT, TO ESTABLISH THE
DESIRED OPERATING MODE AT BOTH
ENDS OF THE CONNECTION.



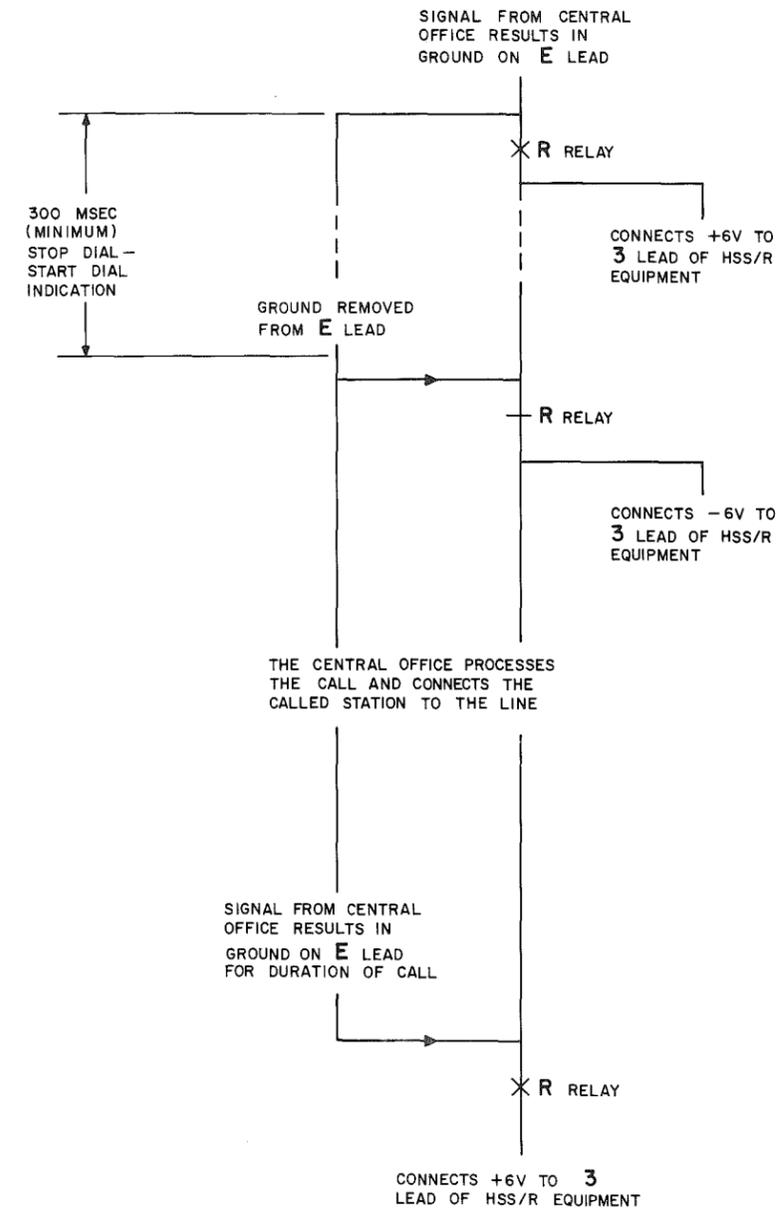
SC6—J53037A Line Circuit Unit—HS S/R Automatic Outgoing Call

TO ORIGINATE AN AUTOMATIC CALL FROM THE HSS/R EQUIPMENT, THE EQUIPMENT IS SET UP PROPERLY AND STARTED. GROUND IS RECEIVED AT THE LINE CIRCUIT ON THE COH LEAD FROM ITS ASSOCIATED TRANSFER CIRCUIT.

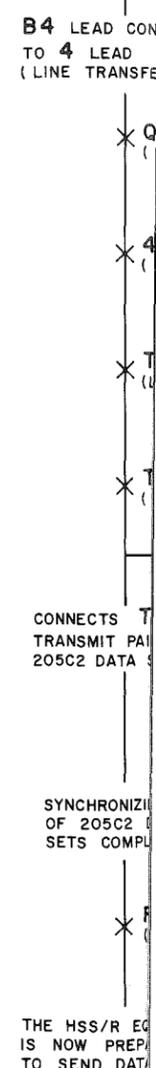
WHEN STARTED, THE HSS/R EQUIPMENT CONNECTS THE B2 LEAD TO THE 2 LEAD, WHICH APPLIES -6V TO THE BASE OF Q1 TRANSISTOR (LINE TRANSFER CKT)



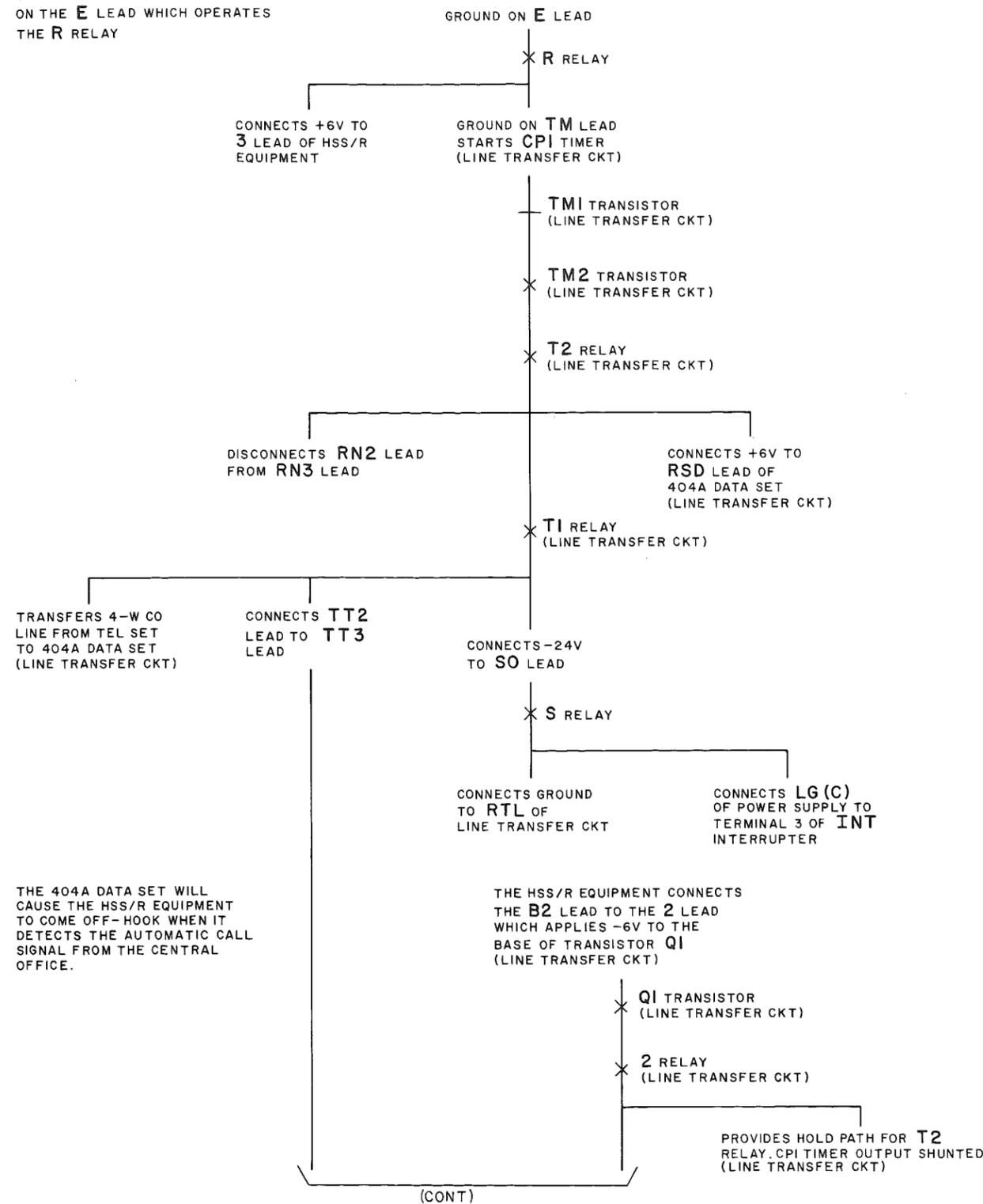
(CONT)



THE 404A DATA SETS REQUIRED SIGNALING FUNCTIONS UNDER CONTROL OF THE EQUIPMENT, TO ESTABLISH DESIRED OPERATING MODES AT THE ENDS OF THE CONNECTIONS.

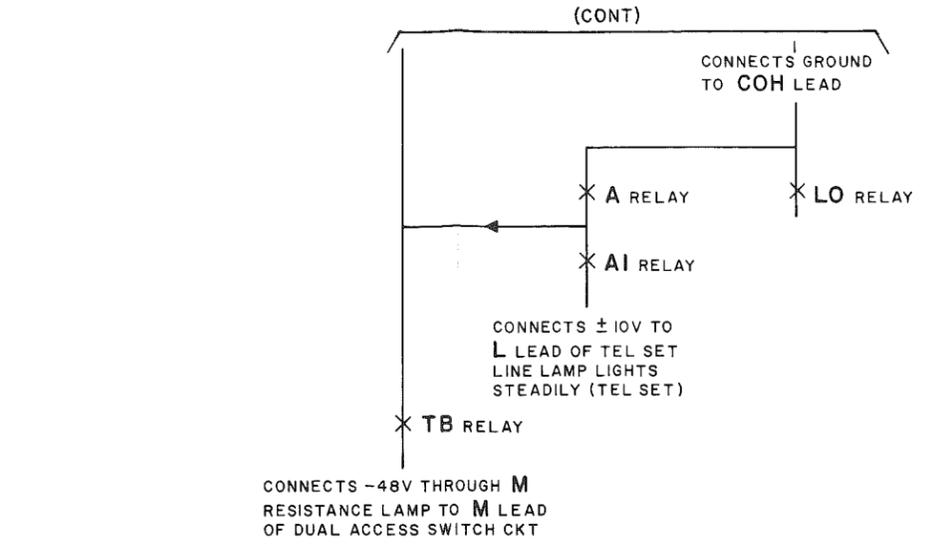


THE INDICATION TO THE STATION OF AN INCOMING CALL IS A GROUND ON THE E LEAD WHICH OPERATES THE R RELAY

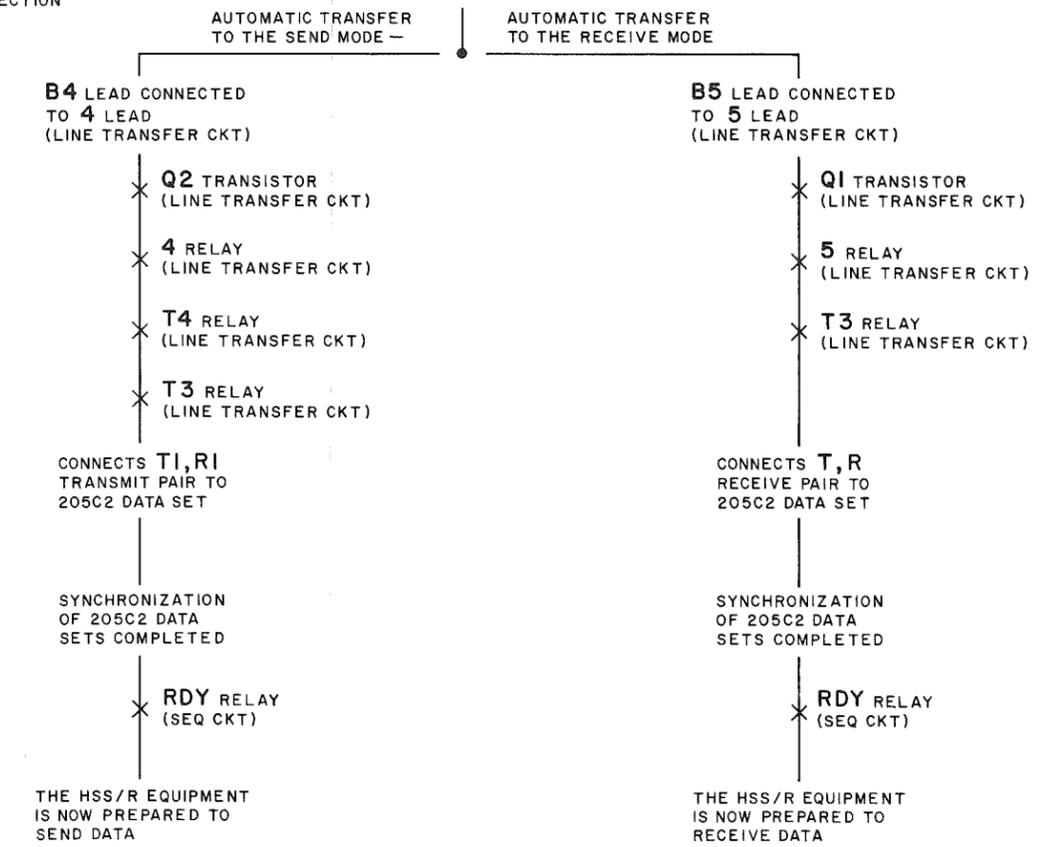


THE 404A DATA SET WILL CAUSE THE HSS/R EQUIPMENT TO COME OFF-HOOK WHEN IT DETECTS THE AUTOMATIC CALL SIGNAL FROM THE CENTRAL OFFICE.

THE HSS/R EQUIPMENT CONNECTS THE B2 LEAD TO THE 2 LEAD WHICH APPLIES -6V TO THE BASE OF TRANSISTOR Q1 (LINE TRANSFER CKT)



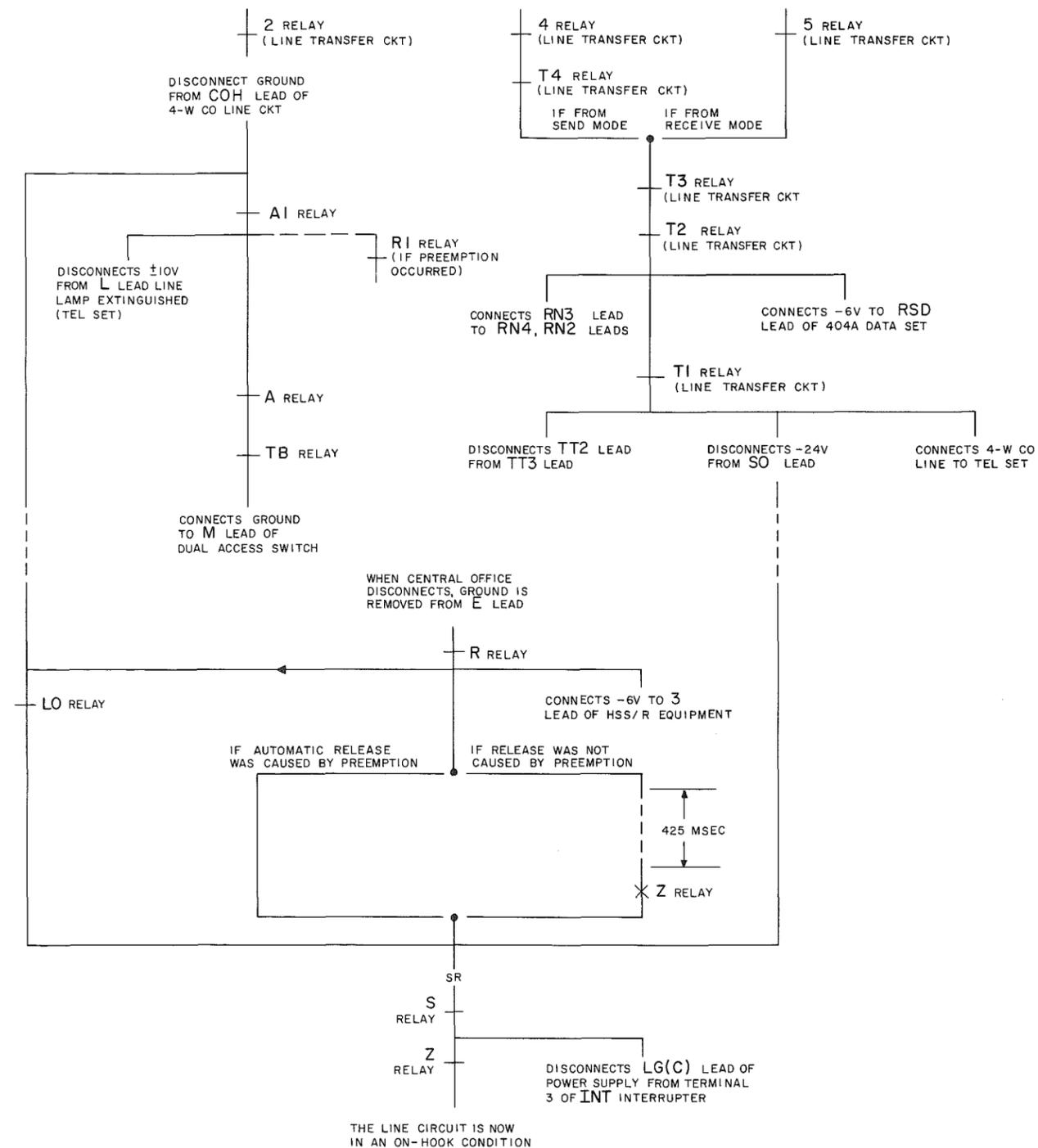
THE 404A DATA SETS PERFORM THE REQUIRED SIGNALING FUNCTIONS, UNDER CONTROL OF THE HSS/R EQUIPMENT, TO ESTABLISH THE DESIRED OPERATING MODE AT BOTH ENDS OF THE CONNECTION



SC7—J53037A Line Circuit Unit—HS S/R Automatic Incoming Call

IN THE AUTOMATIC MODE, DISCONNECT OCCURS AUTOMATICALLY AT THE END OF THE MESSAGE OR WHEN PREEMPTION OCCURS (SC10) AND +6V IS CONNECTED TO 31 LEAD OF HSS/R EQUIPMENT

THE HSS/R EQUIPMENT RELEASES THE 2 AND 4 RELAY (OR 5 RELAY) SIMULTANEOUSLY



SC8—J53037A Line Circuit Unit—HS S/R Disconnect From an Automatic Mode

SC 2)

REMOVAL OF LOOP BACK CONDITION-

IF ATTENDANT REMOVES LOOP BACK CONDITION FIRST, ATTENDANT REMOVES HANDSET FROM SWITCH HOOK AND MOMENTARILY OPERATES LOOP BACK KEY.

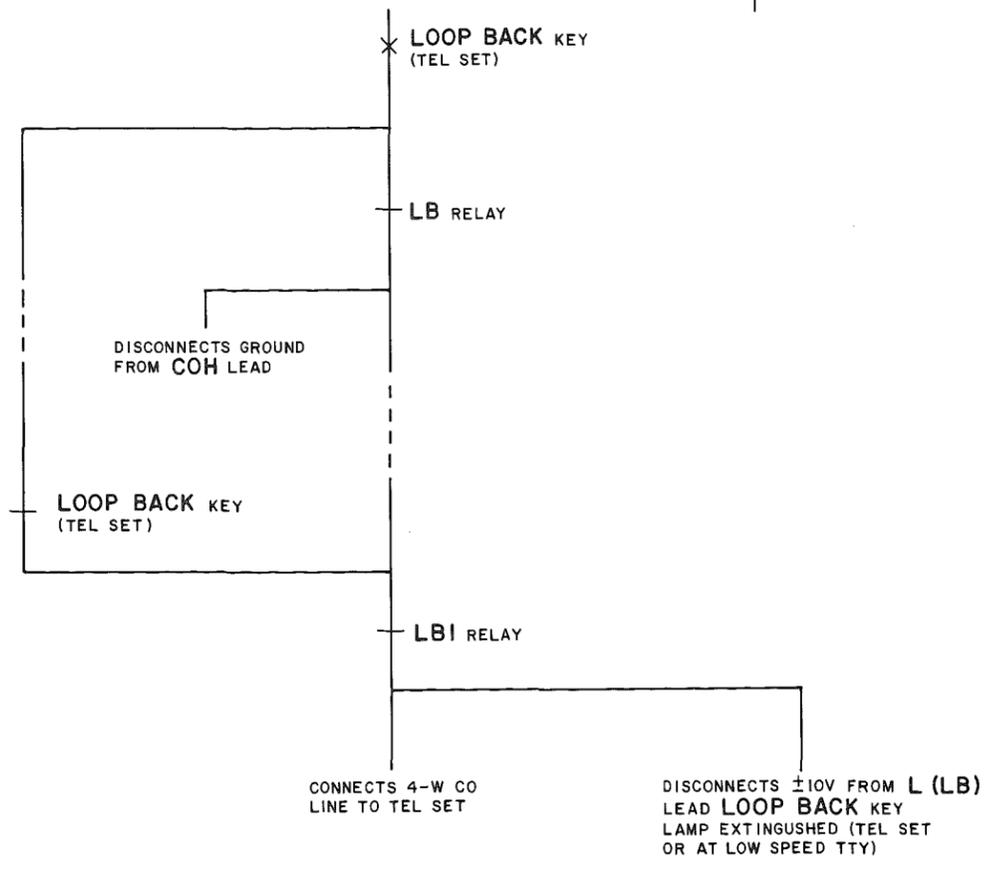
* SH SWITCH (TEL SET)
* APUO RELAY

LOOP BACK KEY

RELAY

RELAY

RELAY

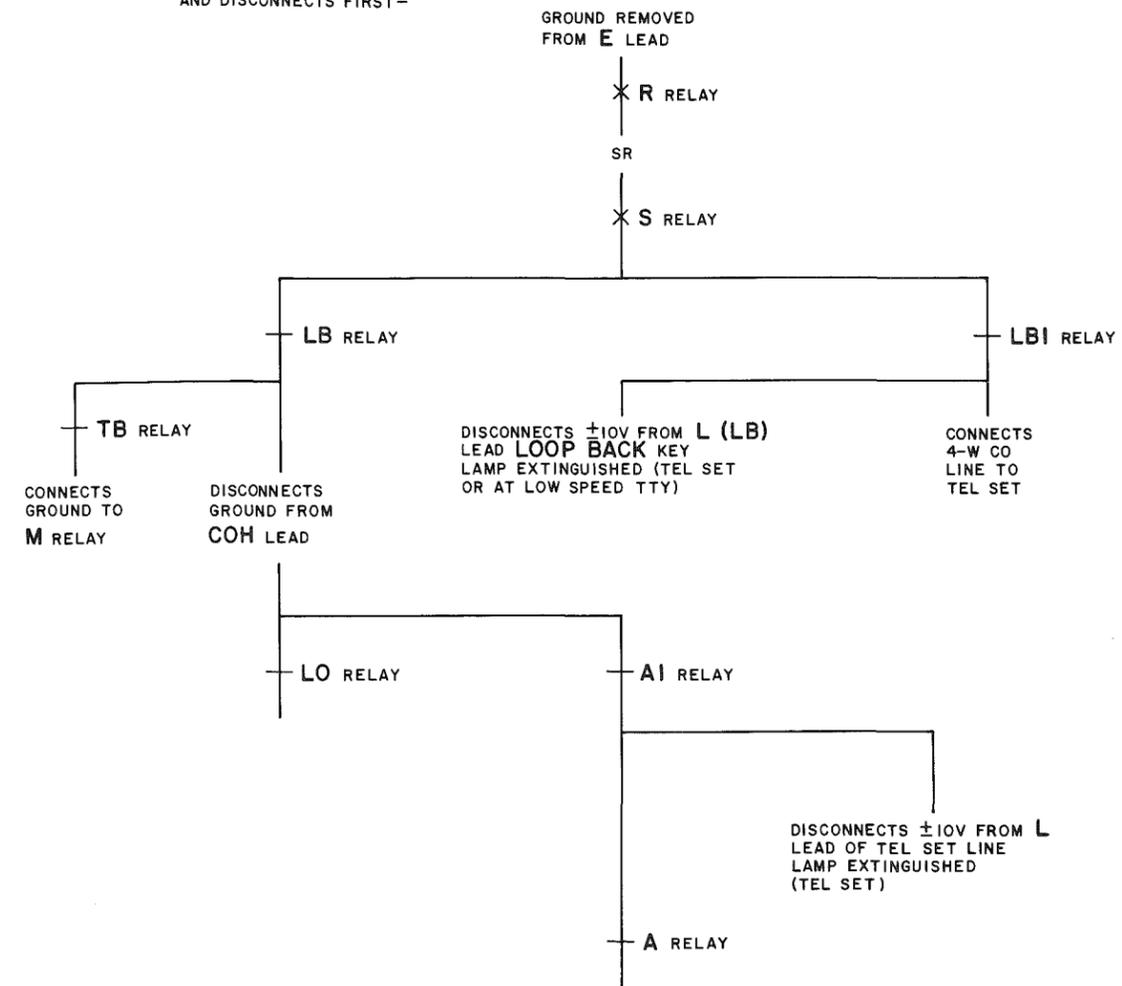


CONNECTS ±10V TO L (LB) LEAD LOOP BACK KEY LAMP LIGHTS STEADILY (TEL SET OR AT LOW SPEED TTY)

CLEAR VOICE CALL REESTABLISHED

(CONTINUED TO SC 4, DISCONNECT OF CLEAR VOICE CALL—WHEN ESTABLISHED CALL IS TERMINATED BY STATION GOING ON-HOOK FIRST)

IF THE TEST CENTER COMPLETES ITS TESTS AND DISCONNECTS FIRST-

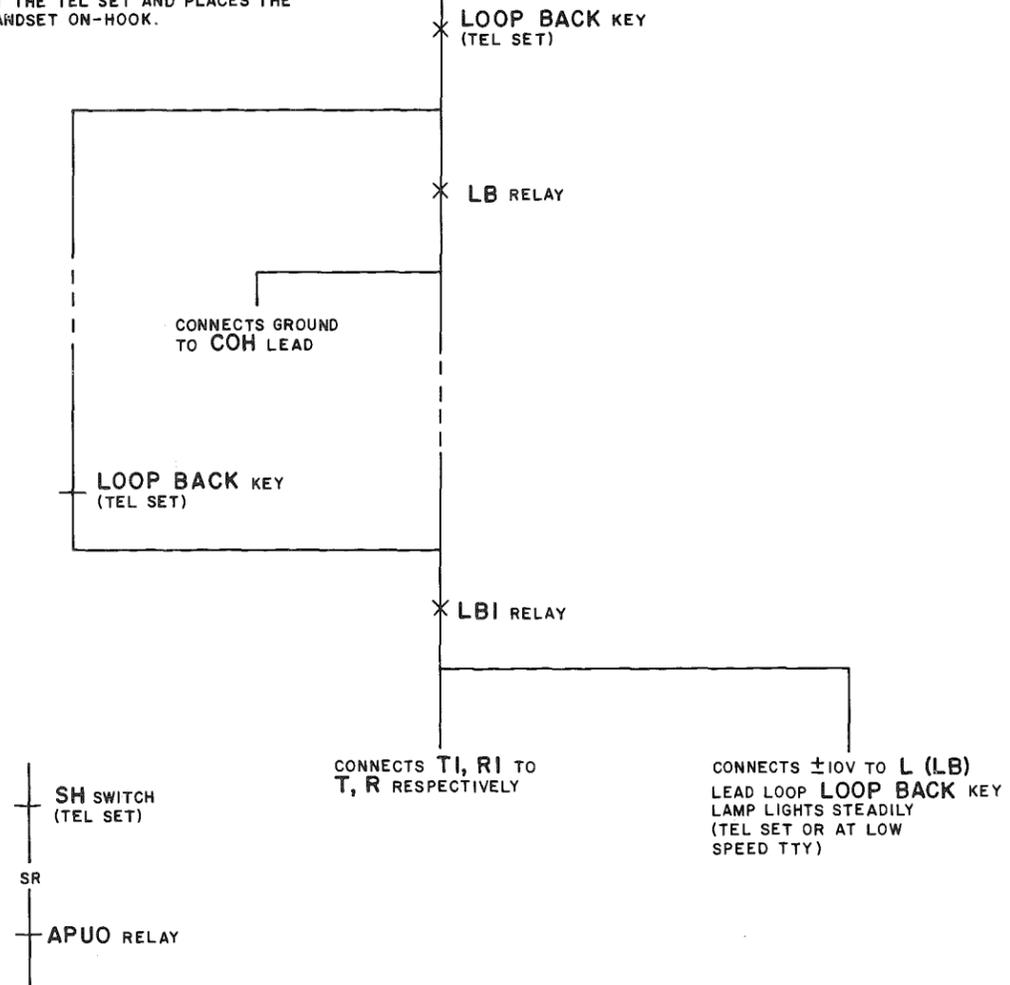


THE CIRCUIT IS NOW IN AN IDLE CONDITION

(CONTINUED FROM SC 1 OR SC 2)

VOICE CALL
ESTABLISHED

AFTER CALL IS ESTABLISHED WITH
TEST CENTER, THE ATTENDANT, WHEN
DESIRING TO GO INTO THE LOOP
BACK CONDITION, MOMENTARILY
OPERATES THE LOOP BACK KEY
AT THE TEL SET AND PLACES THE
HANDSET ON-HOOK.

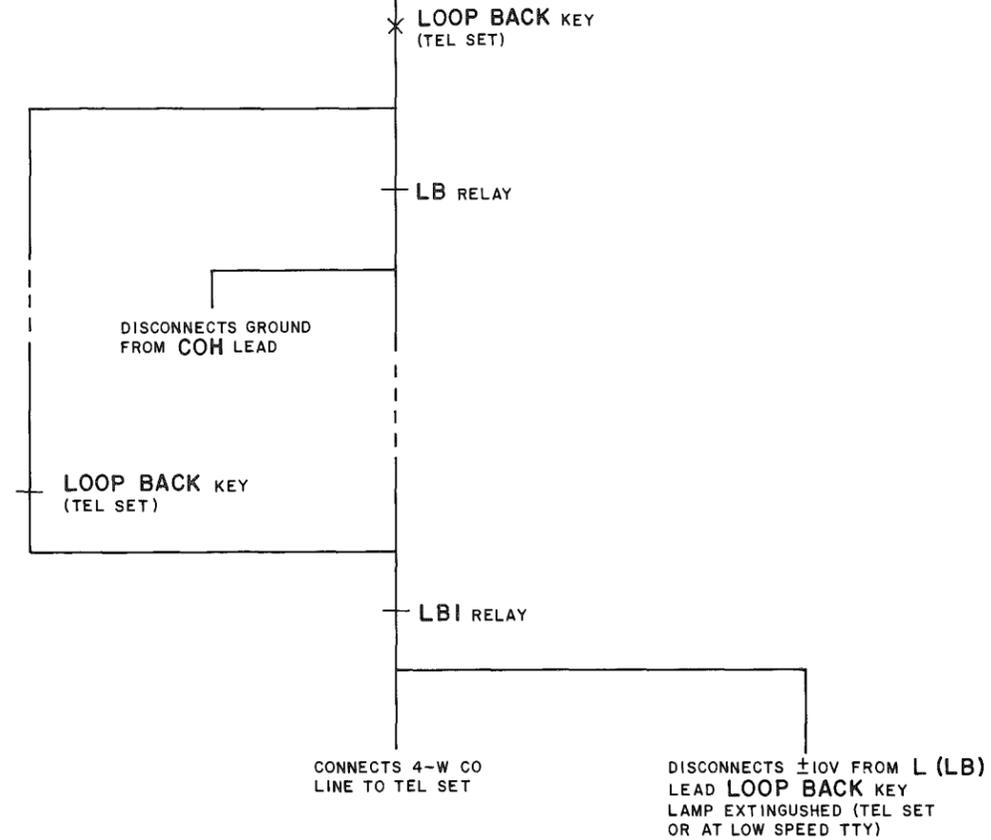


LOOP BACK CONDITION ESTABLISHED

REMOVAL OF LOOP BACK CONDITION-

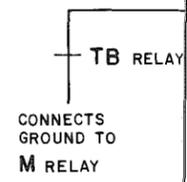
IF ATTENDANT REMOVES LOOP BACK
CONDITION FIRST, ATTENDANT REMOVES
HANDSET FROM SWITCH HOOK AND
MOMENTARILY OPERATES LOOP BACK
KEY.

* SH SWITCH
(TEL SET)
* APUO RELAY

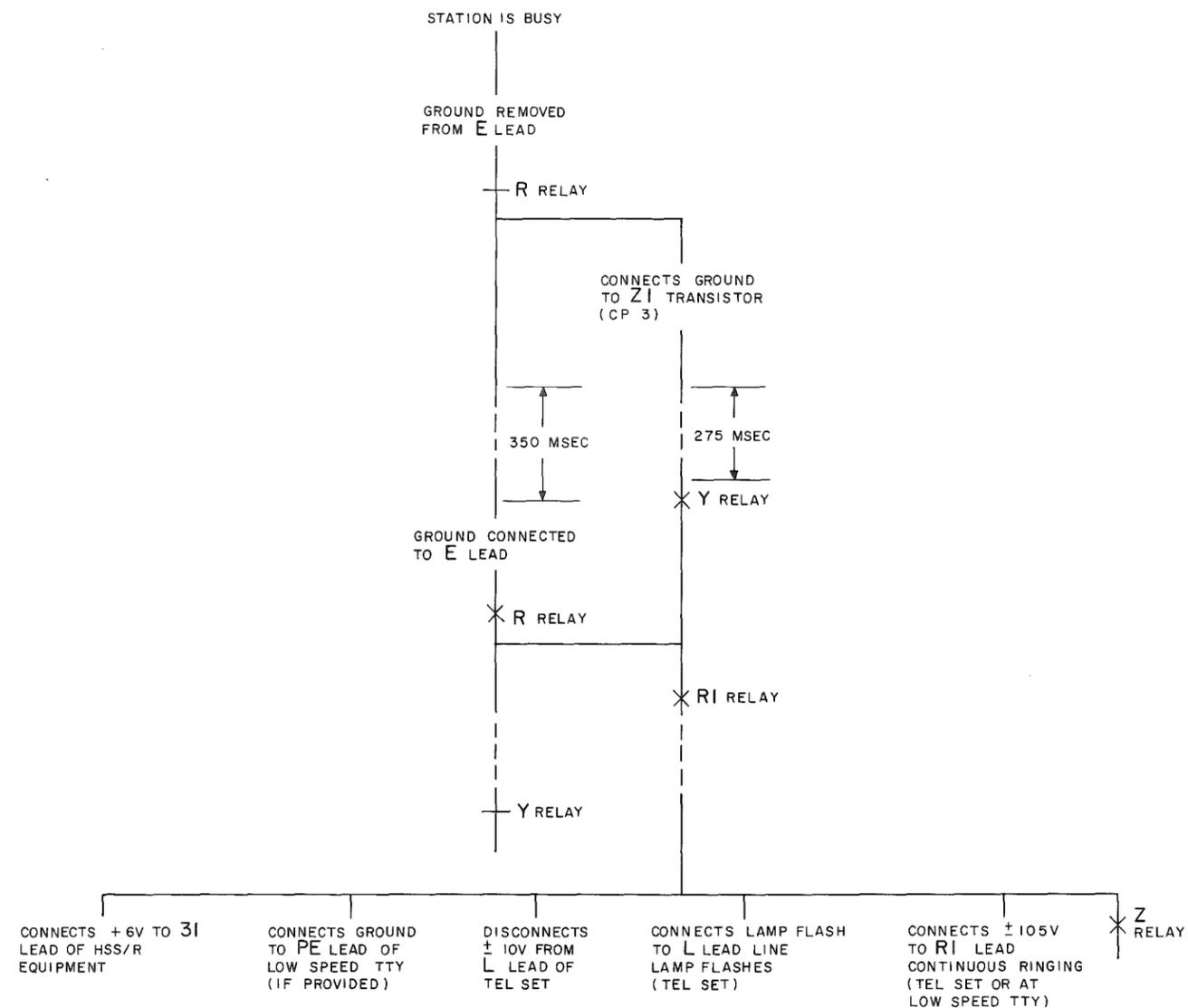


CLEAR VOICE CALL REESTABLISHED

(CONTINUED TO SC 4, DISCONNECT
OF CLEAR VOICE CALL-WHEN
ESTABLISHED CALL IS TERMINATED
BY STATION GOING ON-HOOK FIRST



THE PREEMPT INDICATION
CONSISTS OF A NOMINAL
350 MSEC OPEN OF THE
E LEAD DURING A BUSY
CONDITION.

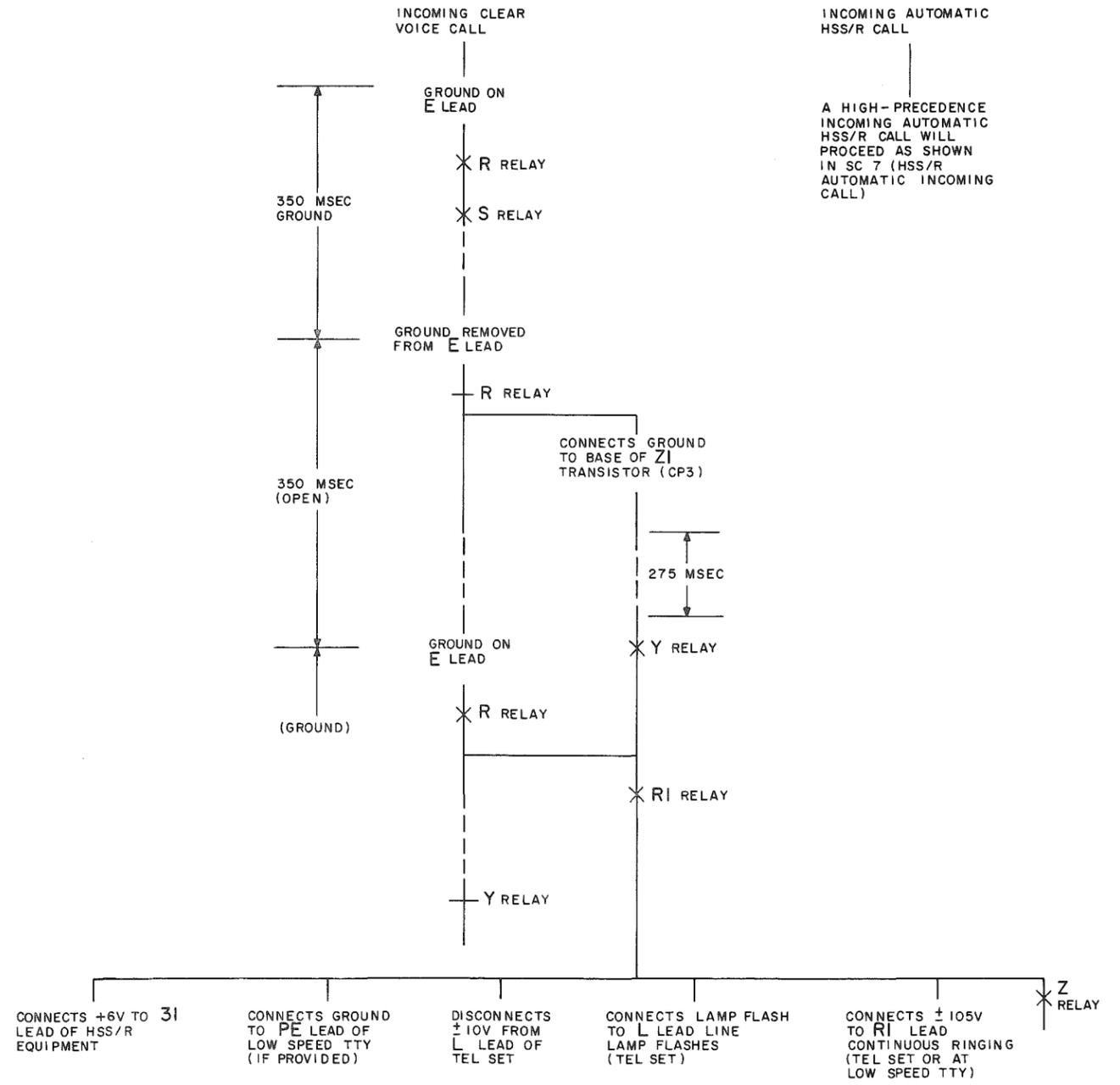


THE ATTENDANT MUST NOW
DISCONNECT THE STATION
TO RETIRE THE PREEMPT
SIGNALS.

CONTINUED TO SC 4, WHEN AN ESTABLISHED VOICE CALL IS
TERMINATED BY HAVING THE STATION GO ON-HOOK FIRST, OR
TO SC 8 WHEN DISCONNECT IS FROM AN AUTOMATIC MODE.

SC10—J53037A Line Circuit Unit—Preemption

A HIGH-PRECEDENCE INCOMING CALL INDICATION WILL CONSIST OF A NOMINAL 350 MSEC GROUND ON THE E LEAD, FOLLOWED BY A 350 MSEC OPEN (WINK) FOLLOWED BY A NORMAL GROUND.

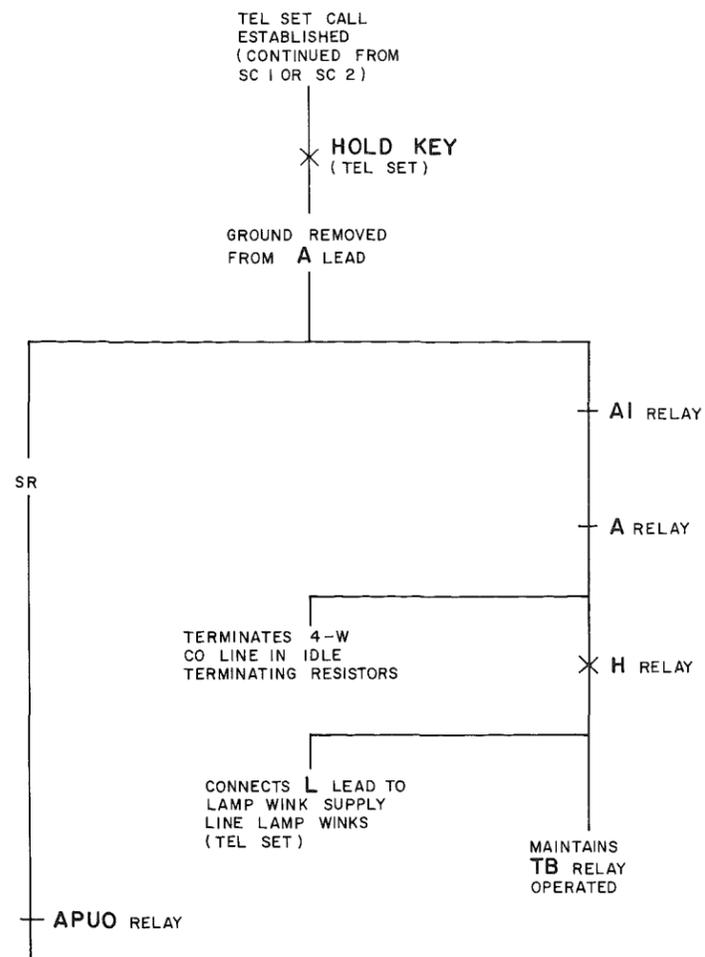


INCOMING AUTOMATIC HSS/R CALL
 A HIGH-PRECEDENCE INCOMING AUTOMATIC HSS/R CALL WILL PROCEED AS SHOWN IN SC 7 (HSS/R AUTOMATIC INCOMING CALL)

CONTINUED TO SC 2—WHERE THE ATTENDANT, UPON RECOGNIZING INCOMING CALL SIGNALS, TAKES THE TEL SET HANDSET OFF-HOOK AND MOMENTARILY OPERATES THE ASSOCIATED LINE KEY.

SC11—J53037A Line Circuit Unit—High-Precidence Incoming Calls

AN ESTABLISHED CALL MAY BE HELD BY MOMENTARILY OPERATING THE HOLD KEY.



THE CIRCUIT IS NOW IN A HOLD CONDITION WITH THE TB RELAY OPERATED TO MAINTAIN AN OFF-HOOK INDICATION TO THE CENTRAL OFFICE, BUT WITH THE TEL SET RELEASED SO THAT IT CAN BE USED WITH SOME OTHER ACCESSIBLE LINE, OR THE TEL SET HANDSET CAN BE PLACED ON-HOOK.



THE TEL SET IS AGAIN CONNECTED TO THE 4-WIRE LINE BY REMOVING THE TEL SET HANDSET OFF-HOOK, IF NOT ALREADY OFF-HOOK, AND MOMENTARILY OPERATING THE LINE KEY.

