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STEP BY STEP SYSTEMS  
NO. 1, 350A, 355A, OR 35E97  
OUTGOING TRUNK CIRCUIT  
E AND M LEAD SIGNALING  
TO CAMA OFFICE

SECTION I - GENERAL DESCRIPTION1. GENERAL FUNCTIONS OF CIRCUIT

1.01 This circuit has one general function: the provision of an outgoing trunk from a step-by-step office to a No. 4 or No. 5 crossbar or crossbar tandem office arranged for handling CAMA calls.

2. GENERAL METHOD OF OPERATION

2.01 This trunk is seized by the closure of its input loop after the calling subscriber has dialed a directing code. It repeats the subscriber's dial pulses to the crossbar office as M lead signals.

2.02 On disconnect by the calling subscriber, this circuit will restore to normal. If the called subscriber disconnects first, and the calling subscriber fails to disconnect by the end of a timed interval, the incoming trunk in the crossbar office signals this circuit to wink off the selectors through which it was seized. After winking off the selectors, this circuit restores to normal.

2.03 If the incoming trunk in the crossbar office is made busy, this trunk is also made busy.

SECTION II - DETAILED DESCRIPTION1. NORMAL CALL, SC1SEIZURE

1.01 When this circuit is seized by a selector, relay A operates over the subscriber's loop. A operates relay B and connects battery through lamp M to the M lead to seize the incoming trunk in the crossbar office. B connects ground to the incoming S lead to hold the preceding circuits and makes this circuit appear busy. B operates relay B1 which initiates a start timing in the connecting timing circuit. B also opens the BR lead to the Traffic Register Circuit.

PULSING

1.02 The A relay follows the subscriber's dial pulses and repeats them to the crossbar office by transferring the M lead from battery to ground on each open of the subscriber's loop. The B relay remains operated during pulsing.

1.03 After dialing is completed, the incoming trunk in the crossbar offices causes the E lead to be grounded, thereby operating relay E. E operates E1. E1 will ground lead C for cutting through the 2-party message rate trunk when it is used. With both E and E1 operated, ground on the S lead is supplied through contacts on these relays.

CALLING SUBSCRIBER DISCONNECTS

1.04 When the calling subscriber disconnects at the end of the call, A releases. A released transfers the M lead from battery to ground to release the polar relay in the CX signaling set. This relay released releases E which in turn releases E1. A released also opens the operating path for the slow release B relay which releases after an interval and removes ground from the S lead. B released also opens the operating path for relay B1, which releases.

1.05 If the calling subscriber disconnects before the completion of dialing (E and E1 unoperated) the circuit action is quite similar. The A and B relays, the only relays operated, release as described above.

2. TIMED DISCONNECT, SC2

2.01 If the called subscriber disconnects first, and the calling subscriber fails to disconnect within an interval of from 13 to 32 seconds thereafter, the incoming trunk in the crossbar office causes the ground to be removed from the E lead thereby releasing E. E1 does not release at this time because it is held through a make contact on the operated A relay.

2.02 With E released and E1 operated, ground is removed from the S lead to release the preceding circuits. When these circuits release, the holding path for the A relay is opened so A releases. A released transfers the M lead from battery to ground to release the crossbar trunk, releases the E1 relay to reconnect ground to the S lead, and opens the holding path for the B relay. When B releases it removes ground from the S lead to make this circuit appear idle. B released also opens the operate path for relay B1, which releases.

3. FUSE FAILURE MAKE-BUSY FEATURE

3.01 A make-busy relay is provided to make this circuit busy if the battery

supply fails. Failure of the battery supply releases the normally operated MB relay. MB released grounds the incoming S lead to make this circuit appear busy and removes ground from the BR lead to the Traffic Register Circuit.

4. OPERATION IN A 35E97 OFFICE, Z OPTION

4.01 When this circuit is used in a 35E97 office the lead designations differ from those used in this description as indicated on the SD. With this exception, an idle circuit is indicated by 500-ohm battery on the C lead, the circuit operation being identical to that described above.

5. TIMED DISCONNECT ON PARTIAL DIAL CALLS, SC4

5.01 Upon seizure of this trunk, after the B1 relay operates a start timing condition is initiated in the connecting timing circuit by grounding the PU9 or ST lead. The receipt of this ground results in the return of a -48 volt battery signal over the same lead to operate the PU relay. If the calling customer fails to dial the proper number of digits (partial dial condition) before a timed interval of 3 to 7 or 4 to 12 minutes, depending on the type of office, the timing circuit will ground the A9 or ET lead to operate the E1 relay. The E1 relay operated removes ground from the S lead to release the preceding circuits. When these circuits release the holding path for the A relay is opened so A releases. A released opens the lockup path of the E1 relay, so E1 releases. E1 released reconnects ground to the S lead and releases the PU relay. A relay released also opens the operate path of the slow release B relay. When B releases, it removes ground from the S lead to make this circuit appear idle. B released also opens the operate path for relay B1, which releases.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The battery voltage shall be minimum -45 volts, maximum -52 volts.

1.02 Relay Working Limits

	Max Ext Ckt Loop	Min Ins Res
A Relay, Pulsing	1500 Ohms	15,000 Ohms
A Relay, Supervision	2375 Ohms	15,000 Ohms

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

- 3.01 To ground the sleeve lead to the preceding circuits when this circuit is seized.
- 3.02 To transfer the M lead from ground to battery when this circuit is seized.
- 3.03 To repeat pulses, transforming incoming loop pulses to signals on the M lead.
- 3.04 To release the switch train when the called party disconnects first and the calling party fails to disconnect within a timed interval.
- 3.05 To restore to normal on disconnect by the calling subscriber.
- 3.06 To test busy in case the battery supply to this circuit fails.
- 3.07 To test busy when the incoming trunk at the crossbar office causes ground to be connected to the E lead.
- 3.08 To wink-off the preceding circuits when this circuit is made busy from the crossbar office immediately upon subscriber disconnect.
- 3.09 To ground lead C for cutting through the message rate trunk.
- 3.10 To provide for timed disconnect on partial dial calls.

4. CONNECTING CIRCUITS

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

- (a) Traffic Register Circuit - SD-30896-01.
- (b) Rotary Out Trunk Switch Circuit - SD-30868-01.
- (c) Selector Bank Multiple Circuit - SD-32123-01.
- (d) Type C CX Set and Repeating Coil Circuit - SD-95004-01.
- (e) CX Signaling Circuit - SD-95029-01.
- (f) Auxiliary Trunk Circuit - SD-32187-01.
- (g) Auxiliary Timing Circuit - SD-32525-01.
- (h) Common Timing Circuit - SD-31310-01, SD-31558-01.
- (i) Incoming Trunk Circuit - E & M Lead Supervision Dial Pulsing - SD-1B004-01.

5. TAKING EQUIPMENT OUT OF SERVICEBUSY CIRCUIT FROM TEST JACK T

5.01 This circuit may be made busy by inserting a plug in jack T. When a plug is inserted in this jack, it puts ground on the sleeve lead to make this circuit appear busy and opens the BR lead to the all-trunks-busy register circuit. Test jack T also provides for making operating tests of this circuit with a hand test set or the trunk test circuit.

BUSY CIRCUIT FROM CROSSBAR OFFICE

5.02 When this circuit is to be made busy while it is in the idle condition, the incoming trunk in the crossbar office causes the E lead to be grounded thereby operating relay E. Relay E operated connects ground from relay MB to the sleeve lead to make this circuit appear busy.

5.03 If this circuit is to be made busy from the crossbar office immediately upon subscriber disconnect the sequence is as follows, refer to SC3. When the calling subscriber disconnects at the end of the call relay A releases, in turn releasing the slow release B relay. Since this circuit and the associated incoming trunk are to be made busy immediately upon subscriber disconnect, the release of the A relay causes the operation of relay MB of the incoming trunk. MB in turn causes the E lead to be grounded thereby causing the E relay to remain operated reoperating it if

it has released. When relay B releases, it releases relay B1 and B removes ground from the sleeve lead to wink-off the preceding circuits. The wink-off is controlled by the release time of relay B1. The released B1 and operated E connects ground from the fuse make-busy relay to the sleeve lead, to make this circuit appear busy as long as its associated incoming trunk in the crossbar office is out of service.

FUNCTION OF TEST JACK TT

5.04 Test jack TT provides for opening the E and M leads to the CX signaling set to prevent false seizure of the incoming trunk in the crossbar office when the A relay is being tested or readjusted. It is also used for testing relay E.

SECTION IV - REASONS FOR REISSUED. Description of Changes

D.1 Circuit Notes 102 and 105 are revised.

The revised table shows that the partial dialed feature may be used when calls are completed to all types of CAMA offices, except crossbar tandem CAMA equipped with 10-digit registers.

D.2 Information Note 302 is removed from the drawing. It read: "This feature can only be applied when this trunk terminates in an incoming trunk which is associated with a 3-digit incoming register circuit at the crossbar tandem office."

BELL TELEPHONE LABORATORIES, INCORPORATED

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