STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
2-WAY INTERLOCAL TRUNK CIRCUIT
COMPOSITE SIGNALING TYPE "B"
OR SIMPLEX SIGNALING
WITH PULSE CORRECTION ON INCOMING CALLS

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 Pulsing to the Incoming Selector is changed from battery-ground to loop.

B. CHANGES IN APPARATUS

B.1 Added

(J) resistance 18AE 600Ω ("G" option)
(C) network 177A ("F" option)

B.2 Superseded

(A) resistance 59E 150Ω ("H" option)
(B) resistance 18F 150Ω ("H" option)

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Option "G" is added to provide for loop pulsing.

D.2 Option "F" and note 106 is added to provide for contact protection of contacts on relay (TO).

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is designed to provide 2-way service between two step-by-step offices over CX trunks.

2. WORKING LIMITS

2.1 Subscriber's limits.

Maximum external circuit loop 1000 ohms, minimum insulation resistance 15,000 ohms.

3. FUNCTIONS

3.1 Functions common to both outgoing and incoming calls.

3.11 To ground the sleeve to the selector multiple when seized either on outgoing or incoming calls.

3.12 To operate a "trunks busy" register when all the trunks in the group are busy.

3.2 Functions on outgoing calls.

3.21 To connect ground to the "S" lead for the purpose of holding the preceding selectors and to make this trunk busy to the other selectors.

3.22 To convert the loop pulses received from the subscribers dials to battery pulses to the CX circuit.

3.23 To provide reverse battery supervision to the calling subscriber.

3.24 To restore to normal when the calling party disconnects.

3.3 Functions on incoming calls.

3.31 To connect the trunk through to the incoming selector when the trunk is seized at the distant end.

3.32 To convert the CX pulses to loop pulses.

3.33 To correct the pulses received from the CX circuit.

3.4 To reduce the impedance of the circuit during the pulsing of each digit.

3.5 To signal the distant end when the called party answers.

3.6 To provide for operation with telephone repeater.

3.7 To restore to normal when the calling subscriber at the distant end disconnects.

4. CONNECTING CIRCUITS

4.1 Local selector circuit - SD-30200-01.

4.2 Repeating coil and composite set circuit. SD-63666-02 (Typical) or SD-95015-01.

4.3 Signaling circuit - SD-95048-01, SD-56202-01 (Typical).

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4.4 Incoming selector circuit - SD-30200-01.

4.5 Traffic register circuit - SD-31976-01.

DESCRIPTION OF OPERATION

5. DESCRIPTION OF OPERATION ON AN OUTGOING CALL

5.1 Seizure

When this circuit is seized relay (A) operates over the subscriber's loop. The operation of relay (A) places battery through the (A) lamp on the "M" lead to the CX signaling circuit and operates relay (B). The operation of relay (B) grounds the sleeve, operates relay (B2) and removes the (H) resistance and (D) condenser from the T and R leads. The operation of relay (B2) opens the circuit to the traffic register grounds the sleeve, and prepares the circuit for operating relay (F) to reverse the loop when the called party answers.

5.2 Pulsing

Each time a digit is received by this circuit relay (A) follows the pulses removing battery and placing ground on the "M" lead to the CX signaling circuit through transmitting pulses to the distant office. The (B) and (B2) relays remain operated during the pulsing of the digit as they are slow to release.

5.3 Supervision

When the called subscriber answers, ground is connected to the "E" lead by the CX signaling circuit which operates relay (F). The operation of relay (F) reverses the tip and ring of the subscribers loop.

5.4 Disconnect

When the calling subscriber disconnects, relay (A) releases removing battery from the "M" lead to the signaling circuit and allows the release of relay (B). The release of relay (B) releases relay (B2). The purpose of relay (B2) is to hold a ground on the sleeve to prevent the originating of a call until the switches and trunk circuit at the distant end have returned to normal.

6. DESCRIPTION OF OPERATION ON AN INCOMING CALL

6.1 Seizure

"R" Option

When this circuit is seized on an incoming call, the (CX) relay grounds the "E" lead and operates relay (B1). The operation of relay (B1) operates relay (D), and prepares a circuit for the operation of relay (TC). Relay (D) operated opens the circuit to the traffic register, grounds the sleeve, disconnects the tip and ring leads from banks of local selectors and closes loop to incoming selector through the (E) relay and (C) resistance.

"Q" Option

When this circuit is seized on an incoming call, the signaling circuit grounds the "E" lead and operates relay (PR). The operation of relay (PR) operates relay (B1) which operates as with "R" option.

6.2 Pulsing

"R" Option

When relay (CX) in the CX signaling circuit closes its back contact on each pulse of each digit relay (TC) operated.

"Q" Option

When the relay in the signaling circuit removes ground from the "E" lead on each pulse of each digit, relay (PR) releases, operating relay (TC).

Relay (TC) operated, operates relay (LU) and locks itself operated through the contacts of relay (LU) until relay (LU) operates. This is done in order to insure that relay (TC) remains operated for a satisfactory period of time on short pulses from the (CX) relay.

Relay (TC) operated, also operates relay (TO), prevents the opening of the bridge to the incoming selector by closing its contacts before the contacts of relay (TO) break and short circuits the winding of relay (LU1).

Relay (TO) operated, operates relay (C), and would open the bridge to the incoming selector if relay (TC) were not operated.

Relay (C) operated, removes the bridge and arranges for loop pulsing through resistance J to the incoming selector.

With relay (LU) operated, as described above, the circuit to relay (TC) is opened, allowing this relay to release.

Relay (TC), released, releases relay (TO).

However, relays (TC) and (TO) are slow releasing relays. Consequently, the bridge to the incoming selector is

opened for a definite interval between the release of relays (TC) and (TO) and this open interval is independent of the time that relay (CX) may be released during pulsing.

Relay (TO), released, closes the pulsing bridge to the incoming selector if relay (LU1) is not operated.

If relay (CX) does not reoperate by the time relay (TC) releases, relay (LU1) will operate in series with relay (LU) and open the bridge to the incoming selector.

When relay (CX) reoperates, relays (LU) and (LU1) will release and prepare the circuit for the next digit.

6.3 Supervision

When the called party answers, the tip and ring are reversed by the incoming selector. This causes the operation of the electrical polarized relay (E). Relay (E), operated, removes ground from and places battery on, the "M" lead to the CX signaling circuit which causes reversal of battery to be transmitted to the calling subscriber.

6.4 Disconnection

When the called party disconnects, relay (E) releases and causes reversal of battery to be transmitted to the calling subscriber.

When the calling subscriber disconnects, relay (CX) releases.

Relay (CX) released, opens circuit to relay (B1) and operates relays (TC), (LU), (TO), (C) and (LU1) as described in paragraph 6.2.

Relay (B1), released, allows relays (LU) and (LU1) to release.

Relay (B1) released, also opens the bridge to the incoming selector in order to prevent this bridge from being reclosed when relay (LU1) releases, before relay (C) releases.

With relays (CX), (B1), (C), (D), (E), (LU), (LU1), (TC) and (TO) released the circuit is restored to normal.

*When relay (LU1) operated on the release of relay (CX) it opened the bridge to the incoming selector circuit and, since relay (CX) does not reoperate under this condition (disconnect) the bridge remains open. This is done so that the bridge to the incoming selector will not be reclosed by the release of relay (TO), thereby giving an additional pulse to the switch and causing the switch to wait for the release of relay (B1) before it starts to release.

7. RESISTANCES

7.1 The (J) resistance is provided for the purpose of improving the pulsing condition and reducing the acoustic shocks by the use of a minimum loop of 600 ohms.

8. TESTING

8.1 The (A) jack is provided for convenience in making routine tests of the circuit. The (B) and (C) jacks are provided for convenience in making pulsing tests of the pulse correcting feature of the circuit. The (C) jack is also used for connection to the per cent break meter circuit for checking the per cent break of contacts 5 and 6 on the (A) relay when operated from the pulsing test set circuit. The toggle switch is provided so that (F) resistance will not be in parallel with the (TC) relay while testing.

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DEPT. 2313-ASD-RLL-ET