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CROSSBAR SYSTEMS
NO. 3
EMERGENCY REPORTING AUXILIARY
LINE CIRCUIT PLUG-ENDED

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SECTION I - GENERAL DESCRIPTION1. PURPOSE OF CIRCUIT

1.01 This circuit is used to direct local or incoming calls (10 maximum simultaneously) to the public emergency line

(10 maximum stations terminated on line). It also provides means for the community representative to actuate the public emergency alarm. For example, this circuit can be used for fire reporting and sounding of the fire alarm.

2. GENERAL DESCRIPTION OF OPERATION

2.01 This circuit can serve in common up to ten line switch appearances, thus permitting ten connections to this line at the same time. The initial seizure causes ringing current (interrupted at 60 IPM) to be applied to the emergency station. Subsequent connections are then added to the talking circuit as they arrive without ringing the established connection. When the community representative is satisfied with the details of the reported emergency, the public alarm may be sounded by operating a key located at the station. As many as 9 additional stations (under certain conditions) may be connected in parallel with the primary emergency station for monitoring purposes.

2.02 An adjustable time interval is provided to continue sounding the alarm after the key is operated at the customer station. This arrangement permits the alarm to sound automatically for a preset timed interval after the key at the customer's station has been operated and released. This permits the community representative to actuate the alarm and then leave the premises.

2.03 Since the alarms must be actuated by grounding the ring side of the customer's line, this circuit is susceptible to false signals that may sound the alarms. To counter this condition a delay arrangement is incorporated in this circuit to afford protection against extraneous signals that may falsely actuate the alarms. A signal that operates relays D and PT or relay D alone with the customer's station in an on-hook condition will be allowed to persist for 3.4 to 4 seconds before introducing a major office alarm. A signal that operates relay PT alone will be allowed to persist for 4 to 5 minutes before introducing a major office alarm. The additional

time permitted here allows the community representatives to converse a minimum of 4 minutes after the calling customer disconnects.

2.04 Since a false signal may occur with the customers station in an off-hook condition, this circuit will recognize ground signals on the ring lead only if they persist for longer than 1.7 to 2.1 seconds. This delay arrangement prevents extraneous ground signals of short duration from falsely sounding the alarms.

SECTION II - DETAILED DESCRIPTION

1. ESTABLISHING INITIAL CONNECTION - SCL

1.01 When the marker connects this circuit to an intraoffice or an incoming trunk through the switching network, the trunk applies ringing current to the R lead and grounds the T and S leads.

1.02 The ringing current and ground on the R and T leads, respectively, causes the R tube to fire and operate the R relay, and the grounded S lead will be used later to operate the SL relay.

1.03 The operation of relay R:

- (a) Operates the RA relay.
- (b) Opens the T and R leads.

1.04 The operation of relay RA:

- (a) Connects relay RB to the LB lead (60 IPM).
- (b) Removes the shorts from the T and R resistors in the T and E leads, respectively.
- (c) Grounds the midpoint of the A resistor.
- (d) Operates the SL relay.
- (e) Provides its own lock path.

1.05 The operation of relay SL:

- (a) Partially closes the T and R leads.
- (b) Breaks the ALA relay operating lead.
- (c) Grounds the ST lead.

(d) Closes the RA relay lock path.

(e) Provides its own lock path.

1.06 The grounded ST lead starts the 60-IPM interrupter circuit which pulses the RB relay.

1.07 The operation of relay RB:

- (a) Applies +105 volts to both the T and R leads to ring the emergency line (Y option).
- (b) Applies AC-DC or SUP- to the R lead and ground to the T lead to ring the emergency line (Z option).
- (c) Removes the PT relay windings with ground and battery from the T and R leads, respectively.

1.08 When the called station answers, the PT relay operates over the line loop during the silent interval (RB relay normal).

1.09 The operation of relay PT operates the PTA relay.

1.10 The operation of relay PTA:

- (a) Connects the A inductor across the T and R leads which trips the ringing in the intraoffice or incoming trunk.
- (b) Operates the PTB and PTS relays.
- (c) Partially closes the operating lead of the ALA relay.

1.11 When the ringing is tripped, the R tube extinguishes releasing the R relay.

1.12 The operation of relay PTB:

- (a) Partially closes the operating lead of the D2 relay.
- (b) Changes the timing of the TD timer from 3.4 to 4 seconds to 1.7 to 2.1 seconds.
- (c) Locks itself to ground through a contact on the PTA relay.
- (d) Transfers a ground from the ALB relay operating lead to the TD relay operating lead.

1.13 The operation of relay PTS:

- (a) Partially closes the operating lead of the ALA relay.
- (b) Releases the RB relay.
- (c) Opens the ST lead.
- (d) Releases the RA relay.
- (e) Provides a locking ground for the ALB relay.

1.14 The connection is now established between the calling party and the community representative on the public emergency line.

2. ESTABLISHING SUBSEQUENT CONNECTION - SC3

2.01 Same as operations 1.01 through 1.05 except LB and ST leads are not activated due to operated PTS relay. This prevents the RB relay from operating and eliminates the ringing of the already busy emergency line.

2.02 The ringing in the intraoffice or incoming trunk is tripped by the closed loop through the A inductor, which extinguishes the R tube releasing the R relay.

2.03 The release of relay R with the PTS relay already operated, releases the RA relay.

2.04 This subsequent connection is now established, connecting this party in parallel with previous established connections to the emergency line.

2.05 As many as ten connections can be set up simultaneously to the emergency line.

3. SOUNDING PUBLIC ALARM - SC2

3.01 When the community representative at one of the associated stations operates the alarm sounding key, the T lead is opened and the R lead is grounded.

3.02 Relay PT holds on its secondary winding and relay D operates on its P1 winding to the grounded R lead.

3.03 The operation of relay D operates the D1 relay.

3.04 The operation of relay D1:

- (a) Starts the TD timer.
- (b) Partially closes a circuit to ground the R lead.

(c) Partially closes a circuit to place +105 volts on the T and A leads (Y option).

(d) Partially closes a circuit to place -130 volts on the T and A leads (Z option).

(e) Partially closes an operating path of the ALB relay.

(f) Partially removes the shunt from the PT resistor.

(g) Partially closes the operating path of the D2 relay.

(h) Locks itself around a break-contact on the D2 relay.

(i) Removes the K resistor shunt from the C capacitor and partially closes the start circuit for the TM timer.

(j) Opens the operating lead of the PTB relay.

(k) Supplies an operating ground for the TD relay.

3.05 When the TD timer operates, it operates the TD relay.

3.06 The operation of relay TD:

(a) Operates the D2 relay.

(b) Transfers its own operating ground from its primary winding to its secondary winding.

(c) Partially closes on operating path for the ALB relay.

3.07 The operation of relay D2:

(a) Starts the TM timer.

(b) Disconnects the incoming T and R leads from the outgoing T and R leads.

(c) Opens the operating lead of the D1 relay.

(d) Opens the operating lead of the ALA relay.

(e) Removes the shunt from the PT resistor.

(f) Grounds the R lead.

(g) Provides a locking ground for the TM relay.

(h) Places +105 volts on the T and A leads (Y option).

- (i) Places -130 volts on the T and A leads (Z option).
- 3.08 The signals on the T and/or A leads activate the public alarm. The community representative must hold the alarm sounding key operated until the alarm is heard to eliminate the possibility of false operation due to a momentary extraneous signal. The alarm sounding key is released when the alarm is heard and then must hang up before the TM relay operates to avoid activating a major office alarm (see 4).
- 3.09 When the calling party or parties hang up, their respective SL relays release.
- 3.10 After a timed interval determined by options Q, N, M, or none, the TM timer operates, operating the TM relay.
- 3.11 The operation of relay TM:
 - (a) Supplies an operating ground for the ALB relay.
 - (b) Releases the D1 relay.
 - (c) Locks itself to the D2 or ALA relay.
- 3.12 The release of relay D1:
 - (a) Releases the D, D2, and PT relays.
 - (b) Silences the public alarm.
- 3.13 The release of relay D2 releases the TM relay.
- 3.14 The release of relay PT releases the PTA relay.
- 3.15 The release of relay PTA releases the PTB and PTS relays.
- 3.16 The release of relay PTB releases the TD relay.
- 3.17 The circuit is now in its idle state.

4. MAINTENANCE ALARM - PT RELAY OPERATED - SC4

- 4.01 If a cable fault should cause relay PT to operate without operating relay D, relay PTA will operate.
- 4.02 The operation of relay PTA:
 - (a) See 1.10.
 - (b) Operates the PTB and PTS relays.

- 4.03 The operation of the PTS relay:
 - (a) See 1.13.
 - (b) Operates the ALA relay.
- 4.04 The operation of relay ALA:
 - (a) Provides a locking ground for the TM relay.
 - (b) Removes the K resistor shunt from the C capacitor.
 - (c) Transfers its own locking ground for its operating ground.
 - (d) Sets the TM timer for its 4- to 5-minute interval.
 - (e) Starts the TM timer.
 - (f) Partially closes the operating path of the ALB relay.
- 4.05 When the TM timer operates after four to five minutes, the TM relay operates. (This interval enables the community representatives to converse for a minimum of four minutes after the calling party disconnects before a major office alarm is sounded during normal operation.)
- 4.06 The operation of relay TM:
 - (a) See 3.11.
 - (b) Operates the ALB relay.
- 4.07 The operation of relay ALB:
 - (a) Grounds the MJ and ERL leads activating the major office alarm.
 - (b) Releases the ALA relay.
 - (c) Locks its primary winding to the LK lead.
 - (d) Locks its secondary winding to a contact on the PTS relay.
- 4.08 The release of the ALA relay releases the TM relay.
- 4.09 When the loop closure is opened or the cable fault is cleared, relays PT, PTA, PTB, and PTS will release.
- 4.10 The major alarm may then be retired by releasing the ALB relay, by removal of ground from the LK lead through operation of the AR relay in the alarm sending circuit.

5. MAINTENANCE ALARM - PT AND D RELAYS OPERATED - SC5

- 5.01 If a cable fault should cause relays PT and D to operate, relays PTA and D1 will operate.
- 5.02 The operation of relay PTA:
- (a) See 1.10.
 - (b) Operates the PTS relay.
- 5.03 The operation of relay D1:
- (a) See 3.04.
 - (b) Starts the TD timer.
- 5.04 When the TD timer operates, it operates the TD relay.
- 5.05 The operation of relay TD:
- (a) See 3.06.
 - (b) Operates the ALB relay.
- 5.06 The operation of relay ALB:
- (a) See 4.07.
 - (b) Grounds the MJ and ERL leads activating the major office alarm.
- 5.07 When the cable fault is cleared, relays PT, D, PTA, D1, PTS, and TD will release.
- 5.08 The major alarm may then be retired by releasing the ALB relay, by removal of ground from the LK lead through operation of the AR relay in the alarm sending circuit.

6. MAINTENANCE ALARM - D RELAY OPERATED - SC6

- 6.01 If a cable fault should cause relay D to operate without operating relay PT, relay D1 will operate.
- 6.02 The operation of relay D1:
- (a) See 3.04.
 - (b) Starts the TD timer.
- 6.03 When the TD timer operates, it operates the TD relay.

6.04 The operation of relay TD:

- (a) See 3.06.
- (b) Operates the ALB relay.

6.05 The operation of relay ALB:

- (a) See 4.07.
- (b) Grounds the MJ and ERL leads activating the major office alarm.

6.06 When the cable fault is cleared, relays D, D1, and TD will release.

6.07 The major alarm may then be retired by releasing the ALB relay, by removal of ground from the LK lead through operation of the AR relay in the alarm sending circuit.

7. TESTING

7.01 Testing of this auxiliary line circuit is performed by setting up a test connection to this auxiliary line from a test line. Routine operations are performed from the test line in the same manner as for a regular service call.

8. MISCELLANEOUS

- 8.01 Capacitors T and R are provided to isolate the incoming circuit.
- 8.02 Resistors T and R are provided to stabilize the charge on the T and R capacitors.
- 8.03 The A inductor and A resistor are provided as a ringing trip path.
- 8.04 The A capacitor and C and D resistors are the timing elements of the TD timer.
- 8.05 The A and B lamps are provided to limit the currents supplied by the -130 volts and the +105 volts or AC-DC or SUP- supplies, respectively.
- 8.06 The B resistor is provided to limit the -130 volts current.
- 8.07 The TA and RA resistors are provided to stabilize the charge on the T and R capacitors.
- 8.08 The C capacitor, G, H, and J resistors, and A potentiometer are the timing elements of the TM timer.

- 8.09 The K resistor is provided to remove the charge from the C capacitor.
- 8.10 The A diode is provided as the trigger element of the TM timer.
- 8.11 The PT resistor is provided to limit the PT relay holding current.

<u>Designation</u>	<u>Meaning</u>
RA	Auxiliary Ring
RB	Auxiliary Ring
SL	Sleeve
TD	Time Delay
TM	Timer

SECTION III - REFERENCE DATA1. WORKING LIMITS

- 1.01 See Notes 302, 303, and 304.
- 1.02 Customers Loop

<u>Max Ext Ckt Loop Res</u>	<u>Earth Potential</u>
2400 ohms	0
2200 ohms	-5
1800 ohms	-10
1300 ohms	-15
1100 ohms	-20

- 1.03 Minimum Insulation Resistance - 15,000 ohms.

2. FUNCTIONAL DESIGNATIONS2.01 Relays

<u>Designation</u>	<u>Meaning</u>
ALA	Alarm
ALB	Auxiliary Alarm
D	Differential
D1	Auxiliary Differential
D2	Auxiliary Differential
PT	Public Attendant
PTA	Auxiliary Public Attendant
PTB	Auxiliary Public Attendant
PTS	Auxiliary Public Attendant
R	Ring

3. FUNCTIONS

- 3.01 See SECTIONS I and II for functions of this circuit.

4. CONNECTING CIRCUITS

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

- (a) Line, Line Switch and Connector Circuit - SD-26382-01.
- (b) 60- or 120-IPM Interrupter Circuit - SD-26407-01.
- (c) PRTD Circuit - SD-26414-01.
- (d) Alarm Circuit - SD-26393-01.
- (e) Alarm Sending Circuit - SD-26442-01.
- (f) Time Delay Control Circuit - SD-94820-01.

5. MANUFACTURING TESTING REQUIREMENTS

- 5.01 This circuit shall be capable of performing all of the functions listed in this Circuit Description and meeting the requirements listed in the Circuit Requirement Tables.

6. TAKING EQUIPMENT OUT OF SERVICE

- 6.01 If it is desired to remove a line switch appearance from service for trouble or other reasons, the associated CO relay should be blocked operated. This will cause the line switch appearance to appear busy to the line number translator circuit.

- 6.02 If it is desired to make the entire circuit appear busy, all associated CO relays should be blocked operated.

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