CROSSBAR SYSTEMS
NO. 3
CODE 911 EMERGENCY REPORTING SERVICE
PLUG-ENDED TRUNK
CIRCUIT
WITH RINGDOWN SIGNALING

CHANGES

B. Changes in Apparatus

B.01 Added

RR Resistance Lamp 13D - App Fig. 2

D. Description of Changes

D.01 Resistance lamp (RR) is added to prevent blowing SUP-AUD and SUP+AUD fuses in the connecting PRTD circuit when the emergency ringback feature is activated and the calling party is off-hook. The change is made on a class "D" basis to agree with the manufactured product.

BELL TELEPHONE LABORATORIES, INCORPORATED

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CROSSBAR SYSTEMS NO. 3 CODE 911 EMERGENCY REPORTING SERVICE PLUG-ENDED TRUNK CIRCUIT WITH RINGDOWN SIGNALING

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit is used for 911 emergency reporting service. It serves to terminate emergency calls direct to an agent at a 911 bureau.

2. GENERAL DESCRIPTION OF OPERATION

2.01 When the marker receives an indication that a 911 trunk is required, it selects an idle trunk switch and connector circuit and an idle trunk on the circuit with the 911 routing. After the marker completes certain tests, the selected trunk is connected to the calling party. A noncharge path to a telephone company official PBX operated by a municipal agency is established with an alerting signal being applied by ringdown operation.

2.02 The 911 trunk holds the established connection regardless of the action of the calling party. This feature provides for holding a call, thereby enabling the bureau with the help of the telephone company, to determine the calling line in those emergencies where the calling party is not properly identified.

2.03 Because of the emergency nature of the calls received, it is necessary for the answering agent at the bureau to readily determine that a calling party is still connected when the call is answered. To provide the agent with this ability, overflow tone is applied to the line when a call is answered, and the calling party has disconnected just before answer by the bureau. If a call is abandoned after answer, steady busy tone is connected to the line. In addition to these tone indications a polarity reversal toward the 911 bureau, under control of the calling party supervision, is provided to indicate visually whether the station is off-hook or on-hook.

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2.04 When the emergency ringback feature is provided, if an agent wishes to alert the calling customer, a 500-millisecond on-hook wink is sent from the bureau position to the 911 trunk circuit. On receipt of the wink the 911 trunk applies approximately a 3-second period of emergency ringing to the calling station, whether the station if off-hook or on-hook. The ringback sequence may be repeated as often as necessary to alert the calling station.

2.05 The agent at the 911 bureau has the ability to force the release of the incoming seizure regardless of action by the calling party. This feature is helpful in the event the calling party fails to hang up upon completion of a call.

2.06 A permanent signal detecting feature is also provided in the event that a seizure from the bureau end of the trunk is initiated without a prior seizure by a calling party. Overflow tone is returned immediately, and after a timed interval of 64 to 75 seconds a minor office alarm is operated plus a PS lamp on the trunk and a flashing indication to the test circuit. This feature guards against inadvertent blocking of the emergency trunks due to an improper action by an agent at the bureau.

SECTION II - DETAILED DESCRIPTION

1. ESTABLISHING CONNECTION - SC1

TRUNK SEIZURE

1.01 When the marker has determined that a trunk of this type is required, it finds and selects an idle trunk in the following manner.

(a) Ground supplied by the trunk over the FT lead indicates to the marker that at least one trunk in the required group on the associated trunk switch and connector circuit is idle.

(b) Ground supplied by the marker is looped through the trunk on leads TG and TT and is directed by the marker connector, trunk block, and trunk group relays to operate one of the TT_ relays in the marker.

(c) Battery supplied by the marker and directed by the marker connector, trunk block, and TT_ relay through lead TF operates the F relay in the trunk.

1.02 Relay F operated:

(a) Contact 5 locks the F relay directly to lead TF.

(b) Contacts 3 and 4 grounds the SW and JC leads to operate the associated SW and JC relays in the trunk switch and connector circuit.

(c) Contacts 10, 9, and 8 transfers the incoming T, R, and S leads from the trunk to the marker (T1, R1, and SL leads, respectively) for test purposes.

(d) Contact 1 opens a ground path to the tip lead to delay ringing until after the marker releases.

(e) Contacts 1 and 12 applies ground to operate relays S1 and RC.

1.03 Operated relay S1:

(a) Contact 8 supplies ground to the S lead, after the F relay releases, to hold the switch connections and to activate the TUR circuit.

(b) Contact 11 supplies its own holding ground.

(c) Contact 6 provides disconnect control of relay RC in event of abandoned call before ringing has been tripped.

(d) Contacts 3, 5, and 9 opens the TT/TG, FT, and TF marker control leads to the trunk switch and connector circuit to prevent reseizure.

(e) Contact 1 closes part of the operating path of relay AM to insure an originating seizure before a bureau answer is recognized.

(f) Contact 7 opens an operate path of relay OFT, before relay AM is operated, to prevent returning of overflow tone.

(g) Through contacts 2 and 10 ground is supplied to the emergency ringback feature (SC6).

1.04 Operated relay RC:

(a) Contacts 11 and 10 opens the T and R leads between the calling line and the 911 bureau and sets the trunk in a mode for ringing.

(b) Contact 8 supplies its own holding ground.

1.05 When the marker has connected the line through the network to the trunk IT:

(a) Tests the tip and ring leads for continuity.

(b) Tests the sleeve lead for a false ground.

(c) If the above tests are successful it releases the F relay which transfers the incoming T, R, and S leads back to the trunk and connects ground to the opened T lead through operated relay RC.

(d) Releases.

CALLING SUPERVISION

1.06 Connection of the trunk to the line causes relay S to operate over the T and R leads to the calling party's line, and:

(a) Closes the holding path for the S1 relay through contacts 11 make S1, 11 break AM and 4 make S.

(b) Contact 8 make operates relay SA.

1.07 Relay SA operated:

(a) Contact 1 applies ringing through the winding of ringing trip relay RT over the R lead toward the 911 bureau and back on the T lead to ground via contact 1 break normal of relay F. Audible ringing is also returned to the calling party via capacitors T1 and R1.

(b) Contacts 10 and 8 applies tip and ring polarity reversal toward the 911 bureau.

(c) Contact 7 opens the operate path of relay BT to prevent a steady busy tone to the 911 bureau.

(d) Contact 12 is provided to allow for insulating during circuit test of relay TM.

(e) Contact 11 provides part of the holding path for relay S when the calling party stays off-hook and rering is later applied to the transmission path.

CALLED SUPERVISION

1.08 When the 911 bureau answers, the low-resistance bridge across the tip and ring causes ring trip relay RT to operate which releases ringing control relay RC. This action:

(a) Removes ringing current to the bureau.

(b) Releases relay RT.

(c) Cuts through the talking path from the bureau to the calling line.

(d) Operates relay CS to monitor the bureaus answer/disconnect status.

1.09 Operated relay CS:

(a) Contact 4 provides a holding path for relay S1 via 11 make S1 and 11 break AM. This holding path provides the bureau with control of the trunk should the calling party disconnect prematurely. It facilitates ringback and call tracing.

(b) Contact 8 make supplies ground to:

(1) Operate relay CSA.

(2) Thermister AM for 300-millisecond timing before operation of relay AM via contacts 1 break AM and 1 make S1 to insure a positive operator answer and not a possible transient voltage.

1.10 Operated relay CSA:

(a) Contacts 4, 6, and 8 open the FT, TG/TT, and TF leads to the trunk switch and connector circuit to prevent a marker seizure in the event the 911 bureau seizes an idle trunk prior to a normal call as in (SC5) or abandon call as in (SC4).

(b) Contact 3 provides part of one of the two holding paths for relay AM.

(c) Contact 10 removes ground from lead I3 to the time delay control circuit TM which starts the 64- to 75-second timing cycle through 10 break AM and using the TM capacitor and CSA resistor on lead C3. (See 1.11 part E).

(d) Contact 5 supplies a ground through 7 break AM to operated 7 S1 which prevents operation of relay OFT and sending of overflow tone to the 911 bureau.

(e) Contacts 2, 7, and 9 follows bureau actions associated with an idle circuit seizure covered by (SC5).

(f) Contacts 1, 4, 11, and 12 follows bureau actions to assist in control of the emergency ringback circuit covered by (SC6).

1.11 Operated relay AM:

(a) Contacts 1 and 3 supplies its own holding ground through parallel paths using 1 make S1 and 3 make CSA, respectively.

(b) Contact 11 transfers the holding path for relay S1 through 2 break TM to arrange for a possible timed disconnect of the trunk per (SC3).

(c) Contact 5 establishes part of the holding path for relay S1 in the event the calling party hangs up releasing relay S and the 911 bureau sends a 500-millisecond wink releasing relay CS covered by (SC6).

(d) Contact 7 transfers the ground supplied by 5 make CSA from the operate path of relay OFT to the operate path of relay BT to return a steady busy tone to the bureau should the calling party disconnect as covered in (SC2).

(e) Transfer contact 10 restores ground to the I3 lead to time delay control circuit which was removed by the operation of transfer contact 10 CSA. Ground on this I3 lead shuts down the time delay control circuit after the 300-millisecond timing period between operation of relays CSA and AM which in turn prevents operation of relay TM and a forced disconnect of the trunk.

(f) Transfer contact 9 changes TM timing interval setting from 64 to 75 seconds with 4.99 megohm resistor CSA for (SC5) to 22 to 26 seconds with 1.75 megohm resistor AM for (SC3).

1.12 With the operation of relay AM a normal calling sequence has been established.

ABANDONED CALLS

1.13 Should a calling party disconnect, after the marker has seized the trunk and released as described in 1.01 through 1.05, before calling supervision relay S can operate as described in 1.06; the holding path for relay S1 via 4 make S, 11 break AM and 11 make S1 will not be established and therefore will slow-release which in turn releases relay RC via 6 make S1. This action returns the trunk to its idle state and makes it available for another call.

1.14 If a call is abandoned after ringing has been applied toward the 911 bureau as described in 1.07 and before the bureau answers as described in 1.08 relay S will release upon the opening of the calling partys loop. Then action similar to 1.13 will result except in addition relay SA will also release via contact 8 of relay S.

2. CALLING PARTY DISCONNECTS FIRST AND CALL HOLD - SC2

2.01 When a calling party disconnects and goes on-hook after a normal calling sequence the call is held by the locking path of relay S1 under control of the CS relay monitoring the 911 bureau via 4 CS operated, 2 TM normal, 11 AM and 11 S1 operated to ground. The on-hook action will release relay S which in turn will release relay SA. Relay SA released will:

(a) Reverse the tip and ring lead polarity toward the bureau. If the bureau is equipped to recognize this reversal, a cord lamp will light as a visual indication of the disconnect.

(b) Operate relay BT via 7 SA normal, 7 AM and 5 CSA operated to ground. Relay OFT will in turn operate from ground supplied by 5 make BT. These two relays both operated will provide a steady busy tone BT3 to the transmission path as an audible indication to the bureau that the calling party has disconnected. Tone is applied to the ring lead via 10 make OFT, TN2 capacitor and 3 make BT. Ground through TN1 capacitor and 11 make OFT is applied to the tip lead of the transmission path.

2.02 With the trunk still held by the CS relay monitoring the bureau, and if the calling party comes back off-hook, relay S and SA will reoperate reversing tip and ring polarity to normal plus releasing relays BT and OFT which will remove the steady busy tone. Talking may then be resumed without tone interference.

2.03 If communication between the calling party and the emergency bureau had been completed, the bureau will also disconnect from the call. This disconnect will release called supervision relay CS which will:

(a) Release relay CSA. Relay CSA in turn will release relay BT and then OFT. This action removes the steady busy tone from the transmission path.

(b) Without App Fig. 2 contact 4 CS will release relay S1 and:

(1) Release the channel by removing ground via contact 8 S1 on the sleeve lead S to the trunk switch and connector circuit TS and C.

(2) Release relay AM and return the trunk to normal.

(c) With App Fig. 2 contact 11 CSA will remove ground from the I lead to the time delay control circuit PG which will start timing for 355 to 410 milliseconds. At the end of the timing period relay PG will operate followed by relay WT which will

recycle the PG timer, release relay PG and operate relay NR to start timing G for 200 to 235 milliseconds. At the end of the second timing period relay PG will reoperate. This sequence exceeds the 550-millisecond maximum required for wink timing and therefore is recognized as a legitimate disconnect. With both relay WT and PG operated the holding ground for relay S1 through contacts 10 PG, 2 WT, 5 AM, and 11 S1 operated will be removed. This action releases relay S1 which:

(1) Releases the channel to the calling line.

(2) Releases relays AM, R1, WT then NR and PG to return the trunk to normal.

3. 911 BUREAU DISCONNECTS FIRST - SC3

3.01 When the 911 bureau disconnects first after a normal calling sequence relay CS will release which in turn will release relay CSA. Relay CSA released will cause the PG timer with App Fig. 2 and the TM timer to start timing and force disconnect the calling party if they do not hang up within 22 to 26 seconds. This action keeps the calling party from holding the trunk out of service.

3.02 With App Fig. 2 provided the PG timing sequence is the same as described in 2.03 (c) with one exception. Relay S1 will not release until contact 4 relay S is released by the calling party or is forced disconnected via contact 2 TM as follows.

TM TIMING

3.03 The TM timer consists of the TM (three-transistor) time delay control circuit, the TM relay and the network of resistors, capacitors, and relay contacts connected to the B3, C3, CP3, and I3 leads of the time delay control circuit. The 226-ohm TM resistor provides a low-resistance path over which the TM capacitor is charged when the timer is recycled. The 40-microfarad B3 capacitor does not affect the timing, but is provided to prevent any high-frequency surges on the 48-volt supply from affecting the timer. The TM capacitor in series with the CSA or AM resistor forms the RC network whose time constant determines the length of the time intervals which are timed. Selection of the intervals is controlled by transfer contacts on the AM relay. Control of the timer resides on the I3 lead to the time delay control circuit. Ground on that lead maintains the TM capacitor in a charged state and holds the control circuit in the state in which it grounds its L3 output lead. Ground on the L3 lead holds the TM relay nonoperated. Timing begins when ground is removed from the I3 lead. This happens when relay CSA is released as described in 3.01 transferring contact 10 CSA to normal with contact 10 AM held operated which breaks ground from the I3 lead.

3.04 With ground removed, the RC network discharges into the control circuit via the I3 lead and initially maintains the control circuit in its previous OFF state. The discharge current diminishes in the typical RC circuit manner and at the end of the timed interval is reduced to a quantity which is no longer sufficient to maintain the time delay control circuit in its OFF state. The control circuit changes state, battery is applied to the L3 lead and the TM relay operates to release relay S1 and force disconnect the calling party and return the trunk to normal.

4. CALL ABANDONED ON ANSWER - SC4

4.01 When the agent at the 911 bureau answers a call just as the calling party disconnects, it is necessary to indicate that the call connection has been abandoned. If the call supervisory CS relay and its auxiliary CSA operate just as the S1 relay releases, the calling linkage releases and the call is lost, therefore, overflow tone is returned to the agent when OFT relay operates. Upon hearing the tone, the agent recognizes the condition and releases from the connection. All operated relays are restored to normal, and the circuit is ready for service.

5. IDLE CIRCUIT SEIZURE FROM 911 BUREAU - SC5

5.01 When the circuit is seized from the bureau while idle, called supervision monitoring relay CS operates which in turn operates relay CSA. Operated relay CSA:

(a) Contacts 4, 6, and 8 make the trunk appear busy to the markers by opening leads FT, TG/TT, and TF leads to the trunk switch and connector circuit.

(b) Contact 5 supplies ground to operate relay OFT which applies 120-IPM overflow tone to the transmission path to alert the agent that no incoming call is present.

(c) Contact 10 removes ground from lead I3 to the time delay control circuit TM which starts the 64- to 75-second timing cycle using capacitor TM and resistor CSA

on lead C3. The TM timing action similar to that described in 3.03 and 3.04 takes place except relay CSA is operated and relay AM is normal. After 64 to 75 seconds, relay TM operates and is interpreted as a false seizure or a permanent signal. This permanent signal results in:

(1) Provision of resistance battery on lead MN to the alarm circuit as a minor alarm indication.

(2) Lighting of the PS lamp as a visual indication of the circuit affected.

(3) Putting ground out on lead STO to the 60- and 120-IPM interrupter circuit to provide a flashing 911 - PS lamp indication at the test circuit over lead OF from the interrupter circuit through contacts 7 CSA and 5 TM operated to lead 911 of the test circuit.

5.02 In answer to the alarms, when the test employee plugs the circuit busy at the test circuit, relay MB is operated. Operated relay MB:

(a) Contact 5 removes resistance battery on lead MN to the alarm circuit retiring the alarm request.

(b) Contact 2 transfers ground through 5 TM on lead 911 to the test circuit changing the 911 - PS lamp indication from flashing to steady.

(c) Contacts 4 and 3 maintains a busy condition toward the trunk switch and connector to the markers.

5.03 When the 911 bureau releases from the call relay CS will release followed by relay CSA. Released relay CSA:

(a) Contact 5 removes ground to release relay OFT which removes overflow tone from the transmission path.

(b) Contact 9 removes ground to extinguish lamp PS.

(c) Contact 10 restores ground to lead I3 of the TM timer which releases relay TM and in turn opens the path to lead 911 to the test circuit to extinguish test frame lamp 911 - PS.

5.04 The circuit will remain busy to normal calls until the make plug at the test circuit is removed by the test employee.

6. RING BACK TO CALLING PARTY - SC6 AND 7

6.01 The agent can try to alert the calling party, if for instance, the party is not responsive to the agents answer or to subsequent questions. To initiate the ring back of the calling party the agent operates a ringback key or button at the position. A wink signal (450 to 550 milliseconds) is then sent from the bureau to the 911 trunk. Relay CS and in turn relay CSA release and the PG timer starts to time the on-hook period.

PG TIMING

6.02 The PG timer consists of the (2-transistor) time delay control circuit, the PG relay and the network of resistors, capacitors, and relay contacts connected to the B, C, CP, and I leads of the time delay control circuit. The 300-ohm PGA resistor provides a low-resistance path over which the PG capacitor is charged when the timer is recycled. The PG capacitor in series with the PG and/or PG2 resistor forms the RC network whose time constant determines the length of the time intervals which are timed. Selection of the intervals is controlled by the transfer contacts on relay WT and break contacts on relay RR. Control of the timer resides on the I lead to the time delay control circuit. Ground on that lead maintains the PG capacitor in a charged state and holds the control circuit in the state in which it grounds its L output lead. Ground on the L lead holds the PG relay nonoperated. Timing begins when ground is removed from the I lead. This happens when relay CSA releases as described in 6.01 breaking ground from 12 RR, 11 CSA, and 10 WT normal and 12 AM operated to lead I.

6.03 With ground removed, the RC network discharges into the control circuit via the I lead and initially maintains the control circuit in its previous OFF state. The discharge current diminishes in the typcial RC circuit manner and at end of the timed interval is reduced to a quantity which is no longer sufficient to maintain the time delay control circuit in its OFF state. The control circuit changes state, battery is applied to the L lead and the PG relay operates.

6.04 Operated relay PG:

(a) Contact 12 provides ground for recycling the PG timer under control of ringing relays NR, R1, R2, and R3.

(b) Contact 11 and 8 provides part of the preference control of ringing relays R1, R2, R3, and NR.

(c) Contact 10 is part of the release path for relay S1 described in 2.03.

(d) Contact 9 operates relay WT which locks to ground via 6 WT and 2 S1 operated before relay CSA reoperates following relay CS at end of the 450- to 550-millisecond wink signal from the bureau.

6.05 Operated relay WT:

(a) Contact 1 provides part of the operating path of relay R1.

(b) Contact 10 provides for recycling the PG timer via 11 NR normal to ground.

(c) Contact 8 supplies ground for the operate path of relay RR.

(d) Contact 2 is part of the release path for relay S1 described in 2.03.

(e) Contact 12 in addition to subsequent operated 11 RR sets the PG riming interval at 555 to 645 milliseconds by eliminating the bypass around resistors PG1 and PG2.

(f) Contact 11 supplies ground to operate relay NR.

6.06 Operated relay NR:

(a) Contact 8 establishes part of its own holding path.

(b) With option X contact 9 will subsequently hold relay RR through the 4-party full selective or 8-party semi-selective ringing sequence.

(c) With option X contact 12 will provide part of the ground path to allow recycle of the PG timer through the positive superimposed audible ringing codes.

(d) Contact 1 applies negative superimposed audible ringing toward the transmission path under control of relays RR, R1, and R3.

(e) Contact 6 controls part of the holding path of relay R3.

(f) Contact 11 is functional only as described in 2.03 since 4 CSA maintains ground to the PG timer I lead.

(g) Contact 4 cuts through ground via 10 S1 operated, 11 PG normal, and 1 WT operated to operate relay R1.

6.07 Operated relay R1:

(a) Contact 1 directs negative superimposed audible ringing toward the tip transmission lead.

(b) Contact 9 establishes part of the release path of relay RR.

(c) Contact 10 establishes part of the release path of relay NR.

(d) Contacts 8, 11, and 6 establishes part of the holding and operating preference for ringing combination relays R1, R2, and R3.

(e) Contact 4 establishes part of a ground path for recycling the PG timer during the subsequent ringing sequence.

(f) Contact 3 closes through the operating path of relay RR after contact 1 CSA has operated as recognition of a wink from the agent at the 911 bureau.

6.08 Operated relay RR:

(a) Contact 8 provides its own holding path via 9 R3 normal and 2 S1 operated to ground.

(b) Contact 10 cuts through ground from 10 S1 operated, 12 R2 normal to hold relay R1 via its contact 8.

(c) Contact 12 opens a ground path associated with PG timer I lead which leaves it under control of ringing combination relays R1, R2, and R3 plus NR. It also supplies ground to hold relay NR during the negative ringins sequences.

(d) Contact 11 is described in 6.05.

(e) Contact 6 is provided to allow for insulating during circuit test of relay PG.

(f) Contact 2 prepares for subsequent application of positive superimposed audible ringing when relay NR releases.

(g) Contacts 4 and 3 will open the tip and ring transmission path and apply negative superimposed audible ringing toward the calling line. This may or may not be the calling stations ringing code therefore subsequent action will ring all remaining stations on the same calling line.

(h) Contact 1 will hold the supervisory S relay operated if the calling party is still off-hook as indicated by operated 11 SA.

(j) Contact 9 will release relay WT.

6.09 Released relay WT contact 10 will remove ground to start the PG timer for 555 to 645 milliseconds. At the end of the timing period relay PG will operate followed by relay R2 which will recycle the PG timer, release relays PG and R1. Similar action is repeated to step through all ringing codes that could be associated with a line. Table A shows the status of the relays which apply ringing to the calling line.

Table A

Relays				Ringing	
R1	R2	R3	NR	Tip	Ring
O	R	R	O	-	-
R	O	R	O	G	-
R	R	O	O	-	G
O	R	R	R	+	+
R	O	R	R	G	+
R	R	O	R	+	G

Notes:
O = Operated

R = Not Operated

+ = Positive Superimposed Audible Ringing

- = Negative Superimposed Audible Ringing

G = Ground

6.10 Without option X after all the negative ringing codes or with option X after all the negative and positive ringing codes have been generated relay RR will release. Relay RR released will:

(a) Remove ringing toward the calling end and restore the transmission between the bureau and the calling line.

(b) Release relays NR, R1, R3, and PG.

6.12 The total ringing period is between 3.33 to 3.87 seconds and may be repeated again if subsequent winks are received.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

Relay S

1.01 Individual noncoin lines, maximum external circuit loop, 1500 ohms; minimum insulation resistance, 10,000 ohms.

1.02 Two-party message rate lines, maximum external circuit loop, 1500 ohms; minimum insulation resistance, 10,000 ohms; maximum earth potential of ±20 volts.

1.03 The PBX trunk, maximum external circuit loop, 1500 ohms; minimum insulation resistance, 20,000 ohms; maximum earth potential of ±10 volts; either 12,000 ohms bridged or 6000 ohms to battery on tip after disconnect of PBX.

1.04 Coin line, maximum external circuit loop, 1500 ohms; minimum insulation resistance, 10,000 ohms; with maximum earth potential of -12.5 to +20 volts; or minimum insulation resistance, 30,000 ohms; with maximum earth potential of ±20 volts.

Relay CS

1.05 Maximum external circuit loop, 1500 ohms; minimum insulation resistance, 20,000 ohms.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

Designation	Meaning
AM	Answer Memory
BT	Busy Tone
CS	Called Supervision
CSA	CS Auxiliary
F	Frame (Traditional)
MB	Make Busy
NR	Negative Ringing
OFT	Overflow Tone
PG	Pulse Generator
R1	Ringing (Combination 1)
R2	Ringing (Combination 2)
R3	Ringing (Combination 3)
RC	Ringing Control
RR	Rering
RT	Ringing Trip
S	Supervision (Calling)

Designation (Cont)	Meaning
S1	Sleeve
SA	S Auxiliary
TM	Timer
WT	Wink Timing

2.02 Lamps

Designation	Meaning
PS	Permanent Signal

3. FUNCTIONS

3.01 When circuit is available for seizure, provides a ground on lead FT of trunk switch and connector circuit to indicate to the marker that there is an idle trunk circuit.

3.02 Provides an F relay associated with lead TF which is operated by the marker when seizing this trunk and provides for making line tip and ring continuity and S lead false ground tests during the build-up of the connection.

3.03 Provides for the removal of ground from lead FT and the opening of lead TT and TG during the operation of this circuit to present a busy indication to the marker.

3.04 When a marker seizes this trunk and operates relay F, which in turn operates relay S1 and RC the trunk connection is held following the disconnection of the marker and ringing control is established.

3.05 When the calling supervisory relay S is operated indicating the calling party is off-hook, ringing and a tip and ring reversal is applied toward the 911 bureau.

3.06 Provides the calling party with ringing tone via the T1 and R1 capacitors until the bureau answers.

3.07 Trips ringing with relay RT when the 911 bureau answers.

3.08 Permits the calling party to abandon the call and release the connection before the 911 bureau has answered.

3.09 Provides an answer memory of 911 bureau status for use in providing steady busy tone for indicating calling party has gone on-hook and other control functions.

3.10 Provides a holding path for the trunk connection when the 911 bureau has answered should the calling party disconnect.

3.11 Provides a double cycle of PG timing to detect a 500-millisecond on-hook wink from the 911 bureau when App Fig. 2 is furnished.

3.12 Provides an emergency ringback cycle of 3.33 to 3.87 seconds of ringing upon receipt of a 500-millisecond wink from the 911 bureau when App Fig. 2 is furnished.

3.13 Provides a forced release after 22 to 26 seconds with timer TM when the 911 bureau disconnects and the calling party remains off-hook.

3.14 Provides an overflow tone towards the 911 bureau that an incoming call is not present due to an abandoned call on bureau answer or where an idle circuit is seized.

3.15 Provides a minor alarm, a permanent signal lamp on the trunk and a flashing indication to the test circuit when an idle circuit is seized from the 911 bureau after a timed interval of 64 to 75 seconds.

3.16 Provides a steady indication to the test circuit when an idle circuit has been seized from the 911 bureau and the trunk circuit has been made busy by maintenance personnel.

4. CONNECTING CIRCUITS

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

(a) Trunk Switch and Connector Circuit - SD-26383-01.

(b) PBX Central Office Trunk Circuit - (Typical) SD-66719-01.

(c) Power Ringing and Tone Distributing Circuit - SD-26414-01.

(d) 60 or 120-IPM Interrupter Circuit - SD-26407-01.

(e) Test Circuit - SD-26411-01.

(f) Time Delay Control Circuit - SD-94820-01.

(g) Alarm Circuit - SD-26393-01.

(h) Traffic Usage Recorder Circuit - (Typical) SD-96494-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 This circuit shall be capable of performing all the functions listed in this circuit description and the requirements listed in the Circuit Requirements Tables.

6. TAKING EQUIPMENT OUT OF SERVICE

6.01 A jack per trunk is provided at the test circuit for making the trunk busy. When a shorting plug is inserted, ground is applied to the MB lead operating relay MB in the trunk. With relay MB operated leads FT, TT, and TG to the trunk switch and connector circuit are opened preventing seizure by the marker. Insertion of the plug does not interfere with a call that may be in progress.

6.02 When testing this trunk, the test circuit will operate relay TST in the test circuit to remove ground from MB leads of any trunks that are made busy and associated with that trunk switch. The trunk is then seized normally by the marker as directed by the test circuit.

6.03 When remote make-busy facilities are provided, the MB lead to the trunk can be grounded by the operation of an associated latching relay located in the code point circuit via the TRK MB jack of the test circuit.

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