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**COMMON SYSTEMS
VOICE ALARM AND CONTROL CIRCUIT**

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit provides means to check for the presence of voice on the announcement bus. When a voice failure occurs, an alarm indication is given, and failure indication is given to the connected circuits.

2. GENERAL DESCRIPTION OF OPERATION

- 2.01 During circuit seizure with voice present on the announcement bus, the ALM relay will remain unoperated. If a voice failure occurs, relay ALM will operate after a delay of approximately 8 seconds. When a voice failure is detected, a major alarm is given, and a signal is provided to the circuits using the announcement to cause transfer to an operator.
- 2.02 Option A - A key is provided to silence the alarm and to hold the circuit out of service until voice is restored to the announcement bus.
- 2.03 Option B - Key AR is provided to release the alarm. Key OS is provided to release the alarm and to hold the circuit out of service as required for maintenance.
- 2.04 The delay time used in the circuit was determined by the length of the announcement cycle.
- 2.05 The recorded announcement should never be less than 10 seconds in order to avoid false voice failure alarms.
- 2.06 In order to provide satisfactory operation of the circuit, the following conditions should be observed:
 - (a) The person making the recording should start talking immediately upon getting a "go ahead and dictate" signal.
 - (b) The person making the recording should speak at a level as constant as possible and should keep the pauses between words as short as practicable.
 - (c) The person making the recording should stop the recorder, or whatever means is used to end a recording, immediately after the last spoken word.

SECTION II - DETAILED DESCRIPTION

1. CIRCUIT IDLE

1.01 With the ST relay normal, the D capacitor is charged from ground through resistor G to the junction of resistor F and regulator diode C. The base of transistor B is at ground through the G resistor and is normally cut off.

2. CIRCUIT SEIZED

2.01 When ground is connected to lead STA, B, C, or D by the connecting circuit, relay STA, B, C, or D will operate. The operation of relay STB, C, or D will also operate relay STA. Relays STB, C, and D transfer the T and R leads from channel A to channels B, C, and D, respectively. Relay STA operated:

- (a) Closes an operate path for relay A.
- (b) Removes resistance ground from the positive side of capacitor D.
- (c) Transfers the negative side of capacitor D from the junction of resistor F and diode C to the same point through relay A.
- (d) Connects ground to lead MST to start the announcement machine.

VOICE PRESENT

2.02 The audio signal across the T and R leads is stepped up by transformer A, tapped off by potentiometer A, and applied to the base of transistor A.

2.03. The signal will be amplified and rectified by transistor A and will build up in steps across the C capacitor. This voltage (positive with respect to ground) is in such a direction as to keep transistor B cut off and relay A normal.

2.04 The signal will also be applied to the D capacitor which remains in its charged state.

VOICE FAILURE

2.05 When a voice failure occurs, the C and D capacitors start to discharge. The C capacitor loses its positive charge very quickly and starts charging in the opposite direction at a rate equal to the discharge time of capacitor D. With capacitor C charging in a negative direction with respect to ground, the B transistor starts to conduct the current flows through the A relay.

2.06 Option A - The current through relay A increases exponentially (based essentially on the time constant of capacitor D and resistor D) and, when the operate value of relay A is reached, it operates. Relay A operates relay ALM through the ALM thermistor. The ALM

thermistor is used to increase the operate time of relay ALM. This prevents false voice alarms due to momentary operations of relay A during speech pauses. Relay ALM operated:

- (a) Connects lead MJ to lead MJ1 to provide an alarm indication.
- (b) Locks operated through an alarm release key.
- (c) Operates relay OS.

2.07 Option B - The current through relay A increases exponentially (based essentially on the time constant of capacitor D and resistor D) and, when the operate value of relay A is reached, it operates. Relay A operates relay A1 through the A1 thermistor. The A1 thermistor is used to increase the operate time of relay A1. This prevents false voice alarms due to momentary operations of relay A during speech pauses. Relay A1 operated:

- (a) Shorts out the A1 thermistor.
- (b) Operates the ALM relay through a contact on the AR relay.
- (c) Connects ground to the AL- leads as a voice failure indication to the circuits using the announcement.

2.08 Option A - Relay OS operated:

- (a) Lights the OS-ALM lamp.
- (b) Connects ground to the AL- leads as a voice failure indication to the circuits using the announcement.
- (c) Releases relay STA.

2.09 Option B - Relay ALM operated:

- (a) Connects lead MJ to lead MJ1 to provide an alarm indication.
- (b) Lights the OS-ALM lamp.
- (c) Locks operated through a contact on the AR relay.

2.10 The release of relay STA causes the release of relay A and causes capacitor D to recharge as described for the circuit idle condition in 1.01.

2.11 Option A - To retire the alarm, OS-AR key is operated. This holds the OS relay operated and releases relay ALM.

2.12 Option B - To retire the alarm, AR key is operated. This operates the AR relay which releases the ALM relay. The AR relay keeps the OS-ALM lamp operated.

RESTORATION OF VOICE

2.13 Option A - When voice is restored to the announcement bus the OS-AR key is released which releases relay OS. The circuit is now in its normal idle state.

2.14 Option B - When voice is restored to the announcement bus, the AR key is released which releases relay AR. This returns the circuit to its normal idle state.

3. DISCONNECT

3.01 When the associated connecting circuit no longer requests service, ground is removed from lead STA, B, C, or D releasing relay STA and relay STB, C, or D. Relay STA released:

- (a) Opens the operate path for relay A.
- (b) Connects ground through resistor G to the D capacitor to maintain the charge on the D capacitor. If this charge is not maintained relay A operates after each operation of relay STA.
- (c) Transfers the negative side of capacitor D directly to the junction of resistor F and diode C.

4. ALIGNMENT PROCEDURE

4.01 Insulate 5M of ALM relay and connect one of the following instruments as indicated:

- (a) A volume-level indicator (Davens Specification 1866 or equivalent) connected across the T and R leads.
 - (b) The DB meter of a 21A transmission measuring set (DET IN 600 Jacks) connected across the T and R leads.
 - (c) A VTVM (Hewlett Packard Model 400D or equivalent) connected across the T and R leads.
- 4.02 A voltmeter (Simpson Model 269 or equivalent) is connected across relay A (dc volts). A VTVM should not be used unless its power is obtained from internal batteries.
- 4.03 A 1000-hertz test tone is fed to the announcement amplifier.

4.04 Ground is placed on the STA lead or block relay STA operated.

4.05 Gain of announcement amplifier is adjusted to 4VU less than required when feeding voice as measured on the V11 meter. If the 21A TMS or the VTVM is used, the VU designation should be changed to DB and read directly on the DB scale of the 21A TMS or the VTVM. For example, if the nominal level of voice required on the bus is -12VU, the adjusted amplifier output should be -16VU, -16 dB, or -16 dB when read on the V11, 21A, or VTVM, respectively.

4.06 Potentiometer A is adjusted until a voltage range of 6 to 7 volts is obtained on the voltmeter across the A relay. The voltmeter needle should remain stationary between 6 and 7 volts for approximately 10 seconds.

CHECKING SETTING AFTER ALIGNMENT

4.07 Gain of announcement amplifier is reduced to 6VU or 6 dB less than required when feeding voice (2VU or 2 dB less than in 4.05, above). The voltmeter reading across relay A should be greater than 8 volts when the circuit stabilizes. Relays A, ALM, and OS should operate.

4.08 Gain of announcement amplifier is increased to required output level with tone still applied, (nominal voice level of particular system). Voltmeter reading should be less than 3 volts when the circuit stabilizes. Relay A, ALM, and OS should release.

CHECKING SETTING WITH VOICE

- 4.09 Ground is removed from the STA lead, or the STA relay is unblocked.
- 4.10 The 1000-hertz test tone is removed.
- 4.11 With the circuit still connected to the announcement bus, a voice recording is fed into the announcement amplifier at the nominal level of the particular system.
- 4.12 Ground is connected to the STA lead or relay ST is blocked operated. The voltage across the A relay will probably fluctuate, but it and relay ALM should not operate.
- 4.13 Output of announcement amplifier is adjusted to 6VU or 6 dB less than required as measured on the V11, 21A, or VTVM. The A, ALM, and OS relays should operate after a short while. The delay time will be greater than the time specified because

the latter time is based on a reduction of 20VU below the nominal level.

Note: The average of the peak readings of the pointer constitutes a reading on the volume level indicating meter. The 21A TMS and the VTVM covered previously do not provide satisfactory results when used with voice output.

4.14 Required output from announcement amplifier is applied. The A, ALM, and OS relays should release after a short delay.

4.15 Remove ground from STA lead or unblock the STA relay, disconnect instruments, the remove insulation from 5M of ALM relay.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

Designation

Meaning

A	Alarm
Al	Alarm (Auxiliary)
AR	Alarm Release
ALM	Alarm (Auxiliary)
OS	Out of Service
STA, B, C, D	Start

3. FUNCTIONS

3.01 Refer to SECTIONS I and II for functions of this circuit.

4. CONNECTING CIRCUITS

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

(a) Announcement Circuit - SD-26435-01.

(b) Intercept Trunk Circuit - SD-26403-01...

(c) Outgoing Intercept Trunk Circuit - SD-26404-01.

(d) VAC Code to Announcement Machine Trunk Circuit - SD-26446-01.

(e) Alarm Sending Circuit - SD-26442-01.

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

5. MANUFACTURING TESTING REQUIREMENTS

5.01 With battery and ground connected to the circuit and the LK lead grounded, the following tests should be made to insure the proper functioning of the circuit before shipping and installation.

(a) Block relay STA operated. The ALM relay should operate in approximately 8 seconds. Release relay STA and momentarily operate OS-AR or AR key to release ALM relay.

(b) Turn the A potentiometer to the extreme clockwise position. Provide a 100-hertz test tone at a level of approximately 0.5-1 Vac. Connect one side of the supply, in series with a 400- to 600-ohm resistor, to the T lead and the other side of the supply to the R lead.

5.02 Block relay STA operated. The ALM relay should not operate. Wait at least 10 seconds before releasing relay STA.

5.03 Turn the A potentiometer to the extreme counter-clockwise position. Block relay STA operated and insulate 5M of the ALM relay. The ALM relay should operate in approximately 8 seconds. With relay ALM operated, turn the A potentiometer back to the extreme clockwise position. Relay ALM should release within a few seconds. Release relay STA and remove insulation from 5M of ALM relay.

6. ALARM INFORMATION

6.01 If for any reason the voice fails on the announcement bus, lead MJ is connected to lead MJ1 to bring in a major alarm.

6.02 To retire the alarm the alarm release key associated with the alarm sending circuit can operate. This releases the ALM relay. However, if the alarm condition is still present, the alarm will come in again on the next circuit usage.

6.03 Option A - The alarm may also be released by a momentary operation of the OS-AR key. This has the same effect as described in 6.02 and causes momentary operation of relay OS and lamp OS-ALM. If the OS-AR key is left operated the alarm will be silenced and the circuit will be in the out-of-service condition as described in 7.

6.04 Option B - The alarm may also be released by operation of the AR key. This operates relay AR which releases the ALM relay. The AR relay also keeps the OS-ALM lamp operated.

7. TAKING EQUIPMENT OUT OF SERVICE

7.01 Option A - To take the circuit out of service for trouble or other reasons, the OS-AR key is operated. This releases relay ALM to silence the alarm if it had been operated and operates relay OS. Relay OS operated:

- (a) Connects ground to the AL- leads as a voice failure indication to the circuits using the announcement.
- (b) Opens the STA relay operating lead.
- (c) Lights the OS-ALM lamp.

7.02 Option B - To take the circuit out of service for trouble or other reasons, the OS key is operated. This operates the Al and AR relays and opens the MST lead. These relay operations:

- (a) Connect ground to the AL- leads as a voice failure indication to the circuits using the announcement.
- (b) Light the OS-ALM lamp.

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.01 Added

AR key	552E
Al Diode	446K
AR Diode	446K

D. Description of Changes

- D.01 Option B is added.
- D.02 Option C is added.
- D.03 Note 306 is changed to reflect the above changes.
- D.04 Note 1 is added.
- D.05 Change the title from:

CROSSBAR SYSTEMS
NO. 3
VOICE ALARM AND CONTROL CIRCUIT
PLUG-ENDED

To:

COMMON SYSTEMS
VOICE ALARM AND CONTROL CIRCUIT

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5242-DAJ

WE DEPT 45820-AJE-WEA-PLS

