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COMMON SYSTEMS
EMERGENCY ALARM CIRCUIT
NOT ARRANGED FOR CODE SIGNALING
WITH PROVISION FOR
AUTOMATIC FIRE DETECTION
FOR USE IN 48 VOLT MULTI-ZONE OFFICE

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 To provide an emergency alarm system in central offices for use by the maintenance force to summon assistance in cases of emergency.

1.02 To provide connection to a fire detection system.

1.03 To provide for transmitting or receiving an emergency alarm signal from a distant office.

2. GENERAL DESCRIPTION OF OPERATION

2.01 This emergency alarm system is used by the maintenance force in the central office to summon assistance from other parts of the building in case of emergency. It consists of a number of remote control station boxes controlling loud and distinctive sounding signaling devices located at advantageous points in the building readily accessible to the maintenance force.

2.02 A number of station boxes are located in restricted areas, hereafter called zones, and are connected in a series loop to associated supervisory relays in a centrally located control cabinet. Each floor of the building may be divided into one or more zones as local conditions warrant. It is not desirable to have a zone cover more than one floor because of the annunciator system. Also when required, a fire detection system may be connected in series with the station loop.

2.03 Signal devices, usually loud-sounding distinctive tone horns are used in locations where the noise levels are high and where there are a number of other signal systems using gongs. In addition to the horns, a solenoid type vibrating bell is provided for use in locations where the horns are not required or where the sound of the horn would be undesirable. Each signal device is under control of an individual

contact on a multicontact signal control relay.

2.04 When a station box is operated or a station loop circuit is opened, the corresponding supervisory relays release, operating all the audible signal devices, lighting lamps corresponding to the location of the zone, and releasing the ventilating fan control relay to stop the fans. The signal is sounded on all the signal devices throughout the building. An arrangement is provided to silence all the audible signal devices after an alarm has been sounded so that signals may be received from other zones.

2.05 The bell in the operating room can be silenced by the operation of a nonlocking key and a locking relay, so that the operating force can observe signals on other signaling systems which may be operating at that time.

2.06 Each magnetic piece of apparatus and each series loop circuit is under constant supervision which indicates at a common point any condition such as an open or a direct ground or battery failure which might interfere with the operation of the system. Generally this supervisory system is connected to the office annunciator circuit to indicate a major alarm in case any supervisory signal is operated.

2.07 The circuit is also arranged for transmitting or receiving an alarm in a distant office to cover those cases where the central office equipment is protected by the fire detection or connecting loop circuit, but where the office is not attended at all times.

SECTION II - DETAILED DESCRIPTION

1. STATION SIGNALING

1.01 Each station box consists of a single-contact, normally closed switch. All stations in each zone are wired in series and the series combination of stations and fire detection or connecting loop circuit, if provided, are connected to the associated ZR and ZT relays.

1.02 When a station box is operated or the station loop or connecting loop circuit is opened, relays ZR and ZT release lighting the associated zone lamps in the central cabinet and in all annunciators in which the lamp is multipled.

1.03 Relays ZR and ZT in addition to lighting the zone signal lamps also close the circuit to relay MC, which operates and closes the circuits to the various signal devices.

1.04 When Fig. 13 is used, relay ZR released or ZR or ZT relays of Fig. 15 released removes ground from the vent fan control relay circuit to release the power relay and stop the associated ventilating equipment. The release of relay ZR or ZT releases relay ZR1 when Fig. 14 is used, which removes ground from the ventilating fan control relay circuit to release the power relay and stop associated ventilating equipment.

2. SIGNAL CONTROL CIRCUIT

2.01 The multicontact relay MC in the signal control circuit is provided so that a number of horns or bells can be sounded simultaneously. Each signal is provided with an individual supervisory circuit; therefore, an individual contact is required for signaling to prevent interference between the supervisory circuits.

3. LOUD SOUNDING HORNS

3.01 Loud-sounding vibrating-type horns are provided where the room noise level is high or where there are so many other signals operated in the room that the signal from this system might not be readily recognized. In other locations a vibrating solenoid-type bell may be provided as required.

4. SUPERVISORY CIRCUIT

4.01 Because of the importance of this system, each audible signal and each normally closed circuit is provided with a supervisory relay to indicate that the circuit is continuous and free from grounds which might cause interference with the operation of the system. Also an alarm is provided to indicate a battery failure or an operated fuse. The circuit is also arranged to transmit a signal to a distant office.

ZONE SUPERVISORY

4.02 Relays ZT and ZR are provided to give an alarm in case the zone loop wiring becomes open, grounded, or crossed with 48-volt battery in order that the signal circuit will not be out of service when needed. On an open, both ZT and ZR will release. A ground will release relay ZT and a cross with 48-volt battery will release relay ZR. A ground or cross with battery through any apparatus which does not cause ZT or ZR to release will not cause a failure of the zone circuit.

SIGNAL SUPERVISORY

4.03 Each horn or bell is provided with an individual battery fuse and a supervisory relay SS. If the circuit to the horn or bell is open or grounded, or if the bell or horn is open or grounded, relay SS will release, lighting the SS lamp and operating the auxiliary signal circuit.

SIGNAL CONTROL RELAY SUPERVISORY

4.04 The signal control relay, MC, is under continuous test by the MA relay in Fig. 8A. In case of a ground or open in the signal control relay MC relay MA will release, lighting the MC lamp and operating the auxiliary signal circuit. Relay MA also provides a locking path for relay SC.

AUXILIARY SIGNAL CIRCUIT

4.05 All of the supervisory circuit relays are connected to the auxiliary signal circuit so that if any lamp is lighted the AUX bell and relay A will operate. This system is connected to the major alarm circuit so that a major alarm will be given in case of any trouble condition in the emergency alarm circuit.

NO BATTERY ALARM CIRCUIT

4.06 If a battery failure occurs, relay NB releases, closing the circuit to the NB bell operated on ringing current. Relay NB also closes the major alarm circuit.

FUSE ALARM

4.07 If a fuse is operated, lamp FA Fig. 6 is lighted and relay FA is released, releasing relay NB which causes the NB bell to ring and signals a major alarm to the alarm circuit. The aisle pilot will light if provided.

5. DISTANT OFFICE SIGNAL

5.01 Whenever a circuit is closed that would ordinarily operate the auxiliary signal circuit, relay DO, in Fig. 5, will release and cause relay A to operate and give auxiliary signal in the office. In addition, relay DO removes battery and ground through relays DB and DG from the loop to the distant office, releaseing relay DG in this office and the D1 relay in the distant office, thus causing an alarm to be sounded in the distant office. Relays DB and DG are provided to keep a continuous test on the cable pair to the distant office to indicate an open, cross with a battery, or a ground on the cable pair. An open or a ground will cause relay DG to release which opens the circuit through the FA relay contact releasing the NB relay which sounds the major alarm and the NB bell. A ground or a cross with battery will cause the DB relay to operate which will also cause the NB relay to release and the NB bell to operate. When either relay DB is operated or relay DG is released, the ODO lamp is lighted to indicate this condition.

6. INCOMING ALARM FROM DISTANT OFFICE

6.01 Fig. 9 is provided to permit a signal to be given in this office of an alarm or a trouble condition at a distant office. Relay D1 is operated over the loop from the distant office. When battery is removed at that point due to the alarm at the distant office, a trouble condition at the distant office, or a trouble condition on the cable pair, relay D1 releases, opening the circuit to relay DP which lights the associated DO lamp and opens the circuit to the associated Fig. 3, 13, or 15. A separate Fig. 9 is provided for each office which transmits an alarm to this office and a separate Fig. 3, 13, or 15 may be provided for each office, although it is generally arranged that a number of Fig. 9 may be connected in a loop to one Fig. 3, 13, or 15 indicator of which office is transmitting the alarm.

7. MANUAL SIGNAL

7.01 A manual alarm may be sent from the central control cabinet by depressing the MAN SIG key located in the cabinet or located at other points and connected to the MS lead. These keys close the circuit direct to the MC relay, holding it operated as long as the key is depressed. These keys may be used to send codes to indicate special signals as required for the particular installation.

8. OPERATING ROOM SIGNAL SILENCING CIRCUIT

8.01 This feature is provided for the bell in the operating room in order that the traffic force can silence this bell whenever an alarm has been sounded so that signals on other signaling systems can be recognized.

8.02 Operation of the nonlocking key located in the operating room operates relay SC in the central control cabinet. Relay SC locks up to contacts on relay MA and disconnects the MC relay contact ground from the bell, thus silencing it. When the system is reset relay SC releases restoring the bell under control of relay MC.

8.03 If for any reason the key is operated or a ground occurs on the lead between relay SC and the key when the alarm system is not sounding, relay SC will operate and open the associated bell lead, releasing the associated signal supervisory relay thus giving a trouble alarm as long as the ground is maintained on the lead between this key and relay SC.

9. ALARM SILENCING CIRCUIT

9.01 This feature is provided so that the audible signals can be silenced immediately after an alarm has been sounded, to avoid unnecessary annoyance to the maintenance force and possibly to occupants of adjoining buildings.

9.02 After an alarm has been sounded, operation of key STOP in the cabinet or at any selected point operates all ZS relays. When the key is released, all ZS relays release except the one associated with the zone in which the alarm originated. This relay remains operated until the loop is closed or the fault remedied as it locks up to the normal contacts or relays ZR and ZT. Relay ZS operated opens the circuit to relay MC from the associated ZR and ZT relays and closes the circuit to relay A which closes the office major alarm circuit.

9.03 With N option, the ZS relay operated also removes the ground from the A lead to Fig. 5, causing the DO relay to operate and discontinue the extension of the alarm to the distant office.

10. VENT FAN CONTROL - FIG. 13, 14, AND 15

10.01 When ZR relay in Fig. 13 releases as described in STATION SIGNALING and ZONE SUPERVISORY or the ZR or ZT relay in Fig. 15 releases, ground is removed from the vent fan control relay circuit to release the power relay and stop the associated fan. Relay ZR released (Fig. 13) or relays ZR or ZT in Fig. 15 releases relay ZR1 when Fig. 14 is used, which removes ground from the vent fan control relay circuit to release the power relay and stop the associated fans.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

FIG. 1 AND 4

1.01 Maximum conductor loop resistance per fire detection loop: 150 ohms.

1.02 Maximum conductor loop resistance to horn or gong; 10 ohms.

FIG. 5 OR 16 AND 9

Voltage Range (Volts)	Outgoing	Incoming
20-28		1200
21-25		1300
22-26		1400
40-56	2600	3100
45-50	3000	3650
125-135	10,000	10,000

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

3.01 To give an audible alarm indicating that a station is sending an alarm.

3.02 To indicate which portion of the system is in trouble in case of an open or ground.

3.03 To give a visual signal indicating the location of the station sending the alarm.

3.04 To sound a major alarm in case of an open or ground in the emergency alarm circuit or if battery is removed from the circuit.

3.05 To provide a manual control method of code signaling.

3.06 To provide for connection to an automatic fire detection system.

3.07 To provide for transmitting or receiving an emergency alarm signal from a distant office.

3.08 To provide for silencing the alarm bell in the operating room without affecting the alarm signals in other locations.

3.09 To provide for silencing the emergency alarm audible alarm signals after an alarm has been sounded in order that signals from other zones may be received.

3.10 To provide for releasing power relays controlling ventilating equipment when a station box is operated or the fire detection or connecting loop opens.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed.

(a) Annunciator Circuits - SD-15443-01, SD-96373-01, SD-90202-01.

(b) Floor Alarm Board and Miscellaneous and Auxiliary Alarm Circuits in Panel Central Office - SD-21205-01.

(c) Pilot Lamp and Audible Alarm Circuit in Step-by-Step Central Office - SD-31548-01.

(d) Floor Alarm, Frame Miscellaneous and Auxiliary Alarm - SD-25047-01.

(e) Audible and Visual Alarm Circuit - SD-96188-01.

(f) Emergency Alarm Circuit Arranged for Code Signaling, in a Distant Office - SD-90437-01.

(g) Emergency Alarm Circuit not Arranged for Code Signaling for use in Multi-Zone Office - SD-96049-01.

(h) Emergency Alarm Circuit not Arranged for Code Signaling for use in Single Zone Office - SD-96052-01.

(i) Incoming Signal Circuit From Distant Office for use When Incoming Signal Is Not To Be Connected to Zone Signaling Circuit - CD-90642-01.

(j) Crossbar System No. 5 Auxiliary Alarm Circuit - SD-96446-01.

(k) Commercial Fire Detection Equipment Application Schematic - SD-99375-01.

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.1 Superseded	Superseded By
Fig. 1, 1A fire detection wire	Fig. 17, connecting loop circuit for us with fire detection equipment

D. Description of Changes

D.1 Provision was made for connecting Fig. 17, the connecting loop circuit for use with commercial fire detection equipment, to Fig. 2, 3, 13, or 15.

D.2 Fig. 2K, 3K, and 51 were modified.

D.3 Fig. 1 and 1K were rated A&M Only.

D.4 Equipment Notes 204 and 205 were added.

D.5 Circuit Notes 102, 103, and 107 are modified.

D.6 Circuit Note 108 was added to prohibit the use of both fire detection and connecting loops in the same zone.

D.7 Information Note 301 was modified to show connections to the connecting loop circuit.

D.8 Fig. 54 was added to provide connection to commercial fire detection equipment.

D.9 Equipment Note 204 was added to provide connecting information for leads to the commercial fire detection equipment.

D.10 Fig. 17 was added to the Figures and Options Table.

D.11 Connecting information in Fig. 2, 3, 13, and 15 was expanded.

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