

BRE OFF  
FIRE ALARM

EMERGENCY ALARM SYSTEMS

1. GENERAL

1.01 This section describes emergency alarm systems used in central office buildings to sound an alarm in case of fire, serious injury or other emergency.

Types of Emergency Alarm Systems

1.02 Three systems are covered herein. Two are systems used in multi-office buildings and in central offices large enough to warrant division of the equipment into "zones," a "zone" being that portion of a building or floor area treated as a unit by the alarm system. The third is a simple system for use in offices small enough so that zoning appears to be unnecessary.

1.03 In one of the multi-zone systems, the zone where the alarm originates is indicated by means of codes sounded on horns or single stroke gongs. The sounding devices are operated under the control of code sending devices, one of which is associated with each zone. The capacity of this system is fifty zones and forty sounding devices.

1.04 The other multi-zone system employs lamps to indicate the zone in which the alarm originates. The zone indicating lamps are mounted in cabinets so distributed throughout the installation that persons responding to an alarm may readily observe them. The alarm is sounded on horns or vibrating bells operated continuously. This system has a capacity of five zones and six sounding devices.

1.05 The system for use in unzoned offices employs two loud ringing bells operated from the central office ringing current supply. These ring steadily in the event of an alarm.

Features

1.06 Although the provision of certain features is optional, complete systems are arranged so that an alarm may be originated by means of an automatic fire detection feature or manually in the event that urgent need should arise for an employee to summon assistance. There are also arrangements whereby alarms may be sounded to indicate that an emergency condition has arisen in a distant office which may be unattended part of the time.

1.07 In all three systems, the arrangement is such that practically any trouble condition likely to interfere with the operation of the system, gives immediate notice of its presence by causing an alarm to be sounded either by

the main sounding devices or (except in the single zone system) by supervisory alarms.

1.08 The Automatic Fire Detection Feature is afforded in all three systems by the use of an insulated fusible wire, known as "Fire Detection Wire," which is installed on the various frames and racks and which, in the event of fire, melts to open the circuit and thereby cause the alarm equipment to function.

1.09 For Manual Operation, alarm boxes known as "Station Boxes" are provided as required in all systems. They are mounted at convenient locations to afford suitable means for an employee to cause the alarm to be sounded. Alarms may also be set off manually by cutting or breaking the fire detection wire. In the system arranged for code signaling, alarms may also be set off manually by operating a trip finger in the code signal sending device. For second alarms and wherever a zone has neither station boxes or fire detection loops, this is the only means for setting off the alarm.

1.10 Code Signaling Feature: The system arranged for code signaling is applicable where there are a number of zones and is intended for use wherever an installation is divided into more than five zones. Each zone is assigned a distinctive code and this is sounded four times when the alarm operates. The code sending equipment has non-interfering and successive features, so that while a code is being sounded for one zone, if an alarm should be originated in another zone, the four rounds of code for the second zone will not be sounded until after the first code signal sending device to start has finished.

1.11 Connection to Central Office Alarm System:

The emergency alarm systems, other than the single zone system, are associated with the central office alarm system so that trouble or off-normal conditions will be indicated by the various aisle pilots, annunciator cabinets, floor alarm boards, main alarm boards, etc., where these facilities are provided.

2. DESCRIPTION OF APPARATUS

Station Boxes

2.01 The station boxes consist of single pole electric switches encased in metal housings arranged for either flush or surface mounting. The switch is held in its normally closed position by a slide which, when pulled down, allows the switch to open the circuit. When an alarm is sent from a station box, it locks in the

operated position with the circuit open. In order to restore a station box to normal after an alarm has been sent, it is necessary to unlock the box, restore the switch to the unoperated position and again lock the box.

Fire Detection Loops

2.02 The fusible fire detection wire consists of a lead-tin alloy conductor with a rosin core and a covering of red cotton braid. The core serves to increase the sensitivity to fire due to a fluxing effect which facilitates separation of the molten metal so that the circuit may be broken even before the braid is completely burned through. This wire requires much greater care in handling than copper wire and it is important that kinking or unnecessary bending be avoided as strains thus set up are likely to result in eventual breaking of the wire.

2.03 Additional protection from possible grounds is afforded to the wire where it passes within 1/2 inch of metal work or is fastened thereto. For this purpose, except where fibre clips are employed, impregnated varnished tubing is used. To guard against the possibility that short circuits might shunt out a portion of a loop and thus prevent an open therein from setting off an alarm, minimum limits of separation between wires have been set up.

2.04 When the automatic fire detection feature is furnished, sections of fire detection wire are installed along the local cables of the

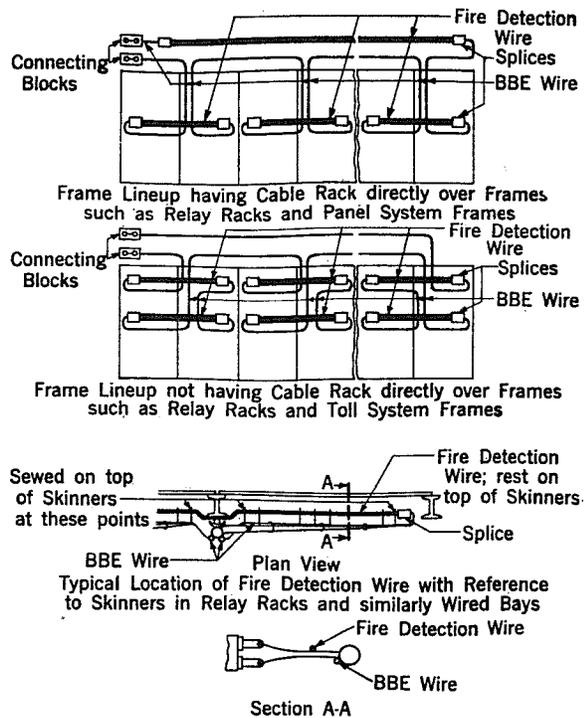


Fig. 2 - Method of Applying Fire Detection Wire to Relay Racks and Similarly Wired Bays.

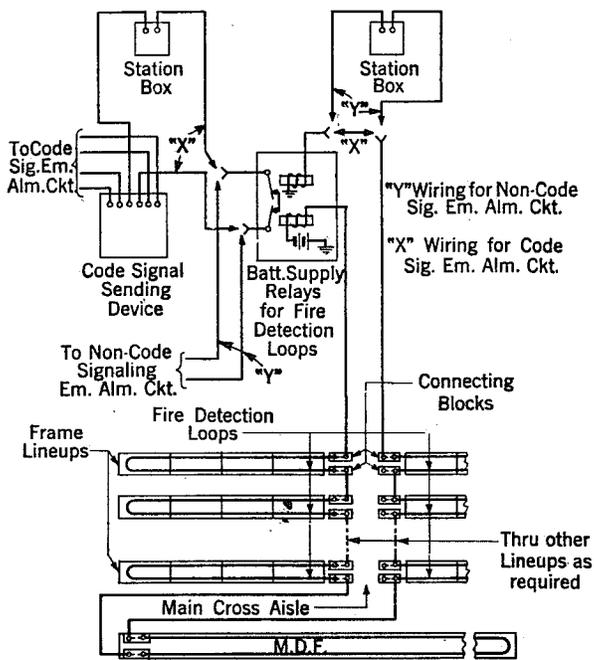


Fig. 1 - Schematic of Typical Zone Installation.

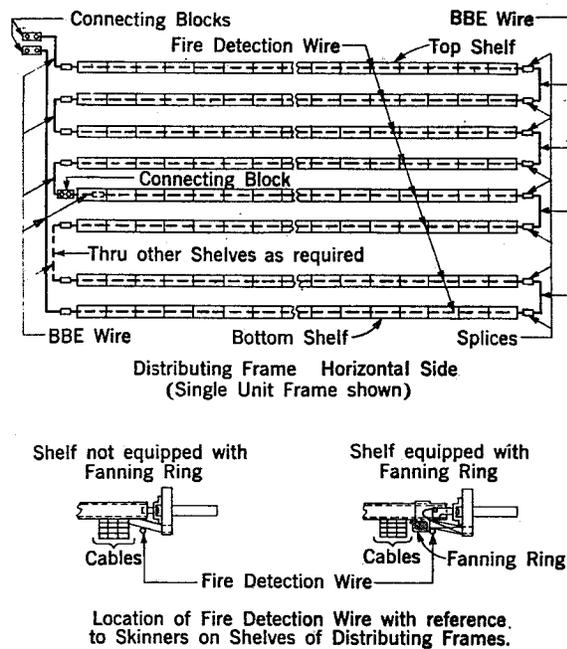


Fig. 3 - Method of Applying Fire Detection Wire to Distributing Frame.

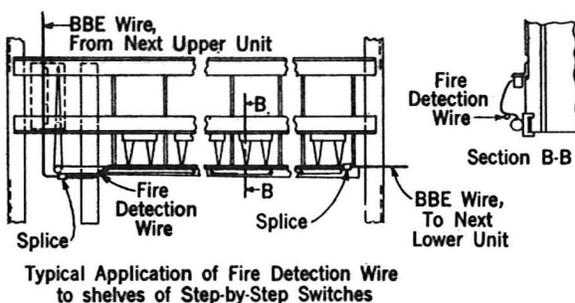
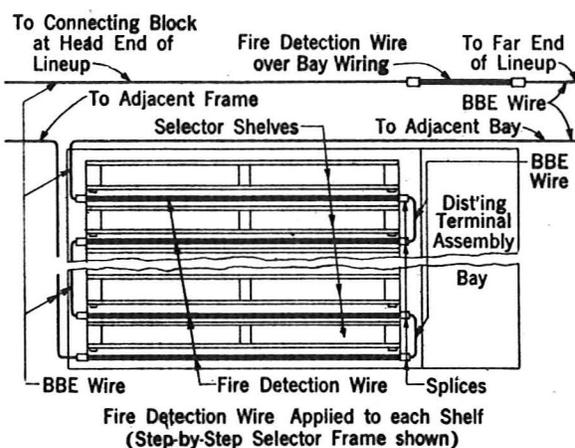
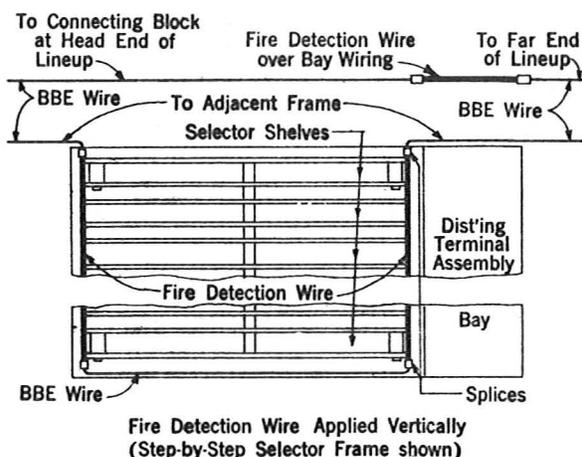


Fig. 4 - Method of Applying Fire Detection Wire to Step-by-Step Frames.

various frames in such a way as to be in the path of an incipient fire. On relay rack and sequence switch bays and similarly wired bays, the fusible elements are usually applied horizontally at two levels, one at the top of the bays and one approximately half way down. In the latter case, the wire is placed over the skimmers of the local forms; that at the top is similarly supported or, if there is a cable rack immediately over the bays, it is fastened to the under side of the cable rack.

2.05 In order to facilitate installation and avoid exposures to mechanical injury, fire

detection wire is applied in short lengths and confined in so far as practicable to the frame areas requiring protection. The methods of installing the wire are illustrated by Figs. 1, 2, 3 and 4.

2.06 All lengths of fire detection wire in the bays of a frame lineup are joined in series with red insulated No. 20 B.B.E. wire which is terminated on connecting blocks at one end of the lineup. The loops serving the various frame lineups in the same zone are in turn connected in series and associated with the zone relays of the alarm system. All junctions of the fire detection wire and the B.B.E. wire are soldered with the aid of a suitable metal sleeve.

2.07 Associated with each zone are two zone relays. In the single zone system and in each zone of the system employing code signaling, these relays are located in a casing mounted usually on a wall or column. In the system having the code signaling feature, the relay casing is usually mounted above the code signal sending device. In the system using zone indicating lamps instead of code signaling, the two zone relays for each zone are located, together with other equipment, in a central control cabinet.

#### Code Signal Sending Device

2.08 In the system employing code signaling, one code signal sending device is required for each zone and it is generally located within the limits of the zone served. This device is a spring driven mechanism the principal parts of which are housed within a dust proof glass case. Holes are provided through the case so that the winding key and the trip finger by means of which the device may be manually put into operation are accessible outside. Usually a trip magnet and associated reset dial are provided outside of the glass case. This external equipment affords means whereby the device may be tripped electrically and is a necessary part of the de-

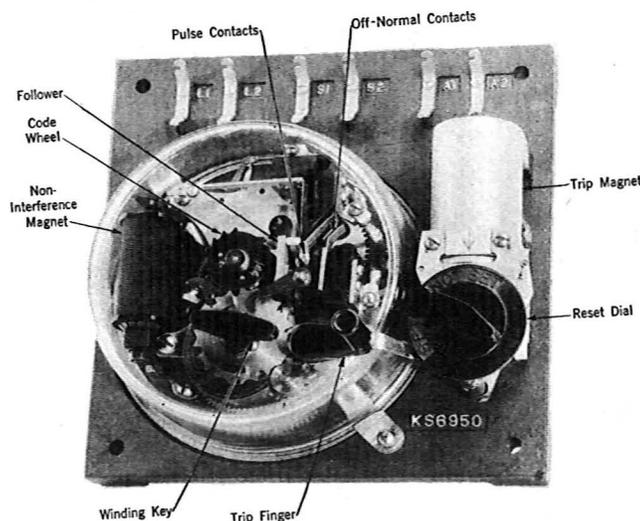


Fig. 5 - Code Signal Sending Device.

vice when used in a zone having station boxes or fire detection loops. The entire device is housed in a metal casing which is mounted in an accessible location on a wall or column. Fig. 5 shows a sending device out of its casing. This is shown fully run down and in an off normal position.

#### Central Control Unit

2.09 For multi-zone systems, a central control unit and auxiliary apparatus are located in a casing which is arranged to be mounted on a 23-inch relay rack. In the case of the system employing code signaling, there are two arrangements of this casing. One is arranged for a maximum of thirty zones and twenty sounding devices. The maximum capacity of the other is fifty zones and forty sounding devices. A control cabinet for the system with code signaling is shown typically by Fig. 6. The wiring to the code signal sending devices and sounding devices, the battery leads and miscellaneous wiring are connected to a wire termination panel above the central control unit and are brought into the casing in a local form.

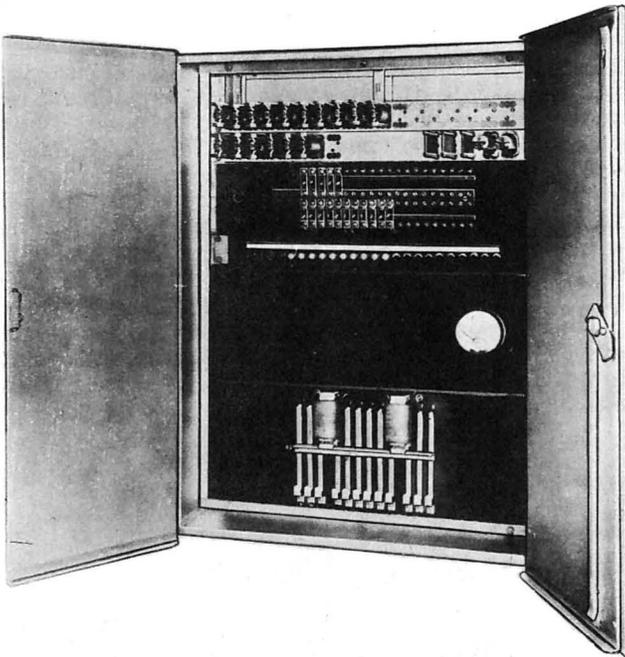


Fig. 6 - Central Control Cabinet for Signaling System.

2.10 Mounted in the central control cabinet of a code signaling system are the multi-contact relay, or relays, which open and close the operating circuits to the sounding devices, the milliammeter in the "main line" circuit, the equipment of the timing circuit, relays, etc. associated with the various supervisory signals and alarms, alarm lamps with designation strip, the fuse panel for circuits associated with the

alarm system and, in systems of more than 10 zones, the jacks for isolating the code signal sending devices into groups of ten, or less, to facilitate the location of wiring troubles. A key, arranged to operate all the sounding devices, is provided in the central control casing for use whenever it may be desired to send a signal manually, as for instance a recall signal.

2.11 For the system which employs zone indicating pilot lamps rather than code signaling to indicate the zone where an alarm has originated, a similar central control cabinet is employed. This contains all the equipment associated with the system except the sounding devices, zone indicating lamps and the supervisory alarm bells. Under this arrangement the zone relays are mounted in the cabinet. As in the code signaling system, a key is provided in the cabinet for manual sounding of special signals.

#### Sounding Devices

2.12 The sounding devices are located throughout the building as the conditions of each specific case require. The single zone system employs two loud ringing bells which are operated from the central office ringing current supply. The system with zone indicating lamps normally employs horns or 6-inch soft tone bells of the vibrating solenoid type. In the system which is arranged for code signaling, horns of the same type may be used or gongs of the solenoid type arranged for single stroke operation. Gongs normally used with the latter system are a 6-inch soft tone gong, 6-inch, 8-inch and 10-inch gongs of regular tone.

2.13 Due to their distinctive sound, horns, rather than gongs, are commonly used in switch rooms particularly where considerable machine noise is present. In general, gongs are used in operating rooms, rest rooms and locker rooms or similar places where it is desirable to cause a minimum disturbance. All sounding devices are mounted away from windows to avoid disturbance to adjacent properties. Fig. 7 shows a horn of the type normally employed for this use. This horn has a shutter arrangement on

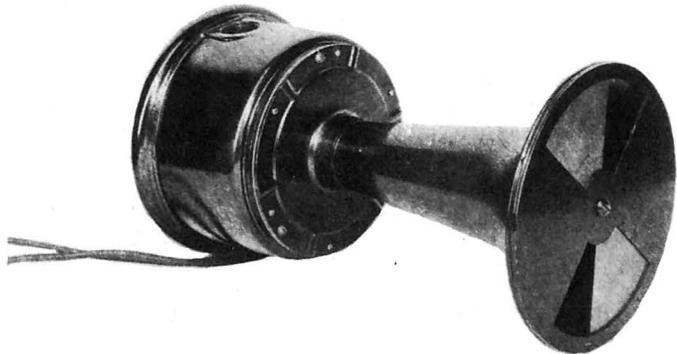


Fig. 7 - Horn with Adjustable Projector.

the end of the projector. There is also a similar shutter inside of the projector about half way between its outer end and the mechanism. The double shutter arrangement affords a wide range of volume adjustment.

#### Visual Signals

2.14 Emergency alarm systems having only two to five zones, and not arranged for code signaling, employ visual signals to indicate the zone where the alarm originated. For this purpose, lamp cabinets having a capacity of five lamps are placed in suitable locations where they can be readily seen by those responding to an alarm.

#### Supervisory Alarms and Signals

2.15 To draw immediate attention to trouble and off-normal conditions, supervisory alarms and lamp signals are provided in all emergency alarm systems having more than one zone. A small vibrating d-c. bell and an a-c. bell are located above the cabinet in which the central control unit is mounted. A number of lamps designated to indicate the various conditions are also provided. The functions and location of these lamps are covered in Part 3.

#### Wiring, Cabling and Conduit

2.16 No. 14 flame-proof power wire is used for connecting together the station boxes, code

signal sending devices, horns and gongs and the central control equipment. It is also used in fire detection loops for the runs between line-ups of frames and from the frames to the zone relays. This wire which is rugged in construction and flame resistant is installed in the same manner as switchboard cable when it is run open on and over frames and racks. In the case of runs on ceilings, walls or columns where no cable racks are available, it is enclosed in conduit, metal moulding or given equivalent protection. No. 20 B.B.E. wire is used in making up the bay local cable form which enters the central control cabinet.

2.17 The power supply feeders are provided in the regular manner but separate leads supply the emergency alarm equipment.

### 3. CIRCUIT ARRANGEMENTS AND OPERATION

#### Systems Having The Code Signaling Feature

##### General

3.01 Emergency alarm systems having the code signaling feature are designed to operate on the regular signaling battery supply and within a voltage range of 40 to 56 volts. A simplified sketch of this type of system is shown on Fig. 8.

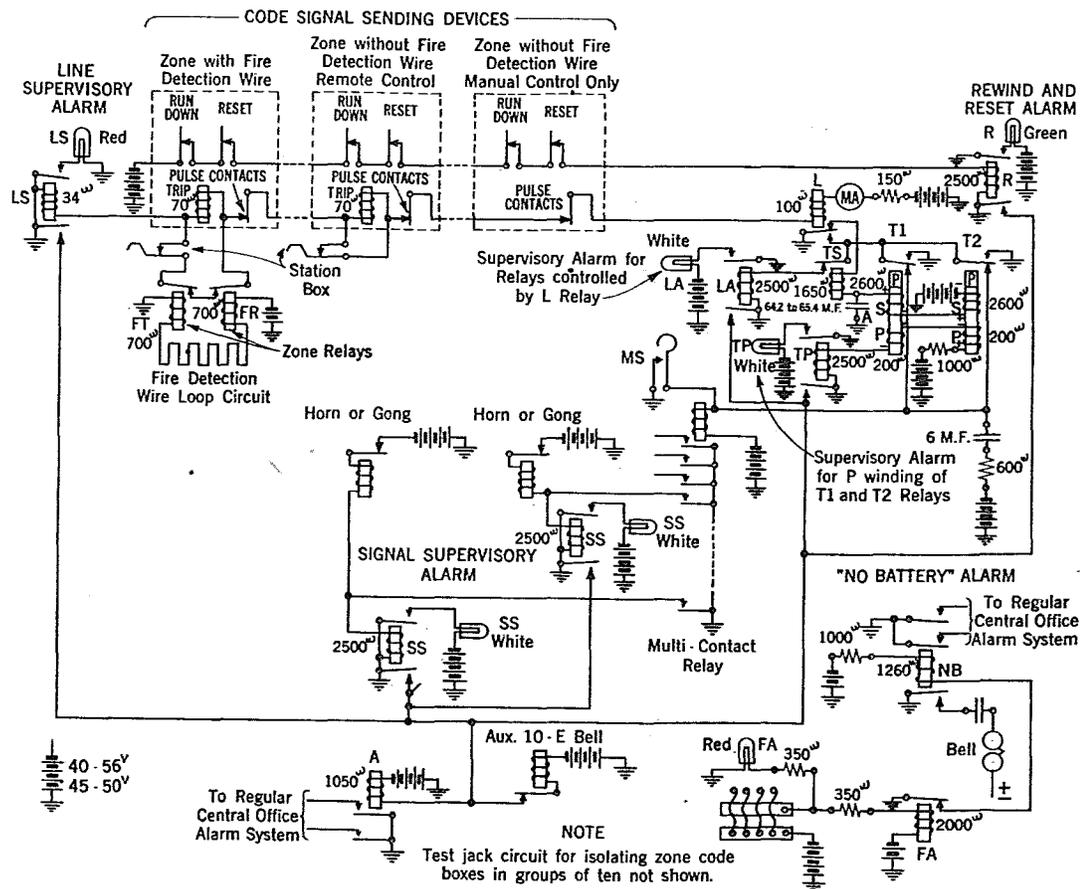


Fig. 8 - Schematic of Emergency Alarm Circuit with Code Signaling.

3.02 As shown on Fig. 8, the code signal sending devices are all connected in series. In the battery side of this circuit, known as the "line" circuit, are a resistance of 150-ohms, a milliammeter, and a line relay "L." The purpose of the resistance is to limit the current flow to the proper amount. The milliammeter provides a means for checking the current flow and may be used in case of possible trouble conditions as an aid in detecting whether the trouble is due to a ground or an open. The relay is used to transfer the pulses sent by the code signal sending devices through a relay timing arrangement to the sounding devices. The relay timing arrangement aids in holding the closures to the sounding devices to a uniform time and limits the time of sounding these devices if circuit trouble should occur.

#### Station Box and Code Signal Sending Circuit

3.03 In order to start an alarm manually from any zone, one of the station boxes in the zone is operated by pulling down a slide which permits a switch in the box to release. This opens a series circuit through the station box or boxes and zone relay contacts in the zone. The opening of this circuit removes a shunt from around the trip magnet of the associated code signal sending device. The trip magnet operates short circuiting its own winding and starts the mechanism of the code signal sending device, causing the code wheel to revolve. The device may also be started manually by pulling down the trip finger.

3.04 The code wheel has projections, cut in accordance with the code of the zone. Unless an alarm is already being sent in from another zone, these projections operate contacts causing the line circuit to open and close in accordance therewith. This opening and closing of the circuit causes the "L" relay to function, which, in turn, operates and releases a multi-contact relay. The multi-contact relay in operating, closes the circuits to all the sounding devices causing the code to be sounded throughout that part of the building associated with the system.

3.05 To render the sending device non-interfering and successive, there is an interval of about one second between the start of the first revolution and a point where the first projection of the code wheel leaves the follower which operates the pulse contacts. During this interval a continuity test is made of the "line" circuit to detect the possible sending out of an alarm from another zone. At the beginning of each revolution (and also whenever the pulse contacts are open), the armature of the non-interference magnet is held mechanically in its operated position. When the device is tripped, the off-normal contacts open a shunt from around the winding of this magnet which is in the "line" circuit and the armature is freed from being held mechanically but remains held magnetically provided the "line" circuit is kept closed. An interruption of the current in the "line" cir-

cuit during the test interval due to code being sent from another sending device allows the armature to release, in which case it moves too far from the magnetic field to be brought up again on subsequent closures. In the released position of this armature, the code wheel follower is held in its normal position with the pulse contacts closed.

3.06 If, at the end of the test interval, the armature of the non-interference magnet is still held, the follower which actuates the pulse contacts is left free to move in accordance with the cutting of the code wheel so that the pulse contacts open when the first projection of the code wheel is passed. As each succeeding projection passes under the follower, the pulse contacts are closed and reopened. Each opening of these contacts causes one stroke or blast to be given by the sounding devices. When the code wheel has made four revolutions thus sending out four rounds of the code, the mechanism recloses the "line" circuit and stops.

3.07 If, during any test interval, the armature of the non-interference magnet falls off, the follower remains held in its normal position and the pulse contacts remain closed throughout the revolution. At the end of the revolution, the armature is mechanically returned to its operated position. The test is then repeated during the first part of the subsequent revolution and so on until the armature remains held throughout the test interval. Then four rounds of code are sent in the regular way. It is not likely that the mechanism will run down and fail to send out its code as this can occur only if alarms are originated in several different zones so that, due to the non-interfering feature, the device would be in operation for some time before commencing to send out its code.

3.08 After an alarm has been sent, the station box and the code signal sending device should be reset. After the circuit has been restored to normal, the code signal sending device can be reset by turning the dial in a clockwise direction to the end of its travel. The dial should then lock with the word "SET" under the arrow on the trip magnet housing. The sending device will not lock in the reset position until any open circuit in a fire detection loop or station box has been reclosed. Although the spring mechanism of the sending device will run long enough to send out a complete alarm of four rounds of the code as many as four times (i.e. 16 revolutions) without being rewound, good practice requires that each device be completely rewound after every alarm by turning the winding key to the end of its travel in a counter-clockwise direction.

3.09 The device is designed for a minimum of 30 complete revolutions of the code wheel from a fully wound condition to the run down condition. After running 16 revolutions and always before running 20 revolutions, the rewind alarm should be operated.

3.10 If it is desired to send in a second alarm from any zone without resetting the station box or the code signal sending device, it is necessary only to operate the trip finger in the sending device associated with the zone.

#### Fire Detection Loops

3.11 Due to the resistance of the fusible wire comprising the fire detection loops, the series circuit through the station boxes does not include these loops but passes through normally closed contacts of "zone" relays which are held operated over a separate series circuit through all sections of the fire detection wire in each zone. An open circuit in a fire detection loop due to breakage or fusing of the wire releases the zone relays thus opening the shunt around the trip magnet of the code sending device in that zone in the same manner as would the "pulling" of a station box.

3.12 To provide a continuous test for failures due to opens, grounds or battery crosses in the fire detection loops, two zone relays are provided in each zone. The winding of one relay is connected into the battery supply end of the series circuit through all the fire detection wire in the zone and the winding of the other relay is connected at the grounded end. The contacts of these relays are wired in series so that the release of either or both relays will open the circuit to the sending device and cause the code of the zone to be sounded on the alarm signals, as in case of fire. An open circuit will cause both relays to release. A ground will release the relay at the ground end of the circuit and a cross with battery will cause the relay at the battery end to release.

#### Alarms in a Distant Office

3.13 Outgoing: The circuit arrangement employed when alarms are to be sounded in a distant office, involves a normally closed two-wire circuit between the two offices. A normally operated relay associated with the emergency alarm supervisory d-c. bell in the originating office, feeds battery and ground through its contacts to a relay in the distant office. An emergency alarm, a battery failure or any condition which would cause operation of the supervisory d-c. bell in the originating office releases this associated relay thus opening the circuit to the distant office and giving an alarm there. The emergency alarm equipment at the distant office may be any one of the three emergency alarm systems listed in 1.02 or the separate alarm for this specific purpose described in 3.32.

3.14 Incoming: An office provided with an emergency alarm system involving code signal sending equipment and having incoming alarm circuits from one or more distant offices, may be arranged so that an alarm at the distant office causes a code alarm to be sounded on the regular

signals or the arrangement may be such that a separate audible alarm is caused to function. When the incoming alarm circuit is associated with the code signaling system, a code signal sending device is required to sound the code which has been assigned to indicate the existence of an emergency in the distant office or offices. In the event of trouble in a distant office or failure of an external loop between offices, a relay normally held operated over the loop from the distant office is released. This in turn releases a second normally operated relay under its control which opens the shunt from around the trip magnet of the associated code signal sending device and also lights a red lamp "DO" in the alarm board or other location as specified by the telephone company.

#### Supervisory Alarms and Signals

3.15 Off-normal conditions or troubles in the emergency alarm system other than those which result in regularly sounding the alarm, are indicated by supervisory alarms and signals. The circuit arrangement and operation of these alarms and signals are covered in the following paragraphs. These alarms cause lamps to light in the central control cabinet as well as the various aisle pilots, class pilots and alarm bells of the central office alarm system. In Table 1 below are given the designation and color of the associated lamp in the control cabinet. The table also shows which of the supervisory alarm bells associated with the emergency alarm system is operated for each kind of supervisory alarm. Many of these alarms and signals operate intermittently during the sending of a code alarm and this is not an indication of trouble conditions.

TABLE 1

#### Supervisory Alarms and Signals

Kind of Alarm	Pilot Lamp		Audible Signal
	Designation	Color	
Line Supervisory	LS	Red	d-c. bell
Rewind and Reset	R	Green	" "
Signal Supervisory	SS	White	" "
Timing Circuit	LA & TP	White	" "
No Battery	None	-	a-c. "
Fuse Alarm	FA	Red	" "
Trouble on Alarm			
Circuit Outgoing			
to Distant Office	DO	Red	" "
Alarm incoming from			
Distant Office	DO	Red	Code alarm

3.16 Line Supervisory Alarm: The line circuit through the code signal sending devices is maintained under constant test. At the ground end of the circuit a line supervisory relay is provided for this purpose. In case of an open or a low resistance ground this relay will release and cause a supervisory alarm. In case of an open in the line circuit, there will also be one operation of the sounding devices.

3.17 A Rewind and Reset Alarm is provided for each ten, or less, zones to ensure that circuits through the fire detection loops are closed, station boxes and code signal sending devices are reset and that the latter are re-wound if more than halfway run down after each alarm. Following the sending in of a regular alarm, this supervisory alarm continues to sound until all sending devices are reset and all are at least half wound.

3.18 A Signal Supervisory Alarm is provided to detect an open circuit or no battery supply for each sounding device. A relay and lamp are provided for each sounding device and each relay is normally held operated over a path from battery through the windings of the sounding device and the relay to ground. Due to the resistance of the relay, insufficient current flows to operate the sounding device. If an open or ground or other trouble conditions prevent current from flowing, release of the relay causes an alarm. A ground on the wiring beyond the sounding device will also cause the latter to operate. Thus a single stroke gong will give one stroke while a horn or vibrating bell will sound continuously.

3.19 Timing Circuit Alarms indicate, by release of normally operated relays, troubles in circuits through the windings of the "T-1" and "T-2" relays, the multi-contact relay, or associated wiring, and failure of certain normally closed contacts in the timing circuit. Troubles due to opens or grounds in the operating circuit of the multi-contact relay, the circuit through the secondary windings of the "T-1" or "T-2" relays or contact failures of the front contacts of the "L," "TS," "T-1" or "T-2" relays are indicated by the "LA" lamp. The "TP" lamp indicates an open or ground on the circuit through the primary windings of the "T-1" and "T-2" relays.

3.20 The No Battery Alarm is given by release of a normally operated relay which then closes a circuit from the ringing current supply to the supervisory a-c. bell associated with the emergency alarm system. As in the case of other alarms indications are also given in the associated central office alarm system. As due to battery failure, a pilot lamp could not function, no pilot is provided for this alarm.

3.21 The Fuse Alarm circuit is arranged so that when battery is placed on the alarm bus of the fuse panel by an operated fuse, a normally operated fuse alarm relay is shunted down. Since the operating circuit for the relay in the "no battery" alarm passes through normally operated contacts of the fuse alarm relay, an alarm is given as in the case of battery failure but is distinguished as a fuse alarm by burning of the "FA" lamp.

3.22 Supervisory Alarm on Outgoing Alarm Circuit to a Distant Office: Both sides of the outgoing loop to the distant office pass

differentially through the windings of the relay. As there is no battery or ground connection at the distant office, the effects of these two windings balance each other and the relay remains unoperated. A ground or cross with another circuit would destroy this balance and operate the relay to give a supervisory alarm. To care for opens in the loop to the distant office, a series relay is also provided which is normally operated and when released causes the supervisory alarm to function. Troubles on alarm circuits to a distant office which cause the relay at the distant end to release, result in a regular emergency alarm being given at the distant office.

#### Five Zone System Without Code Signaling

##### General

3.23 The emergency alarm system which employs lamps as indicators of the particular zone affected, rather than sounding a code, is shown on SD-90560-01. This system is designed for 20 to 28 volt operation. The horns or bells used with this system are of the vibrating type. Like the system arranged for code signaling it may be operated manually by "pulling" a station box or automatically by the functioning of the fire detection feature. It is also arranged for alarms to be sounded in a distant office or to sound in case of an emergency alarm in a distant office.

3.24 It will be noted that zone relays are employed at the ends of the fire detection loop circuits, as in the case of the emergency alarm system arranged for code signaling. The release of either one or both of these relays lights the lamps to indicate which zone is affected and also operates a multi-contact relay directly, which in turn operates the sounding devices. In this system station boxes are in the series circuits through the fire detection loops. The alarm is sounded continuously and the lamps burn until the fire detection loop circuit is closed or, if the alarm is due to the operation of a station box, until the station box is restored to normal. No other means for silencing the alarm is provided, as it might inadvertently be left inoperative.

3.25 The fire detection loop circuits are self-testing against failures due to opens, grounds or battery crosses. If a ground is present the relay connected to ground will be shunted and will release. Similarly, a battery cross will cause the release of the relay which is connected to battery.

##### Supervisory Alarms

3.26 The multi-contact relay and sounding device circuits are also kept under test at all times. Each of these circuits is kept under test by a relay which is normally operated through the circuit being tested. If the circuit becomes open or grounded, the relay will release causing the small d-c. bell to operate

and a supervisory lamp to light. A supervisory relay and red lamp designated "MC" are provided for the multi-contact relay. For each sounding device circuit there is a supervisory relay and a white lamp designated "SS."

3.27 A no battery alarm is provided to give an a-c. alarm in case a fuse operates or battery is disconnected from the emergency alarm circuit. A blown fuse of the alarm type in any circuit of the emergency alarm system causes an interruption of battery supply to the no-battery alarm circuit which will cause its operation but a red lamp "FA" is also lighted to indicate a fuse alarm.

3.28 Except in the case of battery failure, whenever a condition occurs which operates either the small d-c. bell or a-c. bell, a class pilot will light and the major central office alarm bell and a red aisle pilot will be operated where these facilities are provided.

#### Single Zone System

##### General

3.29 This system, which is shown on Drawing SD-90641-01, is arranged for 20 to 28-volt operation and like the other systems it may be operated manually by "pulling" a station box or automatically by the functioning of the fire detection feature. It also has the same general arrangement to care for emergency alarms in a distant office.

3.30 The system is arranged for a single fire detection loop circuit. At each end of this circuit, as is the case in other systems, there is a relay. If either of these relays releases due to an open, ground or battery cross, the sounding devices are operated. The two loud ringing bells which are used for sounding devices are connected in parallel and operate from the central office ringing supply.

3.31 Supervisory Arrangements: In the relatively simple single zone system, provision is not made for supervisory alarms or connection to the central office alarm system. Blown fuses or battery failure causes the release of one or more of the normally operated relays, any of which in releasing will result in an emergency alarm. Troubles on the circuit to or from a distant office also result in an emergency alarm being sounded.

#### Separate Alarm to Indicate an Emergency in a Distant Office

3.32 The separate alarm provided for sounding emergency alarms in a distant office has

essentially the circuit arrangement of the single zone emergency alarm system covered in 3.29 to 3.31 with the fire detection loop and station boxes omitted.

#### 4. MAINTENANCE FEATURES

4.01 Due to the simple nature and rugged construction of the station boxes and direct current sounding devices, there should be little occasion for repairs or adjustments. Volume adjustments of the horns will obviously involve little or no difficulty. No testing equipment other than that normally required in the central office is necessary.

4.02 The standard loud ringing bells and other subscriber set ringers operating on 20-cycle ringing current are adjusted in accordance with the usual methods applying to this apparatus. Requirements and adjusting procedures for the multi-contact relays are covered in Division A400.

4.03 Adjusting information is not being prepared covering the code signal sending devices. In case any of these devices should fail to function properly, necessary repairs or readjustments should not in general be made by the local forces.

#### 5. CIRCUIT DESCRIPTIONS

5.01 Table II lists the circuit drawings pertaining to the emergency alarm systems. Detailed circuit descriptions will be found in the associated C.D. sheets.

<u>Table II</u>	
<u>Title</u>	<u>Drawing</u>
Emergency Alarm Circuit Arranged for Code Signaling	SD-90437-01
Five-Zone Emergency Alarm Circuit	SD-90560-01
Single Zone Emergency Alarm Circuit	SD-90641-01
Emergency Alarm Circuit - Incoming from Distant Office (For use where a separate alarm is used)	SD-90642-01

(This section consists of excerpts from D. & R. Bulletin No. 607 on Emergency Alarm Systems for Central Offices Arranged for Automatic Fire Detection and from Notes accompanying P.E.C. 655.)