ALARM SYSTEMS

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1. GENERAL

1.01 This section provides standards for the Alarm Systems. These standards are provided for use in the design of new buildings or building additions that are intended to house telephone equipment that meets the requirements of Bell System Practice 800-610-164, "New Equipment-Building System (NEBS), General Equipment Requirements."

1.02 This practice supercedes Section 9.6 of Specification X-74300, "NEBS Building Engineering Standards (BES)." Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

2. SCOPE

2.01 All telephone switching and transmission equipment systems are provided with a system of alarms to identify and locate troubles needing maintenance attention. The building housing such equipment, particularly those that will be unattended, should be provided with alarms to indicate abnormal conditions that, if neglected, may result in service failure or damage to the telephone equipment. In the past, building environment alarms for local wire centers were not standardized; in some cases alarms were omitted entirely, and in others only a rudimentary system was installed. With the trend toward unattended operation of the telephone equipment, it is vital that adequate alarms be provided and sent to the groups responsible for buildings operations to protect the environment of all buildings.

3. EQUIPMENT BUILDINGS

Building Maintenance Categories

3.01 Telephone equipment buildings may be fully attended, partiallly attended, or unattended in accordance with local practices of the telephone company. These terms apply to the presence in the building of craft personnel responsible for maintaining the telephone equipment permanently installed there. The same personnel or other assigned company employees may be responsible for the building environmental control systems. In some locations, the building maintenance may be done by contract personnel. The building alarm system should be designed accordingly.

Building Types

3.02 For alarm purposes, buildings may be categorized as either equipment or nonequipment buildings. An equipment building may house a local or toll wire center and the associated transmission facilities. A wire-center building may be either a single-entity (a small Central Office or a Community Dial Office) or a multiple-entity

switching complex. The latter sometimes may be subdivided into separate zones for alarm purposes. Other equipment buildings—usually in remote locations—may contain, for example, transmission repeater stations or microwave radio. Some satellite operator services, such as TSPS and AIS, may be located in a commercial building or a specialized type of telephone equipment building. Computer equipment may be similarly located. Nonequipment buildings include office buildings, garages, repair and service centers, warehouses, and so forth.

4. ALARM SOURCES

4.01 In general, alarms should be provided to indicate security violations or any hazardous condition in the building or in its environmental services. It is also desirable to provide alarms for troubles in building service systems or incipient failures in need of maintenance attention. Local conditions will dictate which conditions and systems should be provide with alarms in any particular building. A list of possible alarm sources is given below:

(1) AC switchgear: Sections 770-280-600 and 770-280-601

(a) Power failure detector (usually covered by telephone equipment power alarm system)

(b) Lightning protector failure detector

(c) Indication of main circuit breaker operated or CO power breaker tripped or main fuse blown

(d) Ground fault detector (Section 760-400-165).

(2) Emergency power:

(a) Indication of engine or turbine operating for trouble or routine service, and associated alarms (usually covered by the telephone equipment power alarm system)

(b) Diesel engine cooling water system detector

(c) Fuel pumping system.

(3) Fire and/or smoke detectors (Section 760-621-150)

(4) Flood:

(a) Highwater level monitor

(b) Water accumulation or overflow detector.

(5) HVAC system:

(a) Temperature (High—100°F, Low—40°F) indicator

(b) Humidity (High—55%, Low—20%) indicator

(c) Ventilating fans.

(6) Security: (At Unattended Buildings)

(a) Door (exterior and/or interior), floor, and window switches or magnetic sensors

(b) Glass-breakage detector tape or wire.

(7) Tower obstacle lighting (Section 770-280-503)†

(a) Indication of no lights (Section 760-380-150)†

(b) Indication or failed flasher, steady lights.

†SD-81113-01;
SD-81114-01.

Hardware

4.02 The actual hardware needed to originate building alarms generally is neither standardized nor available for order from Western Electric. Some exceptions occur, notably for fire detection, emergency power, and lightning protection. Usually it will be necessary for the building engineer to specify the alarm features to be included in the architect's specifications for new buildings or major alterations by a contractor. Vendors of building service equipment usually will be able to supply alarm features with the original equipment, as well as add-on alarms for existing services.

Maintenance

4.03 The detectors and sensors associated with the mechanical and electrical equipment to be alarmed are vital links in the chain of elements that an alarm system comprises. These sensors and detectors and their connecting circuitry may be an integral part of the end equipment, may be

physically attached as an identifiable assembly, or may be mounted a few feet away on an adjacent wall. In all cases, they should be identified on the appropriate Building Mechanical Equipment Record Form E-3925 and be subject to routine maintenance and scheduled operation. To permit coordination with personnel at the remote monitor for the alarm system, it is advisable to establish separate schedules for the routine maintenance of all sensors and detectors associated with the alarm system in a complete building or a zone in a building.

Building Alarm System and Interconnections With Other Alarm Systems

4.04 A building alarm system of electrical wiring and equipment will be needed to connect each appearance of an alarm source to one or more indicating annunciator systems arranged to display the alarm conditions and to sound an acoustic signal (bell, buzzer, or horn) to alert the maintenance personnel. The building alarm system may be totally independent of the telephone equipment alarm system, or it may be integrated with the alarm system. Most buildings also will have a separate system for fire and emergency alarms, called the "Emergency Alarm System." This system usually is interconnected with the telephone equipment alarms. A large building may be divided into zones for maintenance and alarm purposes. In this event, each zone may have a separate alarm system and thus be treated as though it were a separate building, or a common alarm system with zoning features may serve the entire building.

Telemetry and Remote-Control Systems

4.05 If the maintenance staff is not on duty continuously, the building (or zone) is considered to be unattended, either fully or partially. In this event, it is recommended that some form of telemetry transmit the alarm signals to a central maintenance location either in another building or in an attended zone in the same building. The telemetry system may also transmit routine status information and may permit remote-control operation of some building system features together with a verification of each remote-control command. Western Electric manufactures a number of telemetry systems including E3, E2A, E2, C1, and their predecessors. Remote maintenance and control systems using such telemetry are either available or are under development for switching and transmission systems.

4.06 These systems include provisions for building alarms and controls. Normally, such features appear at a switching or transmission center, which are not primarily responsive to maintenance needs. They are also available in the Switching Control Center (SCC) for ESS offices and in the Telecommunictions Alarm Surveillance and Control (TASC) system for electromechanical-type offices. The Surveillance and Control of Transmission Systems (SCOTS) will permit further centralized maintenance of cable and radio transmission repeater stations. In addition to these Western Electric systems, several commercial vendors offer telemetry and control systems that may be used for building alarms. These commercial systems will not interconnect with the standard (Western Electric) alarm systems and may require a special emergency power supply.

4.07 Normally, the status indicators for building alarms and controls that are part of Western Electric equipment alarm systems appear at a switching or transmission center. This arrangement requires that the location be responsive to building maintenance needs or that suitable communication links be provided to the Building Operations forces. The Building Operations managing personnel should participate in the design of the alarm system and should indicate the type and number of the required inputs. The design should centralize the building alarms and controls where they can be responded to by Building Operations. Where vendor equipment is involved, Building Engineering and Building Operations should design the system and network together to obtain the best utilization and the greatest overall savings, of the Building Operation Control Center (BOCC) equipment system.

5. SWITCHING CONTROL CENTER (SCC)

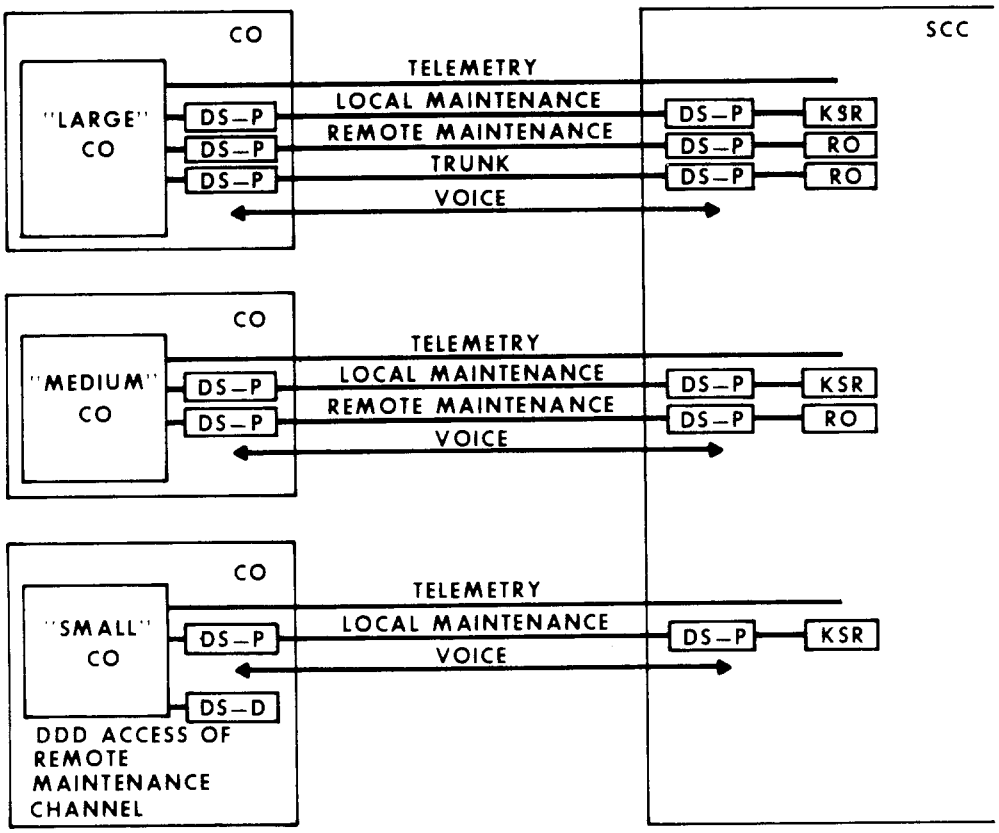
5.01 The SCC makes possible the remote and central monitoring and control of electronic central offices. SCC equipment provides critical status displays on a per-office basis and control, from a console, on a switched basis. Each SCC work station can control up to 16 central offices and gain access to each. An SCC with a minicomputer will process large quantities of telemetry data sent to the SCC and will greatly ease SCC administrative problems. An overall view of the Basic Switching Control Center (BSCC) is shown in Fig. 1. BSCC arrangements are being designed to serve No. 1 and No. 2 ESS, TSPS No. 1, and all new stored-program-controlled switching systems. The

application of alarm systems in No. 1 ESS office is described in GL 73-06-097/EL 2634/PL 2688.

5.02 An SCC console is not connected to each central office on a full-time basis; therefore, critical indicator panels are provided to obtain the real-time status of each central office and to determine which central office is the source when common audible alarms are sounded. Nineteen indicators are dedicated to each central office; these can be duplicated elsewhere in the SCC for viewing ease. The audible alarms used in conjunction with critical indicator panels conform to the three-level alarm standard: critical, major, and minor. Critical and major alarms are continuous audibles that require positive action to retire them; minor alarms are self-retiring. The alarm structure at the SCC is the same as that at each central office. In addition, two building critical indicators are provided: BLDG, which indicates that a building alarm has been detected in a central office, and BLDG INH, which indicates that a central-office building alarm has been inhibited. Sixteen dedicated ESS scan points are reserved for BLDG, and a telemetry input is reserved for BLDG INH. The SCC console has a commercial power indicator and six additional building indicators that can be wired to important building alarm indications.

6. TELECOMMUNICATIONS ALARM SURVEILLANCE AND CONTROL (TASC) SYSTEM

6.01 The TASC System has been developed pimarily for the remote maintenance of electromechanical switching systems and is expected to be furnished in a large number of unattended local crossbar and step-by-step buildings. The TASC System



NOTE: DS–P = PRIVATE LINE DATA SET
DS–D = DDD DATA SET

Fig. 1—Typical Arrangement of Communication Facilities at a No. 1 ESS Basic Switching Control Center

provides low incremental cost telemetry, display, and remote-control features for other systems, such as building, power, and transmission, that are located in the same building with the switching system.

6.02 The TASC System includes provision for scan points dedicated to building alarms and controls. These are displayed or entered as English-language text on a teletype machine at the central location under the control of a minicomputer that will also print out a complete status report for each remote location periodically or on request. Additional building alarms or controls not included in the standard set may be assigned to additional scan points designated "special" that are available as required. Figure 2 is a simplified block diagram of a telemetry alarm system and provides the requirements of a typical sensor alarm circuit. An alarm message will be displayed on a teletype machine at the central location when an alarm sensor actuates normally open contacts connected to a two-wire pair from the E2A telemetry system. Detailed application information for the TASC System is covered on the associated application schematics. (Note 106 on SD-1P027-01, for example, applies to crossbar switching systems.)

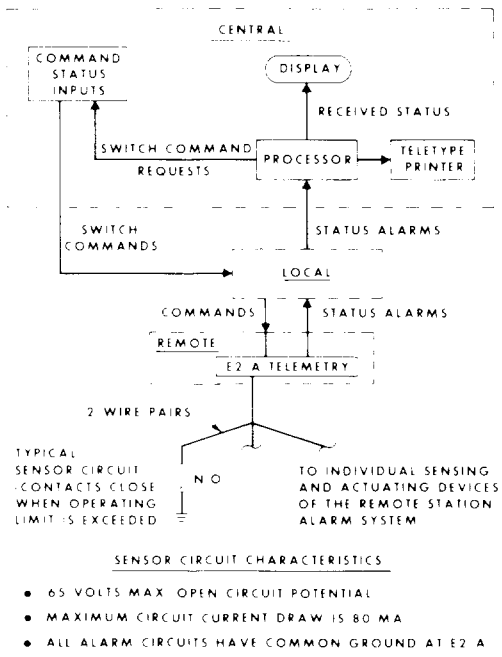


Fig. 2—Telemetry Alarm System Block Diagram

7. E3 ALARM SYSTEM

7.01 The E3 Alarm System, an independent E-Telemetry system, is used in small alarm reporting and remote control application (see Fig. 3). It is an autonomous alarm system that permits centrally located craft personnel to monitor and also control alarm activities at remotely located wire centers and other equipment buildings, such as carrier or microwave repeater stations. The E3 Alarm System interfaces with large maintenance networks, such a TASC System and SCOS, thus allowing an evolutionary approach to centralization of maintenance activities.

7.02 This system consists of a manually operated central terminal, a maximum of 24 E2A Status and Command remote terminals, and a four-wire dedicated multipoint data network that interconnects the central terminal with each remote terminal.

7.03 The E3 Alarm System central terminal automatically and sequentially polls each remote terminal at 1200 bits-per-second and displays routine alarm and status information. (The central terminal emits an audible alarm when an alarm condition exists.) This information can be printed on an optional Teletype® teleprinter (periodically or on request). The central terminal switches and displays provide remote control operations and verifies each remote control command.

7.04 Each E2A Status and Command remote terminal monitors a maximum of 256 scan points and controls a maximum of 64 remote control operations; these sense and detect the functions associated with transmission, switching, power, and security equipment located within the monitored building.

7.05 DL Transmission 3176 provides advance planning information for the E3 Alarm System, and application schematic SD-1C543 supplies E2A scan point and control point circuit characteristics.

8. REFERENCES

Section 760-621-150—Design Criteria for Five Detection Systems in Telephone Equipment Buildings.

Section 201-601-101 and 800-614-151—Emergency Alarm System Automatic Fire Detection Feature.

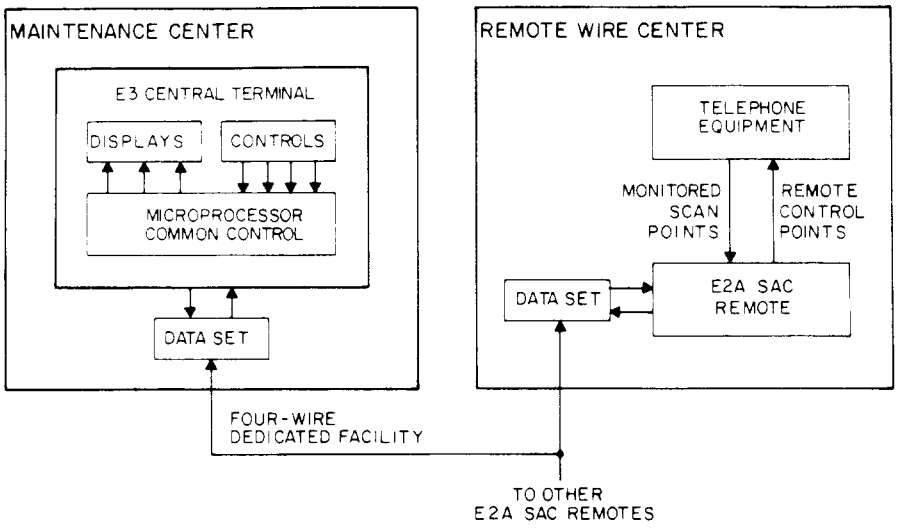


Fig. 3—E3 Alarm System

Section 760-550-208—Engineering Guide for Ventilating and Air-Conditioning—Design Parameters.

Section 760-550-212—Engineering Guide for Ventilating and Air-Conditioning—Refrigeration Systems.

Section 770-200-000—Building Mechanical Equipment, Scheduling Routine Maintenance.

GL 73-06-097/EL 2634/PL 2688—No. 1 ESS Switching Control Center, June 19, 1973.

EL 2371—Common Systems—Centralized Status Alarm and Control System, Feb 7, 1973.