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FIRE SIGNALLING SYSTEMS

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Systèmes de signalisation incendie

FIRE SIGNALLING SYSTEMS

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FIRE SIGNALLING SYSTEMS

1.0 INTRODUCTION

This publication briefly describes the types of fire protective signalling systems (fire alarm systems) available on the market, and provides detailed information on those most commonly used on Indian reserves. The operation of the main components of the systems is explained, and inspection and maintenance procedures are recommended.

The information contained in this publication is intended for band personnel involved in the selection, operation and maintenance of fire protective signalling systems.

2.0 FUNCTIONS OF FIRE SIGNALLING SYSTEMS

The protective signalling systems in fire safety practice are used to detect the presence of fires, or fire hazards, and to:

a. notify occupants to evacuate the area when fire occurs;

b. summon organized assistance, such as the fire department;

c. inform maintenance staff of possible problems with the automatic fire extinguishing installations, such as sprinkler systems, carbon dioxide systems and halon systems; and

d. actuate automatic fire extinguishing systems.

3.0 CLASSIFICATION OF FIRE SIGNALLING SYSTEMS

The signalling systems are classified according to the location where the signals register. The six recognized classifications are:

a. household (residential) fire warning systems;
b. local protective signalling systems;
c. auxiliary protective signalling systems;
d. central station protective signalling systems;
e. remote station protective signalling systems; and
f. proprietary protective signalling systems.

Each type of signalling system consists of the equipment, devices and circuitry necessary to provide a warning. All systems have common components -- the circuits over which signals are received and those over which alarms or signals are transmitted -- but they all differ in the type of protection provided and the location at which alarms are received.

Table 1 provides a brief description of the six systems. The first four are most suitable for use on Indian reserves and will be described in detail. The other two are more suitable for urban or industrial use.

4.0 SIGNALLING SYSTEMS COMMONLY USED ON INDIAN RESERVES

4.1 Household Fire Warning System

This system consists of a smoke or heat detecting device, a suitable power supply and an audible alarm system. (See Figure 1 for a diagram of a typical household fire warning system). It helps to provide reasonable fire safety for home dwellers by notifying them of the presence of fire and the need to evacuate the building. Once the building is evacuated, the fire department can be called. The primary purpose of this system is to help to protect lives.

4.2 Local Protective Signalling System

This system is designed to detect fire and/or abnormal conditions in the fire extinguishing installation, and to sound an alarm. The alarm informs the occupants of a fire or malfunction in the system so that they can take appropriate action. The building where this system is installed must always be occupied and the occupants must be thoroughly familiar with the signalling code.

TABLE #1

FIRE SIGNALLING SYSTEMS

	TYPE	DESCRIPTION	COMMENTS
1.	Household Fire Warning System	This system produces an alarm in a residence (household) to notify the occupants of the presence of fire so that they can evacuate the building. Residential alarms are usually actuated by either smoke or heat detectors operated by household electricity or batteries.	This system is for the sole use of the protected residence. If the alarm is to be extended to any other location, such as a fire department, it must be done by other means. It could be done by telephone, messanger or the use of one of the other systems mentioned below. The residential fire warning system is primarily concerned with protecting lives rather than property.
2.	Local Protective Signalling System	An alarm system operating inside the protected premises, such as schools, office buildings etc. It is actuated by operation of a manual fire alarm box, water flow in a sprinkler system or by a smoke/heat detector. An alarm is sounded within the building indicating the action required (evacuation or maintenance) but is not automatically relayed to the fire department or maintenance staff.	The signals are of no use when the premises are unoccupied - someone must always be present to contact the fire department or maintenance personnel.
3.	Auxiliary Protective Signalling System	Similar to the local protective system, but the signals are transmitted to the fire department automatically using municipal coded fire alarm boxes.	A reliable system which protects unoccupied premises.
4.	Central Station Protective Signalling System	An alarm system connecting a number of protected premises to a privately owned central station whose function is to monitor the connecting lines constantly and record any indication of fire (or other trouble) at the protected premises. When a signal is received, the central station takes such action as is required, such as informing the fire department of a fire or maintenance contractor of a specific malfunction in the system.	This is a flexible system which can handle many types of alarm, including trouble within the signalling system at the protected premises. This system must have a reliable primary and standby power supply at all times.
5.	Remote Station Protective Signalling System	An alarm system connecting protected premises over leased telephone lines to a remote station such as a fire department or a telephone answering service. It includes a separate receiver for individual functions being monitored, such as fire alarm signal, or sprinkler waterflow alarm. Generally used for protection of premises where there is frequently no one present.	Each remote station requires leased telephone line and continuous attendance by specially trained personnel.
6.	Proprietary Protective Signalling System	An alarm system connecting protected premises to a central supervising station located nearby or on the same property. Similar to a Central Station System.	Because of expense in manning station on a 24 hour basis, these systems are usually limited to very large operations, or industrial establishments where a manned security office is an integral part of the complex.

The system consists of a control unit, a reliable power source (commercial power service, an engine driven generator or storage batteries), an emergency signal actuating device (heat/smoke detector, or a fire alarm box), an audible alarm device (bell, horn or siren) and electrical supervisory circuits. See Figure 2 for a diagram of a typical local protective signalling system.

4.3 Auxiliary Protective Signalling System

An auxiliary protective system is basically a local alarm system that has provisions for notifying the fire department automatically using a municipal fire alarm system. It provides protection to an individual building as well as to a group of buildings on the same alarm circuitry.

The system consists of equipment and circuits in the protected property which, by themselves, are insufficient to summon help from the fire department. They must be combined with a suitable municipal alarm system to provide this service. (See Figure 3 for a diagram of a typical auxiliary system).

The devices in the protected building are usually owned and maintained by the property owner while the equipment used for connecting to the municipal system is the responsibility of the municipality. It may be owned or leased by that municipality as a part of its overall fire alarm system.

This system provides a fast and reliable means of summoning help from the fire department.

4.4 Central Station Protective Signalling System

A central station system customarily provides protection to a number of properties within a limited geographical area (approximately 500 square kilometres). It is usually operated under contract by a person or an agency which has no direct monetary interest in the protected properties. The emergency signals are received at the central station through leased telephone lines and are interpreted by specially trained operators who take appropriate action to protect lives and property.

Each central station keeps records of its activities (signals received, action taken and any special occurrences) and reports details to the property owners. Such records are normally retained and frequently are of value in placing an emergency occurrence in proper perspective.

The advantage of a central station system is that its service is given on a commonly recognized standard basis in accordance with established rules and practices. (See Figure 4 for a diagram of a typical central station system).

5.0 INSPECTION, TESTING AND MAINTENANCE

5.1 General Remarks

The authority having jurisdiction (normally the band council) should ensure that the alarm systems under its control are maintained in accordance with the manufacturer's instructions.

Inspection, testing and maintenance of fire alarm systems should be carried out by qualified persons who should indicate in writing whether the systems and their components are in an operating condition at the time of testing. If they are not, immediate steps should be taken to have them repaired or replaced. Inspections and tests should be conducted at the frequency required by the manufacturer.

Simple systems, such as household fire warning systems, can be tested and serviced by the occupants, using the manufacturer's instructions. For more complex systems it is usually desirable to arrange a service contract with the manufacturer or an authorized representative.

SCHEMATIC OIAGRAMS OF FIRE SIGNALLING SYSTEMS

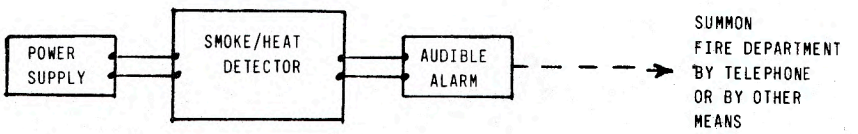

FIG. 1 - TYPICAL HOUSEHOLD FIRE WARNING SYSTEM

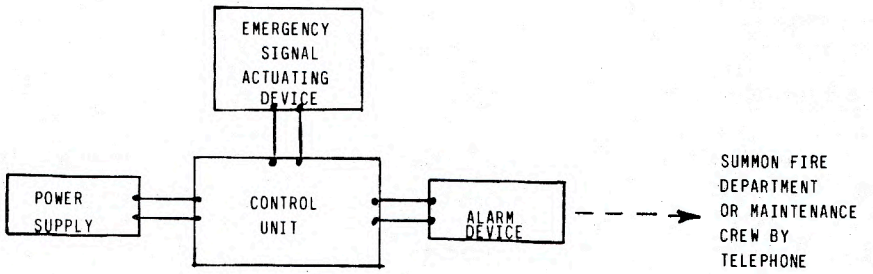

FIG. 2 - TYPICAL LDCAL PROTECTIVE SIGNALLING SYSTEM

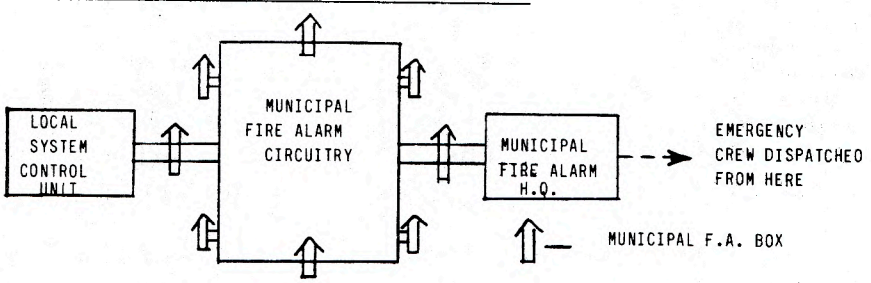

FIG. 3-TYPICAL AUXILIARY PROTECTIVE SIGNALLING SYSTEM

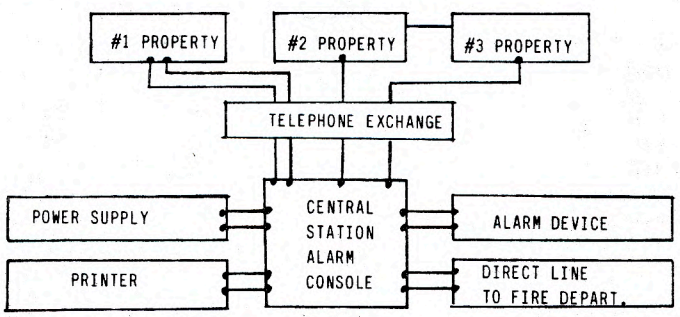

FIG. 4 - TYPICAL CENTRAL STATION PROTECTIVE SIGNALLING SYSTEM

5.2 Testing

The band fire prevention officer or fire control officer should follow the procedures described below as applicable:

a. Notify the fire department before testing a fire alarm system to avoid an unnecessary response.

b. Operate the emergency generator standby power unit at least once a week (or as instructed by the manufacturer), and test the fire alarm system using standby power at least once a year.

c. Once a month, check all fire alarm systems which are not electrically supervised to make sure they are performing properly.

d. Once a month, check that the storage batteries providing standby power are operational.

e. Ensure that the following tests are carried out on all fire alarm systems at least every 6 months:

   (1) Check all audible signal devices to make sure they are performing properly.

   (2) Check that the control panel is fully operational.

   (3) Check the enunciator panel to ensure that it is registering correct locations.

   (4) Check that the alarm is being properly transmitted to the fire department.

   (5) Check the emergency operation of all building systems controlled from the control unit to make sure they are performing properly.

   (6) Test self-reset heat detectors with a source of heat, such as a lighted bulb or a cloth soaked in hot water.

f. Once a year, operate each manual fire alarm station to make sure it is working properly.

g. Non-resettable type heat or smoke detectors are to be tested in strict compliance with the manufacturer's instructions.

h. Take immediate action to have all defects and deficiencies observed during testing repaired or replaced as soon as possible.

i. Report in writing to the band council all defects noted during the tests, and the corrective action taken.

j. A record of all testing procedures should be kept on file.

6.0 SHUT-DOWN OF THE FIRE ALARM SYSTEM

6.1 Accidental Actuation

Routine maintenance, or an alteration to the fire alarm system which might inadvertently actuate it, should not be carried out during normal occupancy periods.

6.2 Deliberate Shut-down

When emergency service or repairs are required, the band council should be notified, and the fire alarm system should be shut off temporarily to prevent a possible false alarm.

If the shut-off period exceeds 24 hours, arrangements should be made to provide temporary fire alarm service by such means as mechanical or electrical gongs, horns or sirens.

7.0 BIBLIOGRAPHY

Fire Commissioner of Canada. October 1979. Fire Protection Engineering Standard 410(M).

National Building Code of Canada, Subsection 3.2.4.

National Fire Code of Canada, Section 6.3.

National Fire Protection Association. 1982. Inspection Manual, Fifth Edition. Chapter 26.

National Fire Potection Association. Fire Prevention Handbook, Section 12.

National Fire Protection Association Codes and Standards, Volume 7.