hazard control points in the plant. Being able to give undivided attention to matters of plant security, they can relay information to fire or police departments without delay. The signal received at the fire department or assistance agency should locate specifically the site of the fire, or at least the building or area, so the fire can be found quickly.

Automatic sending stations (thermostatic detectors) may be used, but should not interfere with the sending of the manual alarm.

Fire alarm sending stations should be near the natural path to exits and as far as possible from the probable source of fire. The fire alarm system should also be designed and located for the convenience of the local plant or fire fighting brigade. In some plants the fire alarm bell located in individual departments is augmented by a system of shop whistle signals which are especially helpful if any of the employees or the fire fighting brigade members are on the outside of the plant.

Regular checks should be made on the alarm system All stations should be inspected on a monthly basis by a responsible person, and the overall system should have a daily test to ensure it is in proper operating condition These daily tests should be conducted at a prearranged time and under a variety of wind and weather conditions to determine whether the signal can be heard in all parts of the plant at all times

Basic principles of alarm systems The National Fire Protection Association lists° five basic principles that are important to all evacuation alarm systems

- That the alarm signal must be distinctive is a major reason for not adapting existing programing or paging systems to be used as fire alarm systems, for not using fire alarm systems for other purposes, and for not combining fire alarm elements, during installation, with those of devices used for other purposes The type of signal must be suitable to the circumstances in which it is used audible signals cannot warn the deaf, nor can visual signals effectively warn the blind.
- The alarm must be seen or heard by all occupants for whom the warning is intended. Location and type of alarms and their sound intensity must be carefully planned If an alarm system is used for evacuation purposes only, it is unnecessary and may be confusing to sound a coded signal. A continuous one is preferable.
- The system must be arranged so that it can be tested periodically Tests are best conducted in connection with evacuation drills, and alarms sounded in the tests should be the same as those used for emergency conditions.
- Equipment should be designed and installed so that malicious operation is, at least, difficult In general the operation of a station should show that the station has been operated, such as by requiring a glass to be broken before the alarm can be activated.
- The probable reaction of people in a protected premises must be considered when deciding whether a general (public) alarm shall be given (which may induce panic) or whether the alarm should be recognizable only by selected personnel who can promptly handle the evacuation

Electrical industrial signals There are a number of major types of electrical industrial signals available They differ in recommended use, and tone and range of signal °°

The various types of signal equipment available include

- *Horns* are probably the most frequently used signals They have loud, sharp, clearly defined tones, and a wide range of power, making them suitable for use in a variety of industrial, commercial, and institutional areas Units are available for interior or exterior installation and may be operated electrically, manually, or pneumatically.
- *Sirens* command the most attention and have the longest effective range. some

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°National Fire Protection Association, 60 Batterymarch St, Boston, Mass *Fire Protection Handbook*, 12th ed. Section 14

°°This discussion is taken from Robert J Barnard, "Three Keys to Specifying Electrical Industrial Signals Proper Type, Proper Loudness, Proper Location" *Actual Specifying Engineer*, Medalist Publications, Inc., 5 90-91 (May 1961).