

# CHAPTER XIX

## YARD COMMUNICATION SYSTEMS

### SECTION A-GENERAL

#### **19.01. Types - Yard communication systems may be of the following types:-**

- (a) Paging and talk back
- (b) Wireless communication
- (c) Line intercommunication

#### **19.02 Paging and talk-back systems**

Paging and talk-back systems are generally required for large marshalling yards. It provides a means for the yard master to make announcements and for communication between yard master and his staff at selected points.

#### **19.03 Wireless communication**

The wireless communication shall be in the VHF region with a fixed set at any suitable location and a number of mobile sets in the yard. The range of such wireless sets used for communication in the marshalling yards is limited normally to the area of the yard. Handheld walkie-talkie VHF sets of 1-2 watts are also suitable for point to point yard communication.

#### **19.04 Line intercommunication:-**

The line intercommunication can be through omnibus limited capacity systems or with small capacity auto exchanges. The omnibus systems may be worked on coding scheme with magneto CB telephones. When the maximum number of telephones involved is upto four, magneto telephones may be employed. When the subscribers exceed four, magneto code ringing will be inconvenient and a code ringing systems or a small capacity auto exchanges of 10 lines or 25 lines capacity may be employed.

### SECTION B

#### **PAGING AND TALK-BACK SYSTEMS-GENERAL REQUIREMENTS**

**19.05 Requirements of paging system:-** The paging system shall comprise a paging amplifier with associated loudspeakers and a microphone with provision on the control panel for the yard master to select any particular group of loudspeakers for making announcements by the operation of a key. Paging loudspeakers will be combined into suitable groups in as many numbers as possible in parallel, consistent with the rated capacity of the paging amplifier, each group being served by a pair of aerial line wire/cable conductors.

### **19.06. Requirements of talk-back system**

- (a) Each talk-back point shall be provided with a loudspeaker capable of being used as a microphone as well, with the necessary line matching transformer.
- (b) Each talk-back point shall be provided with a push-button of non-locking type to call attention of the master.
- (c) The talk-back system shall be designed so as to require not more than two conductors between each talk-back unit and the master unit. In areas provided with either ac or dc electric traction, three conductors between each talk-back unit and the master unit are admissible, one conductor out of the three being used for signalling.
- (d) Operation of the push-button associated with talk-back units should give a visual and audible indication to the master operating the control panel, the visual indication giving the identity of the talk-back units. The indicators shall form part of the control panel and indication shall continue until acknowledged by the operator by the operation of a key relevant to the talk-back unit, which shall connect the talk-back unit to the master unit to enable communication.
- (e) Amplifier(s) shall be provided exclusively for the talk-back system for both way intercommunication between the talk-back unit and the master.
- (f) For talk-back units located very far away from the master unit, transistorised pre-amplifiers shall be provided at each talk-back unit controlled by a relay actuated by the talk/listen key on the control panel.
- (g) A volume control shall be provided on the control panel to adjust the level of incoming speech.

### **19.07 Standby requirements**

Hundred percent standby shall be provided for the paging and talk - back amplifiers and the power supply unit for the operation of the signaling relays, with facility for easy change over to the standby units.

### **19.08 Control Panel**

A common control panel shall be provided to control announcements on the paging system and communication on the talk-back system.

### **19.09 Monitoring**

- (a) A visual indication to monitor the level of speech on the paging or talk-back system shall be provided on the control panel in the form of a meter or LED indicator.
- (b) The monitoring speakers, if utilised, should be provided with their own volume controls and with provision for being switched into different paging zones.

### **19.10 Cables**

Cables may be used in all busy yards. Underground screened cable must be used in cases where AC electrification is introduced or envisaged and the cable screen, and armoring, if provided, shall be connected to earth, the resistance of which shall not exceed 5 ohms.

**19.11 Information from users** - The initial and ultimate requirements of the installation should be ascertained as accurately as possible by prior consultation with the traffic department.

**19.12 Acoustic survey:-** An acoustic survey to decide the location and facing of the loudspeakers is desirable.

**19.13 Installation:-** The installation of wiring, cabling, earthing and other safety precautions shall be as mentioned in chapter XX on "SOUND DISTRIBUTION SYSTEMS".

**19.14 Frequency range:-** The frequency range of 175 to 4000 Hz with negligible distortion shall be ensured. However, in very noisy and reverberant yards, this range can further be limited to 3,000 Hz.

**19.15 Quality:-** All materials of equipment and other components of the installation shall conform to the relevant IS specification wherever they are applicable.

**19.16 Continuous duty:-** All components of the system shall be rated for continuous operation.

## SECTION C

### CHOICE OF EQUIPMENT - MICROPHONE, AMPLIFIERS AND CONTROL PANEL

**19.18. Principal items:-** Normally the installations comprise of the following principal items of equipment:

- (a) Source of input signals - microphones.
- (b) Amplifying equipment/system - amplifiers.
- (c) Control panel or console for the announcer.
- (d) Loudspeakers - (i) Talk-back (ii) Paging.
- (e) Mounting poles.
- (f) Cables or overhead wires.

**19.19. Location:-** The installation of the amplifier equipments and the control panel will be done in the announcer's (Yard Master's) office.

#### **19.20. Microphone**

(a) The microphones for paging and talk-back systems shall be very heavy duty, directional moving coil type, and they should be mounted on adjustable stands so that the microphone is within 15 to 20 cm from the announcer.

(b) A common microphone may also be used for both paging and talk-back systems through a suitable switch.

#### **19.21 Amplifier**

- (a) The amplifier shall be so designed and constructed as to present no danger either in normal use or in the event of developing a fault, which might occur during normal use, specially from electrical shocks, fire and excessive temperatures.
- (b) The circuit values of the amplifiers should be suitably chosen to make the amplifiers safe from shock under normal conditions and the electrical installations shall be sufficiently reliable to maintain this degree of safety, in spite of an accumulation of dust and condensation of moisture. It is essential that the amplifiers are provided with earth terminals.
- (c) In the internal wiring of an amplifier, failure of insulation at certain points, may cause overheating with risk of fire. Therefore, the resistors, inductances and other components shall be positioned that they are inherently protected to a higher degree by the design itself.
- (d) These amplifiers shall be robustly made and designed for continuous operation.
- (e) All controls shall be mechanically and electrically noiseless.
- (f) The hum and noise level of the amplifiers shall not be worse than(-) 40 dB with reference to rated output.
- (g) The racks and decks must satisfy the following requirements:
  - (i) It is desirable to mount these amplifiers on the racks consisting of decks of suitable dimensions.
  - (ii) The height of the rack will depend on the number of equipments to be mounted and accommodation available, ensuring that all manual controls are within easy reach.
  - (iii) The connecting wires used shall be tested and neatly arranged to avoid obstruction and should be easily identifiable, being provided with labels or markers.
  - (iv) Decks of the racks should be capable of being removed by sliding the same from the front.
  - (v) Each deck therefore should have chromium-plated handles in the front.
  - (vi) Necessary catches shall be provided to prevent the decks from falling down when the decks are to be pulled out.
  - (vii) Necessary ventilation, preferably by a small cooling fan suitably placed, should be provided.
  - (viii) If the fan is not used, wire meshing shall be provided at two sides and at the top of the rack.
  - (ix) The whole rack should be capable of being mounted on bolts mounted on a concrete platform and held down by bolts.

## **19.22 Control panel**

- (a) The control panel should be made of dura-aluminium or similar light metal and should be finely finished with grey enamel paint.
- (b) The panel shall be so designed that the wiring portion is easily accessible.

- (c) All the switches including spares to be operated for the paging loudspeakers are to be mounted in neat rows.
- (d) For paging, the group selection switches shall be 'fly-back' type.
- (e) Change-over switches may be provided on the control panel to changeover from normal to the standby equipment in case of failure.
- (f) The loudspeaker, preferably of a small cone type design for the talk-back system, shall be mounted flush with the panel.
- (g) The loudspeaker shall be protected by a good quality metal grill.
- (h) Indication lamps shall be provided to indicate the calling talk-back unit or the selected paging group.
- (i) The description of the various switches, lamps, etc., shall be engraved in red in chromium plated strips and screwed to the panel neatly.
- (j) The wiring shall be neatly done so as to facilitate easy servicing.
- (k) Terminals shall be provided for taking out and bringing in the wires for the control panel.

## **SECTION D**

### **CHOICE OF EQUIPMENT - PAGING LOUDSPEAKERS**

#### **19.23          Type and quantity**

The number, type and location of loudspeakers required to be installed to cover the entire area of the yard, at the required volume level, have to be decided with reference to the following points:

- (a) The area to be covered
- (b) Direction and velocity of the wind
- (c) Echoes from nearby structures and
- (d) Ambient noise level at different places at the location and at the adjacent areas.

#### **19.24          Size of area**

The size of the area to be served will give a basic idea of the acoustic power requirements of the installation. The loudspeakers shall be capable of handling the required output. Because of their directional properties and higher acoustical efficiency, the reflex horn type of speakers will be more suitable in big yards.

#### **19.25          Wind**

The speed and direction of the wind over the area during the duration of the announcements influence the distribution of the sound over the area. A cross wind of 15-20km/h speed is sufficient to deflect the sound up to 10-15 degree from the normal. This point shall be kept in view during planning and installation.

**19.26 Echoes**

The echoes from large structures, nearby at the periphery of the area cannot be avoided altogether. The intensity of echoes shall be reduced by directing speakers away from the reflecting surfaces and towards the ground as far as possible.

**19.27 Noise level**

It is a matter of general experience that noise level increases fairly in proportion to the distance from the announcement place under normal conditions. More often than not, engines ply in the yards, crossing the rear or sides of the area giving rise to considerable noise. The number of paging speakers, their location, height, direction and the power input to the speakers installed will have to be decided with the object of maintaining the intensity of reproduced sound at least 10 dB, above the ambient noise level, so that the masking effect of noise over the signal could be reduced considerably.

**19.28 Height and inclination of paging speakers**

This shall be so adjusted as to give maximum satisfactory coverage.

**19.29 Grouping**

The paging speakers installed should be grouped depending on the area of the yard to be served, such as left wing, right wing, etc. All the speakers in each group shall be connected in parallel, and in proper phase across the output line, by a pair of twisted conductors of a cable. This means that each group of speakers will have a separate cable pair allotted in the main cable.

**19.30 Matching**

(a) In the case of matched systems, when a number of speakers are connected to the same output circuit, matching transformers shall be used with each speaker so that it consumes its rated power only.

(b) In case of constant voltage systems, the total load connected should be such that the rated power of the amplifier is not exceeded.

(c) The line matching transformers shall be provided with tappings suitable for 70V or 100V on the line.

(d) The line matching transformers shall be mounted in weather-proof junction boxes when used along with the projector or horn type of speakers. In this case, a board with screw type terminals may be provided for the changing of the transformer tap quickly.

**SECTION E**

**CHOICE OF EQUIPMENT - TALK-BACK LOUDSPEAKERS**

**19.31 Location**

Talk-back units shall be provided at important points in the marshalling yard to facilitate two-way communication between the yard staff and the Yard Master, whenever necessary.

### **19.32 Type**

- (a) The talk-back unit should consist of a 15 cm dia cone type or re-entrant type speaker with an output of 3-5 Watts with the associated matching transformers. This speaker should also serve as a microphone for the yard staff.
- (b) A plug-in type transistorised pre-amplifier with the associated power supply (6V dry battery) should be provided in the talk-back units located very far away. This pre-amplifier should be brought into the circuit only when the talk-back speaker is used as a microphone.

### **19.33 Cabinet**

- (a) The complete talk-back units should be housed in all-weather proof cabinets of suitable size.
- (b) The cabinets should be impervious to dust, dirt, fumes, smoke and salt water sprays.
- (c) It should be lacquer finished with a protective undercoat to withstand long service under severe conditions of humidity, temperature and heavy smoke, preferably a fly-back type lid should be used for additional protection.

## **SECTION F**

### **MOUNTING OF LOUDSPEAKERS-CABLES, MARKING, STANDBY POWER SUPPLY**

#### **19.34 Mounting of paging loudspeakers**

Weather-proof paging speakers with the associated units and transformers shall be mounted rigidly for the correct direction at a height of about 5-6 metres from the ground level.

#### **19.35 Mounting of talk-back loudspeakers**

- (a) The talk-back speakers with the associated units and transformers shall be mounted rigidly at about 2-3 metres from the ground.
- (b) The plug-in type pre-amplifier unit with the associated power supply, switches, etc., wherever used should be mounted just below the speaker, if the assembly is used separately.

#### **19.36 Cables**

- (a) In all busy yards, sheathed cables should preferably be used for the paging and talk-back systems. In yards where AC electrification has been introduced, only lead/aluminium sheathed cables shall be used. Where an omnibus talk-back circuit is used, the whole length of the yard to be covered by the system can be run by a main cable with suitable junction boxes at intervals with tail cables to feed each unit.
- (b) PVC insulated 0.9 mm dia copper conductors Al. screened and armoured cable having adequate number of twisted pairs can be utilised for the main cable.

(c) PVC cables can be used as tail cables for connecting the paging and talk-back speaker unit from the junction box points. This PVC cable should be inserted into alkathene pipe to prevent any possible damage.

(d) The same cable can be used for both paging and talk-back systems with separate pairs of conductors.

### **19.37 Marking**

The amplifiers, racks, control panels, paging and talk-back speakers including the pre-amplifier units, etc., shall have the following information clearly marked on it.

(a) Model, serial number and manufacturer's name:

(b) Rating and/ or operating power capacity:

(c) Description of keys, lamps, controls, etc.

### **19.38 Standby power supply**

Independent standby power supply unit, for example petrol or diesel oil engine coupled to 230V, 50 Hz, alternator of the required capacity can be provided, if necessary.

## **SECTION G MAINTENANCE- TALK-BACK SYSTEMS**

### **19.39 Protection from water**

The outdoor equipment, viz., loudspeakers, must be adequately protected from water getting into the voice coils. The protection provided shall be periodically checked and more frequently during rainy season.

### **19.40 Response of amplifier**

The amplifier response must be checked at least once in a year.

### **19.41 Cable insulation and earthing of screens**

The cables used must be tested for insulation at an interval of not less than 12 months and record maintained. The good condition of cable sheath earthing and the equipment earthing shall be checked up by the maintenance staff.

## **SECTION H INSPECTION, TESTING AND MONITORING**

**19.42** The complete installation should be inspected and tested by the DSTE/ADSTE to ensure that the work has been carried out in a satisfactory manner and that the materials and components used conform with the recommendations and that the plan and operating instructions called for have been furnished.

**19.43** DSTE/ADSTE shall ensure that the installation is in perfect working order. It must also be ensured that the maintenance as called for in Section G is regularly done by the staff.

**19.44** In his periodical inspection, DSTE/ADSTE shall carry out a sample inspection of the outdoor equipment and the standard of maintenance.