

## SALIENT FEATURES

### 1.0 SIGNALLING

#### *1.1 Multiple Aspect Colour Light Signalling (MACL)*

Mechanical signals of Semaphore type are progressively replaced by Electrical signalling with Multiple Aspect Colour Signals (MACL). MACL signals have better visibility, quick operation and less maintenance.

#### *1.2.1 Route Relay Interlocking (RRI) and Central Control Panels in signal control system*

By mere operations of knobs and route buttons, routes are set automatically and signals are cleared with absolute safety. The entire station is track circuited. Points and signals are operated by individual knobs/slides in small yards.

#### *1.2.2 Panel Interlocking system*

Unlike Route relay interlocking, in panel interlocking points and signals are operated individually. This is being adopted in smaller wayside stations.

#### *1.2.3 Solid State Interlocking*

As a technological development, the solid state with electronics system having software programming, solid-state interlocking signalling control system is being now inducted to achieve economy and flexibility. This sophisticated microprocessor based interlocking system works through Microprocessor devices and software programming. In this system there is less number of relays, and alterations/additions in the yard is possible without much extra wiring. This system adopts the usage of latest CENLEC standard of software validation.

### *1.3 Automatic Block Signalling with Continuous Track Circuiting*

Automatic Block signalling systems are mostly used when the train traffic become more congested and busy, especially in suburban area and to increase line capacity. This eliminates block working and trains are signalled automatically without much dependence on human element. This ensures train safety, speed and also detects any rail discontinuity.

### *1.4 Token less Block working*

In the absolute block system in single line, Token Block instruments are used. The token will be handed over to the driver of train after granting line clear to enter in the Block section. The process of handing over of token at every station is time consuming and laborious resulting in token missing. The system of token less block working helps to increase line capacity on single line sections.

### *1.5 Audio Frequency Track Circuits (AFTC)*

Southern Railway has the distinction of introducing Audio Frequency Track Circuit for the first time in the Indian Railway system in 1994-95.

As the conventional DC track circuits are found vulnerable to the interference of currents generated by the thyristor/Chopper controlled locomotives, joint less Audio Frequency track circuits have been found to be the solution in such sections. The AFTC does not require

insulated joints and can work for longer lengths and is suitable for AC and DC electrified areas. These track circuits are more reliable because failures due to block joint shorting are avoided, due to non-availability of joint and the train running is very smooth.

### *1.6 LED signals for colour light signalling (LED)*

In the colour light signals light aspects of mechanical signals are lit by incandescent bulbs. These bulbs have limited hours of working and get fused due to ageing and voltage fluctuations. The bulbs have to be replaced frequently. As an improvement, LED lit signals are now introduced. LED signals are having longer life and better visibility. This type of signal has enhanced the reliability by reducing the incidences of signal lamp fusing. It also affords good visibility to the drivers and more signals are likely to be converted to LED signals.

### *1.7 Replacement of over aged assets*

Over aged signalling assets are normally to be replaced after a codal life of 25 years. Most of the signal systems are obsolete mechanical type and no spares are now available in the trade. The mechanical signals are operated from the mechanical lever frame from cabin. Most of the signalling systems have become over-due for replacement. With the sanction of the Special Railway Safety Fund the over aged assets are being replaced on priority basis.

### *1.8 Track circuiting*

Track circuit detects the presence or absence of the train on the track. This is the backbone of the signalling system. This ensures complete safety to the train in case of human failure. Due to high utilisation of the track capacity, this ensures safe, speedy and punctual movement for train services.

### *1.9 Level crossing*

The unmanned gates are taken up for manning where telephone facilities are provided from the nearest station so that gate will be closed well in advance before the train approaches the manned gates. LC gates are being taken up for interlocking on the basis of train vehicle units (TVUs) to ensure safety for both trains and road users.

### *1.10 Train protection & Warning system*

This system will give information to the driver to regulate the train speed depending upon the aspect of the signal in advance. In case, the driver fails to do so, the train will be automatically stopped by applying brake without the intervention of the driver. This ensures that whenever any train stops on the track, the following trains stop automatically, thus ensuring safety.

### *1.11 Train Actuated Warning Device*

Whenever train approaches an unmanned level crossing, a hooters sounds giving warning to the road users well in advance about the approach of the train thereby avoiding any accident.

### *1.12 Networking of Data Loggers*

This is a modern equipment used for monitoring the operation of important functions like Track circuits, Points, Signals, Battery chargers, Batteries etc. installed in Panel interlocked/RRI installations. These are microprocessor-based equipment logging the events of the change of status of the various functions in field and relay rooms and recording the precise time also. The data loggers are useful devices for detecting the cases of passing the signal at danger by the

driver and give important clues in case of accidents. The data loggers are also used as predictive maintenance tools regarding deterioration of the performance of signalling gadgets.

### *1.13 Integrated Power Supply System (IPS)/ Non-conventional energy sources*

With the introduction of more and more modern Electrical Signalling Systems, the dependency on the power supply becomes more essential. To get reliable power supply, the concept of Integrated Power Supply (IPS) has been introduced wherein, the different signal power supplies like 110 AC, 110 VDC, 24 DC etc. are derived from the common system, which works on common battery, i.e. DC-DC converter, modular power packs. This IPS will enhance the working of the signaling system especially in RE (Railway Electrification) area.

## **2.0 TELECOMMUNICATION**

### *2.1. Train Control Communication:*

Movement of each and every train is monitored by a controller at the nearest divisional Hqrs. Facility is also provided to the driver or guard to communicate with divisional Hqrs through portable telephone which can be easily connected to the overhead line wires which are running parallel to the track or connected to the Emergency Telephone sockets provided at every KM in the section where controls are working through under ground cables. An emergency portable telephone is kept in the Guard's compartment of each and every train.

### *2.2. Block Circuits*

Running of trains in each section (between any two stations) is controlled by block circuits through which running of only one train in a section at one time is Electrically ensured in

addition to oral confirmation. Overhead lines of Railway or BSNL and underground cables are used for this purpose.

### *2.3 Optical Fibre Cable network*

Optical Fibre Cable is laid along the track to provide a reliable and noise free communication. OFC network is widely used for Railway Control Communication taking advantage of its all long haul high bandwidth circuit interconnecting Railway Telephone Exchange. Passenger Reservation System, Unreserved Ticketing System, Network Freight Operating Management system have been transferred through railway OFC.

In Southern Railway distribution of various media for Telecommunication is as follows

1. OFC and RE quad cable in Electrified sections
2. OFC and 4/6 quad cable
3. Only OFC.
4. Railway owned overhead line.
5. Rented overhead line/ channels/ bandwidth from BSNL

### *2.4 Railway Telephone Network*

There is an in-house Railway Telephone Network connecting all-important offices, officials, Way stations, Divisional Headquarters & Zonal Head Quarters. Railway telephones exchanges are inter-connected through Railway OFC network, Railway Microwave network and are supported by rented BSNL channels as stand by.

## *2.5 Railway Microwave Communication Network*

In Southern Railway telecom network is supported by Railway Owned MW network using state of the art technology (Digital Microwave System). MW network is spread over Chennai-Jolarpettai, Erode – Palghat, Chennai - Tiruchchirappalli, Madurai - Palghat covering all divisional headquarters, mostly along the tracks.

## *2.6 Wireless communication System*

Driver, Guard, Supervisors & officers of permanent way, Mechanical, Electrical and Signal & Telecom departments are provided with 5 watts hand held walkie-talkies, which can be used to establish communication between moving train & adjacent stations. Every railway station is provided with 25 watts VHF set for this purpose.

## *2.7 Data network*

There is an exclusive PRS network connecting Chennai and all the PRS centers of Southern Railway and other Metros. The centers are connected either through Railway OFC network or hired channels from BSNL. Similarly there is a Freight Operating Management System network for monitoring the movement of freight transport. Coach Operation Information System is a network for coach management and this is under implementation.

## *2.8 Passenger Amenities*

Safety, security and comfortable journey of the passengers are the aims of Railways in train operation. To meet this objective, the following facilities have been provided in almost all-important stations.

- Continuous announcement through public address system
- Electronic display board
- IVRS system for giving on line information about availability of Accommodation, arrival & departure of trains.
- Call centers and integrated IVRS for giving all types of passenger Information.

### *2.9 Voice Recorder*

Train operation information between controllers at Divisional headquarters and way stations are normally passed through control circuits. All such conversations between section controller and station Master are recorded at control office, which can be used for train management at any time of investigation in case of any accident/mishap.

### *2.10 Rail net*

Railway has its own data network for management purpose called "RAILNET". This is widely used for file transfer, e-mail and public information. Public can visit site [www.gov.railnet.in](http://www.gov.railnet.in). This network spreads through entire Railway system connecting divisional headquarters, Zonal headquarters, workshops and hospitals.

### *2.11 Disaster Management*

Telecom plays a vital role in Disaster Management. To meet the requirement of Disaster Management a universal number is provided at all control offices which can be accessed from any part of India duly pre fixing the city code. There are Accident Relief Trains and Medical Relief Vans placed at strategic locations. All such ARTs and MRVs are equipped with mobile INMARSAT telephones, walkie-talkie sets and public address system. Video conferencing equipments and wireless satellite based modems are also being added.

#### *2.12 Video conferencing*

Video conferencing facilities are available in divisional headquarters, zonal headquarters and Railway board, for administrative purpose.

#### *2.14 Tele Medicine*

A wide band connection has been established between Railway Hospital/ Perambur, Railway Hospital/Golden Rock and with major Railway hospitals in other Zonal Railways. This enables exchange of expertise opinion between hospitals.

#### *2.14 Maintenance*

Maintenance of all equipments is carried out through the maintenance set up of staff at Divisions, Way stations and in specialized laboratories. However, since the telecom technology is changing fast, Annual Maintenance Contract through reputed firms wherever necessary is being opted. Maintenance is carried out as per the schedule drawn up in Telecom Manual.

#### *2.15 BSNL Telephone:*

BSNL telephones have been provided at all Railway stations for giving train information to the public.