

SIGNALLING AT A GLANCE

1. ELECTRONIC INTERLOCKING (EI):

EI is a Microprocessor based electronic interlocking system used for controlling points, signals, level crossing gates etc, through VDU/Panel. Provision of Electronic Interlocking in place of Relay Interlocking enhances safety. System validation is done to international standards to meet Safety Integrity Level 4 (SIL 4 - defined in CENELEC Standard).

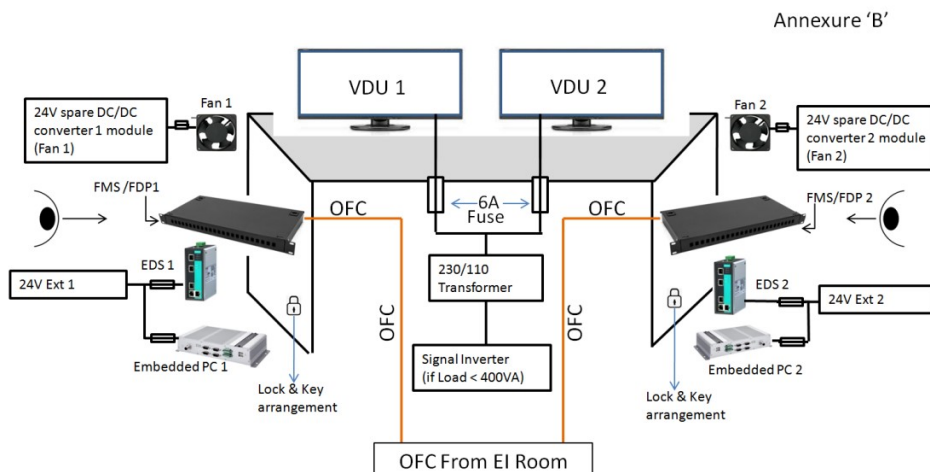
Additionally EI possess read back scanning of output and checking of basic safety in interlocking. In case of an internal fault in one of the interlocking processors or mismatch in its output v/s inputs from field gears, the system assume the safe state i.e. put all signals back to red (stop aspect) in case interference to interlocking is made by external agency.



EI system is configured as 2 out of 2 or 2 out of 3 for enhanced safety and reliability feature. It can be operated by one control cum indication panel (CCIP) and one visual display unit (VDU) or Two VDUs. Two VDUs are provided at every EI now-a-days to ensure 100% redundancy. But use of common power supply/common FMS defeats the very purpose and doesn't give 100% result. Principle of providing standby was not comprehensive.

To obviate this problem, work done in SEC Railway is as appended:

- Provision of separate OFC for A & B system and plan to terminate underneath each VDU on separate counter on Fiber Management System (FMS) was coined.
- Similarly, power supplies of both the fans were segregated. Distinct feed for each Embedded PC/Ethernet Distribution Switch, fan and VDU was envisaged from IPS.



2. AUTOMATIC SIGNALLING:

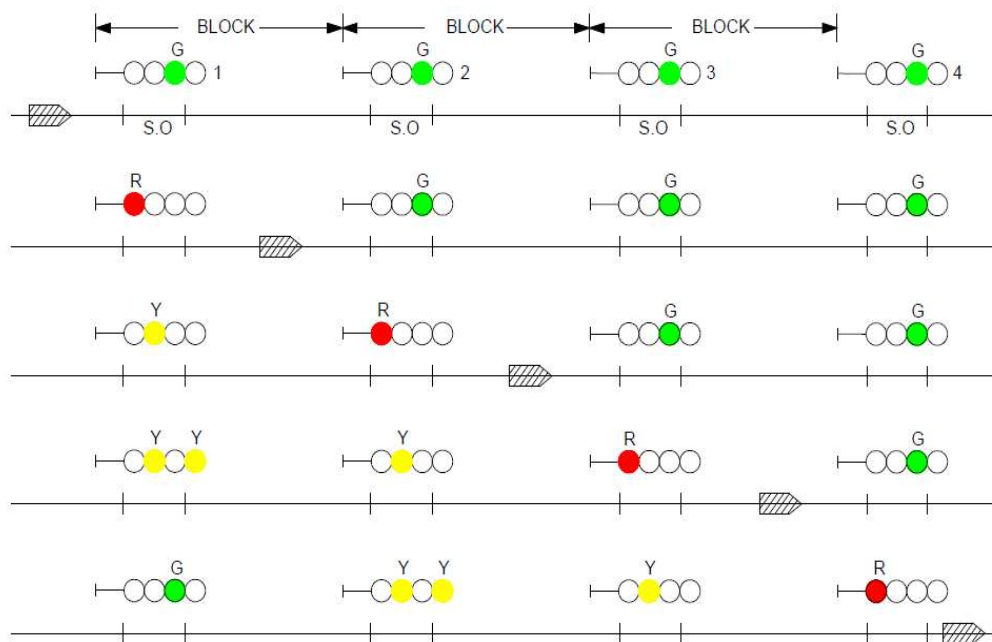
Automatic Block Working is a system of train working in which movement of the trains is controlled by the automatic stop signals. These signals are operated automatically by the passage of trains into and out of the automatic signalling sections between two stations or even few consecutive stations.

The Automatic Signalling arrangement facilitates to Increase the Line capacity without any additional Stations being constructed and maintained. The entire length of track is provided with track circuits or axle-counters for automatic block working and divided into sections which are called the Automatic Signalling Sections.

The Automatic Signalling Section is defined as the portion of the running road between any two consecutive automatic stop signals and each of these sections is protected by an automatic stop signal. These automatic stop signals control the movement of trains into the sections and signal aspects are changing automatically by the passage of train.

The essentials of automatic block system are -

- (i) The line shall be provided with Continuous Track Circuits or Axle Counters.
- (ii) The line between two stations may where required be divided into a series of sections known as "Automatic Block Signalling Section".
- (iii) Entry into each automatic block signalling section is protected by a colour light Multiple Aspect Stop Signal.
- (iv) Track Circuits or Axle Counters should control the aspects of the Signal such that:
 - It cannot display the 'OFF' aspect unless the line is clear not only upto the next stop signal but also for an adequate distance beyond it. Since the 'OFF' aspect can be yellow, double yellow or green, the 'OFF' aspect of stop signal mentioned above can be only yellow with the minimum clearance of one Block plus Overlap. The stop signal can exhibit green aspect when the line is clear for 2 blocks and overlap in the case of 3-aspect signalling or double yellow in the case of 4-aspect signalling. The signal will go to green only when 3 blocks plus one overlap are clear in the case of 4-aspect signalling (refer figure given below).
 - The Signal is automatically replaced to 'ON' soon after it is passed by a Train.



FOR SIGNAL 1. TO ASSUME YELLOW - LINE MUST BE CLEAR FOR ONE BLOCK AND ONE OVERLAP
FOR SIGNAL 1. TO ASSUME DOUBLE YELLOW - LINE MUST BE CLEAR FOR TWO BLOCKS AND ONE OVERLAP
FOR SIGNAL 1. TO ASSUME GREEN - LINE MUST BE CLEAR FOR THREE BLOCKS AND ONE OVERLAP

3. ABSOLUTE BLOCK WORKING:

To control the movement of trains, the length of track is divided into sections called "Blocks". The entry of a train into the 'block' is controlled in such a way that only when it is free, a train can be allowed to enter it. This means that between two consecutive trains, there is a definite space interval.

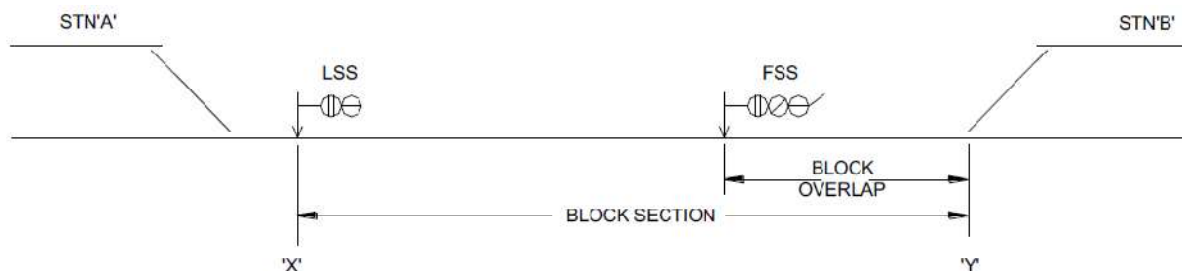
This space interval or block is controlled at the entry. This controlling point should know whether the train, which had entered this space, vacated it so that another following train can be sent. Since the length of a block is beyond the normal visual range, another controlling point is set at the end of the block. This point can know whether the train has arrived and advise the controlling point at the entry. So, with the two controlling points and intercommunication, it is possible to control the entry of a train into a block only when it is vacant.

The information about the condition of this block is given by the exit point to the entry point, and the entry point transmits this information to the driver of a train. The driver of the approaching train must be able to know whether the next block is clear or not, he should stop and wait. Here is where "signal" comes in to picture.

The space interval system uses the block working wherein the entry of train onto the block section is jointly controlled by the entry and exit points of the block section. The driver is authorized to proceed into a section by the signal controlling the entry to the section. This working could be a manual block system or automatic block system. In any type before the train could be allowed to enter a section "PERMISSION" is required to be obtained from the Exit end to the effect that the section is "CLEAR" of trains and the train could be permitted. Different systems of working for getting this "PERMISSION TO APPROACH" have been evolved on Indian Railways and are classified as "System of Working".

4. BLOCK INSTRUMENTS:

The absolute block system is the most important system of train working. The sketch below shows the essentials of Absolute Block Signalling. For Station "B" to give Line Clear to Station "A", line must be clear of trains between 'X' and 'Y'.



Station "A" and Station "B" are two block stations. Under the Absolute Block System, movement of trains between Station "A" and Station "B" is technically regulated by two Station Masters using the **Block Instruments**. Block instrument is an equipment/device used for safe running of trains between two adjoining block stations.

The object of providing such instruments is to prevent more than one train being in a block section at a time, and when the block section is clear, to admit one train into the block section, thus ensuring absolute safety in the running of trains at all times & always maintaining space interval between two trains.

The Authority to proceed for the driver is the "OFF" aspect of Last Stop Signal. General Rule 3.42 lays down that the Last Stop Signal shall not be taken off for a train unless Line Clear has been obtained from the Block Station in advance. It, therefore, becomes compulsory to interlock the Last Stop Signal of a Block station on Double Line with the Line Clear indication.

To ensure compliance with the rules, and for ensuring safety it thus becomes necessary to interlock Block Signals with Block Instruments, and, thus, we get, what is known as the Lock and Block working. In this method the Signal and Block indications can never conflict. The object of 'Lock and Block' working is, thus, to ensure that a train which has been accepted and signalled forward must clear the section and also signals replaced to danger behind it before a following train can be accepted and signalled forward. 'Lock and Block' is defined as a system of Block Signalling wherein the passage of trains electrically controls the Block Instrument, which in turn electrically controls the signals.

a) Handle Type Tokenless Block Instrument For Single Line:

Due to various steps involved in Extracting Token & Handing over to Driver (Loco Pilot) at dispatching station and Handing over of token at receiving station and normalization causes delay (Token loss is another problem) in Neal's Token Block Instrument, this Token working is not suitable for high speed trains where traffic is dense. In this context, Token Less Block Instruments were introduced in Indian Railways.

The modified instruments are designed to work either on 1800 Hz or 2700 Hz Carrier frequencies. The Modulating frequencies are 85 Hz and 65 Hz and these are common for all the instruments and the Carrier frequencies are 1800 Hz and 2700 Hz. The external appearance of the instrument is shown in below figure:

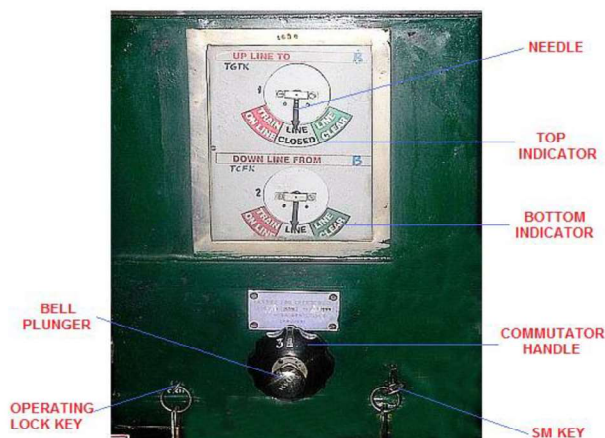


Features of Token Less Block Instruments:

- This instrument consists basically of a set of push buttons and relay circuits, and operates on DC impulse codes. By eliminating transistors and diodes from the line circuit, this instrument can withstand high surge voltage accidentally encountered in the line.
- All relays as well as signal control relays are contained in the relays cabinet, therefore, no other relay rack is required.
- Circuit is so designed as to minimize power consumption.

b) Double Line Block Instrument:

A front view of the instrument is shown in below figure:



Front view of Double Line Block Instrument

Features of Double Line Block Instruments:

- It is Non-Cooperative type block instrument.
- All operations are carried by Receiving end block instrument.
- It has a Commutator Handle for operation which has 3 positions
 - (i) Line Closed (LB)
 - (ii) Line Clear (LC)
 - (iii) Train on Line (TOL)
- It has Conditional TOL locking
- Operation of block instrument is easier
- Line current is 25mA.
- Suitable both for Non-RE & RE section

c) Block Proving through Axle Counterusing Single Section Digital Axle Counter with UFSBI & Block Panel (Single/Double Line):

It is a non-co-operative, user-friendly push button type Block Instrument capable of providing the last vehicle verification information in both single & double line sections. The Block Panel provided, offers easy-to-understand audio-visual indications for all vital information. The unique design of interlocking circuits and input/outputs through Q-series relays provide galvanic isolation, making the system usable in both RE & Non-RE sections.

The system is media independent i.e. it works on Copper cable, OFC or microwave without hampering the fail-safety of the operation. The schematic diagrams below show the working of the system in Single & Double Line. A front view of the instrument is shown in below figure:



UFSBI with Block Panel

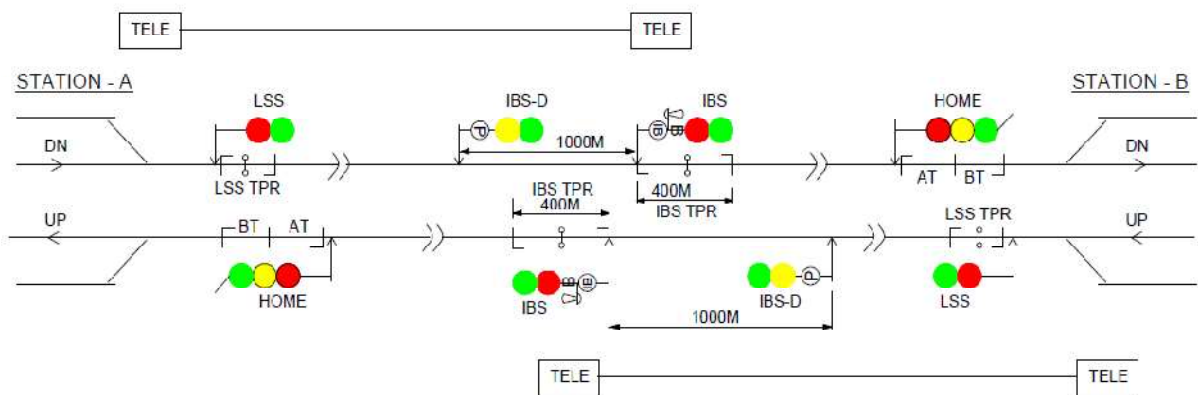
Design Features:

- The Interlocking circuits as well as the UFSBI inputs are taken through Q-series relays, providing galvanic isolation, thus making the system usable in both RE and Non-RE sections.
- The system is designed to work with MACL, PI, RRI or SSI installations.
- Triple Modular Redundant fail-safe multiplexer working on 2 out of 3 logic ensures greater level of safety and availability.
- The software coding for inter-station signal transmission takes care of noise disruptions generally encountered in the transmission system. It ensures safety of operation against these noises by use of fail-safe data structure, message redundancy, minimum Hamming distance of 5, etc.

5. INTERMEDIATE BLOCK SIGNALLING:

This is a Signalling arrangement on Double Line Section for increasing the section capacity by splitting of long Double Line Section into two portions called as Rear section, also called axle counter section & Advance section. It is substitute to "C" Class station, which otherwise will be required (manned by Operating Staff) for the purpose of splitting of long Double Line Section into two portions.

To avoid the expenditure on the Block Instruments, Station buildings and recurring cost of Operating Staff, IB Signalling either with continuous track circuiting between the Last Stop Signal of the Station in rear upto the overlap of IB Signal or with an axle counter with the entrance and exit point located at the LSS and at the overlap of IB signal respectively can be provided. The Station Master of the Block Station in rear controls the IB signal. IBS layout is shown in the figure below:



Features of IBS:

- IBS exists only on Double line section.
- The sole purpose of IBS is to increase the Section capacity.
- It is a replacement to "C" Class station because of the following advantages
 - (i) Block Instruments are not required
 - (ii) Station Master & Operating staff are not required.
 - (iii) Station Building is not required.
 - (iv) Section Capacity is further increased.
- It splits block section into two sections
 - (i) Rear section (Axle counter section).
 - (ii) Advance section.
- On a line maximum two trains can be run in the block section by the system.

6. INTEGRATED POWER SUPPLY SYSTEM:

Features of IPS

- Reduces maintenance on Batteries, Battery charger & overall maintenance.
- Its construction is in modules and hence occupies less space. Reduced space requirement, resulting in saving of space for power supply rooms.
- Provides centralized power system for complete signalling installation with continuous display of working status of system for easier monitoring.
- Defect in sub-units of system is shown both by visual & audible indication. Reflects the condition of battery with warning.
- Replacement of defective modules is quick & easy without disturbing the working of the system.

INTEGRATED POWER SUPPLY



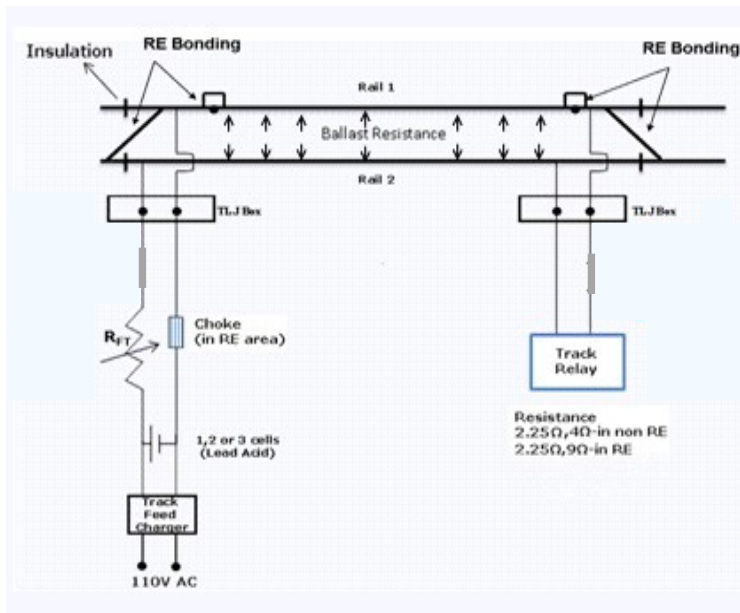
- It uses (n+1) modular technology hot standby arrangement and hence high reliability and more availability of the system.
- The system provides uninterrupted supply to all signalling system even during the power failures. Thus, No blank Signal for the approaching drivers.
- System can be easily configured to suit load requirement.
- The diesel generator set running (Non- E area) is reduced almost to 'NIL'. Hence, low wear and tear of D.G. set components & reduced diesel oil consumption.
- SMR/FRBCs used in this system are of SMPS technology chargers with 90% efficiency. These chargers are supported with hot standby mode with (n+1) modular technology, where 'n' is the actual require number of charger modules.
- Two sets (110VDC) of Battery bank is used which further eases the maintenance. Conventional flooded type Lead Acid Batteries or Low Maintenance Lead Acid batteries can also be used.
- DC-DC Converters working from 110V Central battery have been used for all dc supplies. This has improved overall efficiency of the system since number of conversion from AC to DC have

been reduced to 2 stage as compared to 3 stage conversion in case of transformer-rectifier system.

- DC-DC converters are available in modules. Easy replacement of defective modules. This ensures less down time.
- The DC-DC converters of Relay Internal are provided with (n+1) modular technology hot standby arrangement with active load sharing basis.
- Capacity of inverter has been brought down to 1.5 KVA from 5 KVA and used for feeding only Signals supply. Hot standby inverter is provided with auto changeover facility. This improves the availability of the overall system.
- High efficiency inverter is used with PWM (Pulse Width Modulation) technology in place of Ferro-resonant technology based inverter. This improves the efficiency of the overall system.
- Continuous power to Signal Circuits even in absence of DG set/Local Power Supply.
- Generators need not be switched ON every time during train movement.
- Metal-to-Metal relay installations and block working by axle counters have also been covered.
- Supply of spare modules/Components/Cells have been included as part of main supply.
- Provides highly regulated voltage to all signal relays & lamps for better life.

7. DC TRACK CIRCUITS:

In a track circuit, a portion of rail track is electrically isolated from adjoining rails and included in a circuit to energize a relay. The occupation or vacancy of the track portion is detected by the condition of track relay. A schematic diagram of a DC Track Circuit is connected as below:



In a Track Circuit, feed is connected at one end of the track and the relay at the other end, which is normally energized. Track relay drops when shunted by a Train. Any breakage of rail continuity also drops the Track relay

A resistance called Regulating Resistance (also referred as Track Feed Resistance) is connected in series at feed end. It serves the following purposes.

- To alter relay end voltage.

- It protects the feed equipment when the track is shunted, by avoiding a short across it as battery internal resistance is less.
- It causes voltage drop (when track is occupied) to reduce voltage at relay end to drop the relay. In RE areas, one B Type Choke ($R=3\Omega$ & $Z=120W$ at 50Hz) each is used in series both at Feed end and Relay end to increase AC immunity level of track relays.

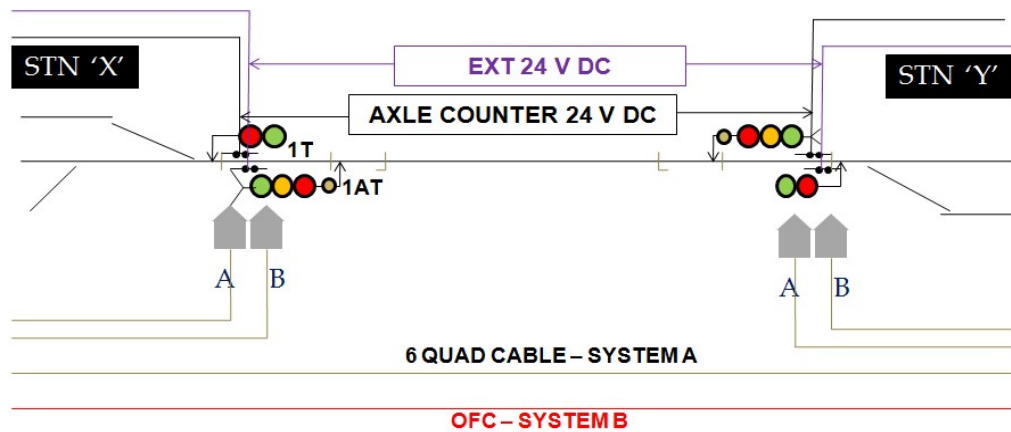
8. AXLE COUNTERS:

Axle counters were developed as a substitute for track circuits. The advantages of Axle counter over a conventional track circuit are:

- It does not require wooden sleepers (where concrete sleepers are not available).
- An axle counter system can cover a very long section up to 15 kms compared to 750mtrs of maximum length of operation of conventional track circuits.
- It does not get affected either by flooding of track or poor maintenance of tracksunlike the track circuit, which is highly susceptible to these conditions.
- It does not require insulated rail joints, thus, rails can be continuously welded. Thisreduces track maintenance cost, low wear and tear of tracks and vehicles and toincrease traveling comfort.
- Efficiency and safe working of axle counters does not depend on various trackparameters and climate condition such as length, ballast condition, drainage, strayvoltage and currents, track feed voltage and lead cables, etc like track circuits.
- Cable requirement for multi-section digital axle counters is also reduced due toavailability of power data coupler (PDC) facilitating transmission of data and power tothe detection joints on the same pair of quad cable.
- The axle counter proving relays have inherent characteristic of slow to pick up andtherefore, the use of QSPA1 relay as the first track repeater in RE area is not needed.
- In concrete sleepers layouts, on an average, 6-7 glued joints are required per turn out fortrack circuiting, which along with less cabling requirement itself may neutralize the costof provision of axle counters. Hence, the provision of digital axle counters appears to bea viable solution from the installation, maintenance and reliability point of view even inareas having concrete sleepers.
- The maintenance staff is also relatively less compared to the conventionaltrack circuits, wherein extensive jumpering/bonding is involved and when trackcircuit failure takes place on point zones in major yards, trouble shooting is difficultthereby prolonging the failures duration.

a) Single Section Digital Axle Counter:

- The system consists of
 - (i) Single Section Digital Axle Counter (SSDAC) units.
 - (ii) Tx / Rx coils.
 - (iii) Vital Relays.
- Tx/Rx coil axle detectors are mounted to the web of the rails. The design of system consists of high frequency Phase Reversal type axle detectors.
- Compatible with 90R, 52Kg & 60Kg rail profiles. Easy to install, commission & maintain.
- Track devices at both (entry & exit) points of the section, should be fixed on the same rail.
- System is designed to detect the solid wheels with diameter > 400mm with standard wheel flange.
- The system works in pairs. For monitoring single-track section one pair of SSDAC units are required and to be installed near the trackside one at the beginning and another at the end of the track section. i.e. Trackside electronic counting equipment.
- The basic design of the system is based on counting the number of axles passing ateach detection point. These stored counts are transmitted to the second unit of thesystem and vice versa by means of modem communication.
- The communication consists of digital packets having details of Counts & Health.
- If counts registered at both detection points are equal, the section is clearedotherwise the section is shown as occupied. The system ensures no error conditionto arrive at the decision of clearance.



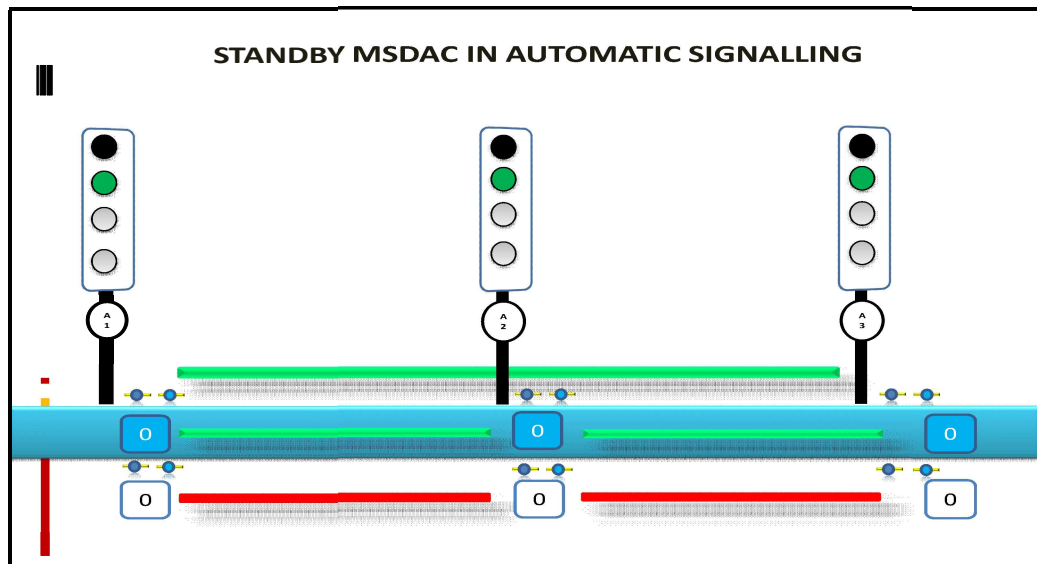
- System is designed as per CENELEC, SIL-4 (European standard), using microcontroller along with other electronic circuits and programmed using dedicated software. When any of these circuits fail, the system goes to fail safe condition.
- It is programmable for either Preparatory Reset or Conditional Hard Reset as per requirement.
- Micro controller based design with 2 out of 2 decisions and counting through software.
- Opto-isolated vital relay drive for Q-style 24V, 1000Ω and Vital Relay output can be given at both ends of the system.
- The system can be widely used in Railways for Block Working (BPAC), Intermediate Block Signalling, Auto signalling and Track circuiting in station yards.
- When used as BPAC, this system helps in determining whether whole train has cleared the block section or not, so that decision for sending subsequent trains into block section can be taken. Earlier this task was carried out manually by ASM by checking 'Last Vehicle'.

b) Multi-Section Digital Axle Counter:

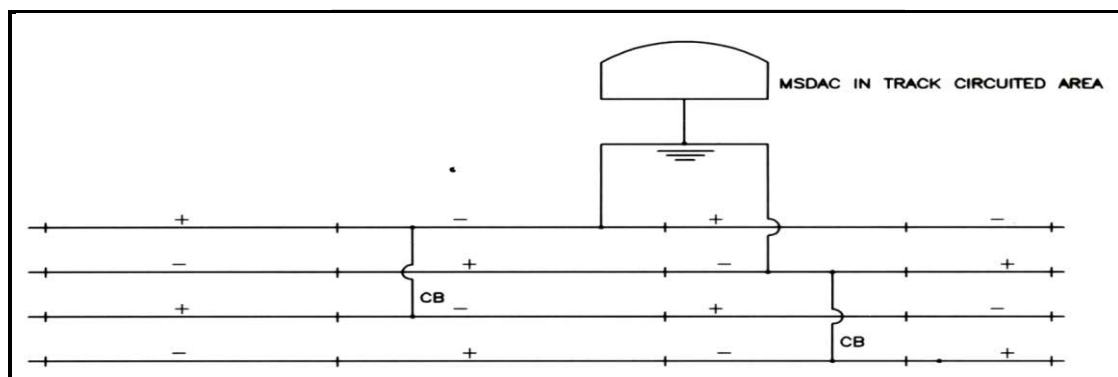
- Detection point comprises of Axle detectors, Digital Axle Counter Field Unit connected to it.
- Axle detector is web mounting type and is comprises of two sets of Tx/Rx coils. Different frequencies are used for each set of Tx/Rx coils.
- DAC Field Unit is provided with 2 out of 2 architecture. It detects and counts axles passing over the axle detector. It determines the direction of passing of axles. The field unit communicates with central evaluator unit at regular intervals regarding health status, axle counts, removal of cards from the unit, voltage fluctuation beyond upper and lower limits and power fails and restore back.
- The Central Evaluator unit receives count and health information from Digital Axle Counter Field units. It evaluates the counts received from the digital axle counter field units to generate relay-driving signals for individual track-sections.
- It supports up to 40 detection points and generates Vital Relay outputs for up to 39 track sections. The Central Evaluator is connected to DAC field units in Star configuration.
- Each track section can be reset independently from the Reset Box. Resetting commands the setting to zero the records of counted axles. Depending on the application option for providing the Preparatory Reset or Conditional Hard Reset.
- Central Evaluator unit drives 24V DC, 1000 ohms Plug-in type Vital Relay. Free and occupied indication of an axle counter section (track section) is available in the form of vital relay pick up and drop contacts respectively.
- The event logger records all the events occurring in the multiple section of the system. The events are status of track section i.e. clear, occupied, failed or preparatory reset, application

of reset command, Failures/errors in field units or central evaluator, communication link failures, change in date/time etc., It logs minimum 40000 events. To download the logged events from event logger card a diagnostic terminal (computer) is connected through a standard communication port.

- The multi section digital axle counter can be widely deployed for simultaneous monitoring of any type of track sections in a station or yard area viz. Main Line, Loop Line, Point Zones, Dead End, Over run lines, goods lines, stabling lines etc.
- Multi-entry Digital axle-counter (MSDAC) can also be used in Automatic Signalling and Intermediate Block Signalling for detection of occupation and clearance of automatic track section.



- Additionally, Double rail earthing is provided for Track side equipment in SEC Railway to surmount the problem/failures due to lightning.



Double Rail Earthing

9. ELECTRIC LIFTING BARRIERS AND SLIDING BARRIERS:

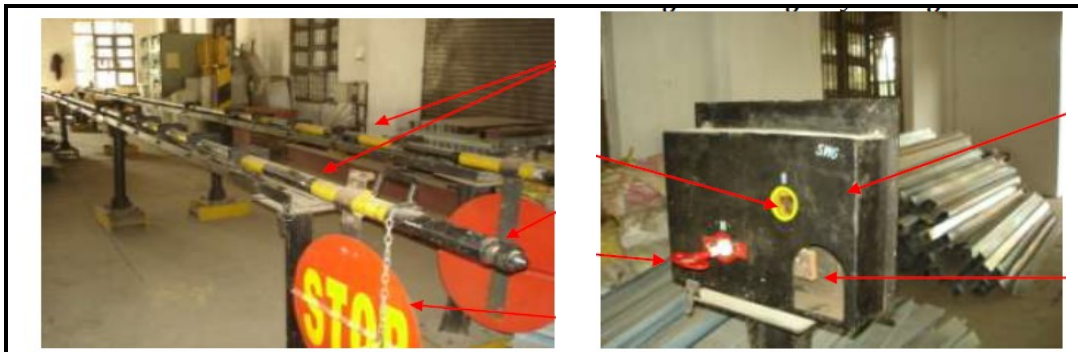
The level crossings are provided with lifting barriers, which were previously operated by a central winch through wire transmission. As road and rail traffic are increasing, introducing electrically operated lifting barriers on Special, A & B class level crossing gates necessitated. The other advantages are:

- Easy operation to avoid physical strain on gate man.
- Crank handle facilitates manual operation of gate in case of power failure.
- Barrier pedestals can be erected on opposite sides of roads for equal flow of road traffic when barriers are raised. If barrier pedestals are erected on LHS of road at entry ends, road vehicles get more time to clear while closing the barriers.
- The time of operation is only 10 sec. against 60 sec. for manual operation.
- Barrier width is enlarged to increase its visibility to road users.
- Boom segments are bolted together to facilitate easy replacement in case of damage to barrier by road vehicles, hence break down time can be reduced.
- Increased safety due to boom lock/lock post and lock detection.
- Feasibility of remote operation in conjunction with close circuit TV.
- Effortless operation and hence improved service condition of gate man.

Sliding Barriers:

Sliding barriers are provided at interlocked gates to ensure closure of road traffic with interlocking arrangement and allow passage of train in its normal speed even when one or more barriers of main system is damaged due to dashing of road vehicles. Earlier chains were put by gateman across the road to block road traffic but the train has to pass the gate signal at ON resulting in loss in running time.

In case of failure of one or more lifting barriers, sliding barriers are pulled manually against road traffic by the gateman and are locked with key locking and trains are allowed to pass at their normal speeds even if actual restoration of lifting barriers take more time.

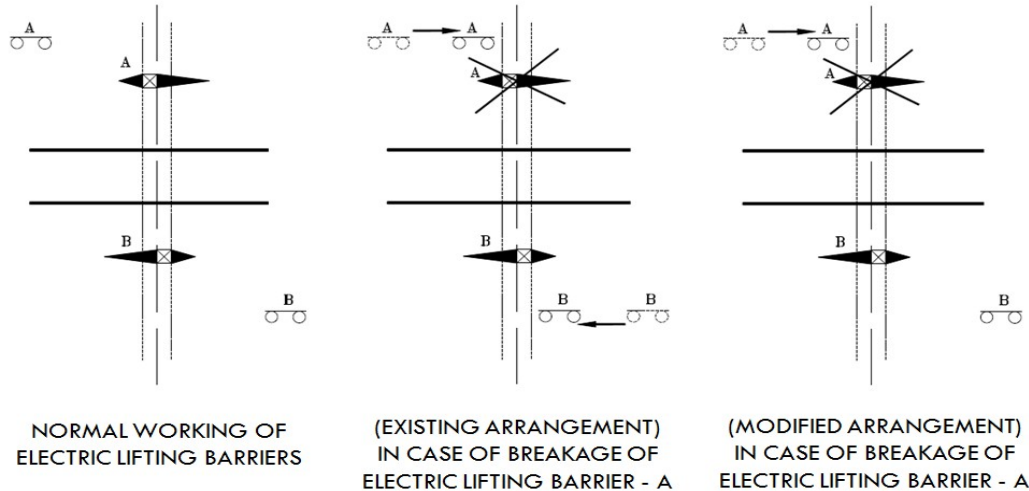


Provision of sliding barrier has improved availability but due to manual pulling of all barriers and electro-mechanical interlocking arrangement, time delay was inevitable. For efficient use of sliding barriers, hybrid use of working main barrier and sliding barrier against the defective barrier/barriers only has been implemented in SEC Railway under the name FOUR -TWO-KA-ONE System. It has following features

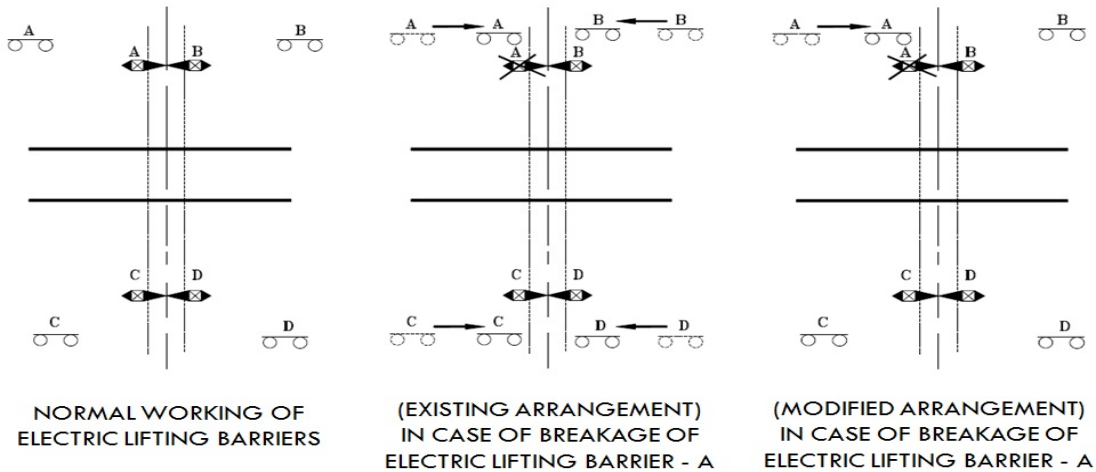
- One/more LC gate barrier and only one sliding boom operation.
- Not much extra hardware involved.
- Ease of maintenance and operation.
- Saves time as only one of the sliding booms is required to be pulled.
- Waiting time is also reduced to half/one fourth for road users. This is directly enhancing safety and giving direct benefit to public.

- As the operation time reduces so signal failure time also reduces which results in better MTTR.
- It optimises safety in train operation.

WORKING IN CASE OF TWO SLIDING BARRIERS



WORKING IN CASE OF TWIN BARRIERS

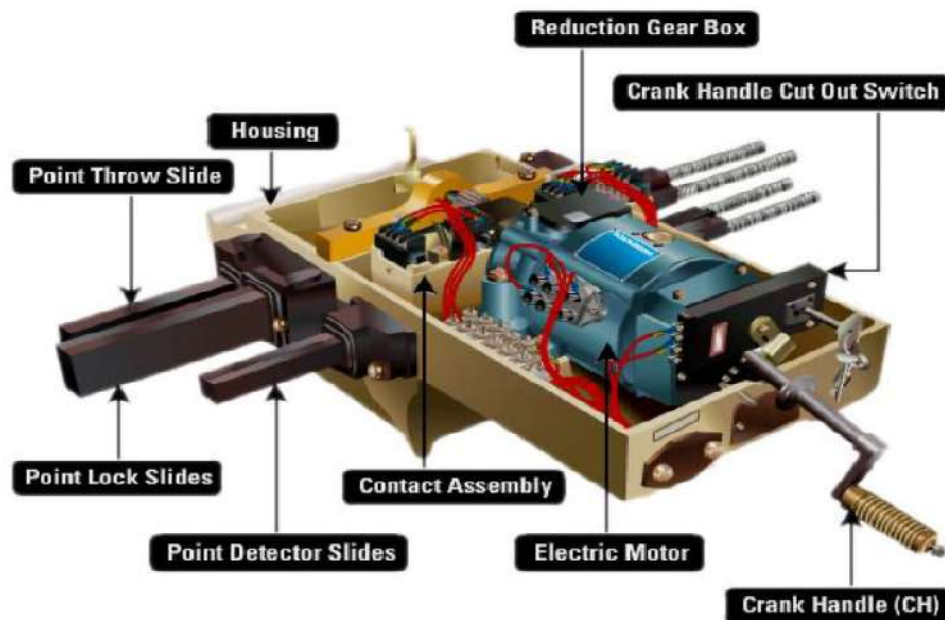


10. POWER OPERATION OF POINTS (POINT MACHINES):

An electric point machine is an electrically driven machine used for operation of points in railway yards, and comprises an electric motor, point mechanism, crank handle mechanism, point detector and unless otherwise specified, a point locking device also.

These machines incorporate future needs for direct and relayed operation and can also be controlled remotely. These machines can be used for single point, single slip, double slip and trap points for all types of switch fittings and weight of rails.

A hand crank arrangement is provided for adjustment at the time of installation and maintenance as well as setting of point in emergency when the operation by electric power has failed.



11. LED SIGNAL UNITS:

Previously filament lamps were used in colour light signals. Rated life of filament lamp is only 1000 hours. Replacement of a signal lamp is not a simple work, as focusing is to be checked and adjusted after replacement of each lamp. With increase in signalling gears at most of the stations, signal technicians in general were not able to cope up with the huge work of adjustment of focusing. To overcome these problems RDSO developed LED Signal units, which has the life of not less than one lakh hours.

Salient features of LED Signal Unit

- There is no Phantom effect
- LED lamps are pre-focused and do not need external lenses or periodic focusing.
- LED lamps are compatible with existing signal housings, hence can be retrofitted.
- Traffic hazards while bulbs are being changed by maintenance staff are eliminated.
- LED signals use less energy.
- DC power feeding to signals possible, thereby eliminating transformers.
- Wide voltage variation in power feed is tolerated.
- One design of ECR for all LED signal lamp application including shunt signal and route indicator (universal ECR).
- Maintenance cost is reduced, as they don't need frequent replacement. Only occasional cleaning of transparent cover needed in dusty areas.
- Power factor of LED signal lamp is 0.8 or better.



12. DATA LOGGER:

Datalogger is a Microprocessor based system, which helps in analysing the failures of relay inter locking system / Electronic Interlocking system. This is like a black box, which stores all the information regarding the changes take place in relays, AC / DC Voltages and DC currents along with date and time. The same information / data can be transferred to the computer to analyse further “on line” / “off line” analysis of stored data. A print out also can be obtained through a printer by connecting directly to the datalogger unit.

The relay contacts data is considered as digital inputs and the data belonging to voltage levels/currents is considered as analog inputs.

Datalogger is mandatory for all new relay interlocking (PI/RR1), EI installations and it is also recommended to provide in all existing PIs / RRs.

Advantages of data loggers:

- Dataloggers helps in monitoring the typical failures such as intermittent, auto right failures.
- It helps in analyzing the cause of the accidents.
- It helps in detecting the human failures / errors such as :
 - (i) Drivers passing signal at Danger.
 - (ii) Operational mistakes done by panel operators / ASM's of operating department.
 - (iii) Signal and telecom engineering interferences in safety circuits.
 - (iv) Engineering and electrical department interferences / failures.
 - (v) It helps as a “TOOL” in preventive maintenance of signaling gears.
- Dataloggers can be connected in network. Networked data loggers help to monitor the PI/RR1/EI remotely.
- Failure reports can be generated remotely with help of datalogger network
- On line and Off line track simulation is possible.
- Speed of the train on point zones can be calculated.
- Age of the equipment in terms of number of operations, etc.

