

## System of working

A Train is run between stations through a system of working. There are different systems of working viz. Absolute Block, Automatic Block, One train only, Following train, Pilot guard and Train staff & ticket system. In Absolute Block System, at any point of time, only one train can run in the block section. While in Automatic Block System the block section is divided into small auto signaling sections controlled by automatic signals which assume off aspects automatically depending on the movement of trains. In some metro systems, intelligent trains work on concept of moving block sections. When very less number of train/trains is/are required to be run in a section, One Train Only System is adopted. In all systems of working, a train requires an authority to proceed to leave a block station and enter the block section. As per GR 1.02 (10) "block section" means that portion of the running line between two block stations on to which no running train may enter until Line Clear has been received from the block station at the other end of the block section. Apart from the authority to proceed, the station also issues a Caution Order which lists out the various temporary speed restrictions to be followed by the crew in the section till the next Caution order notice station.

## Coaching Train Operations

Coaching train operations are planned, run and maintained to cater to the travel needs of the public so as to provide maximum level of satisfaction. Different passengers have different needs and consequently different criteria for satisfaction. While freight services are mainly end to end oriented services, the coaching services cater to enroute passengers also. Therefore, coaching train operations are planned to a reasonably predictable, systematic and regular pattern. Time tabling and punctual running are the two corner stones of coaching train operations.

## Types of coaching services

Indian Railways have evolved various types of services keeping in view of the public demand, such as...

**Vande Bharat:** These are the latest train services using train sets that can run up to 160kmph. Named as Train-18 in the design stage, these semi high speed train sets currently manufactured by Integral Coach Factory Chennai are provided with latest passenger friendly features. At present they have only seating facility, while sleeper berth facilities are under development.

**Rajdhani:** These are super-fast semi high speed trains connecting New Delhi and state capitals. These are elite trains provided with all AC sleeper coaches and given highest priority in timetabling and running.

**Shatabdi:** These are intercity super-fast trains conceptualized in 1989, on 100th birth anniversary of Pt. Jawaharlal Nehru. They run between state capitals, usually having a travel time of 6-8 hours. Only AC chair cars and executive chair cars are provided in these trains.

**Duronto:** These are non-stop superfast trains that run between source and destination stations. They don't stop enroute except for operational reasons like crew change. Duronto means "*restless*" in Bengali and the rakes are painted with unique yellow green livery.

**Sampark Kranti:** The word Sampark means contact and Kranti means Revolution. The combined name denotes revolution in public contact i.e., the steps taken by Indian Railways to provide high speed train connections from cities around our country with the National Capital through the provision of few stops and running at high speeds.

**Superfast:** These are express trains with limited halts at the important stations in order to achieve an average speed of 55kmph or more. Rajdhani, Shatabdi, Duronto and many long distance trains are all super-fast trains connecting major cities with additional premium features associated with their brand.

**Mail and Express Trains:** These are high speed services carrying passenger and postal mails and stopping only at important stations. These are run between distant places as inter-regional or between the important cities as intercity trains.

**Garib Rath:** In order to provide a superfast AC train affordable to common man, the concept of Garib Rath (means chariot of the poor) was evolved. The coaches used in this service are slightly larger than normal coaches with middle berth in the side portion also.

**Intercity:** In order to provide quick movement day journey travel between nearest cities, the Intercity Express services are provided. The trains are less expensive than other express trains, and usually reach their destinations within 5–6 hours. As they complete a round trip in a day, returning to the origin station at night, they are usually run with single rake. They connect various major cities that are adjacent to each other, all over the country. They contain a large number of general class coaches with a few reserved coaches.

**Jan Shatabdi:** As the Shatabdi trains are expensive; non-AC trains with Shatabdi features at affordable prices were planned as Jan Shatabdi. These trains have both AC and non-AC accommodations.

**Premium Trains:** In order to cater to the need of public that need to travel at short notice, Premium trains services are evolved. These trains are generally superfast trains. The Advance Reservation Period (ARP) is 15 days only and no wait-listed tickets will be issued. There is no cancellation facility and no refund is allowed. Unique feature of these trains is its dynamic pricing system. The prices vary according to the demand. As the seats are being filled the fare will increase, as in case of pricing of flight tickets in vogue.

**Passenger trains / MEMU / DEMU:** These trains contain only general coaches and stops at all the stations including the stations in villages. They take highest running time because of the number of stops, and hence average speeds are lowest. These services cater to the needs of short distance travelling public, of both rural & urban areas. Their fares are also low.

**Suburban trains / EMU:** These services cater to the need of mass transportation in densely populated cities. The fare is very minimal. The priority is to transport maximum people in least possible time.

## Numbering of trains

Every coaching train in Indian Railways is provided with unique number, following a five digit numbering system in vogue since December 20, 2010. In this scheme, the first digit indicates the type of the passenger train, as follows:

1 <sup>st</sup> digit	Type of trains
0	Special trains (e.g., summer specials, holiday specials, etc.)
1	long-distance trains, including the Rajdhani, Shatabdi, Jan Sadharan, Sampark Kranti, Garib Rath, Duronto, and other classes.
2	Long-distance trains; it is to be used when train numbers starting with 1 are exhausted in any series.
3	Kolkata suburban trains.
4	Suburban trains in Chennai, New Delhi, Secunderabad, and other metropolitan areas
5	passenger trains with conventional coaches
6	MEMU trains
7	DMU (DEMU) and railcar services.
9	Mumbai area suburban trains

The second digit usually denotes the owning zonal railway except for number 2, the details are furnished below:

2 <sup>nd</sup> digit	Zonal codes
0	Konkan Railway
1	CR, WCR and NCR
2	Superfast, Shatabdi, Jan Shatabdi, and some other classes of trains regardless of zones. For these, the next digit is usually the zone code.
3	ER and ECR
4	NR, NCR and NWR
5	NER and NFR
6	SR and SWR
7	SCR and SWR
8	SER and ECoR
9	WR, NWR and WCR

## Coaching locomotives

Locomotives are categorized as coaching, freight and mixed based on their design specifications especially hauling power and gear ratio. It finds mention in the locomotive syntax which generally has three digits followed by a number and subsequent digit if any.

The locomotive syntaxes normally used are:-

<i>Digit</i>	<i>Meaning</i>	<i>Types with description</i>
First	Gauge	W–Broad gauge; Y–Meter gauge; Z–Narrow gauge (2ft6in); N–Narrow gauge (2ft)
Second	Motive Power	D–Diesel; C–DC electric; A–AC; CA–both DC & AC; B–Battery
Third	Job type	G–Goods; P–Passenger; M–Mixed (Pass. & Goods); S–Shunting; U–Multiple units; R–Rail cars
WDM3A – Broad gauge; Diesel; can work both passenger & goods; 3A denotes 3100 hp		

## Loco Maintenance

Locos are maintained in the loco sheds. Depending upon the type of locomotives, kms worked and time spent on line, different schedules for maintenance are mandated. An Illustration is given below.

<i>Schedule</i>	<i>Duration</i>	<i>Periodicity</i>
Trip inspection (TI)	2 hrs	After 4500 kms or one trip whichever is later
IA	4 hrs	60 days

IC	8 hrs	120 days
AOH	6 working days	18 months + 15 days (WAP-4 & WAG-5) 12 months + 15 days (WAP-1)
IOH	9 working days	36 months + 1 month or 6 lakh km, whichever is earlier (WAP-1 & WAG-5) 54 months (4 ½ years) + 1 month or 9 lakh km, whichever is earlier (WAP-4)
POH	24 working days	6 years + 3 months or 15 lakh km, whichever is earlier (WAP-1 & WAG-5) 108 months (9 years) + 3 months or 18 lakh km, whichever is earlier (WAP-4)

### Loco Links

Locomotives nominated to work coaching trains are programmed to match the time table. These schedules are called loco links. While preparing loco links, factors like adequate powering for the train service, permitted speed of locos, time slots for maintenance schedules, fueling slots in case of diesel, time for shed in / out movements have to be kept in mind. Lie over periods have to be kept bare minimum duly taking into account the time needed for the terminal operations required to pick up the next train. Power interception for a train should not be planned unless it is unavoidable.

The efficiency of loco links is assessed by train kms per engine day in use. Care has to be taken to ensure optimum utilization of loco shed capacity by avoiding bunching of locos. Diesel loco working under wire to be kept minimum. Where ARMVs and ARTs are stationed and no powers are designated, links have to be made strategically so as to make available at least one diesel loco at any point of time.

### Coaching stock

For providing the various types of services mentioned above, different types of coaches have been designed, manufactured and put into service. They form the coaching stock. There are two types of Coaching Stock.

- i) Passenger coaching vehicle (PCV): A vehicle in which whole or some portion is being utilized for carrying passengers.
- ii) Other coaching vehicle (OCV): These vehicles do not have a passenger carrying portion but are planned to be attached to coaching trains for providing other facilities. Saloons, inspection cars, medical cars, tourist cars, parcels & horse van, composite luggage Power Cars, Pantry Cars & brake van are some of the OCVs.

### Types of coaches and their codes

All coaching vehicles are provided with an alphabetical code indicating the facilities provided in them. The meanings of the letters in the code are as follows.

Code	Details
W	Vestibuled
G	Self-Generating
S	Second Class
F	First Class
L	Luggage Van
R	Guard Brake Van
Y	Ladies Compartment
J	Ice Compartment
Q	Attendant
D	Vendors Compartment
P	Postal Van
U	Kitchen
CB	Pantry Car
CD	Dining Car
CN	Sleeper Class Three Tier
CW	Sleeper Class Two Tier
CZ	Chair Car
CT	Tourist Car
AC	Air Conditioned
FC	First Class with Coupe
GS	Second Class with Self Generating Equipment
JJ	Refrigerator Compartment
M	Military Car Ordinary
MA	Military Car Ambulance
ML	Military Car Kitchen
MF	Military First Class
CTS	Tourist Car for 2nd Class Passengers
CZACEN	Air Conditioned Chair Car with End on Generation
EN	End-on-Generation
FCS	First Class Coupe and Second Class
FSCN	First cum 2 <sup>nd</sup> Class 3-tier Sleeper
LR	Luggage with Brake Van

The above codes are generally given to coaches of IRS make having screw coupling. For the LHB coaches an additional alphabet L is prefixed.

### Coaching Stock numbering syntax

All coaches are also provided with a unique five digit number with each digit signifying the following

- The first two digits of the number indicate the year of manufacture of the stock.
- The third digit indicates the type of stock. i.e.
  - 0- FAC & ACCW (First AC or 2-tier AC class)
  - 1- ACCN & ACCZ (3-tier AC or AC Chair Car class )
  - 2&3 – GSCN (II<sup>nd</sup> Sleeper Class)
  - 4 & 5 – GS (II<sup>nd</sup> General)
  - 6 – GSCZ (II<sup>nd</sup> Chair Car)
  - 7 – SLR (II<sup>nd</sup> class cum luggage cum brake van)
  - 8 – WCB (Pantry car)
  - 9 – FC and VHP & VPU (First class or Parcel van)
- The fourth and fifth digit indicates the serial number of the coach
  - 11025 - Year of manufacture is 2011, FAC or ACCW, serial no. 25
  - 00534 - Year of manufacture is 2000, GS, serial no. 34
  - 98115 - Year of manufacture is 1998, ACCN or ACCZ, serial no. 15
  - 12765 - Year of manufacture is 2012, SLR, serial no. 65

### Coach composition

Detailed analysis of passenger traffic are done to decide the number and type of coaches (1<sup>st</sup> AC, 2<sup>nd</sup> AC, 3<sup>rd</sup> AC, First, Sleeper class and General) to be provided in a particular train service. Periodic survey of occupation percentage for various classes is conducted and the train composition is reviewed accordingly.

### Rake Links

For ensuring better utilization of coaches, coaching trains formation is fixed as rakes. Rake links are made so that formations are available for running train services without further shunting as far as possible. While linking rakes among different services, sufficient time slots shall be given for Primary/Secondary maintenance including time for shunting for pit line placement and platform berthing etc. In case of long distance trains, some cushion time for accommodating late running may also be given. While linking rakes it has to be ensured that pit line capacity of various depots is used efficiently.

### Coach Maintenance

The following schedules of maintenance are followed for coaching trains...

- i) Primary Maintenance: Passenger carrying trains are required to be checked for rakes with ICF coaches after every 3500 kms and LHB Rakes after 4000kms in pit line for 6 hours thoroughly by mechanical & electrical departments for fitness of undergear equipment, passenger facilities and cleanliness.



- ii) Secondary Maintenance and OEM (Other end maintenance): The rakes that have undergone primary maintenance in the originating station are subjected to secondary / other end maintenance in the destination station depending upon the distance traveled.
- iii) IOH (Intermediate over hauling) is a scheduled maintenance of coaches, checked thoroughly in IOH sheds separately for each coach.
- iv) POH (Periodic over hauling) is a scheduled maintenance of coaches checked thoroughly in workshops separately for each coach.

Policy Guidelines regarding Revised Maintenance pattern of coaching trains

(Railway Board letter no. 95/M(C)/141/I Pt. Dated 14.6.17):

S.No	Trains description	Primary Maintenance
1	Rajdhani / Duranto	At both originating and destination stations
	Shatabdi	At primary end only
2	M/Express round trip more than 3500km for ICF / 4000km for LHB stock	At both originating and destination stations
3	M/Express round trip up to 3500km for ICF / 4000km for LHB stock and touch primary depot within validity (excluding sl no 1 above)	At Primary end only once within the limit of 3500 Kms (ICF) or 4000 Kms (LHB) / 96 Hrs. whichever is earlier.
4	Interconnected Mail/Express Trains Round trip run up to 3500 Kms (ICF) or 4000 Kms (LHB)	To be done within 3500 Kms (ICF) or 4000 Kms (LHB) or 96 hours after the issue of original BPC whichever is earlier, only at Primary end.
5	Passenger trains with toilets including interconnected passenger trains/ shuttles	Done within 3500 Kms or 96 hours after the issue of original BPC whichever is earlier, only at Primary end.
6	Passenger trains without toilets	To be done after 3500 Kms or 7 days whichever is earlier, only at Primary end
7	Dedicated Parcel Trains	To be done after 4500 Kms or 10 days whichever is earlier.
8	Military/Election Special trains	To be done within 3500 KMs (ICF) or 4000 KMs (LHB) or 96 hours whichever is earlier. Other end under gear examination may be permitted only once.
9	DEMU/MEMU/EMU*	At the maintenance shed during every trip Inspection. 7 days periodicity for 700 HP units; 10 days periodicity - other units.

\*At present BPC for EMU is being given for 14 days instead of 10 days.



### Spare Coaches

These are general guidelines for spare coaching to be kept at station where Primary maintenance takes place:

Type of stock	Traffic	Mechanical	Total
AC coaches	5 %	6%	11%
Non AC coaches	4 %	5%	9%
Rajdhani/Shatabdi	5 %	6 %	11%

However, with advent of ICMS, it is possible to position spare coaches against IOH/POH on days of expected due and also replace coaches with trouble. Traffic spares have to be fully utilized for catering to demand by attaching to train.

### Crew links

Coaching crew is scheduled to work coaching trains as per time table. These schedules are called crew links. These links are prepared for optimum utilization of crew duly ensuring compliance to HOER. Separate links are prepared for Mail/Express, passenger and suburban trains.

### Time Tabling

The coaching train services are time tabled to serve the passengers. The arrival and departure times of the trains for all the stations through which it runs is published once in a year in the form of a time table.

#### Factors to be kept in view for scheduling of passenger carrying trains

#### Passenger's needs

- (i) Convenient departure and arrivals at station based on types of service offered.
- (ii) Speed and reasonable transit time
- (iii) Appropriate halt for meals/breakfast
- (iv) Sufficient time for entraining and detraining of passengers
- (v) Requirements of short/medium/long distance passengers need to be balanced.

#### Service Requirements

- i) Maintenance slot for primary, secondary and OEM.
- ii) Platform availability
- iii) Coach Watering facility
- iv) Catering for long distance trains
- v) Fueling if diesel loco planned.