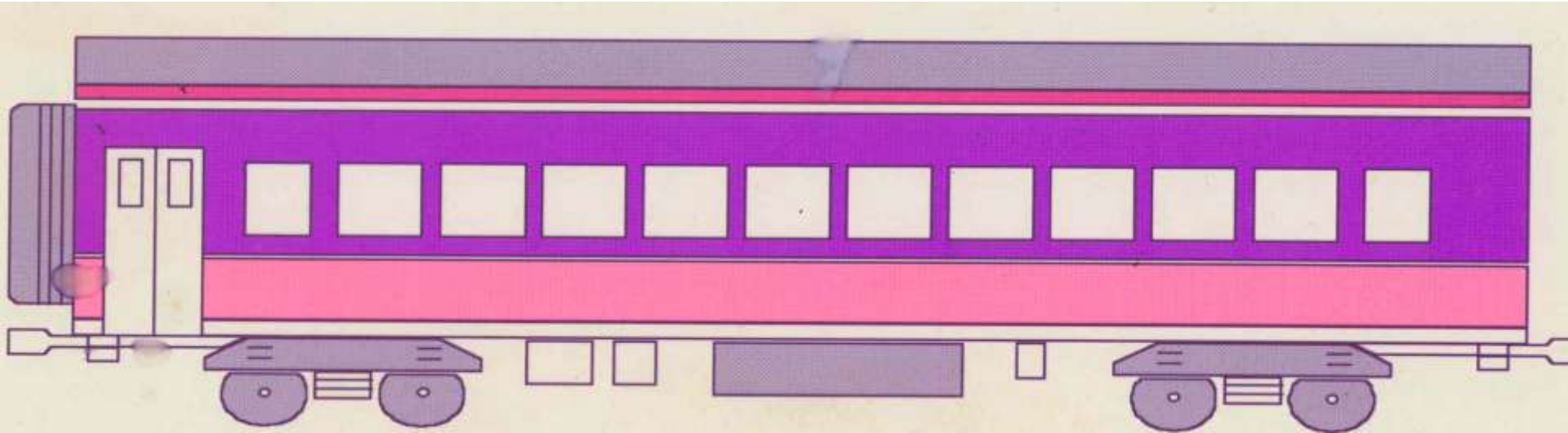


TYPES OF PASSENGER COACHES FOR DIFFERENT SERVICES



V.K.SAXENA
Sr. Prof.Mech.Engineer

COACH



Basic Structure



Based on the basic structure Indian Railways has following types of coaches.

- IRS Coach
- ICF Coach
- BEML Coach
- LHB Coach

Basic Structure- Continued



- IRS COACHES
 - Steel Under Frame,
 - Wooden Body,
 - Laminated Springs in primary suspension and coil springs in secondary suspension,
 - Tyred Wheels
- ICF COACHES (Started from 1955)
 - Integral All Metal Design
 - Design from Schelieren,Switzerland(1954).Original Design

ICF COACH

SHELL



Bogie

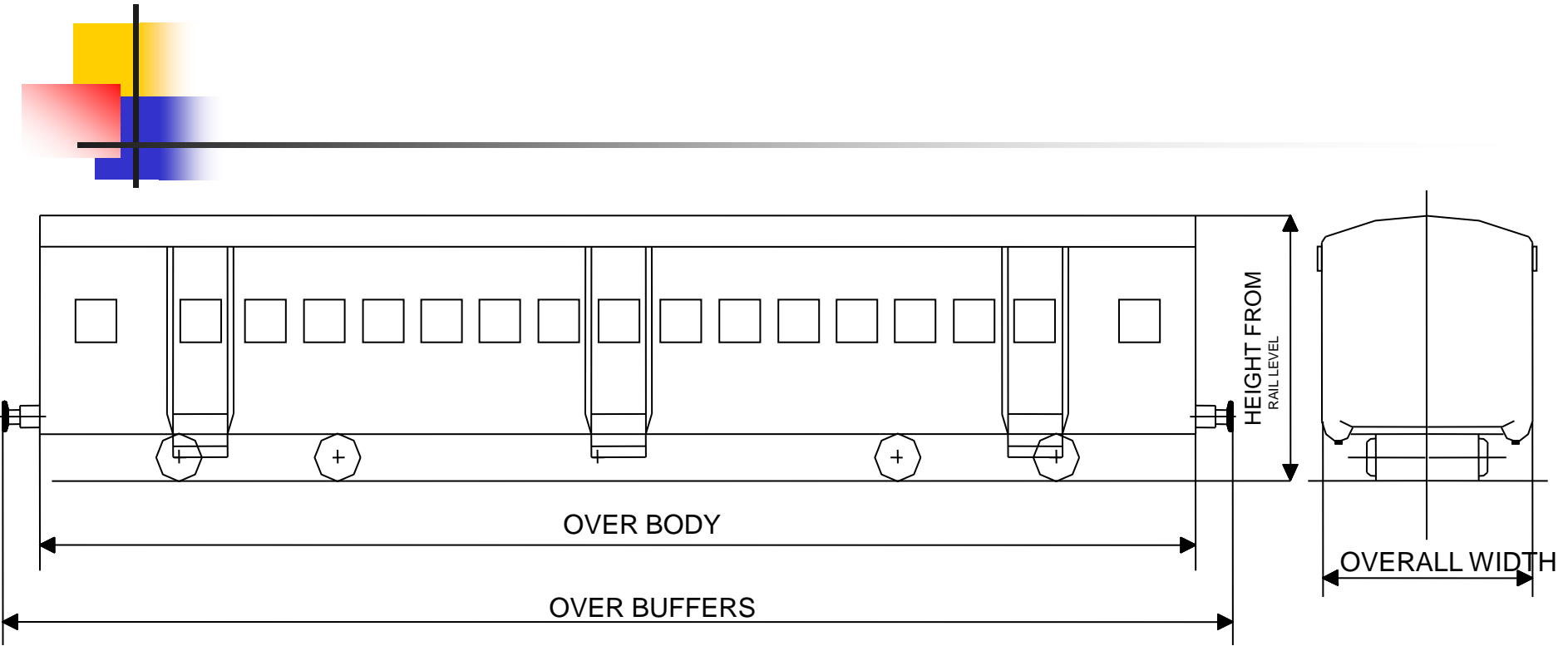




ICF COACH

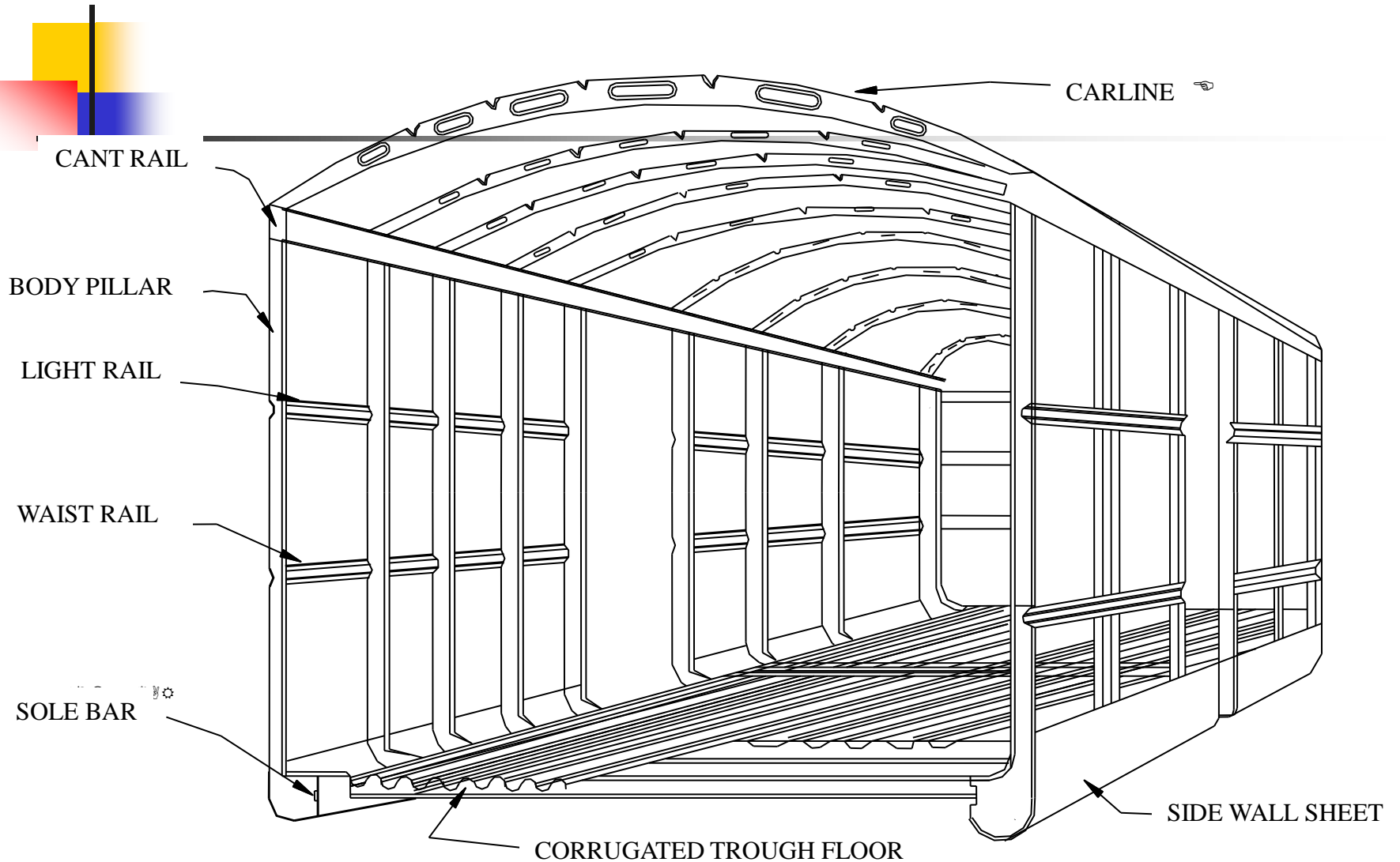
- Integral design
- Anti telescopic
- All coil springs
- Air brakes/Vacuum brake
- Self aligning spherical Roller bearings
- Stainless steel body for anti corrosion
- Better riding comforts

COACH SHELL



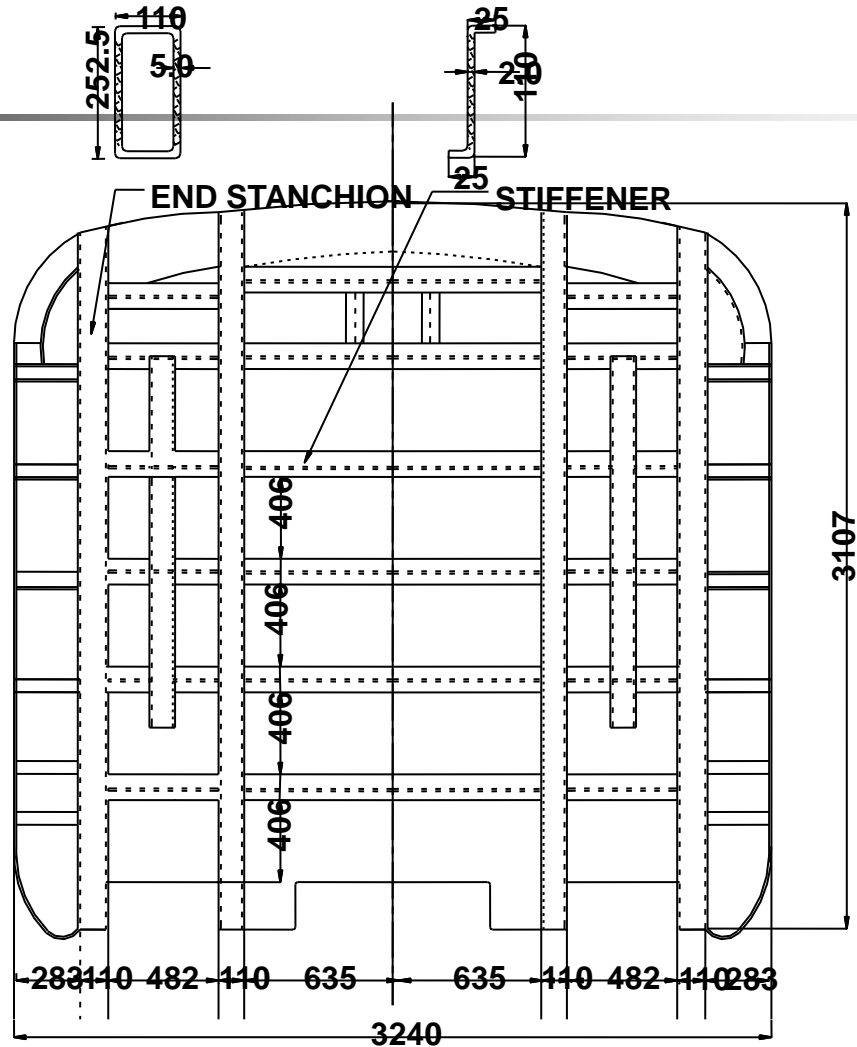
**COACH
SHELL**

ICF SHELL



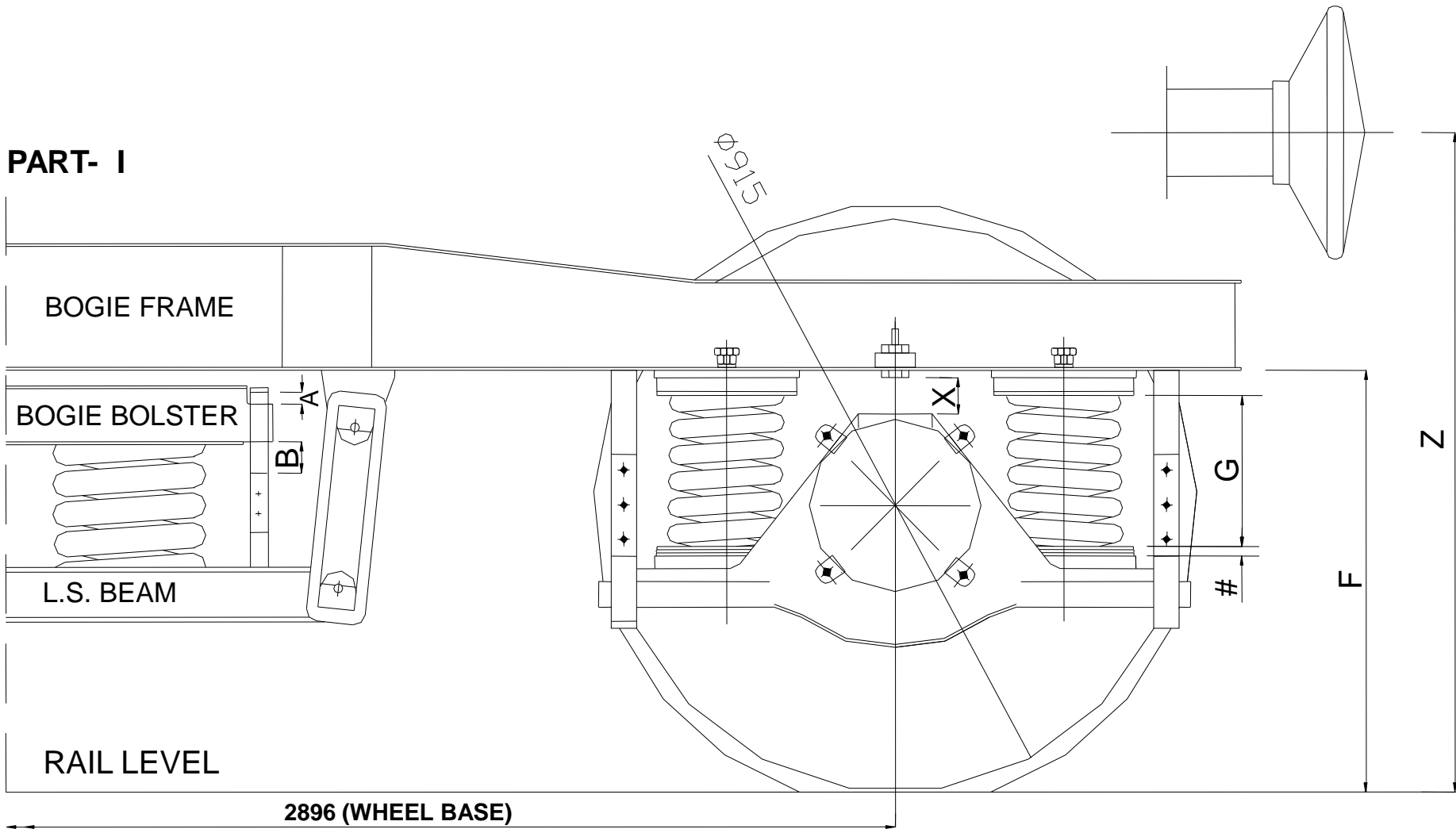
SHELL FOR ICF COACHES (CROSS SECTIONAL VIEW)

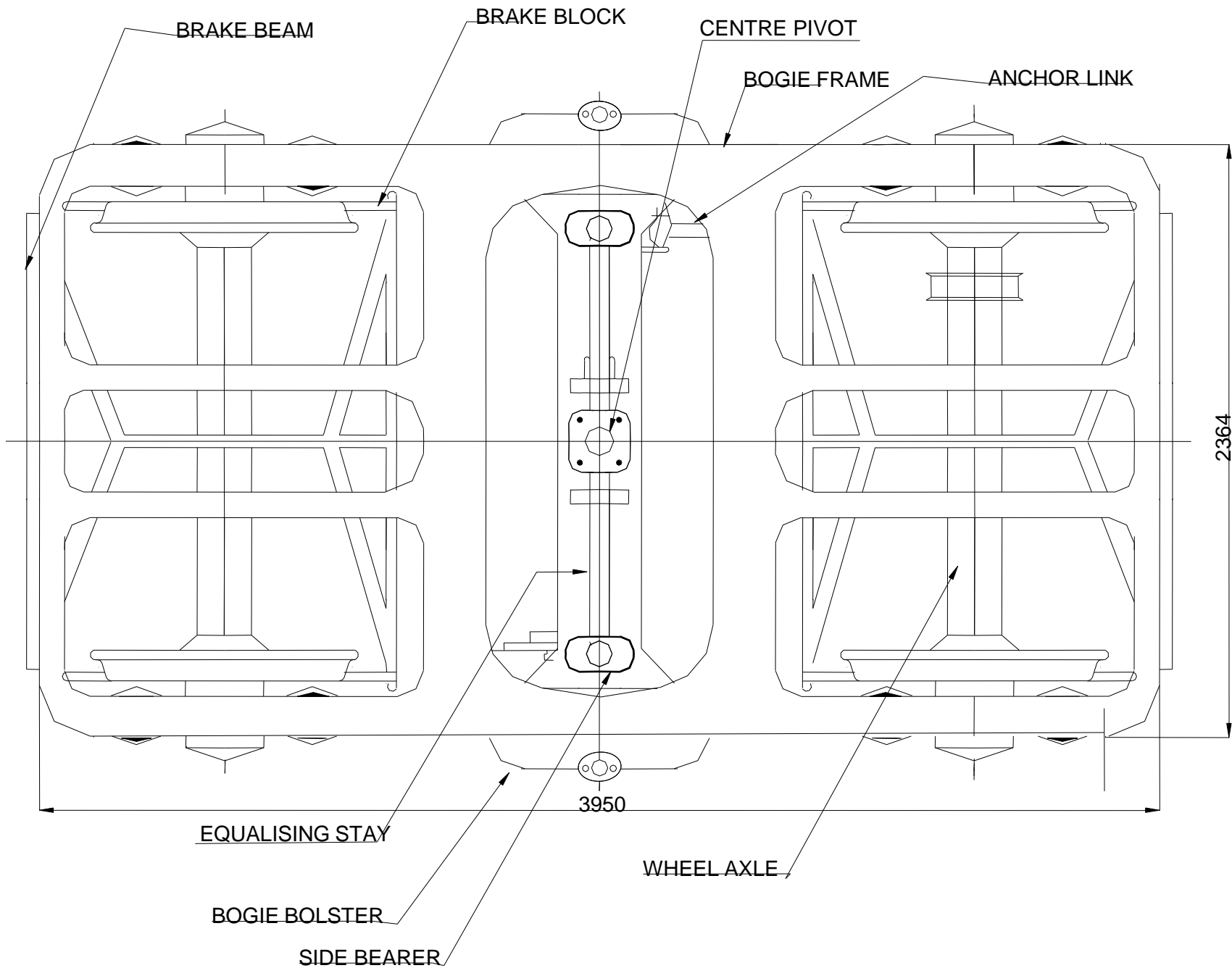
ICF SHELL-END CONSTRUCTION



END CONSTRUCTION

PART- I





LO 5 BOGIE



BEML COACH

- Just after independence, acute shortage of coaches
- Hindustan Aeronautics Ltd. (HAL) entered into a deal with M.A.N of Germany to produce all steel coaches
- Model 404 and 407 with centre lav , all third on IRS under frame
- First integral coach 41 series recognizable by small window on the toilet
- This business transferred to BEML in 1970
- Their floor level slightly higher than the ICF
- BEML coaches are mostly decommissioned.

LHB COACH





LHB /FIAT COACHES

Contract with M/s LHB in 1995 to supply

- 19 AC 2nd class chair car
- 2 AC Executive class chair car
- 3 Generator cum brake van

TOT available for

- AC first class sleeper
- AC second class sleeper
- AC pantry car

AC 3 tier developed by IR



LHB /FIAT COAHES FEATURES

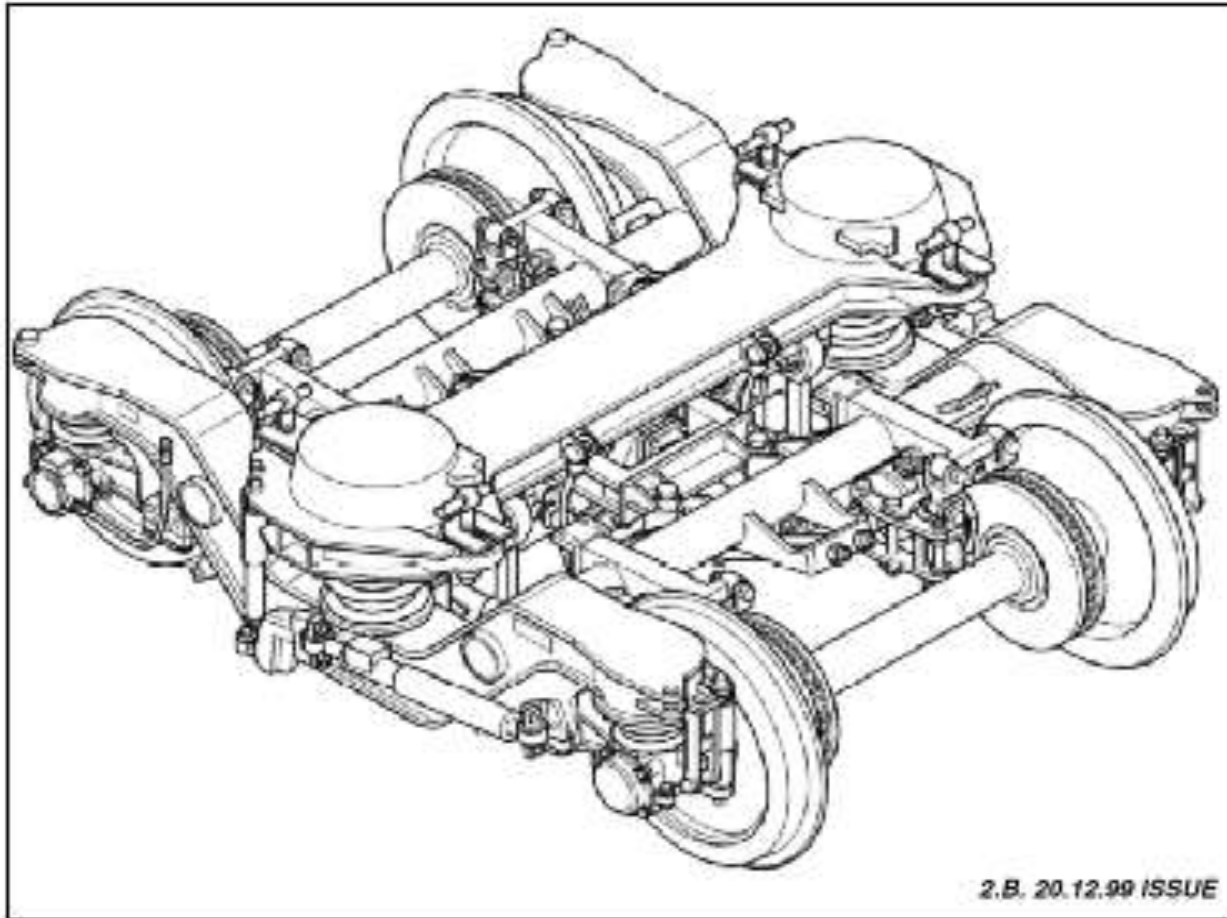
- Shell manufactured by LHB and bogie by FIAT based on EUROFIMA concept
- Speed potential 160 kmph can be raised to 200 kmph
- AAR 'H' type tight lock coupler
- Window with double glazing with inert gas in between
- Noise and heat insulation
- Two microprocessor roof mounted air conditioned unit



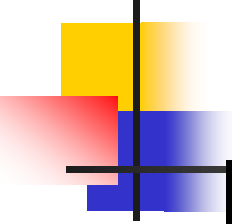
LHB /FIAT COACHES FEATURES

- Axle mounted EP type disc brake with wheel slide protection
- Interlocking type of joint between vertical and longitudinal stiffener
- Use of stainless steel to minimise corrosion
- Modular design interior
- Hygienic toilets with controlled discharge
- Spherical roller bearings

BOGIE GENERAL ARRANGEMENT



Comparison of LHB and ICF Coaches



| S.No. | Item | LHB | ICF |
|-------|---|--------------|--------------|
| 1 | Length of body (m) | 23.54 | 21.337 |
| 2. | Width(m) External Internal | 3.24 3.07 | 3.24 3.03 |
| 3. | Weight of coach (t) | 40.2 | 47 |
| 4. | Bogie wheel base(m) | 2.56 | 2.896 |
| 5. | Maintenance periodicity (in millon km) | 1 | 0.3-0.4 |
| 6. | Riding index | 2.75 | 3.5 |



CLASSIFICATION OF COACHES

- Main Line Coaches
- Suburban Passenger Coaches
- Other Coaching Vehicles
- POPULATION ON INDIAN RAILWAYS

| | |
|----------------|--|
| DMU/DHMU | 578 |
| EMU | 5316 |
| Coaches | 38,196 (seating capacity 2.75 million) |
| Other Coaching | 5990 |

Main Line Coaches



Requirements

- Journey is longer therefore better ride index 3.5
- More space per person
- Cushion seats or berths
- Toilet facilities
- Passenger Amenities
- Doors
- Vestibules

Types of Main Line Coaches- Based on Passenger Services



```
graph TD; A[Types of Main Line Coaches-  
Based on Passenger Services] --> B[Non AC Services]; A --> C[AC Services]; B --> B1[General Class]; B --> B2[Three Tier Sleeper]; B --> B3[Chair Car]; B --> B4[First Class]; C --> C1[AC Three Tier]; C --> C2[AC Two Tier]; C --> C3[AC Chair Car]; C --> C4[AC Executive Class]; C --> C5[AC First Class];
```

Non AC Services

General Class

Three Tier Sleeper

Chair Car

First Class

AC Services

AC Three Tier

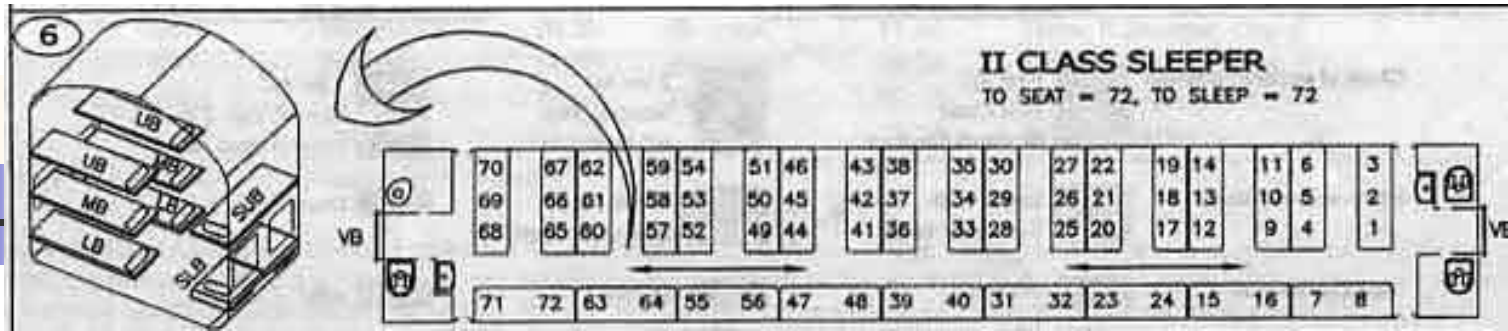
AC Two Tier

AC Chair Car

AC Executive Class

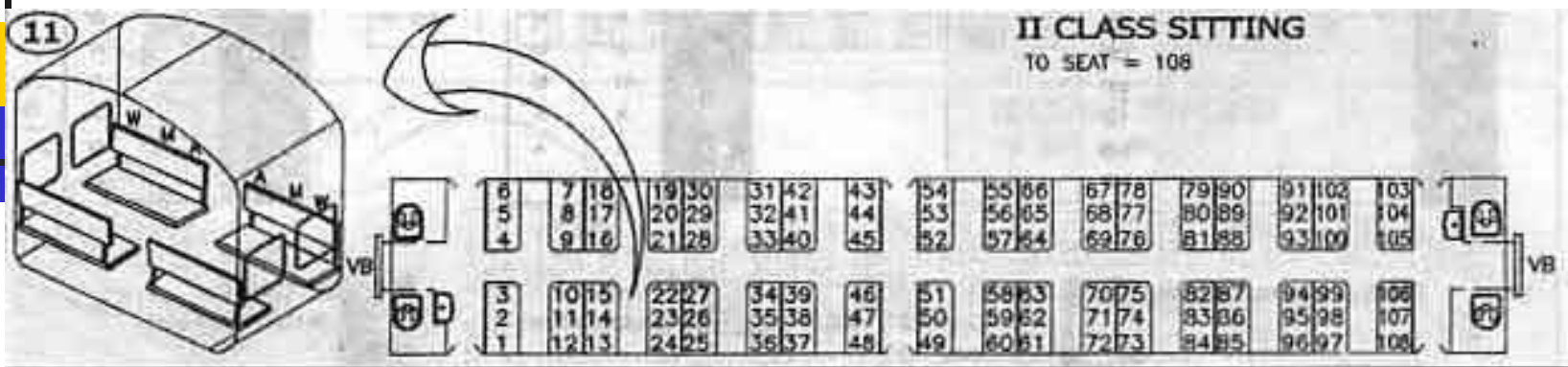
AC First Class

Three Tier Sleeper



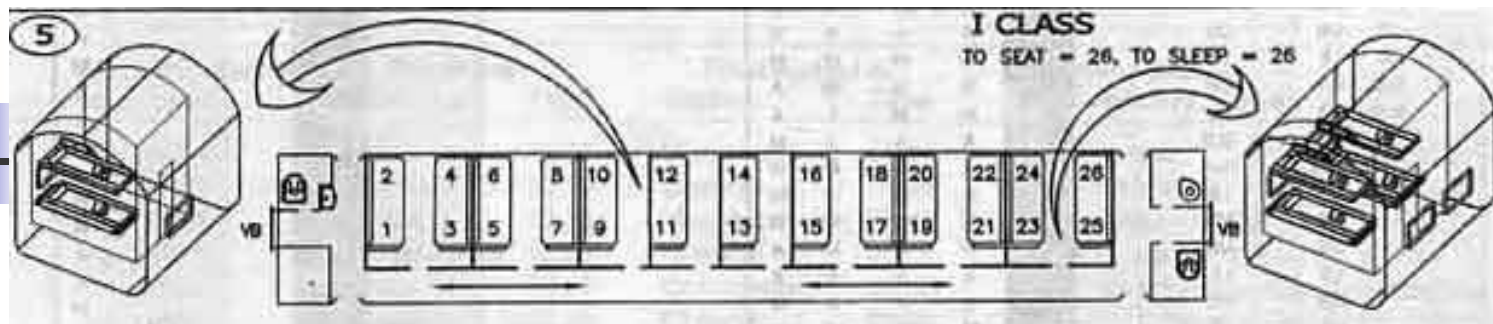
- Most Common Coach
- Used for general public going for long journey particularly involving night travel
- Accommodation for 72 persons
- Each compartment 6 berth, middle seat foldable, no doors for compartments
- Across the aisle two shorter berth along the length of Coach
- Toilets at the ends
- Some coaches with ladies compartment (6 Berth) with door²²

Second Class Chair Car



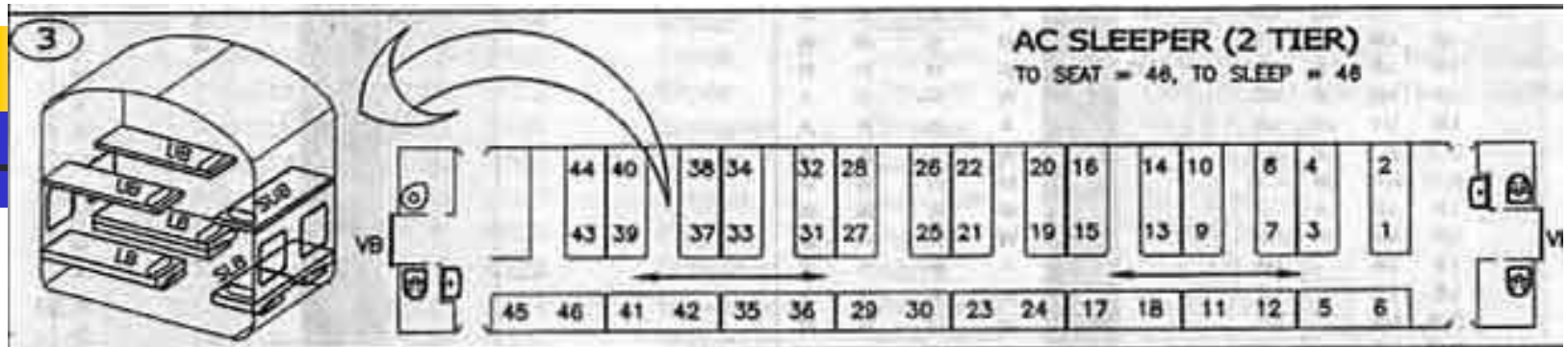
- Earlier Version have 72 seats(3 and 2 across the aisle)
- Since 1995 sitting accommodations for 108 persons (Seating 3 and 3 across)
- Toilets at the ends
- Used for intercity traveling spanning 5-6 hours

First Class



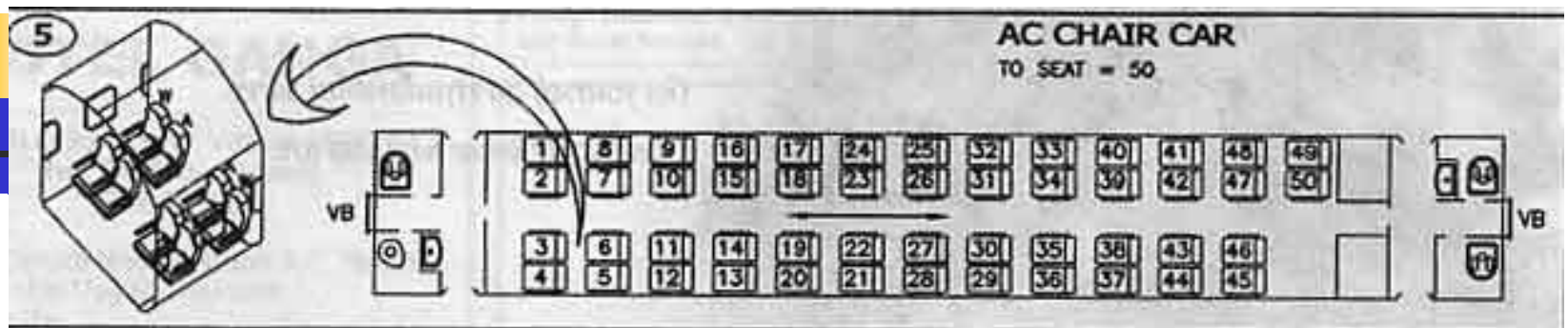
- Used for longer journey by affluent class
- Accommodation for 26 persons
- Provided with door
- 5 compartment with 4 berth each
- 3 Coupe with 2 berth each
- Toilets at the end
- These are being phased out

AC Sleeper (2 Tier)



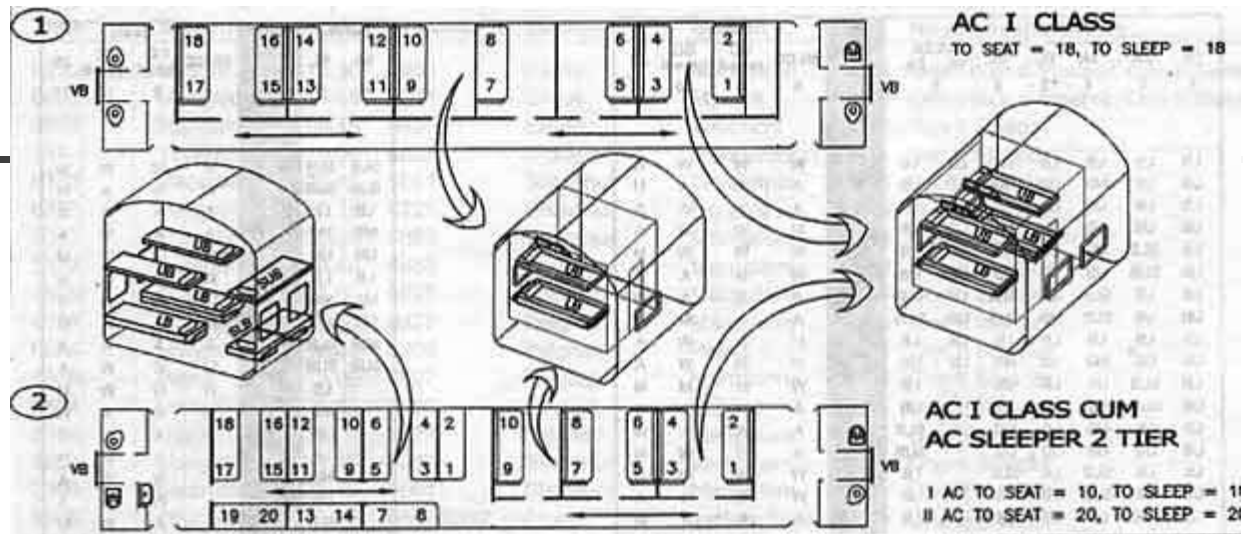
- Used for longer journey involving night by affluent class
- It has 46 berths , LHB coach has 54 berths
- It has 3 oriental and one western style of toilets
- There are no doors but curtains are provided
- 8 compartment (LHB-9) , 7 are with 4 berths, One with 2 berths.
- 2 shorter berths provided in front of each compartment along the length of the coach

AC Chair Car



- 50 seating capacity
- Used for short journey like intercity travel etc.

AC First Class & Composite AC First Class



- Super Luxurious Class with only 18 berths
- Each compartment has door for privacy
- 3 Compartment each with 4 berths and 3 coupe with 2 berths each
- Combination of AC 1st Class and AC 2- Tier Sleeper has 10 berths for AC 1st and 20 berths for AC 2-Tier sleeper

Garib Rath

- Seating capacity 102 against usual 73
- Speed potential-130 KMPH
- AC with 3 doors aside
- Each passenger with snacks table, magazine bag and bottle stand
- Each row with window
- Cell Phone charger
- Four emergency windows





Composite Classes

- AC first class coaches with one section having sleeping accommodation and rest being a chair car- Coal field Express
- Composite first and second class coach with two compartment being 1st class (6 berths) rest 59 are 2nd class berths. Only handful of this type.
- Earlier odd mixed accommodation which was like a 2 Tier sleeper coach but provided sleeping accommodation only for some passengers in the upper berths (24) and lower berths are for sitting only(48)
- **Double decker** coaches on WR- Flying Rani, They have a single level at either end with the double deck portion forming mostly of the middle of the coach. Underframe has a well. Used mainly for intercity traffic but not very popular.



DOUBLE DECKER COACHES

Comparison of Capacity of LHB and ICF Coaches

| S.No. | Type | LHB | ICF |
|-------|------------------------|-----|-----|
| 1 | AC-First Class | 24 | 18 |
| 2. | AC-2 Tier | 54 | 46 |
| 3. | AC-3 Tier | 72 | 64 |
| 4. | Second Class 3-Tier | 78 | 72 |

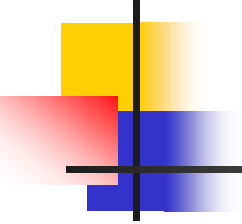
Suburban Passenger Traffic Coaches



Requirements

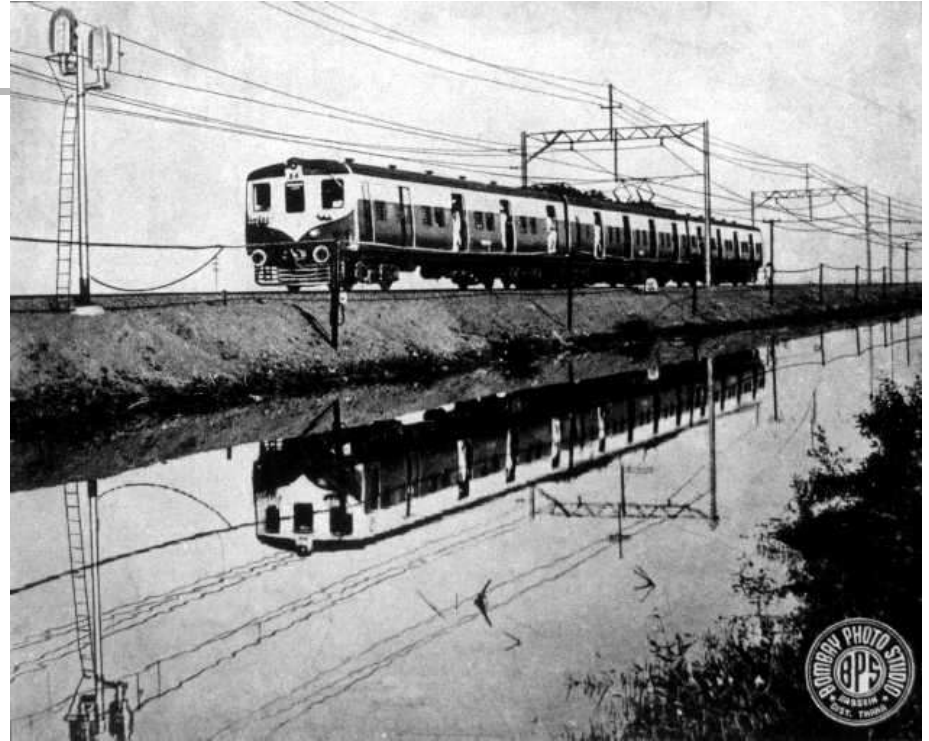
- Journey is short mainly intercity or city transportation
- Berth are not provided.
- No facilities for toilets.
- Less passenger amenities.
- Wider doors.
- Floor at the platform level.
- More space for standing.
- Suspension system to suit variation in load.
- Ride Index = 4.0 for EMU/DMU
- High Acceleration/deceleration

Suburban Passenger Traffic Coaches-Types

- 
-
- Electric Multiple Unit(EMU).
 - Main Line Electric Multiple Unit (MEMU)
 - Diesel Multiple Unit
 - Rail Bus

Electrical Multiple Unit

- Run in suburban section of Mumbai, Kolkatta, Chennai
- Fast acceleration and deceleration
- Basic unit is 3 coaches where one motor coach and 2 trailer coach
- Run in consist of three units
- First and Second Class accommodation is available
- Coach for ladies are also provided



Electrical Multiple Unit-Continued

Churchgate

| | | | | | | | | | |
|--|---|---|---|---|---|---|---|---|---|
| | c | B | A | C | B | A | C | B | A |
|--|---|---|---|---|---|---|---|---|---|

| Type of Coach | C-Driving Trailing Coach | B-Motor Coach | A- 1 st and 2 nd class coach | Total |
|---------------------------|--------------------------|---------------|--|-------|
| Seating Capacity | 86 | 86 | 112 | 284 |
| Standing capacity in ease | 90 | 86 | 116 | 292 |
| Crush load | 176 | 172 | 228 | 576 |

Train Normal load - 852 all seating

Crush load - 852 seating + 876 standing

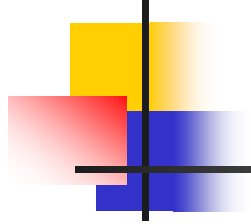
Dense Crush Load - 852 seating + 1740 standing

Main Line Electrical Multiple Unit



- Run other than suburban area connecting two cities nearly covering about 150 to 200 kms.
- In general 8 coach trains runs where 2 units are provided having one motor coach and three trailer coaches in each unit.(1DMC+3TC)
- DMC- 64 , TC -80

Diesel Multiple Unit



- Powered by diesel engine
- Transmission- hydraulic/electric
- One unit consist of
-1DPC+3TC
- Train consist of 3 to 4 units
 - A new aerodynamically shaped DEMU brought into service
 - DPC accommodate 56 passenger(37 ladies +19 handicapped), TC accommodate 96 passengers and TC/vendor 97(2nd class 85 and vendors 12.

Rail Bus

- Used where traffic is less
- Substitute to road bus
- Powered by diesel engine
- Seating capacity of about 60 passengers
- Driving cab on both the sides



Other Coaching Vehicles



- Accident Relief Medical Van
- Accident Relief Train
- Parcel Van
- Inspection Carriage
- Pantry Car



Accident Relief Medical Van

- Diesel Powered -sometimes actually converted EMU units with diesel units
- Usually two such coaches coupled together, one supplying power and other converted to house an emergency medical treatment facility
- Usually beds for 12 patients are also provided

Accident Relief Tool Van

- Usually coupled in pairs, one as a hospital coach and other coach with rerailling and metal working equipments and tools.
- Coaches modified to keep equipments
- Staff coaches are also added in formation



SELF PROPELLED ACCIDENT RELIEF TRAIN



New Developments

ICF has come up with

- Special coaches for disabled
- Wider and longer side berths
- Improved exhaust arrangement in the toilets of air conditioned coaches.
- Emergency window
- A reclining mechanism in chair car
- Night light with berth number indication
- Improved reading lamps
- Wider window glasses etc.

CODES FOR COACHING STOCK- GUIDELINES

| | | | |
|-----------|---------------|-----------|-----------------|
| L | LUGGAGE | | |
| R | BREAKVAN | G | SELF GENERATING |
| P | POSTAL VAN | CD | DINNING CAR |
| Y | LADIES COMPT. | CW | 2 TIER |
| W | VESTIBULED | CN | 3 TIER |
| C | WITH COUPE | CG | 3 TIER+SITTING |
| AC | A C COACH | CF | 2TIER+SITTING |
| F | FIRST CLASS | CZ | CHAIR CAR |
| S | SECOND CLASS | CT | TOURIST CAR |

EXAMPLES

| | |
|----------------|----------------------------------|
| CTS | TOURIST CAR FOR SECOND CLASS |
| ART | ACCIDENT AND TOOL VAN |
| FSCN | FIRST CLASS+3 TIER SLEEPER |
| GS | SECOND CLASS-SELF GENERATING |
| LR | LUGGAGE+BRAKE VAN |
| SLR | SECOND CLASS+LUGG.+BRAKEVAN |
| WGACCN | VESTBULE+SELF GENER.+A C+3 TIER |
| WGACCW | VESTBULE+SELF GENER.+A C+2 TIER |
| WGFACCW | VESTB.+S-G.+A C+FIRST CUM 2 TIER |
| WGFAC | VESTBULE+SELF GENER.+A C+FIRST |
| WACCWEN | VESTBULE+END GENER.+A C+2 TIER |



THANKS