ELECTRIC TRACTION & CONTROL

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UNIT-4
ELECTRIC LOCOMOTIVES AND AUXILIARY EQUIPMENT

- Important features of electric locomotives
- Different types of locomotives
- Current collecting equipment
- Coach wiring and lighting devices
- Power conversion and transmission systems
- Control and auxiliary equipment

IMPORTANT FEATURES OF LOCOMOTIVES

- Self contained
- Easy Speed Control
- High Acceleration
- Smooth Retardation
- Less weight
- High Efficiency
- Long Life

Classification of Locomotives

Self Contained Locomotive

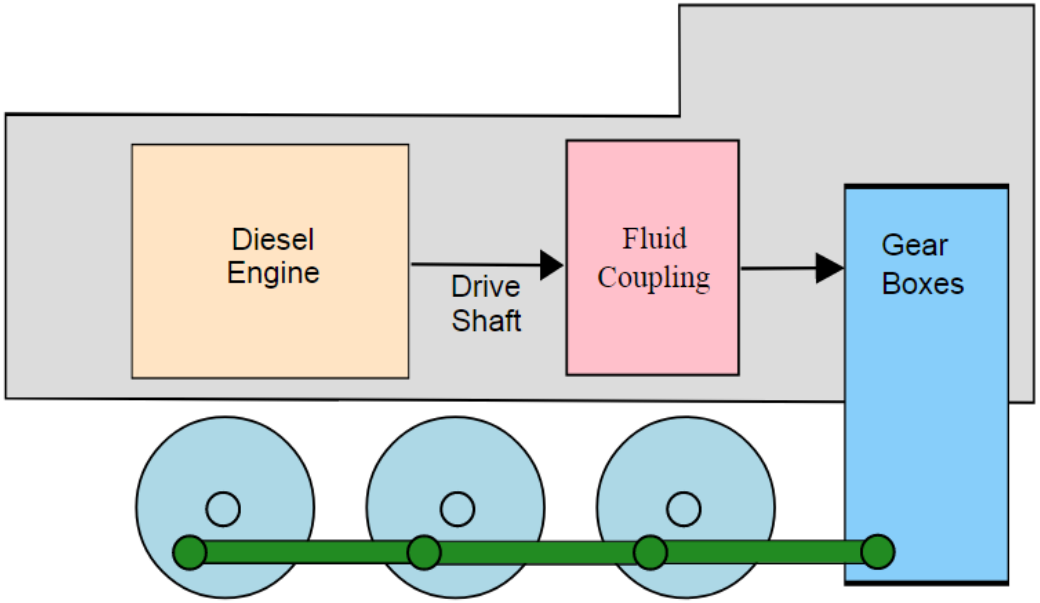
- Diesel
- Steam
- Battery
- Diesel Electric

Locomotive obtaining energy from external source

- DC
- AC
- Dual (AC&DC)

Self contained locomotive

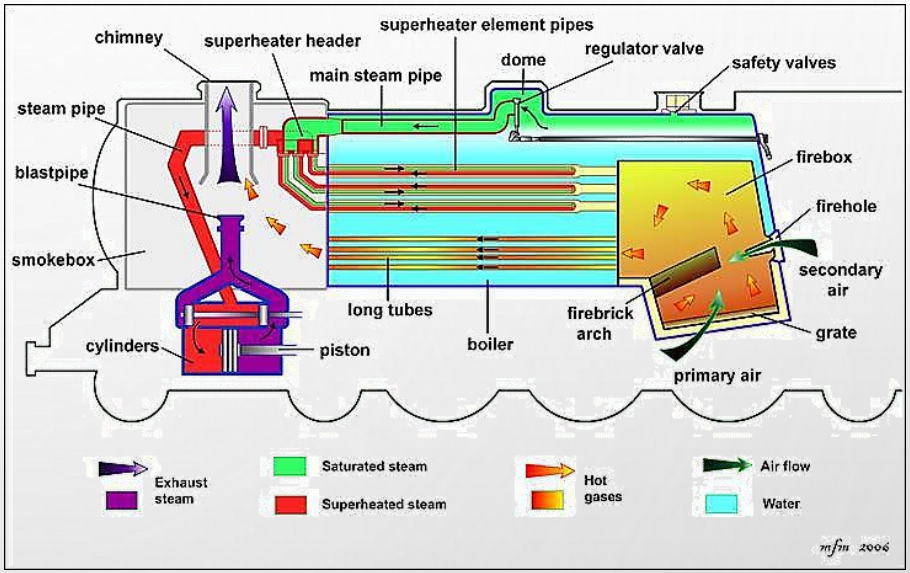
Diesel Locomotive



SCHEMATIC DIAGRAM OF A DIESEL MECHANICAL LOCOMOTIVE

SELF CONTAINED LOCOMOTIVE

- STEAM LOCOMOTIVE



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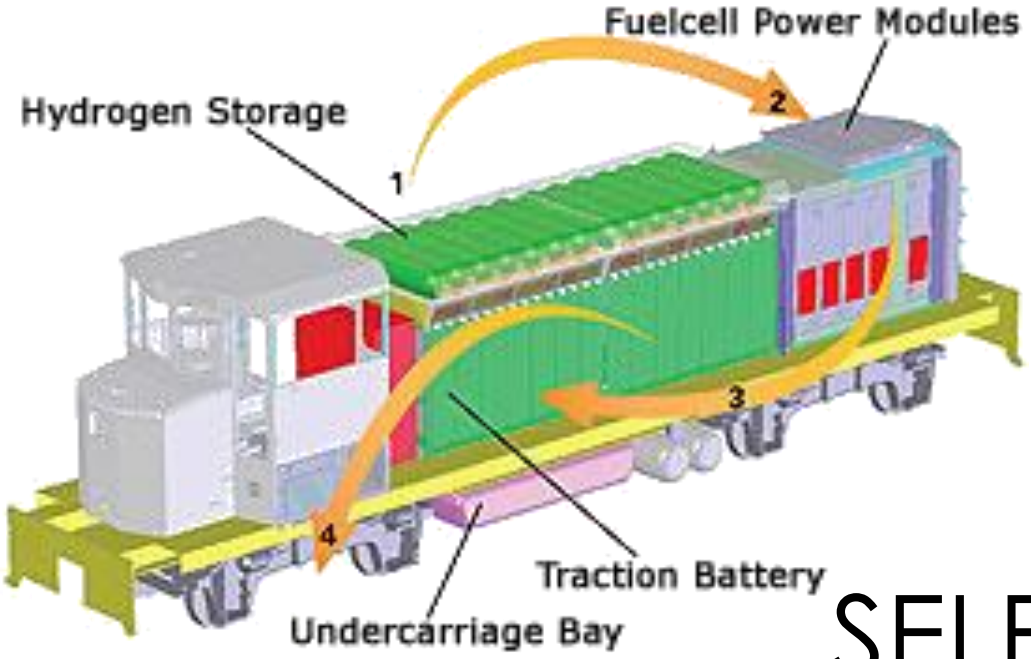

SELF CONTAINED LOCOMOTIVE

Battery Locomotive

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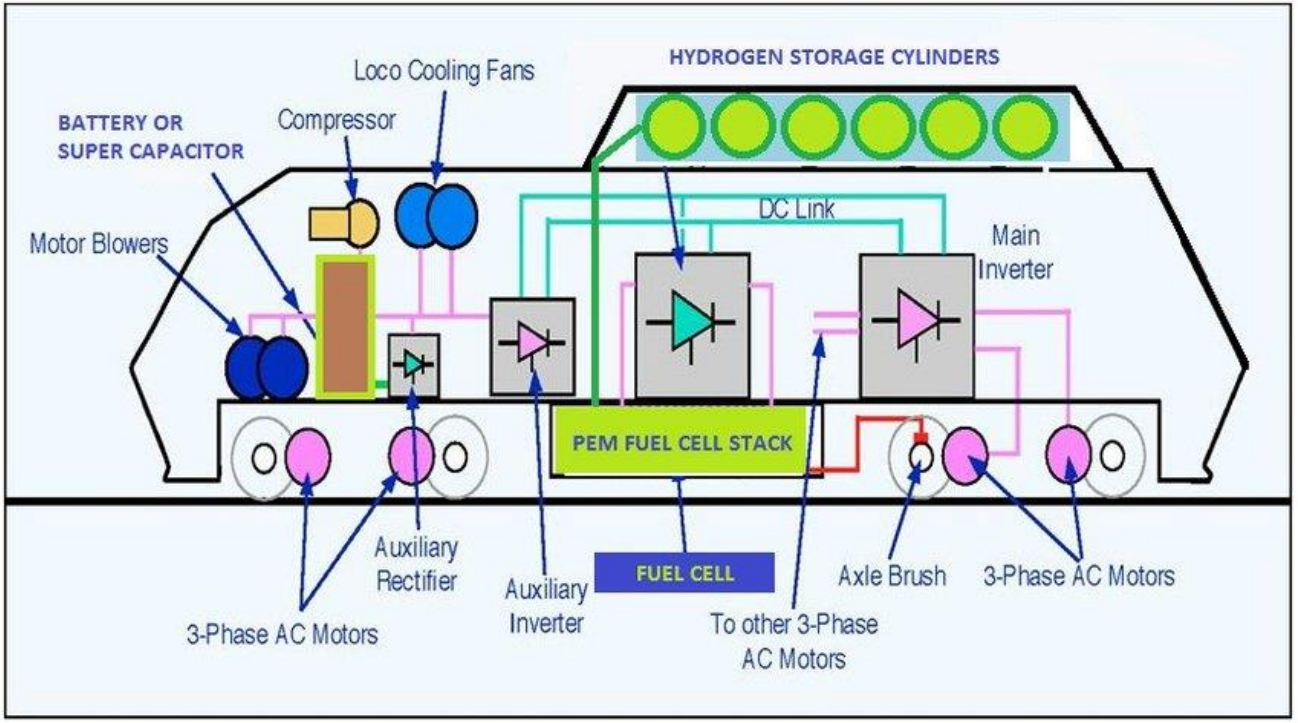
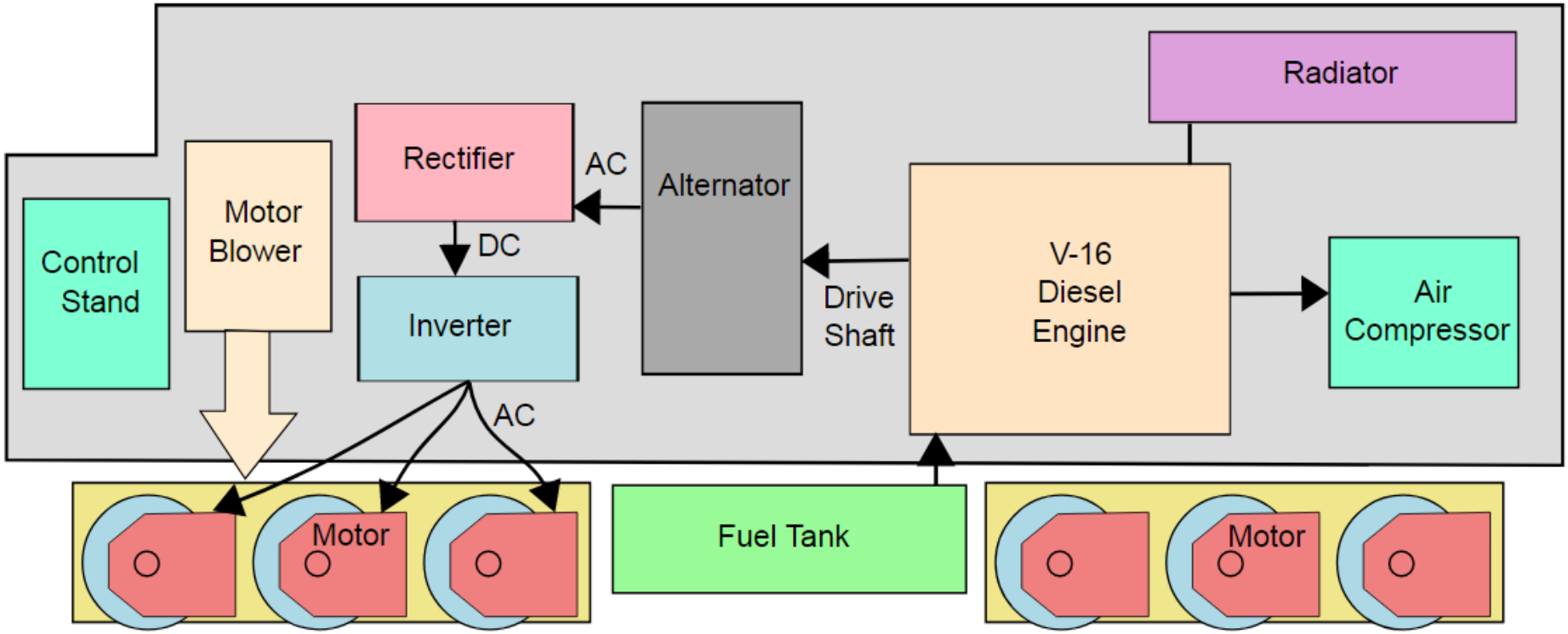
SELF CONTAINED LOCOMOTIVE
Battery Locomotive



SELF CONTAINED LOCOMOTIVE

Diesel-Electric Locomotive



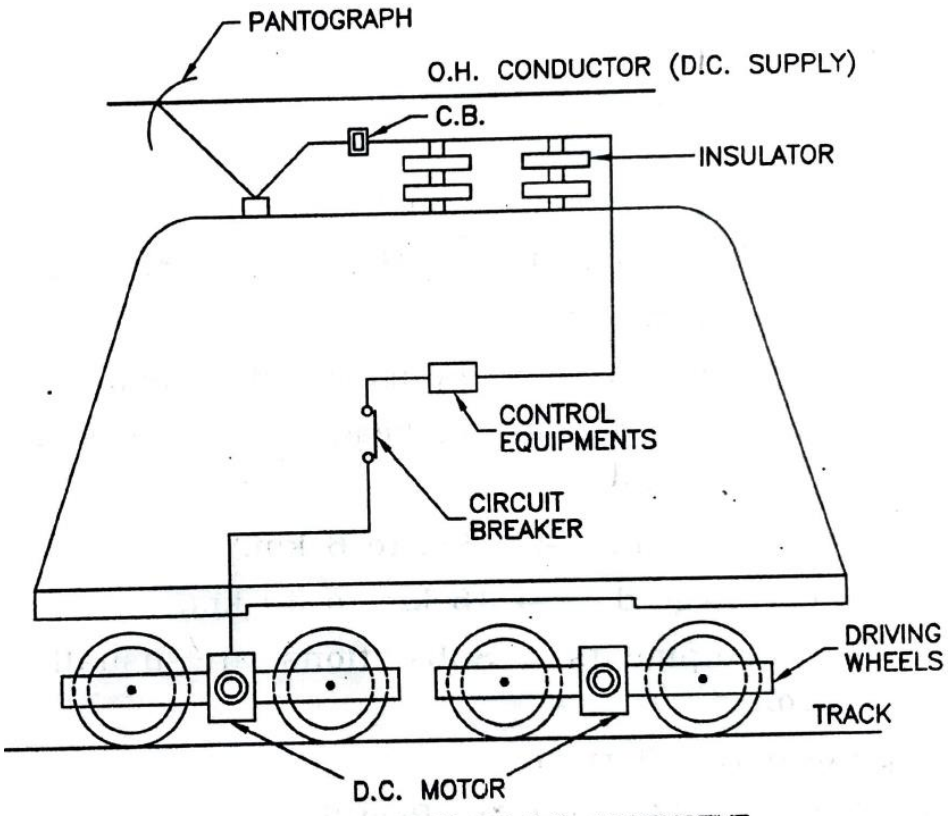
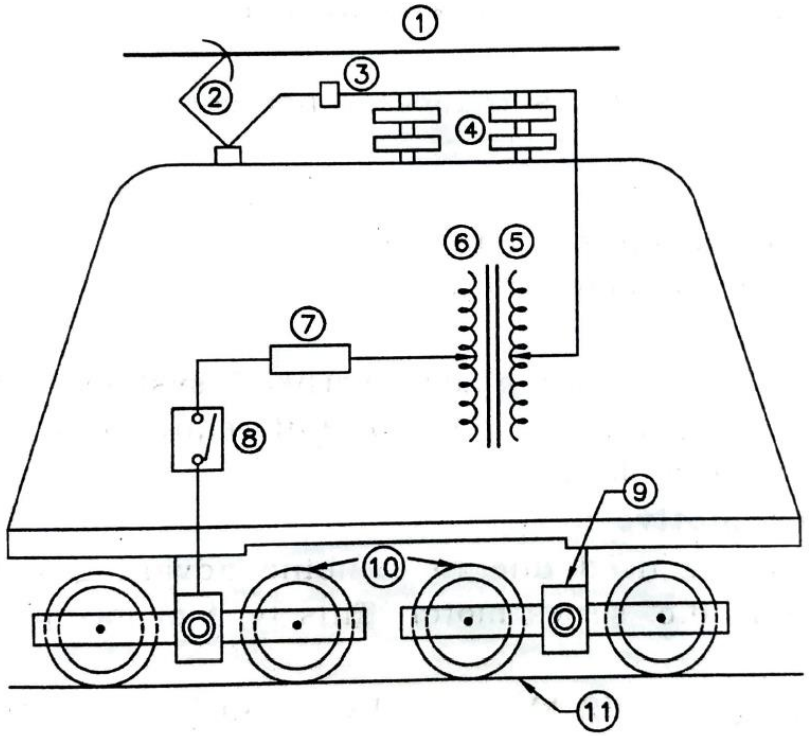


FIG. 5.2 BLOCK DIAGRAM OF D.C. LOCOMOTIVE

EXTERNAL SOURCE LOCOMOTIVES

DC Locomotive

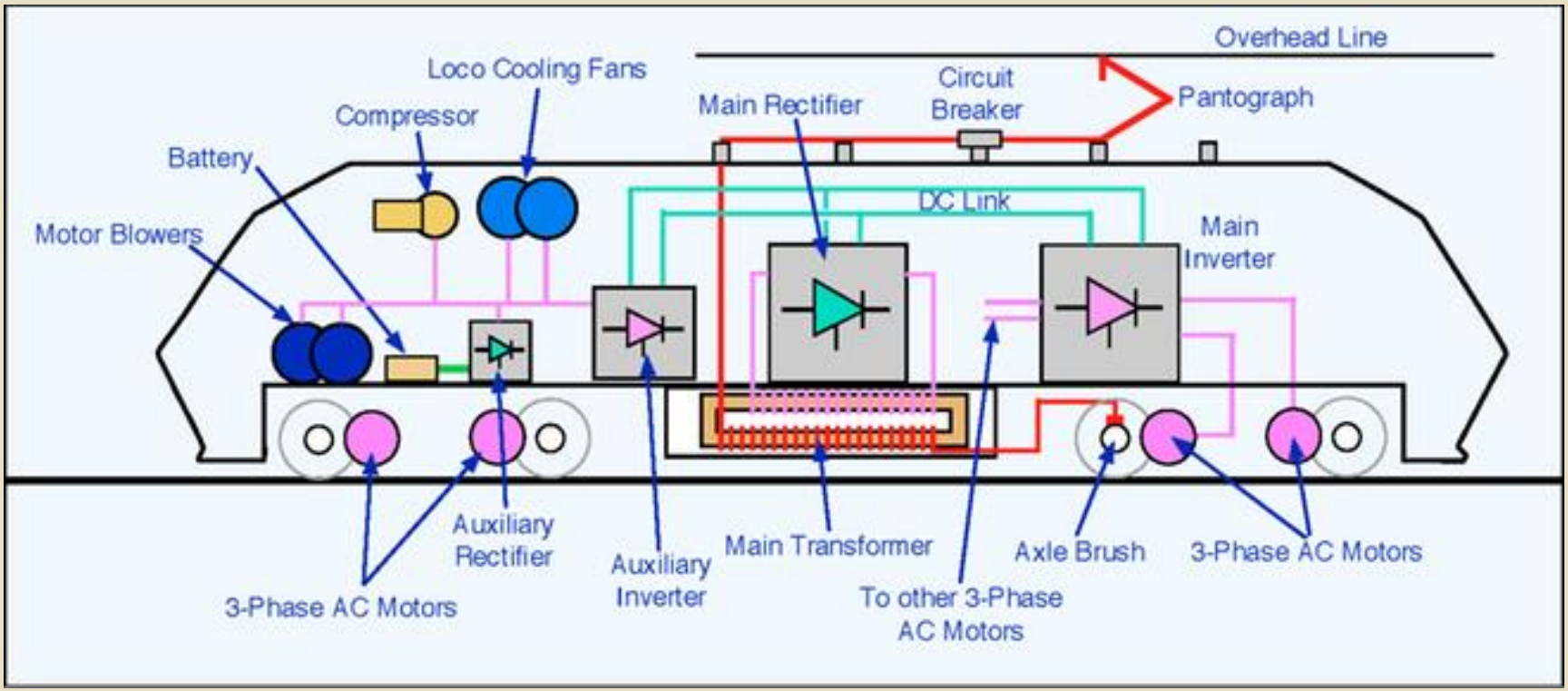


1. OVERHEAD CONDUCTOR
2. PANTOGRAPH
3. CIRCUIT BREAKER
4. INSULATOR
5. TAP CHANGER
6. TRANSFORMER
7. CONRTOL EQUIPMENT
8. STARTING & SPEED REGULATOR
9. A.C. SERIES MOTOR
10. DRIVING WHEEL
11. RAIL TRACK

FIG. 5.3 BLOCK DIAGRAM OF SINGLE PHASE A.C. LOCOMOTIVE

EXTERNAL SOURCE LOCOMOTIVES

AC Locomotive



External source locomotives

AC Locomotive

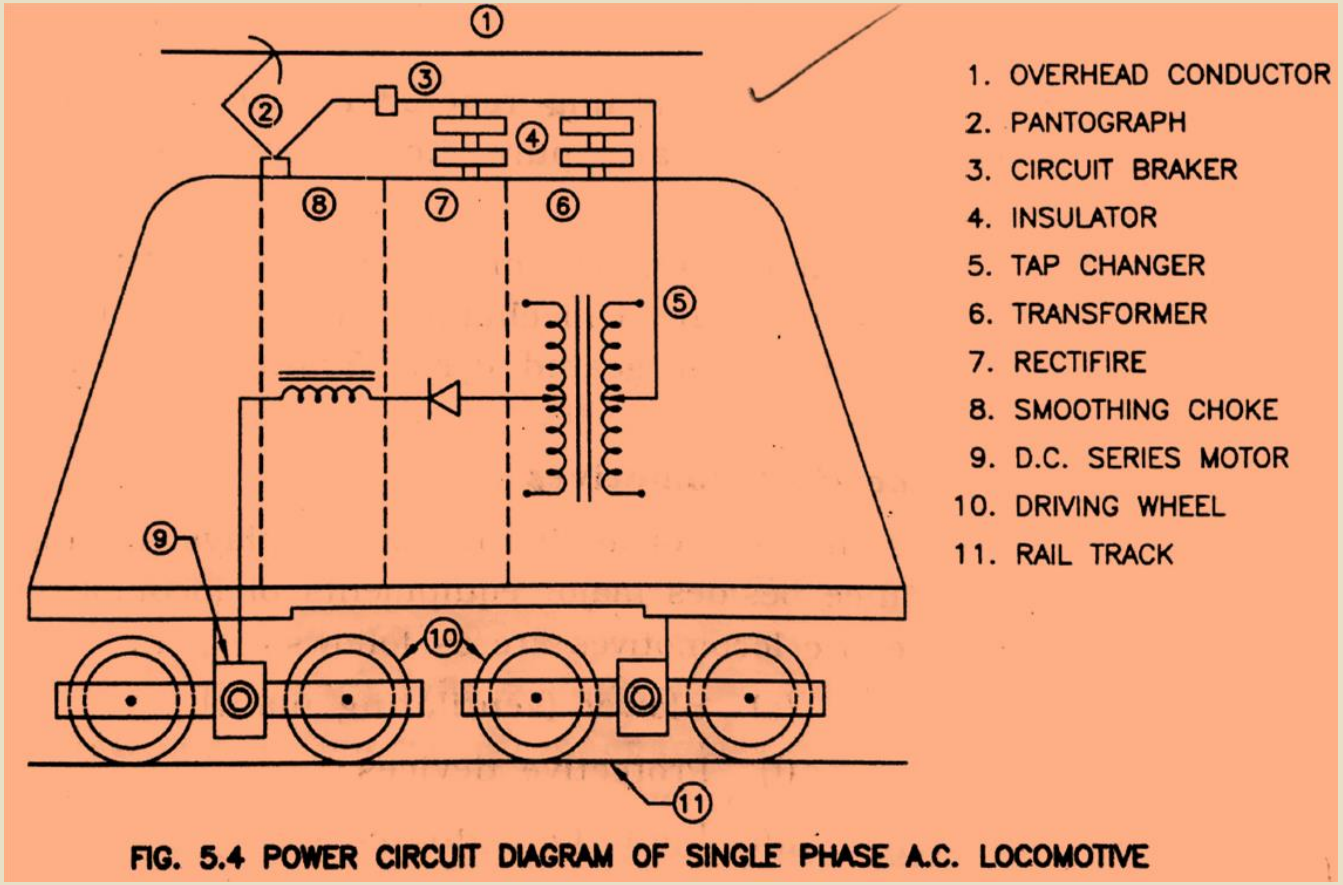


FIG. 5.4 POWER CIRCUIT DIAGRAM OF SINGLE PHASE A.C. LOCOMOTIVE

External source locomotives

AC-DC Locomotive

Types of locomotives

Sr. No.	First Letter (Gauge)	Second Letter (Motive Power)	Third Letter (Job Type)
1	W – Broad gauge (wide)	D – Diesel	G – Goods
2	Y – Metre gauge (yard)	C – DC electric (DC overhead line)	P – Passenger
3	Z – Narrow gauge (2.5 Foot)	A – AC electric (AC overhead line)	M – Mixed (goods and passenger)
4	N – Narrow (toy) gauge (2 Foot)	CA – DC and AC (AC or DC overhead line)	S – Shunting (switching)
5		B – Battery (rare)	U – Multiple unit (electric or diesel)
6			R – Railcar

TYPES OF LOCOMOTIVES

Diesel

- WDM – Wide diesel mixed
- WDP – Wide diesel passenger
- WDG – Wide diesel goods
- WDS – Wide diesel shunter
- WCDS – Wide converted diesel shunter

DC Electric

- WCM - Wide DC mixed
- WCP – Wide DC passenger
- WCG – Wide DC goods

TYPES OF LOCOMOTIVES

AC electric

- WAM – Wide AC mixed
- WAP – Wide AC passenger
- WAG – Wide AC goods

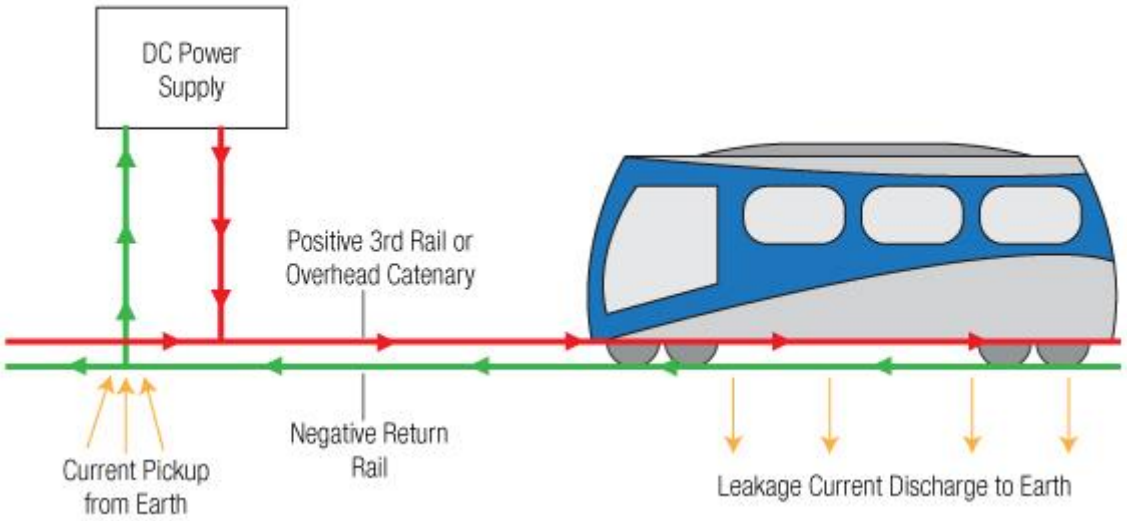
Dual (AC and DC)

- WCAM - Wide DC/AC mixed
- WCAP – Wide DC/AC passenger
- WCAG – Wide DC/AC goods

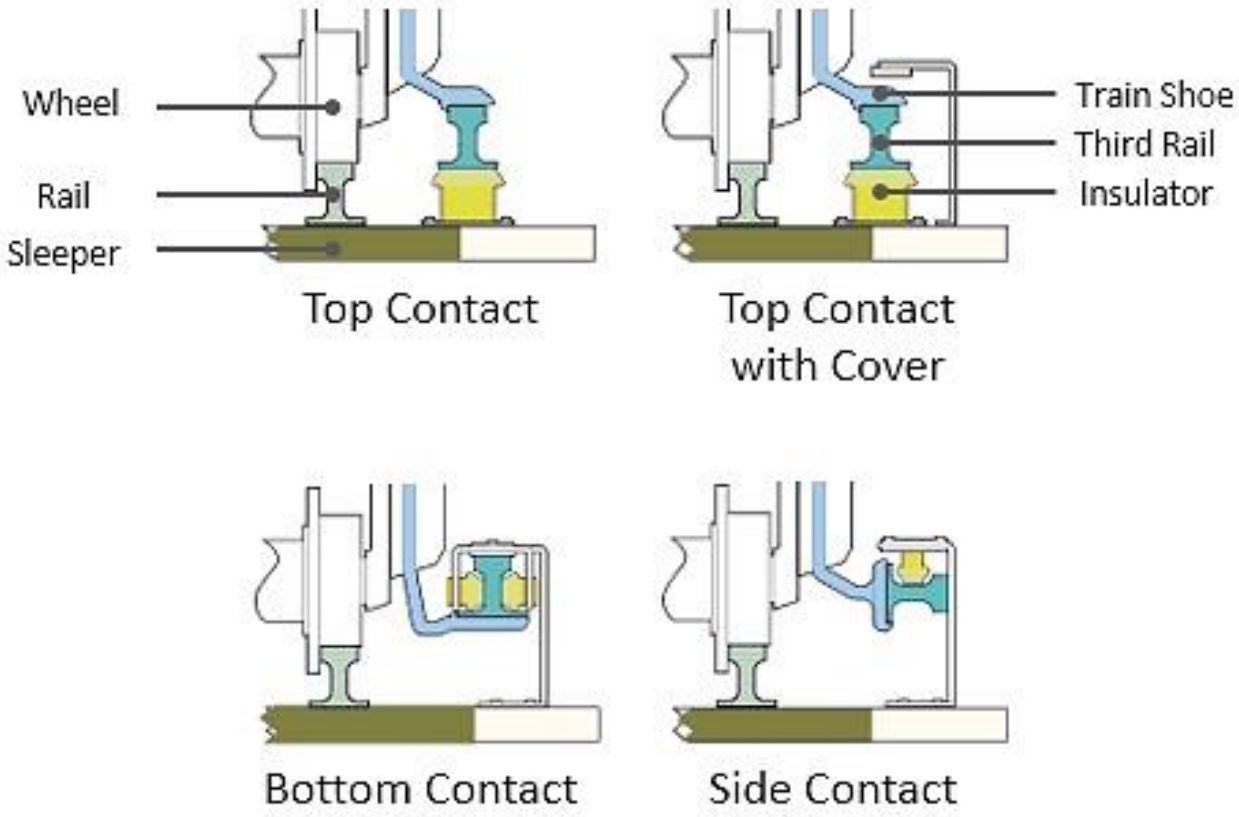
ELECTRIC LOCOMOTIVES

CURRENT COLLECTING EQUIPMENT

- Conductor rail system
- Overhead current collection system

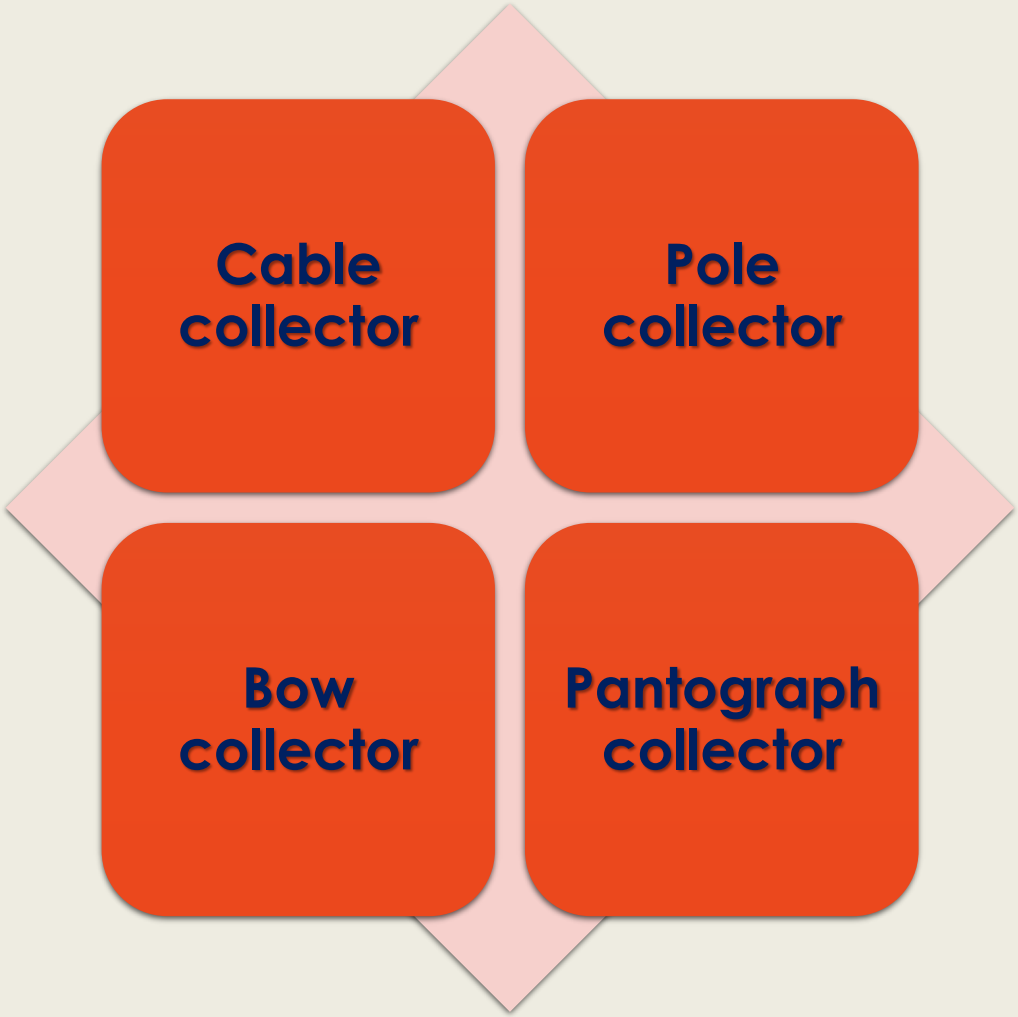


CONDUCTOR RAIL SYSTEM

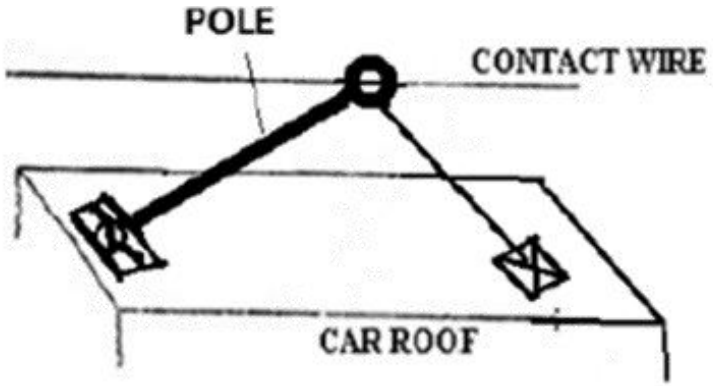


CONDUCTOR RAIL SYSTEM

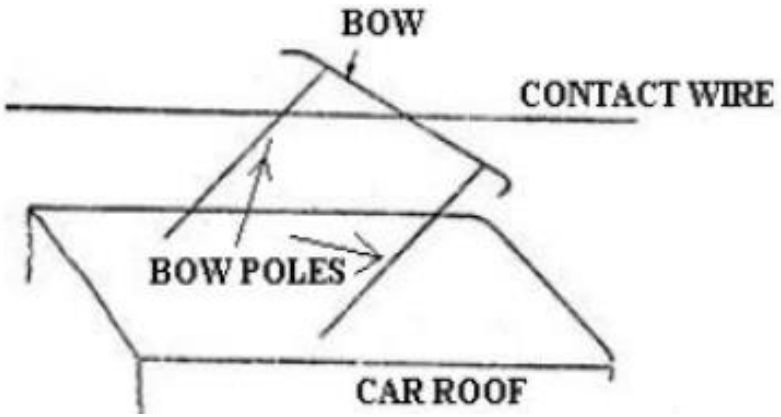
Overhead Current Collection System



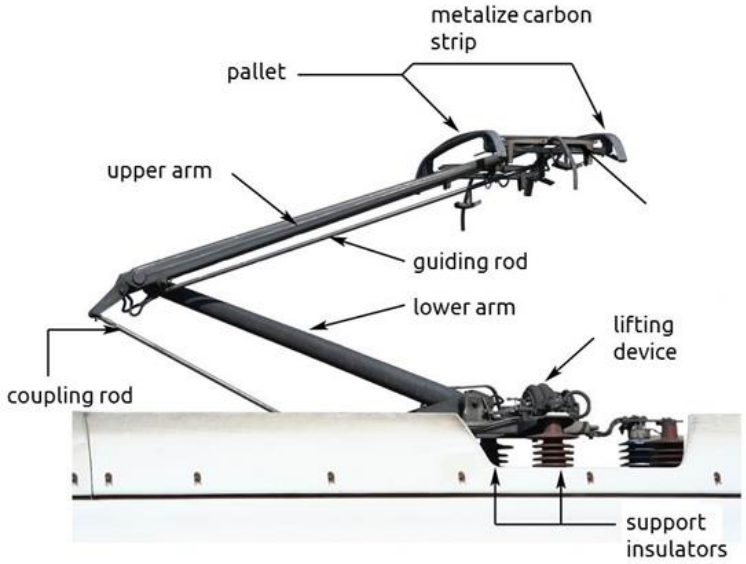
Cable collector



Pole collector



Bow collector



Pantograph collector

CATENARY SYSTEM


CATENARY SYSTEM
Single Catenary System
Double Catenary System
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SINGLE CATENARY SYSTEM

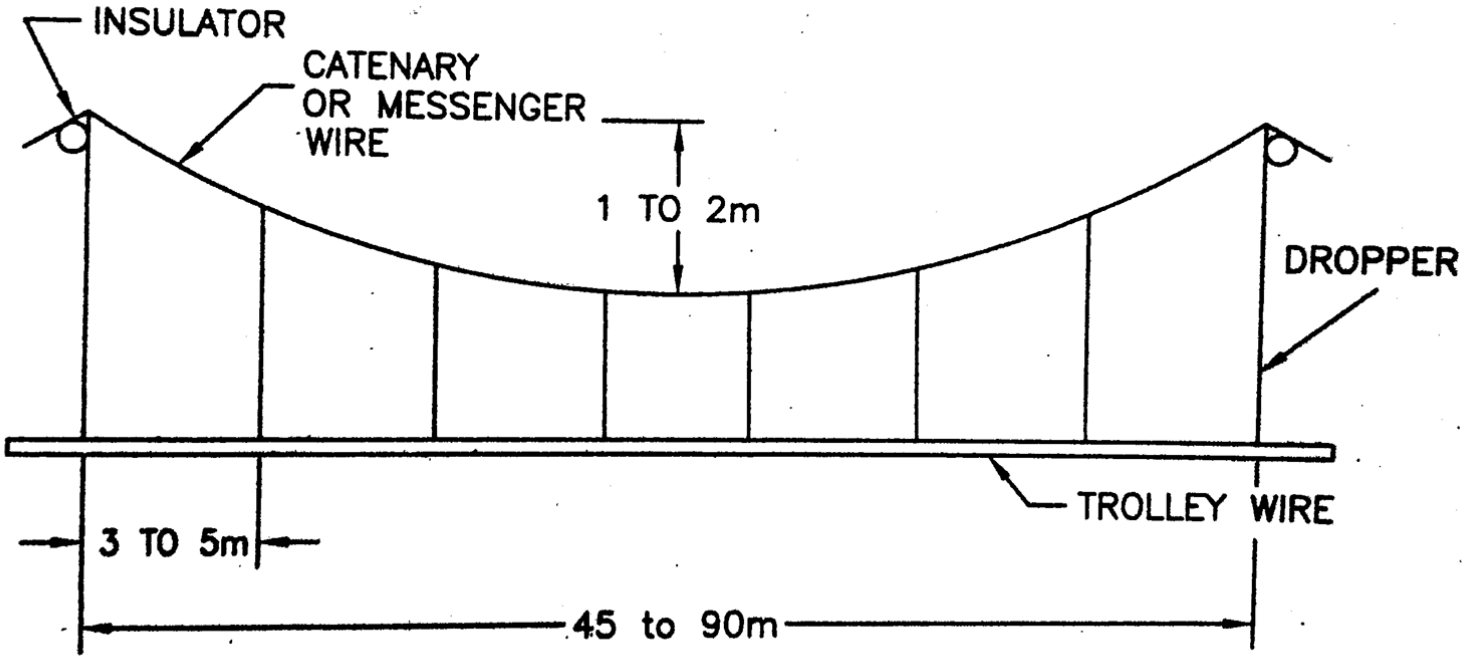


FIG. 4.11 SINGLE CATENARY SYSTEM

DOUBLE (COMPOSITE) CATENARY SYSTEM

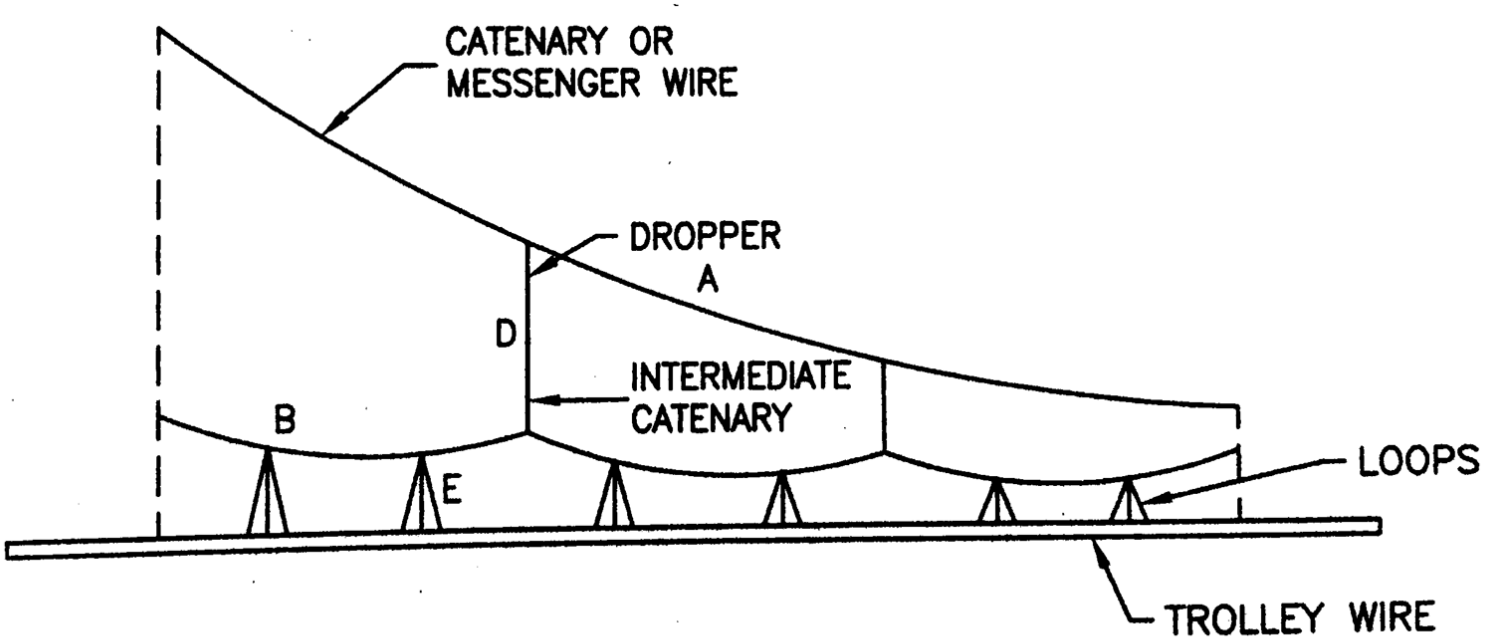


FIG. 4.12 DOUBLE (COMPOUND) CATENARY SYSTEM

SUPPORTING STRUCTURE

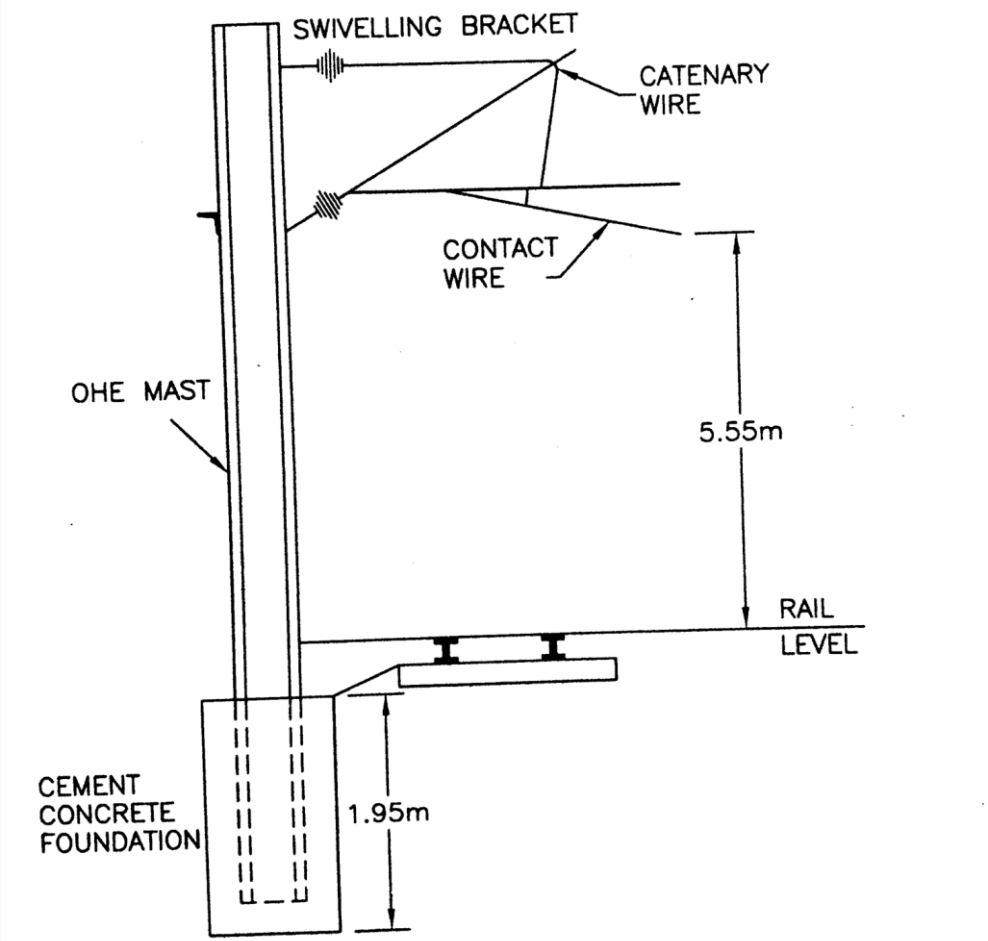


FIG. 4.13 (a) SUPPORTING STRUCTURE OF SINGLE TRACK SYSTEM

SUPPORTING STRUCTURE

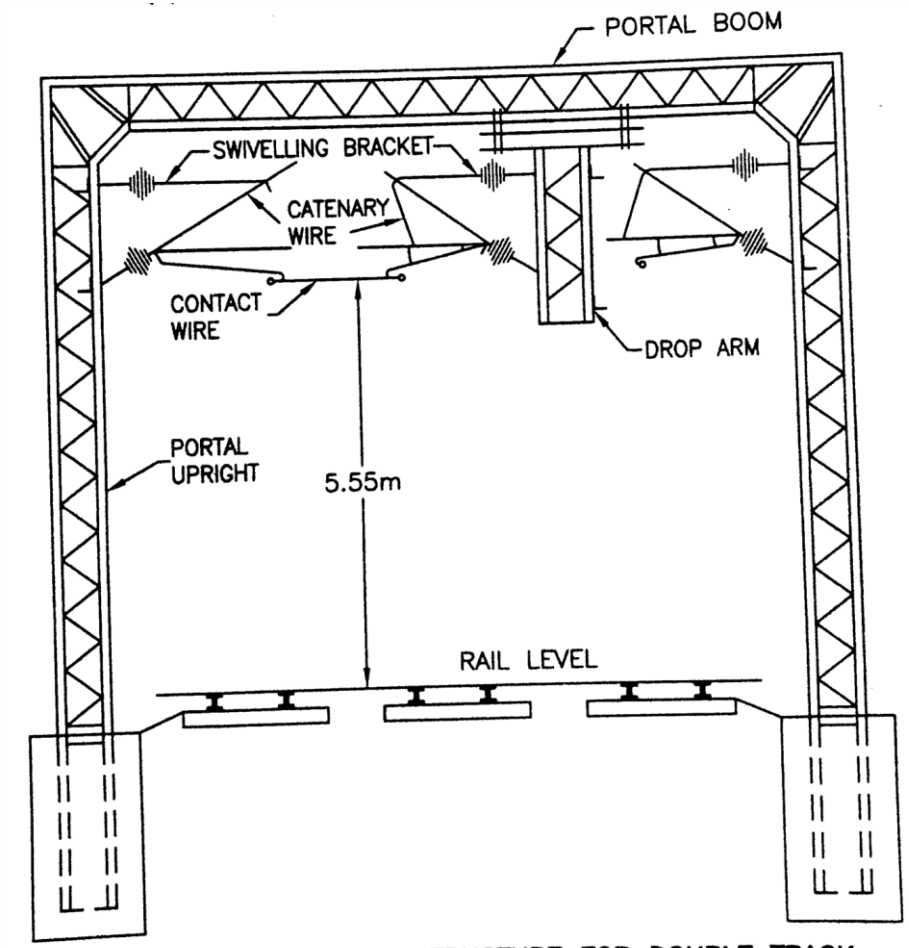


FIG. 4.13 (b) SUPPORTING STRUCTURE FOR DOUBLE TRACK SYSTEM WITH PORTAL AND MAST

SUPPORTING STRUCTURE

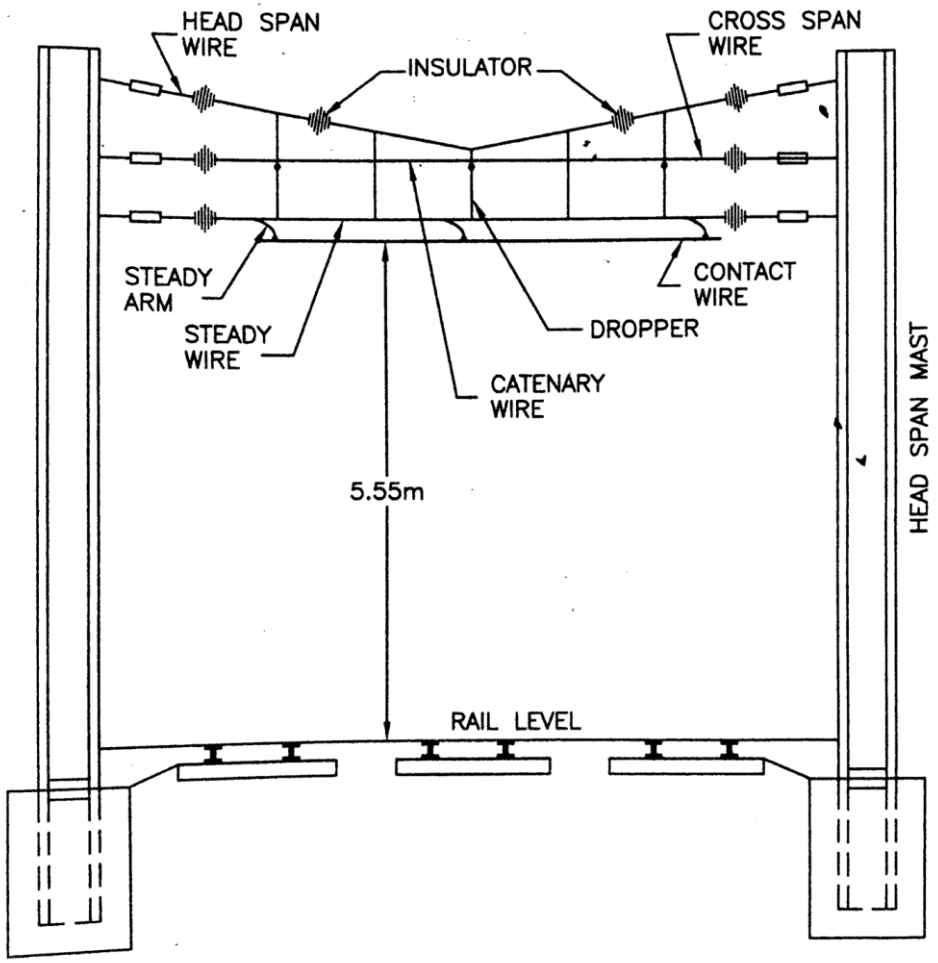
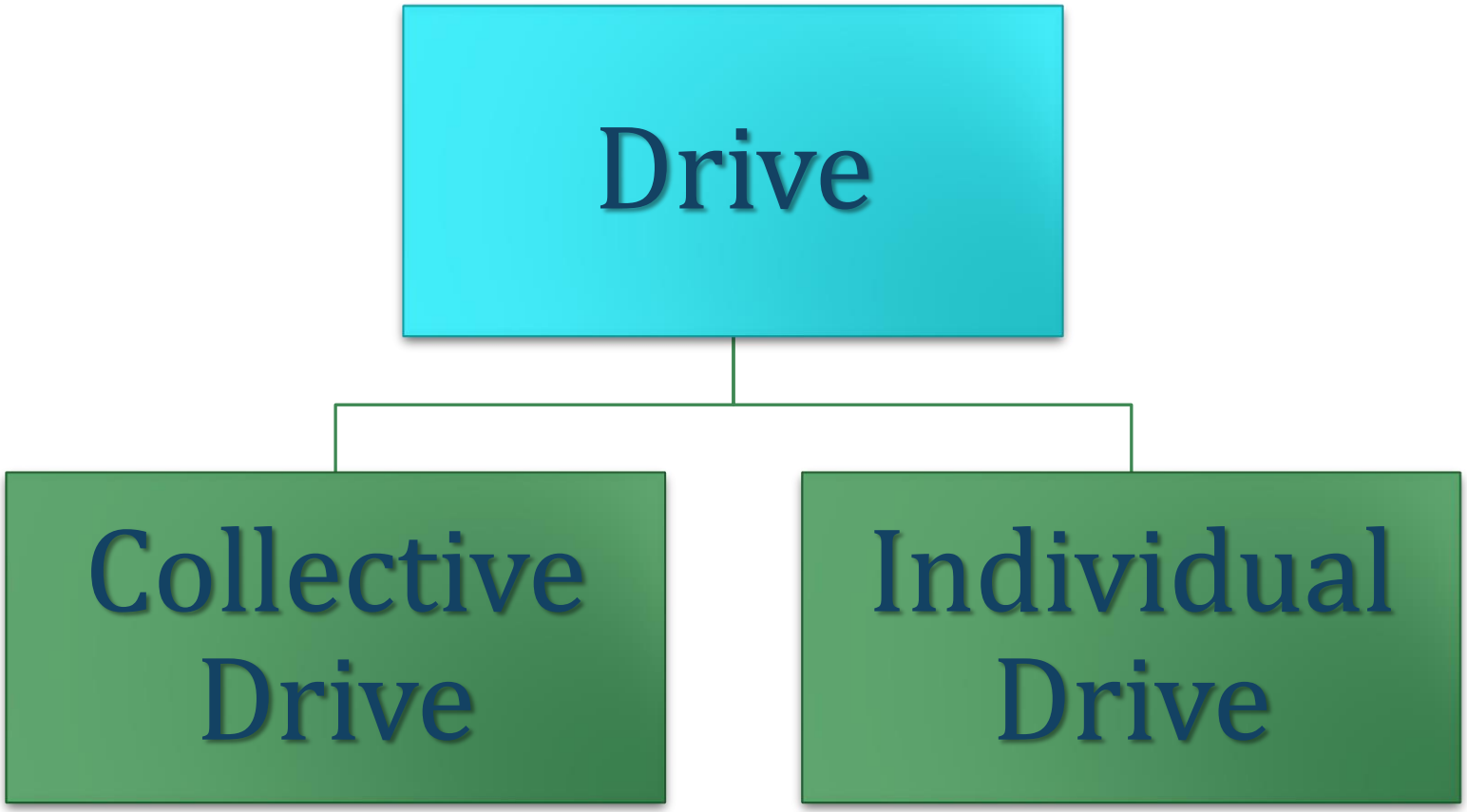
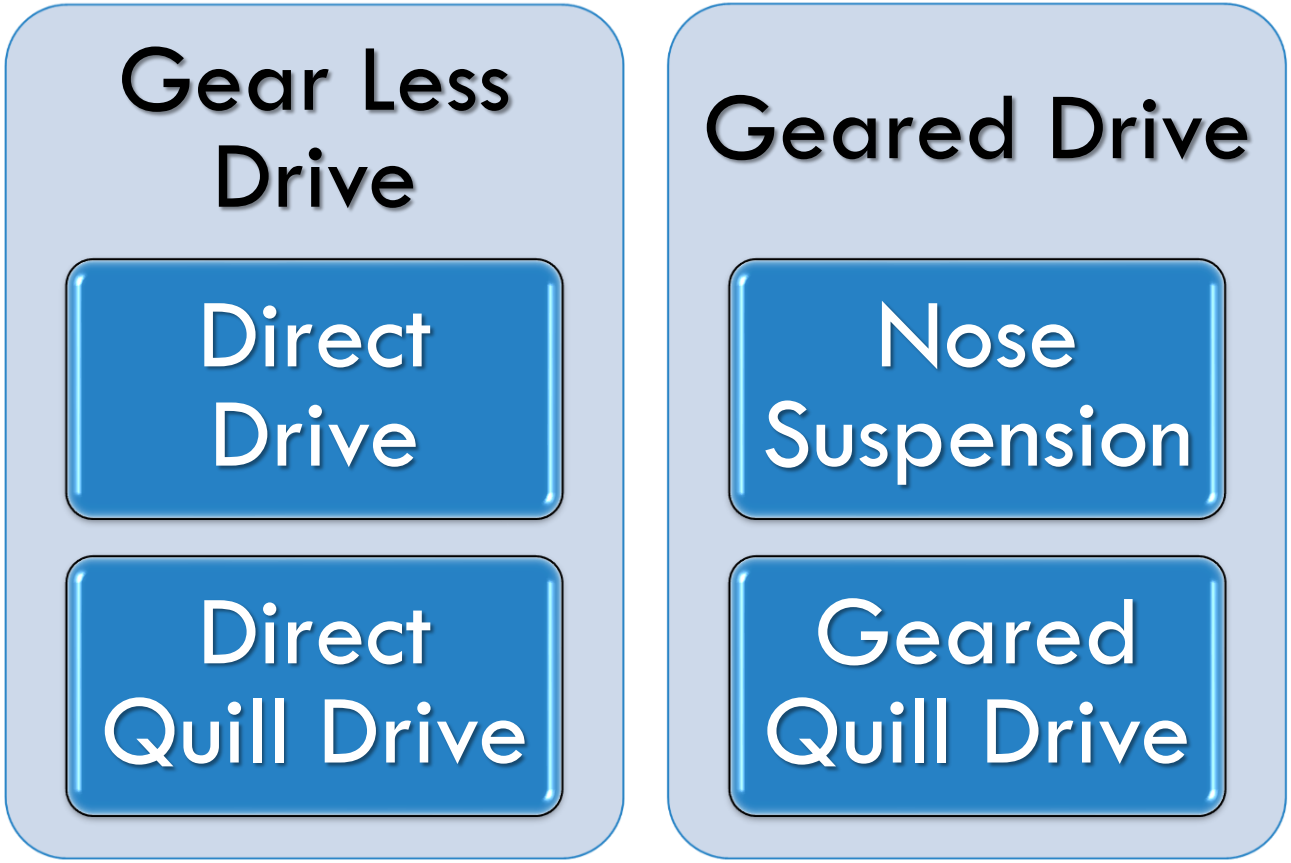


FIG. 4.13 (c) SUPPORTING STRUCTURE FOR DOUBLE TRACK SYSTEM WITHOUT PORTAL

POWER TRANSMISSION – MECHANICAL DRIVES



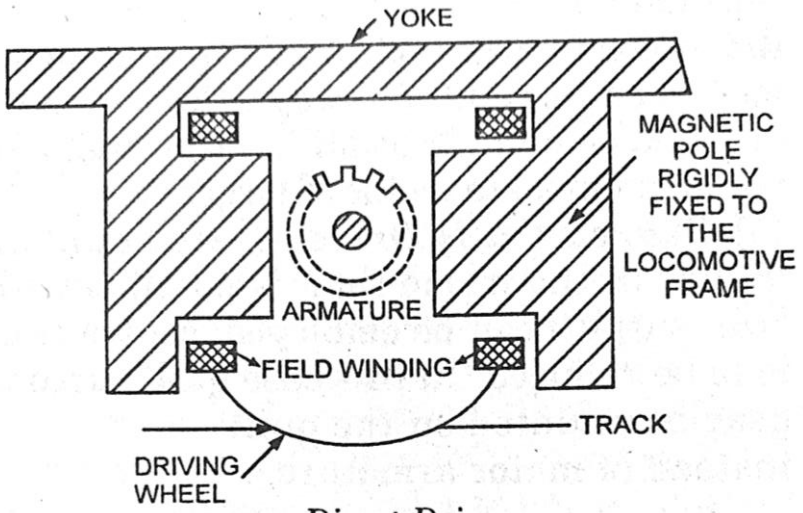
INDIVIDUAL DRIVE



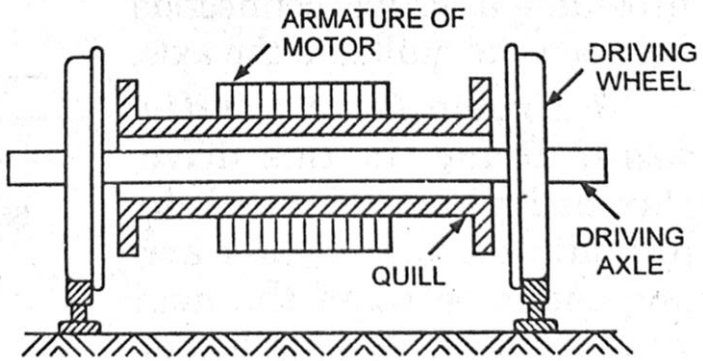
INDIVIDUAL DRIVE

Gear Less Drive

- Direct Drive
- Direct Quill Drive



Direct Drive

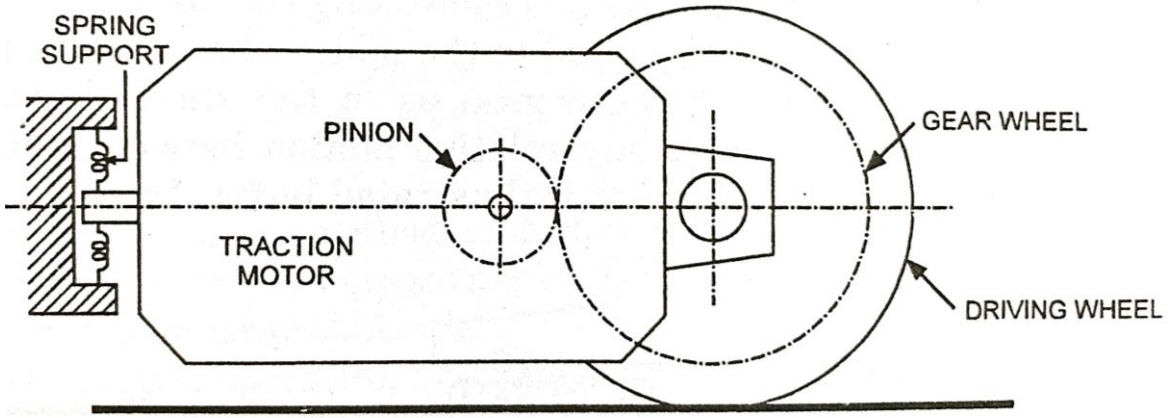


Direct Quill Drive

INDIVIDUAL DRIVE

Geared Drive

- Nose Suspension
- Geared Quill Drive



Nose-Suspension Geared Drive

Thank You

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