

VEHICLE LAYOUT

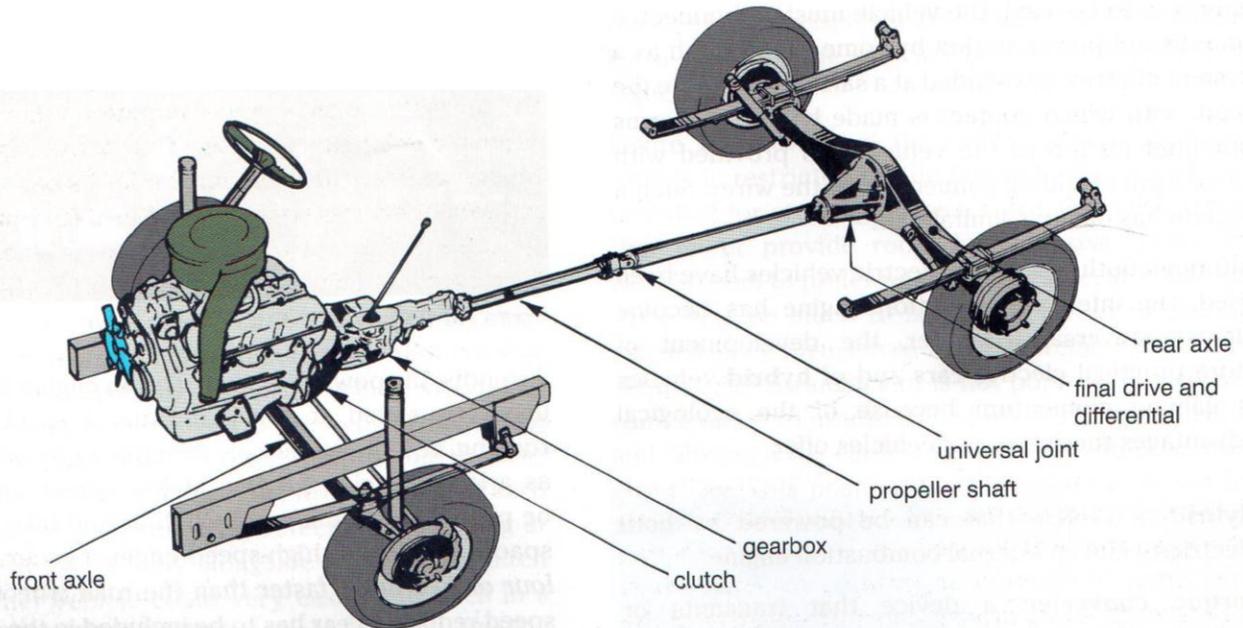


Figure 1.5 Layout of mechanical systems (simple front-engine, rear-wheel drive layout)

A motor vehicle can basically be sub-divided into 2 categories i.e. light commercial and heavy commercial vehicle.

LIGHT COMERCIAL VEHICLE

There are mostly bulk to carry passengers and sometimes goods and may be broadly classified as follows:

- (a) Saloon car
- (b) Couple
- (c) Convertible
- (d) Estate car
- (e) Pick up (a two door front seating Van is an open back)

NB It should be noted that most light car have integral body construction whereas heavy commercial vehicle have separate body chassis construction (convectional) chassis and attached body.

HEAVY COMMERCIAL VEHICLES

-Most commercial vehicles constructed with a cab head carrying compartment attached to separate chassis.

- The chassis resembles a ladder having 2 side member made from channel section high –tensile steel is pressed. Steel cross members riveted bolted or welded to them.

TYPES OF HEAVY COMMERCIAL VEHICLE

(a) **Lorries-** May be grouped into 2 categories

- (i) **Rigid Trucks:** Are vehicle designed to carry goods unlike articulated vehicle they are built so that all the axles are attached to a single chassis frame rigid truck may be classified as

A four Wheel 4 x 2(4 Wheel location drive)

A six Wheel 6 x 4(6 Wheel location 2 for drive)

An eight Wheeler (indicate should location of 4 are for driving Wheels)

- (ii) **ARTICULATED TRACTORS/SEMI-TRAILER)**

Articulated Vehicle consists of a tractor unit which supplies the propulsive power and semi-trailer which carries the pay load.

VANS: Can be described as light good vehicle which may be used for long distance journey or door delivery small van combine the cab and body and of internal or mono box construction while large vans sometime separate the cab and the body which would be mounted on an independent chassis frame.

COACHES:-Are used for carrying passengers on journey of consideration distance the interior is of luxury quality provide the best possible comfort and to minimize fatigue.

DOUBLE –DECKER BUS

It is a solution so that the vehicle occupies the mini amount of road space but carries the maximum no of passengers hence a second floor is built.

THE FUNCTION OF THE MAIN VEHICLE COMPONENTS

- Vehicle layout can basically be grouped/categorized into the following main units

(a) Vehicle Body Chassis/Frame

(b) The Power Unit-Engine

(c) The Transmission)-This consist of

(i) The Clutch

(ii) The Gearbox

- (iii) Propeller shaft of universal joint
- (iv) Drive Shaft & Wheels
- (v) Difference Unit /final drive
- (vi) Steering System
- (vii) Suspension system
- (viii) Braking System
- (ix) Electrical System

I BODY & CHASSIS:

Like a building have roof, wall and floor foundation to a vehicle the body acts as the roof and walls whereas the chassis is like the floor or foundation to a vehicle.

The body & chassis may either have (integral connection) or separate connection). This former means the two are permanently jointed and the latter means the joining is temporal.

II THE POWER UNIT/ENGINE

The engine is a machine which takes in combinatable mixture of (air) and fuel burn it and converts the released heat energy which is then harnessed to a rotating (Crankshaft).

III THE TRANSMISSION SYSTEM.

- (1) **THE CLUTCH** is a device which is designed to separate the (engine) power unit, when running from the final drive it then enables the vehicle to be brought to a stand still without **stalling** the engine.

It provides smooth engagement of the engine power to the drive wheel from the rest and enables different gear ratios to be selected and engaged when the vehicle is in motion.

(2) GEAR BOX

This is the machine which takes in the engine power from the Crankshaft and through a relay of gearwheel alters the output turning effort and speed to suit the vehicle propelling force and road speed requirements A number of different gear ratios can be selected to cover the speed range and acceleration conditions expanded from the vehicle.

1. PROPELLER SHAFT & UNIVERSAL JOINT

The propeller shaft is a hollow shaft whose purpose is to joint the gearbox out put drive to the final propeller shaft function is to accommodate any angular misalignment which may occur 1:1 the gearbox and the final drive under operating condition.

2. DIFF/UNIT/FINAL DRIVE

-Consist of two dissimilar sized machining gear which change the direction through a right angle and provide a permanent gear reduction.

- Also as a result connecting shaft going to the road.

- Wheel will be slowed down and the turning effort) usually referred to as (torque) which multiplied to match the road condition requirements.

3. DRIVESHAFT & WHEELS

- These are usually solid shaft which join the final drive to the road

Wheel live axles through the medium of universal joints. Road wheels are where the engine torque are finally harnessed and turned into propulsion power to keep the vehicle into motion.

6. STEERING SYSTEM

The steering power that means for the drive to alter the vehicles direction when it is moving its designed to convert relay move of the drivers steering wheel's to a linear to and front transverse more of the steering link roads. The movement of the sub axles about their Swivel pins this turning & pointing the front wheels along the path the vehicle is expected to follow.

7. SUSPENSION SYSTEM

The road wheels are attached indirectly to the vehicle chassis or body structure through a spring and hinged linkage arrangement known as **suspension**. This method of mounting and supporting the body prevents bumps caused by road surface irregularities being transferred in the form of noise and vibrations to the body or chassis passengers and any goods being transported.

1. BRAKING SYSTEM:

The braking system is designed to slow down or being a stand still a moving vehicle either progressively or rapidly. A brake-drum and shoes or a brake-disc and pads are attached to each road wheel and when the foot brake or handbrake is applied friction will be generated 1.1 the drum and the shoe or the disc and the pads. The friction produced converts the vehicle kinetic energy of motion into mechanical and heat energy, resulting in a reduction in vehicle speed.

2. ELECTRICAL SYSTEM & LIGHTING

Electrical system of vehicle consist of the batteries the charging the charging system (Alternation) the starting system (starter motor) the Audio Visual systems (Horns Radios cassettes, videos and TV).

Heating ventilation and Air conditioning systems window Alarm system and Windscreen Wiper system of a motor vehicle comprises of Head light side light, tail light panel light, indicator-lights stop/brake light, Number plate light beam light Dips interior lights Hazard/starting lights.

TYPES OF DRIVE

1. **FRONT** –Mounted engine and rear -Wheel drive.
2. **FRONT**-Mounted engine and front-Wheel /drive
3. **REAR**-Mounted engine and rear –Wheel/drive
4. **CENTRALLY**-mounted engine and rear/front-Wheel drive
5. **FOUR WHEEL DRIVE**- Front mounted engine.

