

Recent trends and developments

Objectives: At the end of this lesson you shall be able to

- state the history of auto industry
 - state the leading manufacturers
 - state the auto mobile industry, new product.
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Auto industry - History, leading manufacturing

In 1887 first car rolled out in the streets of Calcutta the next year there were four cars in the street of Bombay.

1940 Indian company like Hindustan motors and premier started to manufacture car of other firm, the same decade started Mahindra and Mahindra also started utility vehicle.

1980 Hindustan Motors ambassador and premier were challenged by a new entrant, maruti udyog limited.

The alliance between maruti and Suzuki was first joint venture between an Indian company.

2000-2010, almost every major car company establishing manufacturing facilities across different parts of the country.

Chennai, Mumbai, pune, north NCR are majority of Indian car industry

Top and major manufactures in Automobile industry

- Maruti udyog
- General motors' India
- Ford India
- Eicher motors
- Bajaj Auto
- Daewoo motors India
- Hero motors
- Hindustan motors
- Hyundai Motor India.
- Royal Enfield motors
- Telco
- Swaraj mazda
- BMW

The pioneer Mr. J.R.D. Tata's role in setting up the Tata group (ERC).

In India maruti 800, Car launched by SMT, Indira Gandhi - In 1983.

India in the largest three wheeler and two wheeler market in the world and second largest tractor manufacture in the world, fifth largest commercial vehicle manufacture in the world and second largest producer of motorcycle in the world after china.

In Indian some Industries are manufacturing the vehicle parts and assembling.

Example: TATA, Hindustan Motor and ashok leyland etc.

In India some vehicle parts are importing and assembling in the plants

Example: Ford, Hyundai, Audi etc.

Development in automobile industry

Due to the recent developments in electronics and computers lots of changes have come in the automobile also a mini computer named ECM electronic control module takes the control of

Engine control, transmission control, Brake and steering system controls, Safety controls, and infotainments.

More no of sensors and transducers are employed in all systems to send information to their corresponding electronic control units to achieve precise control on all activities.

Due to this precise controls we could achieve,

Fuel efficient engines, clean emission engine, Easy steering, and anti locking brakes, keyless entry, Navigation and smart dash board etc.

Gasoline Direct Injection (GDI)

Fuel is injected directly into the cylinders, not mixed with air in the inlet manifold or inlet ports before being drawn into the cylinders. The advantages of direct injection are that the fuel can be placed in the combustion space in a more controlled manner than the conventional inlet injection system.

Hybrid vehicles

Hybrid vehicle that combines a conventional internal combustion engine with an electric propulsion system (hybrid vehicle drive train). The presence of the electric power train is intended to achieve either better fuel economy than a conventional vehicle or better performance.

Electric vehicle (EV)

India has plans to make a major shift to electric vehicles by 2030. E-commerce companies, Indian car manufactures like Rava Electric Car Company (RECC), and Indian app-based transportation network companies like Ola are working on making electric cars in the near future.

The electric cars available in India are:

Mahindra e2oplus

Mahindra e-Verito.

Tata Tigor Electric

Mahindra e-KUV 100

Tata Tiago Electric.

Fuel cells

The fuel cell as used in space-craft, reverses this reaction combining hydrogen and Oxygen to release electrical energy with pure water as a byproduct.

The attraction of using in an internal combustion engine, is that the fuel cell is very efficient indeed, achieving 45 to 60% efficiency versus petrol engine 15 to 35%.

A danger involved in fuel cell is the hydrogen is an explosive gas that is difficult to store and handle.

Lean burn engines

This engine are designed for Lean-burning, They have higher compression ratios and thus provide better performance, efficient fuel usage and low exhaust hydrocarbon emissions compare with the conventional gasoline engines. Lean mixtures with very high air-fuel ratios can only be achieved by direct injection engines.

Driverless Cars

This is a vehicle that is capable of sensing its environment and navigating without human input.

Driverless cars combine a variety of techniques to perceive their surroundings, including radar, laser light, GPS and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage.

The potential benefits of driverless cars include reduced mobility costs and infrastructure costs, increased safety, increased mobility, increased customer satisfaction, and reduced crime. And also potentially significant reduction in traffic collisions, resulting injuries and related costs, including less need for insurance.

Waymo is a self-driving technology development company and it is subsidized by Google.

Alternate fuel.

Bio fuels are also considered a renewable source. Although renewable energy is used mostly to generate electricity, it is often assumed that some form of renewable energy of a percentage is used to create alternative fuels. Research is going on the search of more suitable bio fuel crops and improving the oil yields of these crops, Using the current yields, Vast amount of land and fresh water in needed to produce enough oil to completely replace fossil fuel usage. Alternative fuels, known as non-conventional and advanced fuels, any materials or substances that can be used as fuels, other than conventional fuels like; fossil fuels (Petroleum (oil), coal, and natural gas.

Some well-known alternative fuels includes biodiesel, bio alcohol (Methanol, ethanol), vegetable oil, propane and other biomass sources.

Classification of vehicles

Objectives: At the end of this lesson you shall be able to

- **classify the vehicles.**

Classification of vehicles**Based on central motor vehicle act**

- Motor cycle
- Invalid carriage
- Three wheelers
- Light motor vehicle
- Medium passenger motor vehicle
- Medium goods vehicle
- Heavy passenger motor vehicle
- Heavy goods vehicle
- Any other motor vehicle of a specified description

Based on wheel

Two wheeler

Three wheelers

Four wheelers

Six wheelers

Multi axles

Based on fuel used

Petrol vehicle

Diesel vehicle

Gas vehicle (CNG & LPG)

Electric vehicle

Based on body

Saloon (BMW, AUDI)

Sedan (Maruti ciaz, ambassador etc)

Hatch back (Alto, i10, santro, Tata Tiago)

Convertible (Jeep, maruti gypsy)

Station wagon (Innova, Ertiga, etc)

Van (Omni, Touristor)

Special purpose (Ambulance, Milk van, etc)

Based on drive

Front engine rear wheel drive (Sumo, Omni, Ambassador, etc) (Fig 1)

Rear engine rear wheel drive (Tata Nano, Bajaj auto, Valvo bus etc) (Fig 2)

Front engine front wheel drive (Alto, Ertiga, santro, Tiago etc) (Fig 4)

Four wheel/ All wheel drive (jeep, Scorpio, Gypsy etc) (Fig 3)

Based on position of engine

Front transverse engine (Example ; Maruti 800)

Front longitudinal engine (Example ; Maruti Omni)

Rear Transverse engine (Example ; Volvo bus)

Based on steering

Conventional manual steering

Power steering hydraulic

Power steering electric

Based on transmission

Manual transmission

Automatic transmission

This is transmission that uses a torque converter, planetary gears set and clutches or bands to shift a vehicle's forward gears automatically.

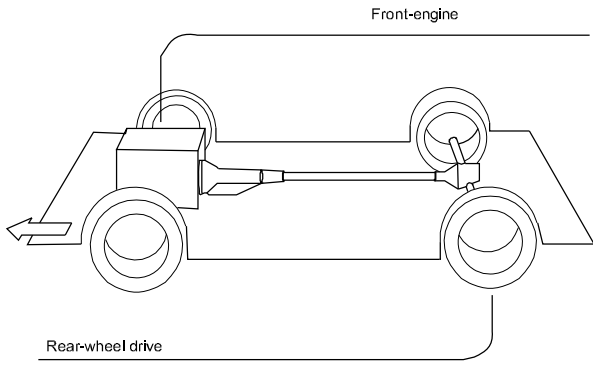
Automated manual transmission (AMT)

This is an automated manual transmission it employs a mechanical clutch, but the action of the clutch is not controlled by the driver's clutch pedal. Gears shifts done by using automated electronic, pneumatic or hydraulic controls.

Continuously Variable Transmission (CVT)

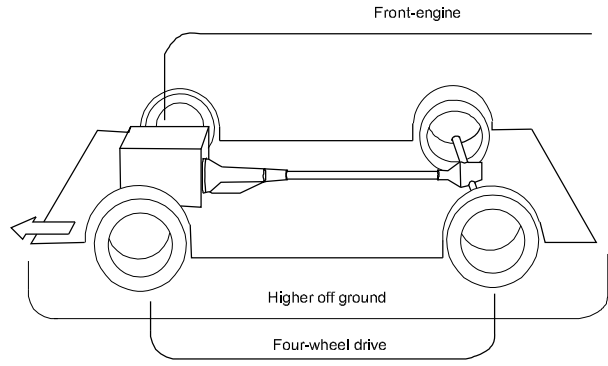
This transmission has a continuously variable drive ratio and uses belts, pulleys and sensors rather than gears to maintain a steady acceleration curve with no pauses for gear changes. Because of this, a CVT can keep the engine in its optimum power range, thereby increasing efficiency and gas mileage.

Fig 1



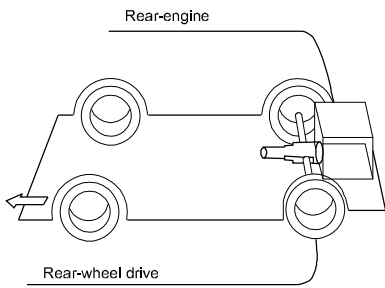
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Fig 3



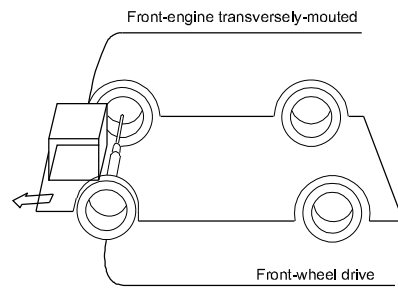
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Fig 2



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Fig 4



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Ministry of road transport & high ways

Objectives: At the end of this lesson you shall be able to

- state the function of ministry of road transport & highways
 - state the function of NATRIP
 - state the function of ARAI
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Ministry of road Transport & Highways

This is an apex organization under the central Government, is entrusted with the task of formulating and administering, in consultation with other central Ministries/Departments, State Governments/ UT Administrations, organisations and individuals, policies for Road transport, National highways and transport research with a view to increasing the mobility and efficiency of the road transport system in the country. The ministry has two wings: Roads wing and Transport wing.

Roads wing

Deals with development and maintenance of National Highway in the country

Main Responsibilities:

- Planning development and maintenance of national Highways in the country
- Extends technical and financial support to state Governments for the development of state roads and the roads of inter-state connectivity and economic importance.
- Evolves standard specifications for roads and bridges in the country.
- Serves as a repository of technical knowledge on roads and bridges.

Transport wing

Deals with matter relating to Road transport

Main Responsibilities:

- Motor vehicle legislation
- Administration of the Motor Vehicles Act, 1988
- Taxation of motor vehicles.
- Compulsory insurance of motor vehicles.
- Administration of the Road transport corporations Act, 1950.
- And promotion of transport co-operatives in the field of motor transport
- Evolves road safety standards in the form of a national

policy on road safety and by preparing and implementing the Annual road safety plan.

- Collects, compiles and analyses road accident statistics and takes steps for developing a road safety culture in the country by involving the members of public and organizing various awareness campaigns.
- Provides grants-in-aid to non-governmental Organisations in accordance with the laid down guidelines.

National automotive testing and R&D infrastructure project (NATRIP)

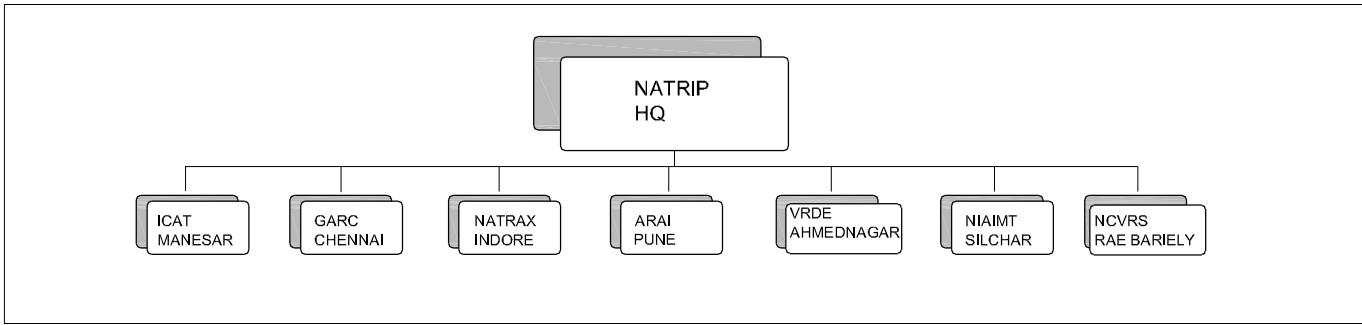
The largest and one of the most significant initiatives in Automotive sector so far, represents a unique joining of hands between the Government of India, a number of state Governments and Indian Automotive industry to create a state of the art testing, Validation and R&D infrastructure in the country.

The project aims at creating core global competencies in Automotive sector in India and facilitate seamless integration of Indian Automotive industry with the world as also to position the country prominently on the global automotive map.

Create state-of-art research and testing infrastructure to drive India into the future of global automotive excellence.

(NATRIP) aims at setting up of seven-of-the-art automotive testing and R&D centers across the country and thereby;

- Creating core global competencies.
- Enhancing competitive skills for product development leading to deepening of manufacturing.
- Synergizing Indias unique capabilities in information technology with the automotive sector.
- Facilitating seamless integration of Indian automotive industry with the world to put India strongly on the global automotive map.



Automotive Research Association of India (ARAI)

The Automotive Research Association of India (ARAI) has been playing a crucial role in assuring safe, less polluting and more efficient Vehicles. ARAI provides technical Expertise in R & D, testing, certification, homologation and framing of vehicle regulations.

ARAI is research association of the Automotive Industry with Ministry of Heavy Industries and Public Enterprises, Government of India, It works in harmony and complete confidence with its members, customers and the Government of India to offer the finest services, which earned for itself ISO 9001, ISO 14001, OHSAS 18001 and NABL accreditations.

ARAI has a strong base of state-of-the-art technology equipments, laboratory facilities and highly qualified and experienced personnel. With these assets, ARAI has goals, strategies and action plans to achieve fullest customer satisfaction.

These are

- to compete in service with excellence
- to cover global market
- to obtain recognition and accreditation
- to build commitment of all personnel
- to develop team spirit and sense of belonging amongst all.

Automotive research association of India

ARAI has been providing various services to the Indian Automotive Industry in the areas of design & development and know-how for manufacture & testing of components/ system to national /international standards. ARAI shall strive to achieve international recognition in these areas.

ARAI shall seek the valuable guidance and support from association members, from time to time to achieve growth and stability.

With the globalization of economy and business, ARAI shall enlarge its scope of services to meet the requirements of automotive industries anywhere in the world.

ARAI strongly believes that satisfaction of the customer needs on continuing basis is of prime importance to earn the loyalty of the customers. Therefore, emphasis shall be on meeting and exceeding the customer needs through continuing quality improvement with active participation of employees and also the customer.

Uses of hoists, jacks and stands.

Objectives: At the end of this lesson you shall be able to

- state the function of vehicle hoists
- state the function of engine hoists
- state the function of jacks
- state the function of axes stand standt.

The modern automobile service stations are used the various types of equipments to lift the vehicles. They are as follows.

Single post hydraulic car hoist

Two post car hoist

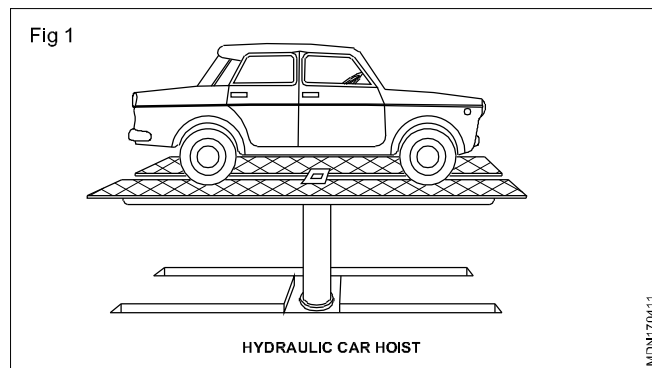
Four post car hoist

Engine hoist

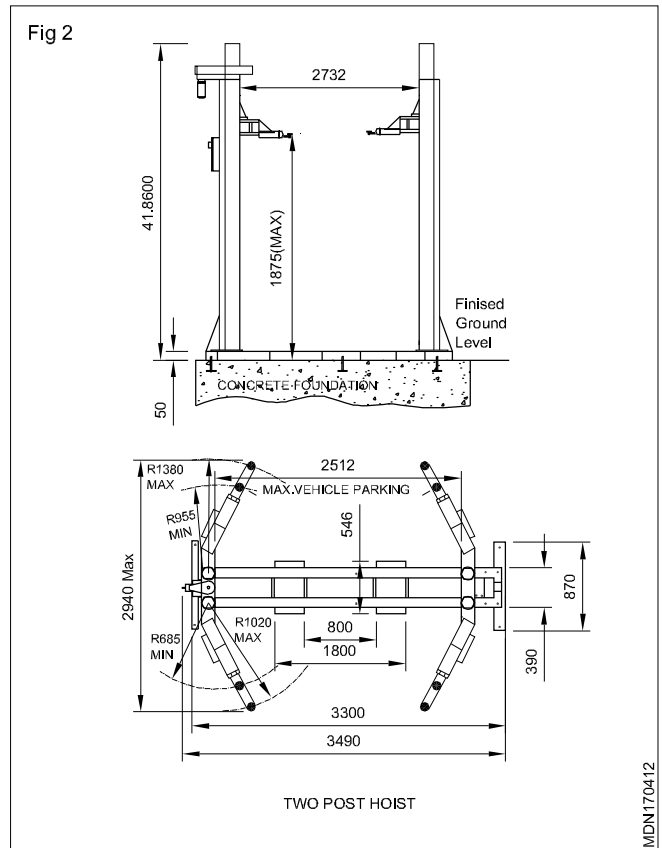
Jacks

Stands

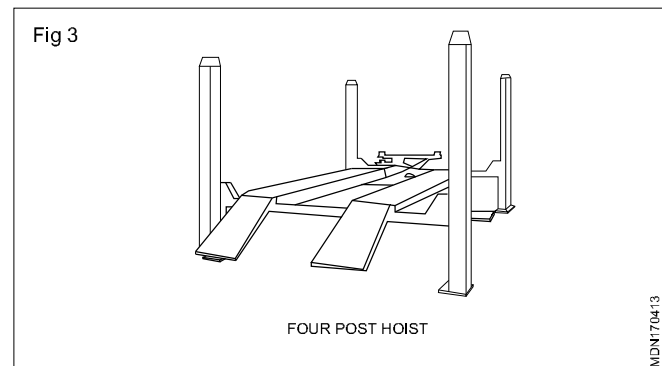
Single post hydraulic car hoist (Fig1) : It is facilitate the servicing and reaper works conveniently. It is constructed for dependable, trouble free performance and ensuring smooth and safe operation. The post is made of high grade steel. The car hoists are specially designed for resistant to wear and damage during water wash. Single post type is suitable for vehicle up to 6 tones.



Two post hoist (Fig 2) : It is operated by electro-hydraulic system. it is easy to operate and maintain the double post hoist and safety provision also provided to hold the vehicle. Double post type suitable for vehicle upto 4 tones.



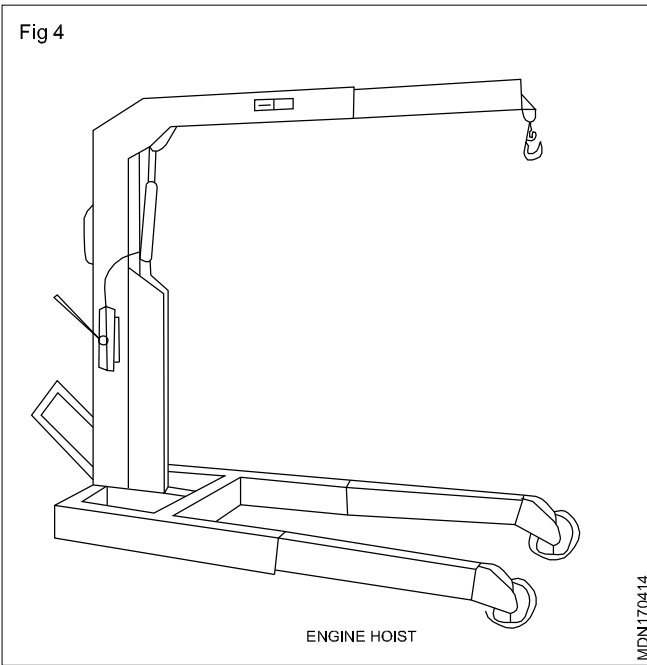
Four post car hoist (Fig 3) : It is operate by electro hydraulically and balancing the lifting vehicle. It is easy to operate and maintain the moving parts. Four post hoists is work as single and double post hoist it is suitable for lift the vehicle light and heavy vehicle.



Engine hoist (Fig 4)

The engine hoist helps to lift an engine from a car/truck. The hydraulic pressure converts power to a mechanical advantage and lifts the engine from the car with less effort. When using a block and tackles for lifting an engine, use a lifting plate attached to the intake manifold or use a chain bolted at each end of the block.

so on. They are operated by moving the handle up and down. The other type of portable floor jack is the pneumatic jack which uses compressed air to lift a car or truck. It is mostly used in production side.



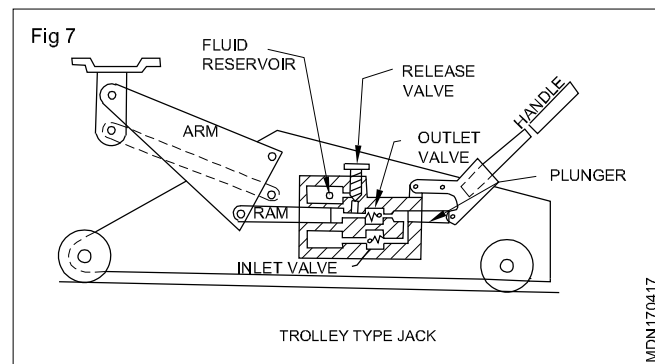
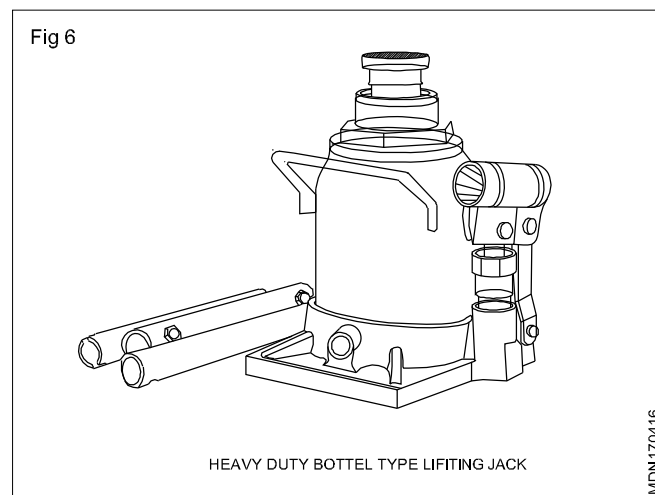
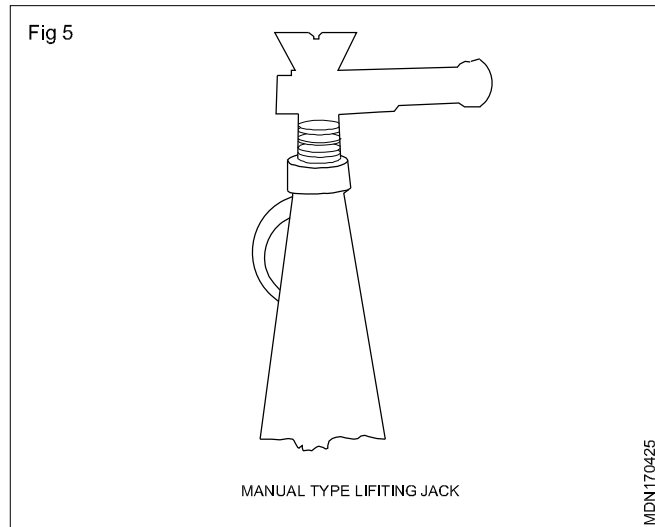
Never work under a car without safety stands or jack stands.

On roads mostly mechanical jacks are used to lift the car/vehicle for small jobs. These jacks work under the principle of screw and nut.

Jacks: It is used to lift the vehicle, which are operated by mechanically and hydraulically, Jack is designed to lift the vehicle and hold the vehicle load during the repair works. Jack is a standard accessory with many vehicles.

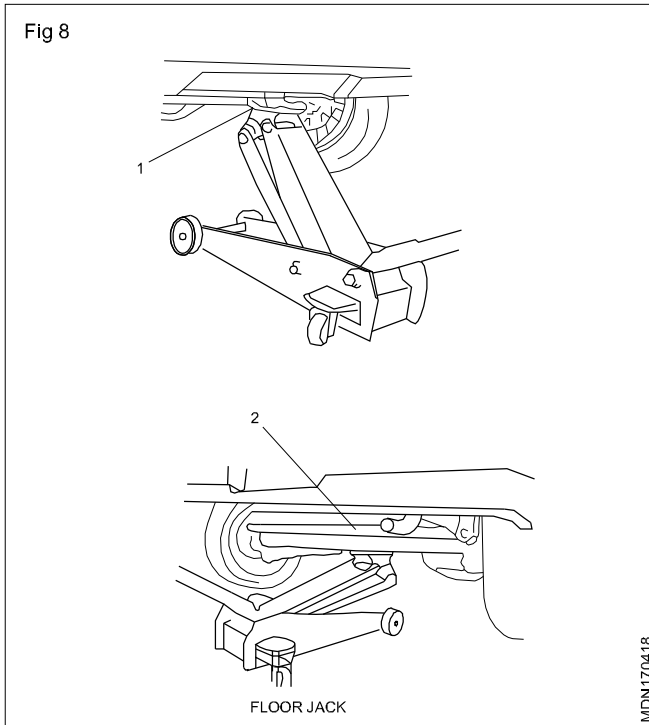
Types of jacks

- Light weight screw jack (Fig 5)
- Heavy duty bottle type hydraulic jack (Fig 6)
- Trolley types hydraulic jack (Fig 7)



In raising front vehicle end off the floor by jacking, be sure to apply jack against front jacking bracket(1) (Fig 1).

In raising rear vehicle end off the floor by jacking, be sure to apply jack against the center portion of rear axle (2) .

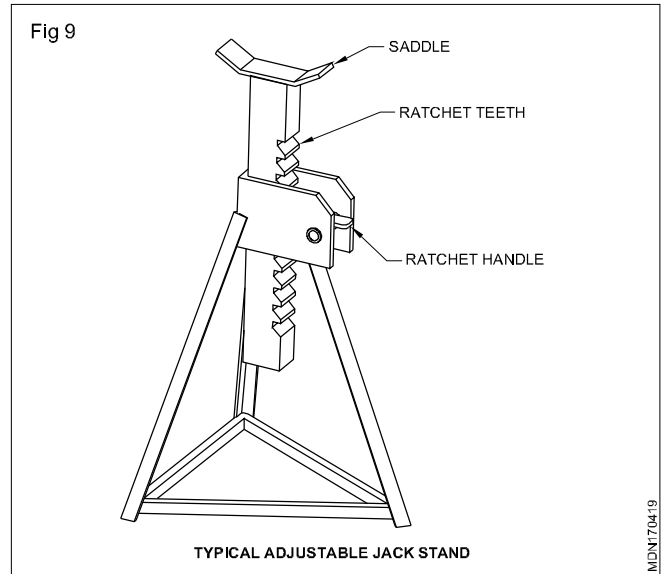


Caution: Never apply jack against suspension parts (i.e., stabilizer, etc.) front bumper or vehicle floor, Otherwise it may get deformed.

Warning: If the vehicle to be jacked up only at the front or rear end, be sure to block the wheels on ground in order to ensure safety.

After the vehicle is jacked up , be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone.

Axle stand (Fig 9): It is always injure safety before starting the work under the lifted vehicle, Jack report is not enough, it could be dangerous. Always use axle stands for safety work. Different size of stands are used depend upon the vehicle load.



To perform service with either front or rear vehicle end jacked up, be sure to place safety stands (1) under body so that body is securely supported. And the check to ensure that body does not slide on safety stands and the vehicle is held stable for safety's sake.