

**C. B. KORA INSTITUTE OF VILLAGE
INDUSTRIES**

**KHADI & VILLAGE INDUSTRIES COMMISSION
MINISTRY OF MSME (GOVT. OF INDIA)**

&

Dr. Ambedkar Vocational Institute

WELCOMES YOU

FOR

THE ONE MONTH TRAINING PROGRAMME

OF

FOUR WHEELER PETROL (CAR) MAINTAINANCE

**FOUR WHEELER
(PETROL)
MAINTENANCE**

**ONE MONTH
TRAINING
PROGRAMME**

TO KNOW ABOUT FOUR WHEELER (PETROL) CAR.

- Detail construction of four wheeler vehicle.
- Study of different features of automobile cars(Maruti, Indica, Santro)
- Information about operational maintenance.
- Study of different system such as fuel supply, cooling, lubrication, transmission, suspension, brake and steering system
- Study of automobile chassis, wheels, body and other accessories used on cars.
- Study of safety equipments used on today's car
- Information about good driving habits for less consumption of fuel.

INFORMATION ABOUT FILLING FUEL, LUBRICATING OIL, COOLENT, BRAKE FLUID & TRANSAXLE OIL

ENGINE OIL UPTO DIPSTICK MAX.MARK ~ 4.0 Ltrs.

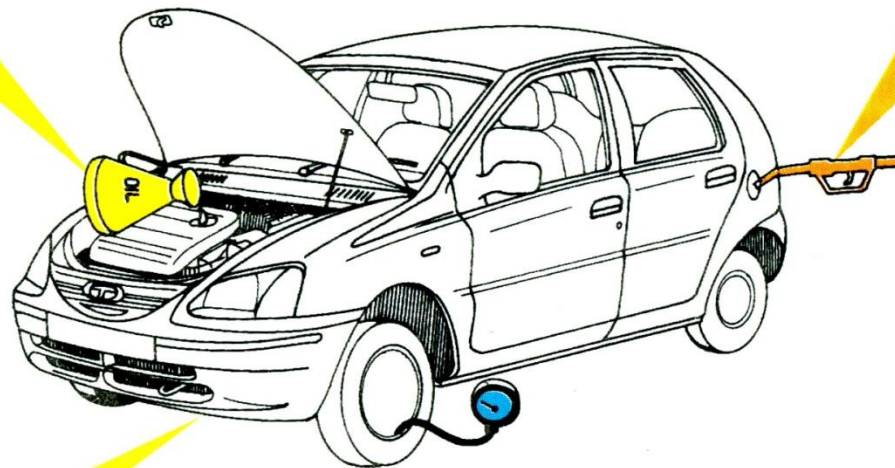
FUEL TANK CAPACITY

37 Ltrs.

Engine coolant
+ Softwater
50:50 = 6 Litres

Windshield Washer
reservior = 3.5 Litres

Brake fluid = 0.265 Lires



TRANSAXLE OIL

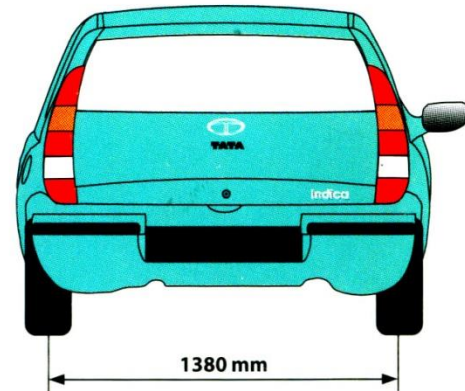
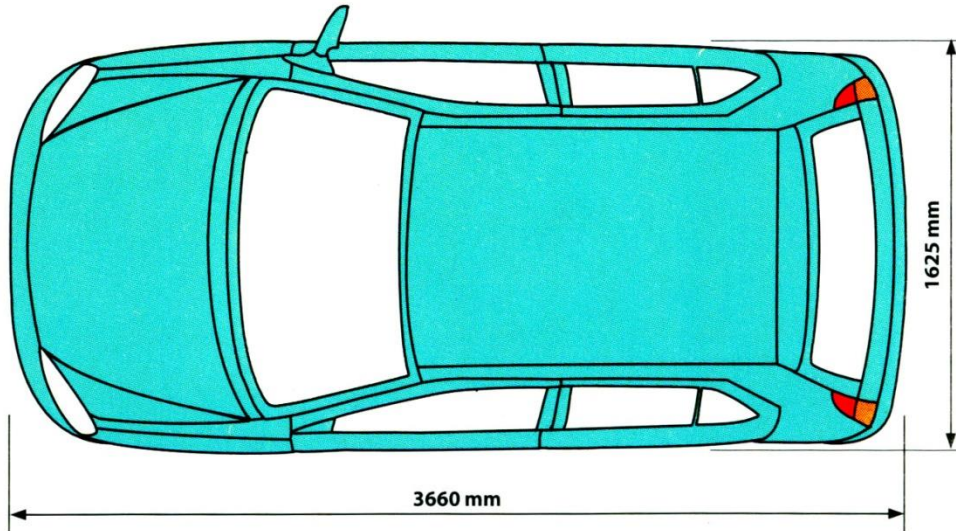
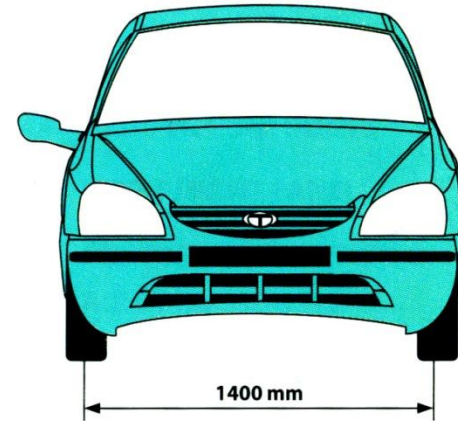
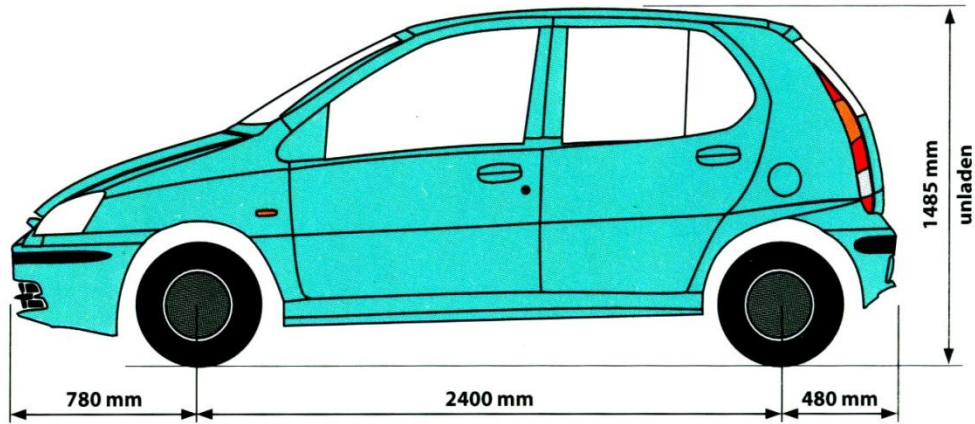
2.9 Ltrs.

TYRE SIZE	TYRE PRESSURE	
	FRONT	REAR
165/65 R 13	30 psi.(2.1 bar)	28 psi.(1.9 bar)

IMPORTANT : For diesel car fitted with catalytic converter use diesel with sulphur contents less than 0.25%.

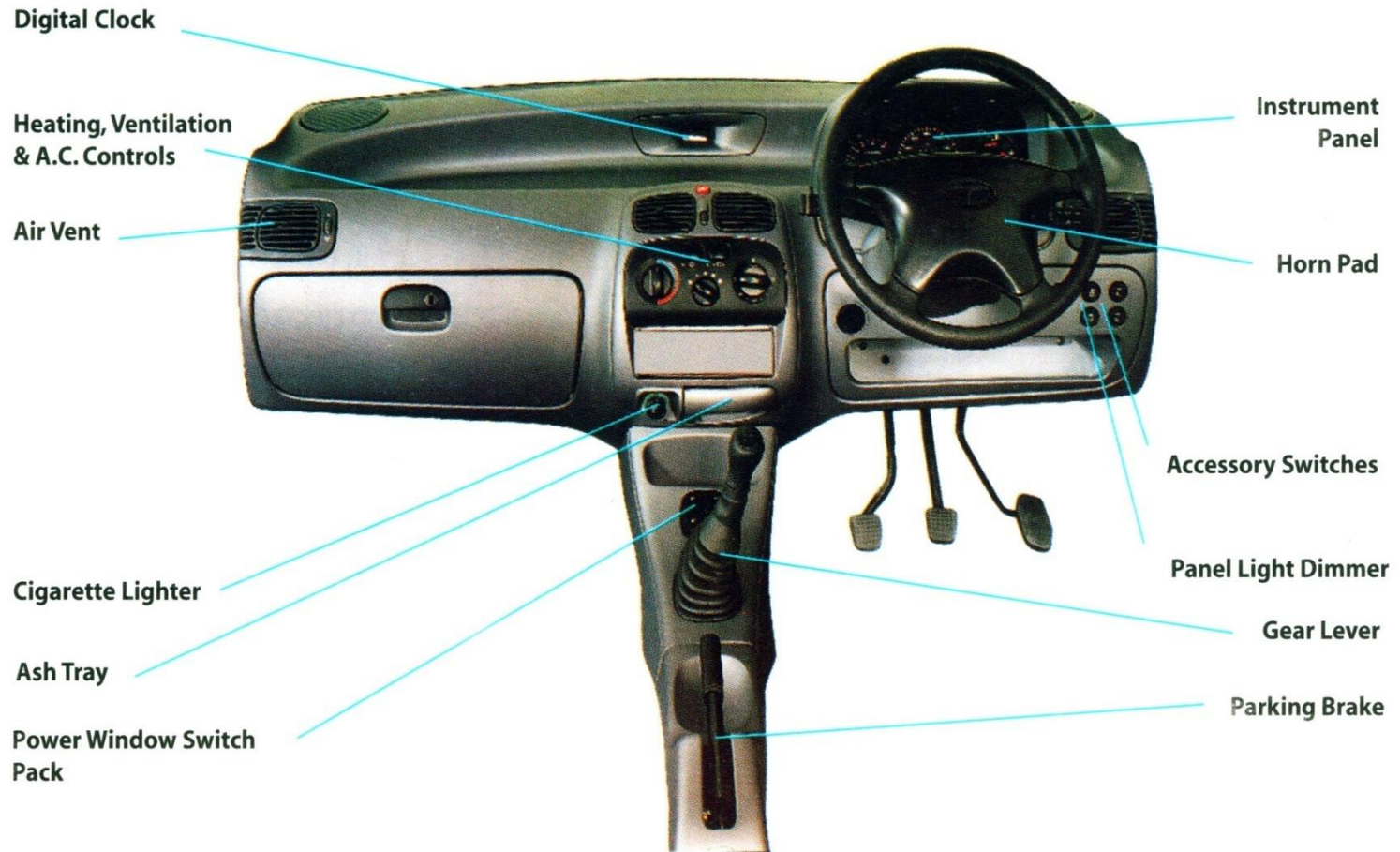
For recommended oil grades and change intervals, refer lubricants chart and service schedule

DIMENSIONS

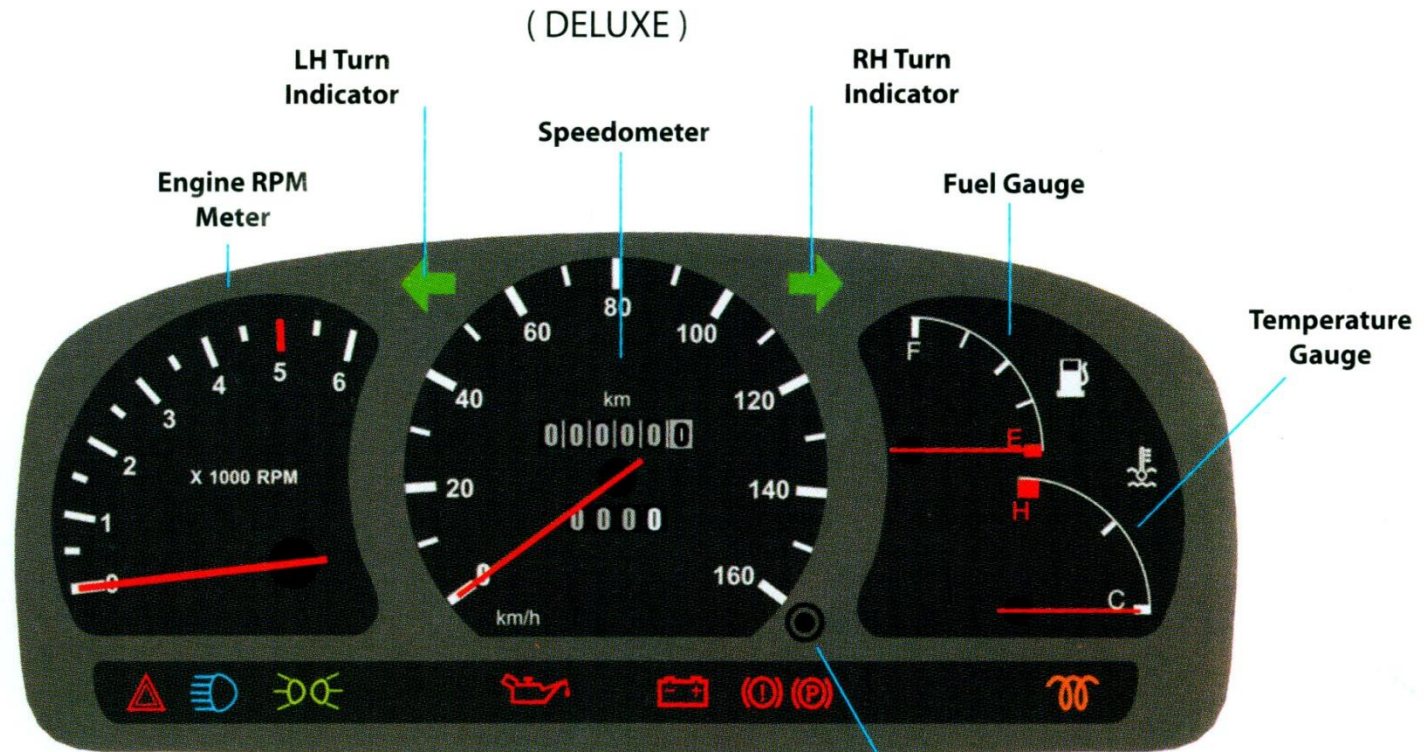


DRIVING CONTROLS

DRIVING CONTROLS - DLX



INSTRUMENT PANEL



Note : Some of the indicators shown here may not be available on a few models.

Tripmeter Reset Knob

OPENING & CLOSING THE BONNET

OPENING & CLOSING THE BONNET

Opening :

1. Ensure that the car is in neutral gear with the parking brake applied.
2. Pull the bonnet release lever located under the right hand corner of the dash board. The bonnet will pop up slightly.
3. Raise the bonnet slightly and with your finger lift the secondary lock lever located under the bonnet centre.
4. Lift the bonnet up. Pull the bonnet stay rod from its clip and insert the free end into the slot in the bonnet, slide stay rod outward to secure.

Closing :

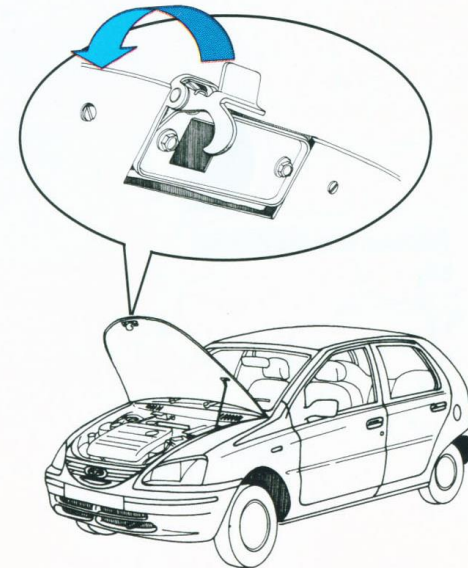
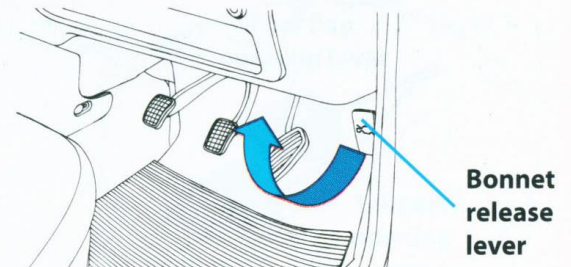
1. To close the bonnet disengage the stay rod & clamp it properly.
2. Lower the bonnet and drop it from a short height to shut.



Ensure that the bonnet is properly locked before driving.
Do not press the bonnet onto the bonnet lock.



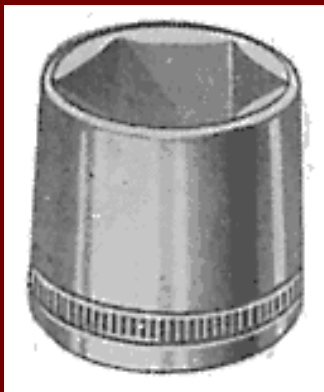
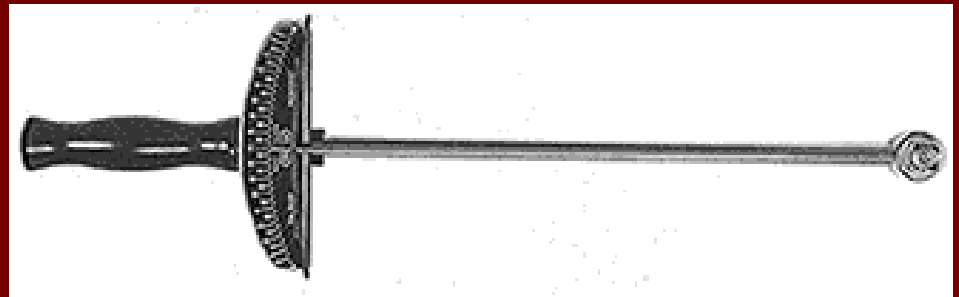
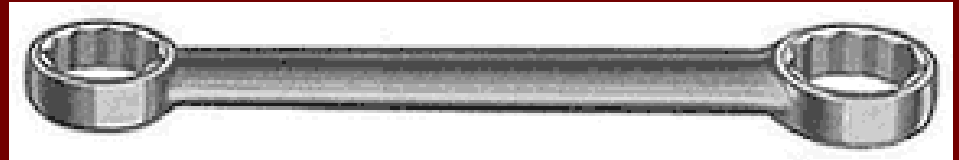
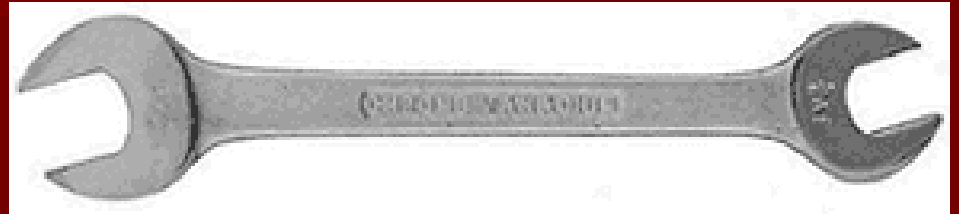
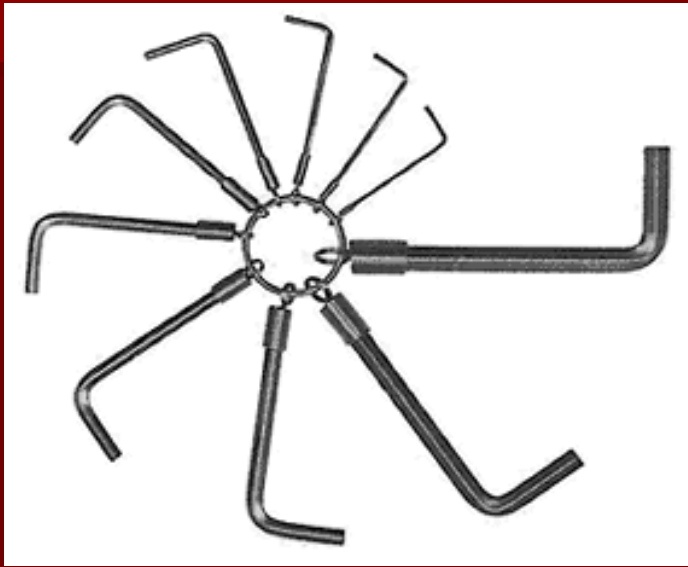
Do not leave the engine running in a closed garage.



TO KNOW THE USE OF DIFFERENT TOOLS AND EQUIPMENTS USED FOR MAINTENANCE WORK OF AUTOMOBILE CARS.

- **Equipments used for jacking up the vehicle and safety precautions while using them.**
- **Tools used for loosening and tightening the nuts and bolts and fasteners.**
- **Special tools used in automobile workshop such as torque wrench, Élan keys, vacuum gauge, pressure gauge, filler gauge, hydrometer, spark plug tester, etc.**

OPEN ENDED SPANNER, RING SPANNER BOX SPANNER, ALLEN KEY ,TORQUE WRENCH

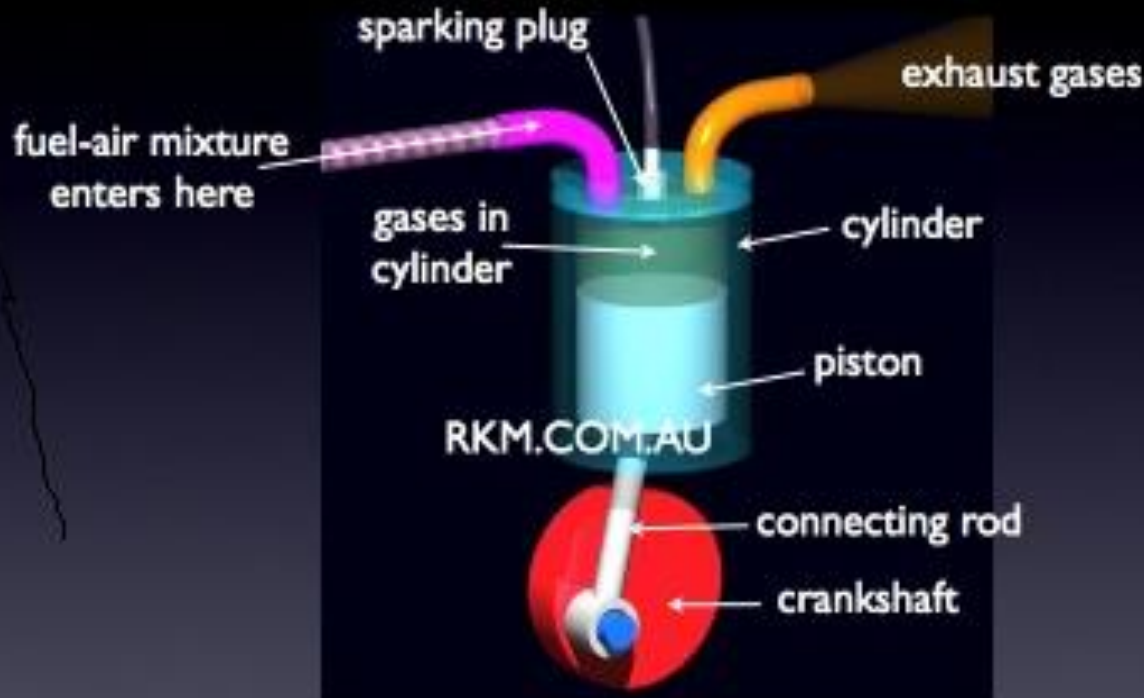


TO KNOW ABOUT THE CONSTRUCTION AND WORKING OF FOUR STROKE IN LINE PETROL ENGINE.

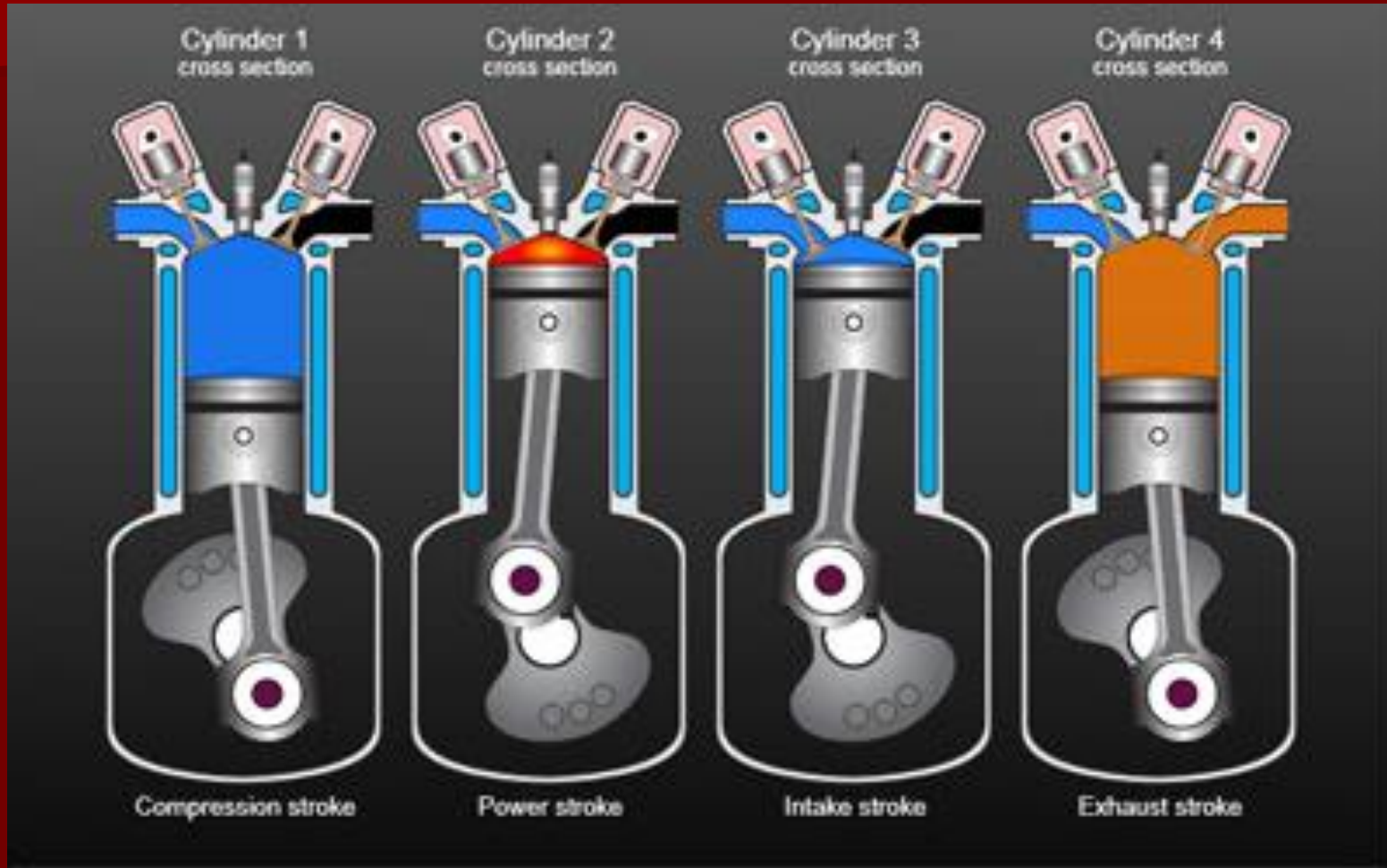
- **Working of I.C. engine**
- **Types of I.C. engine**
- **To know the detail construction and working of four stroke engine.**

FOUR STROKE SPARK IGNITION ENGINE

4-stroke engine model



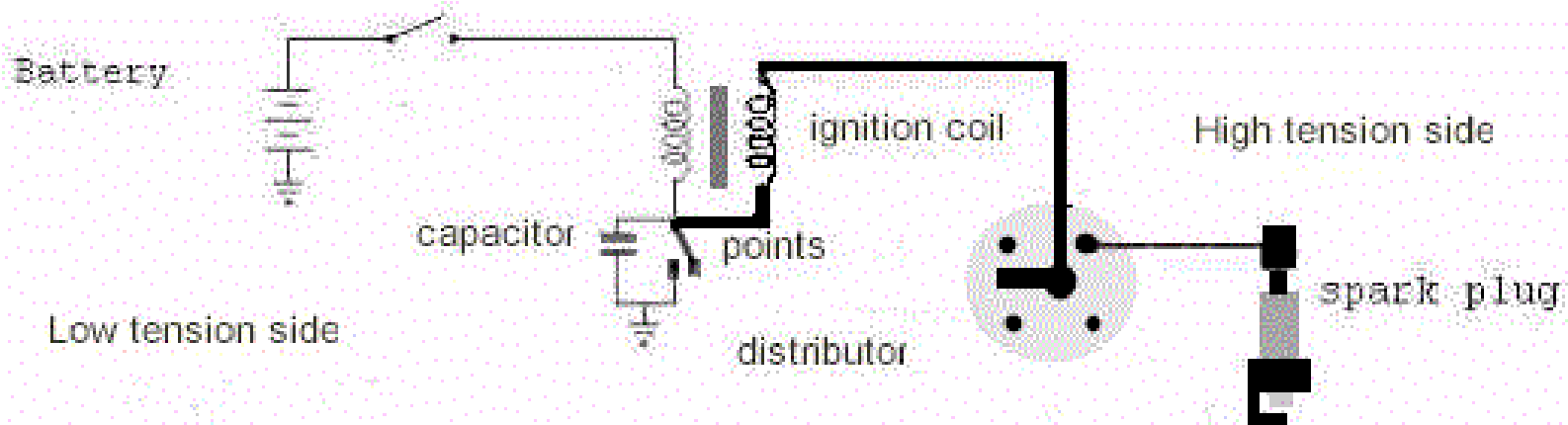
FOUR STROKE FOUR CYLINDER ENGINE



TO KNOW ABOUT THE CONSTRUCTION AND WORKING OF IGNITION SYSTEM, COOLING AND LUBRICATION SYSTEM OF FOUR STROKE IN LINE PETROL ENGINE.

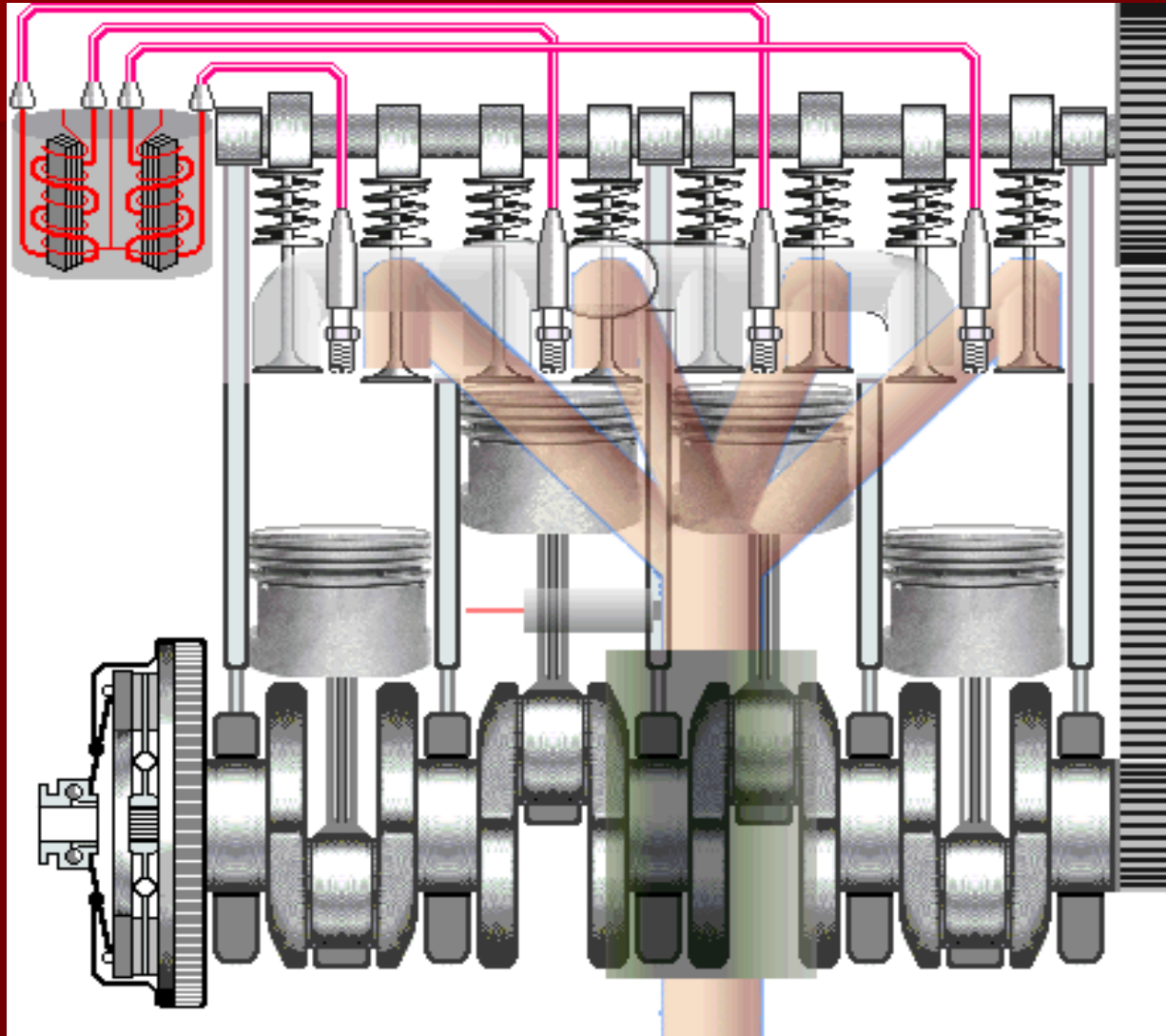
- **Working and construction of ignition system used on four stroke in line engine**
- **Working and construction of cooling system used on four stroke in line engine**
- **Working and construction of lubrication system used on four stroke in line engine.**

IGNITION SYSTEM OF FOUR CYLINDER ENGINE



Simple view of Kettering ignition system

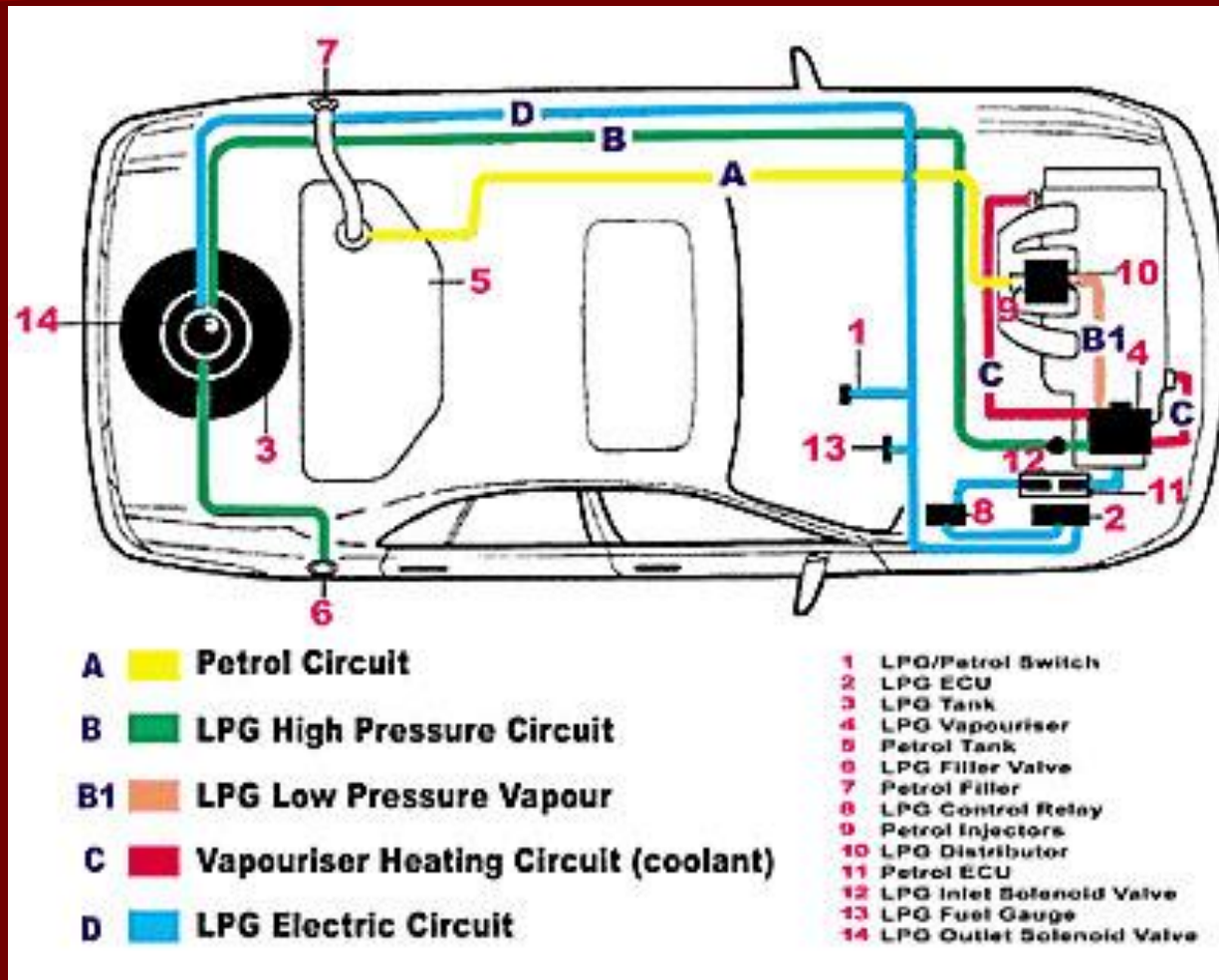
INLINE FOUR CYLINDER FOUR STROKE ENGINE



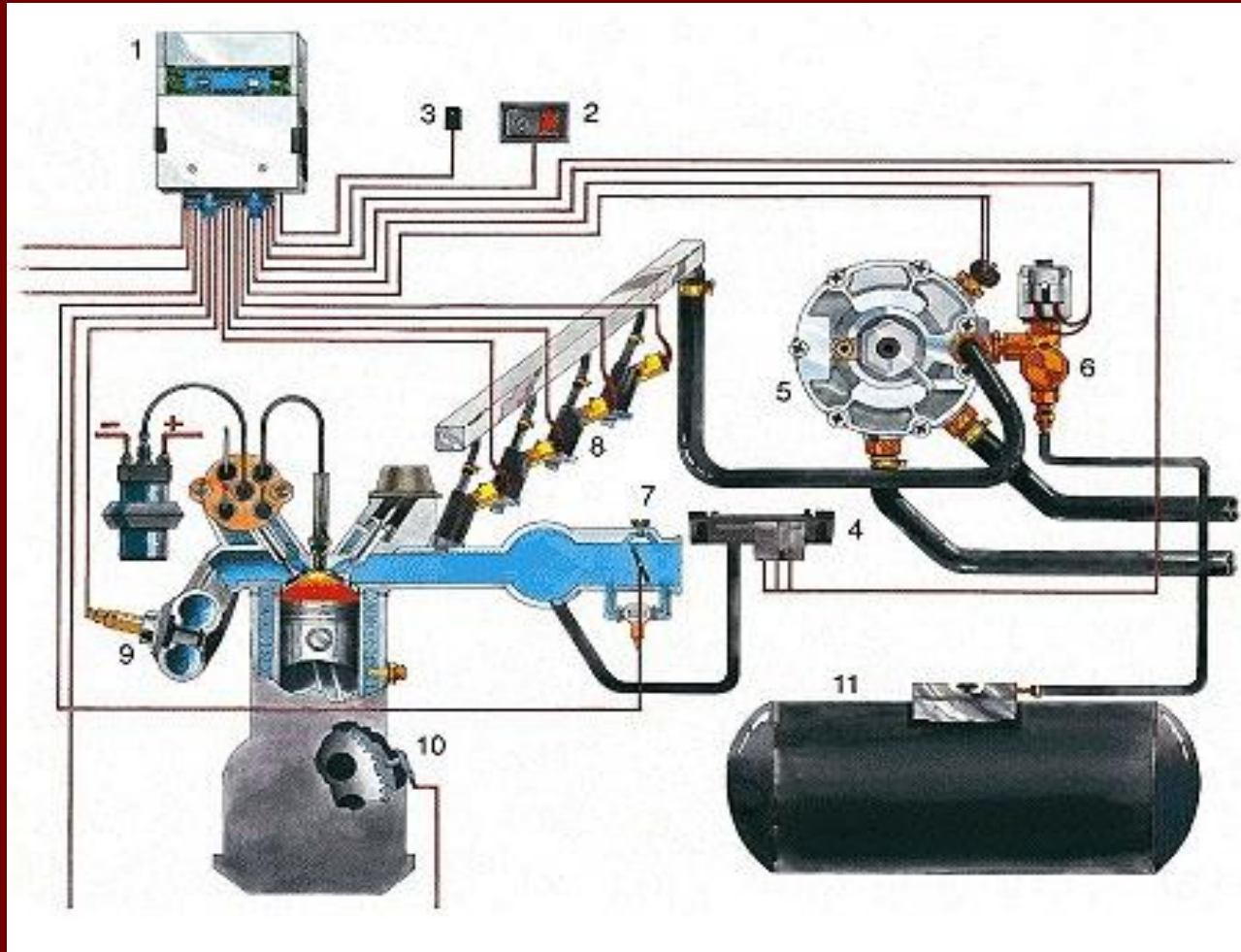
TO KNOW ABOUT THE FUEL SYSTEM.

- **The detail construction and working of fuel supply system used on cars.**
- **Study of fuel tank,**
- **Study of M. P. F. I. system. fuel filters, fuel pump, carburetor**

FUEL SYSTEM LAYOUT



MULTI POINT FUEL INJECTION SYSTEM



INJECTOR TESTING



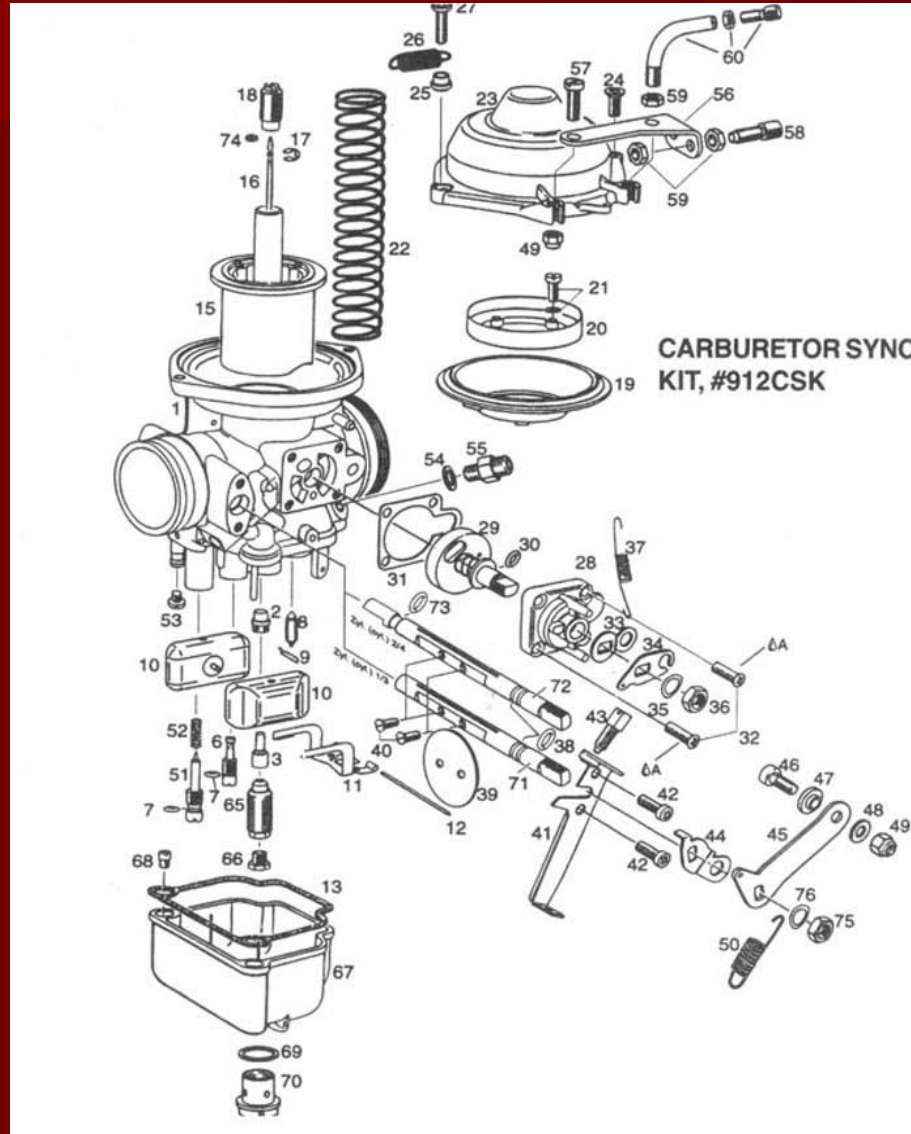
TUNE UP THE FOUR STROKE IN LINE ENGINE

- **Clean up the carburetor and refit the same.**
- **Clean up the spark plugs and refit the same.**
- **Check the distributor clean adjust and refit the same.**
- **Adjust the engine timing and carburetor.**

CARBUERATOR



EXPLODED VIEW OF CARBUERATOR



DISTRIBUTOR



ENGINE PARTS



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ENGINE GASKETS, LINERS & RINGS



TO SERVICE THE COOLING SYSTEM OF THE CAR.

- **Checking the cooling system for leakages.**
- **Removing the leakages with the use of brazing soldering and replacing gaskets.**
- **Checking opening and closing the thermostat valve.**
- **Checking of water pump.**

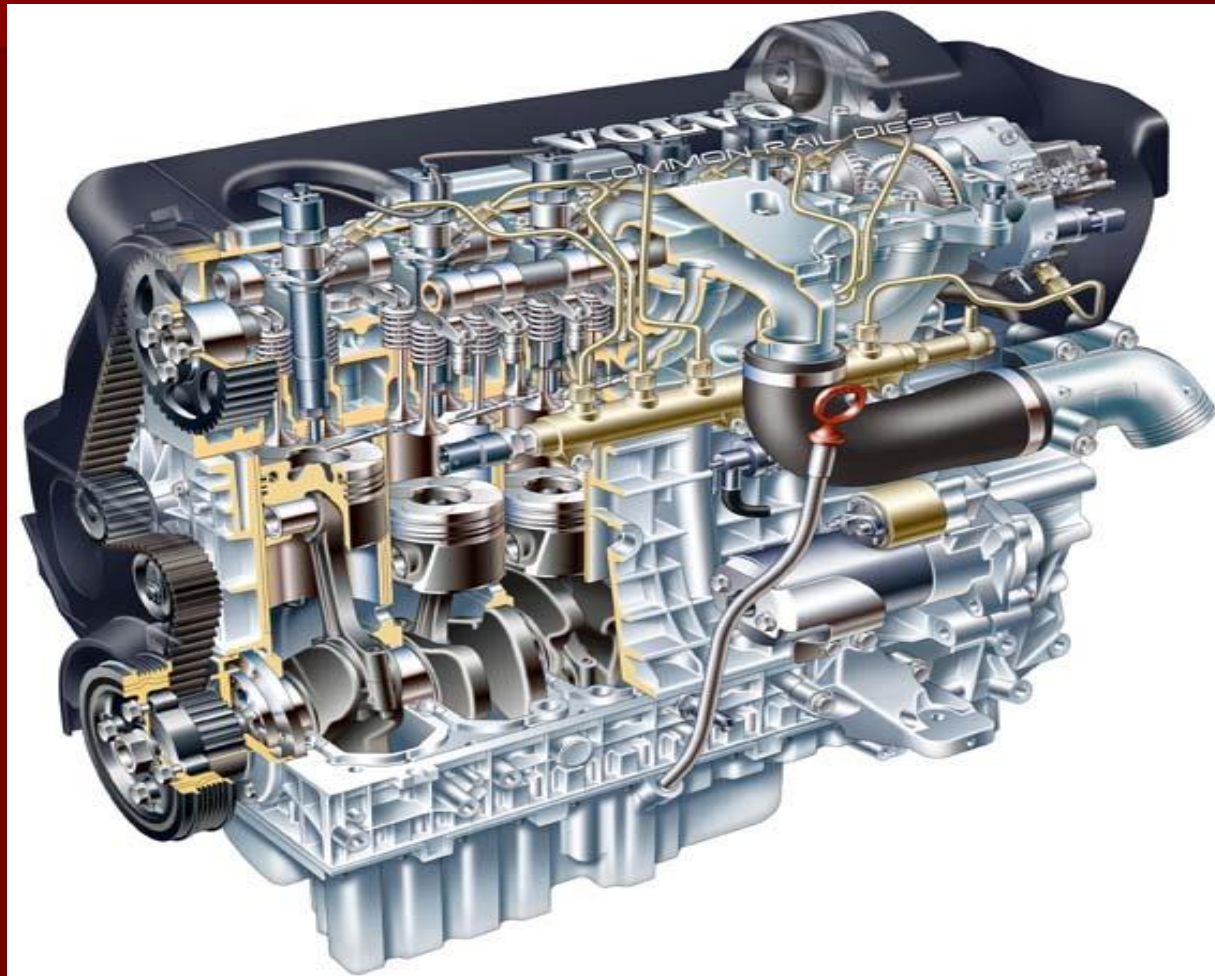
COOLING SYSTEM



COOLING WATER CIRCULATION



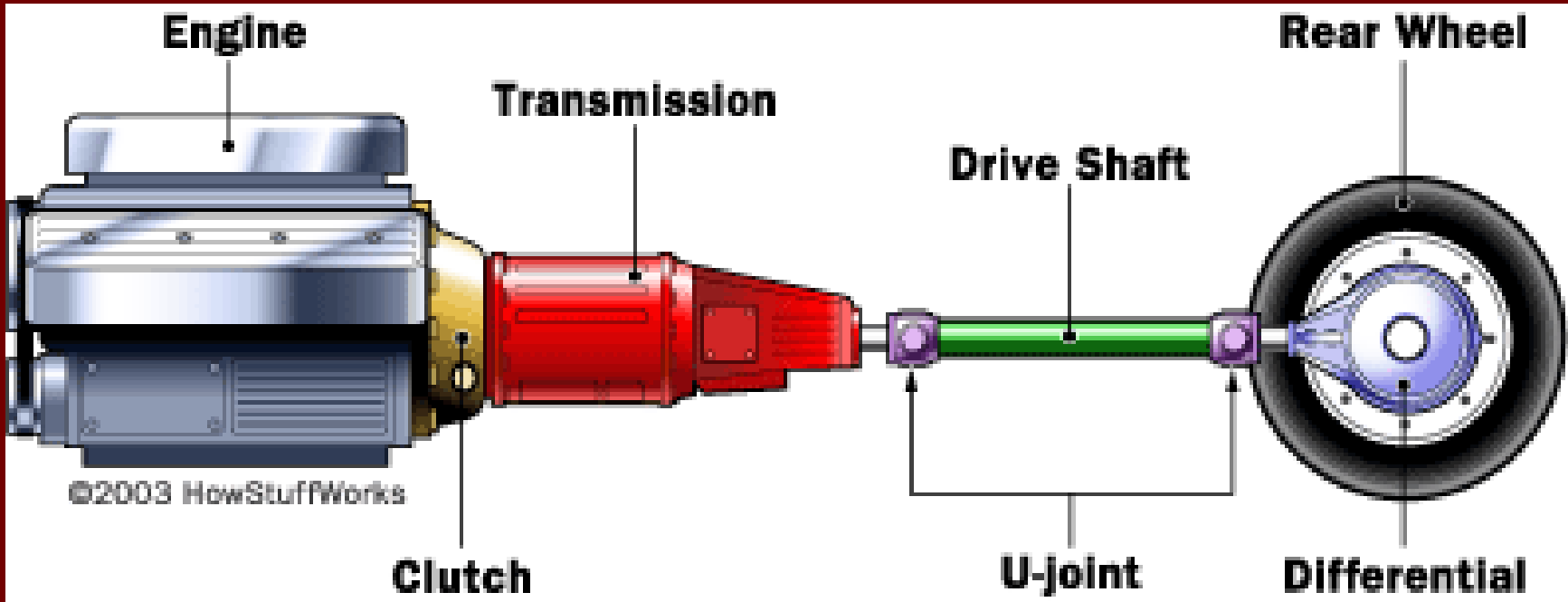
ENGINE EXPLODED VIEW



TO SERVICE AND STUDY TRANSMISSION SYSTEM.

- **Study and service of clutch.**
- **Study and service of gear box.**
- **Study and service of propeller shaft.**
- **Study and service of differential.**
- **Study and service of rear & front axle.**

TRANSMISSION SYSTEM



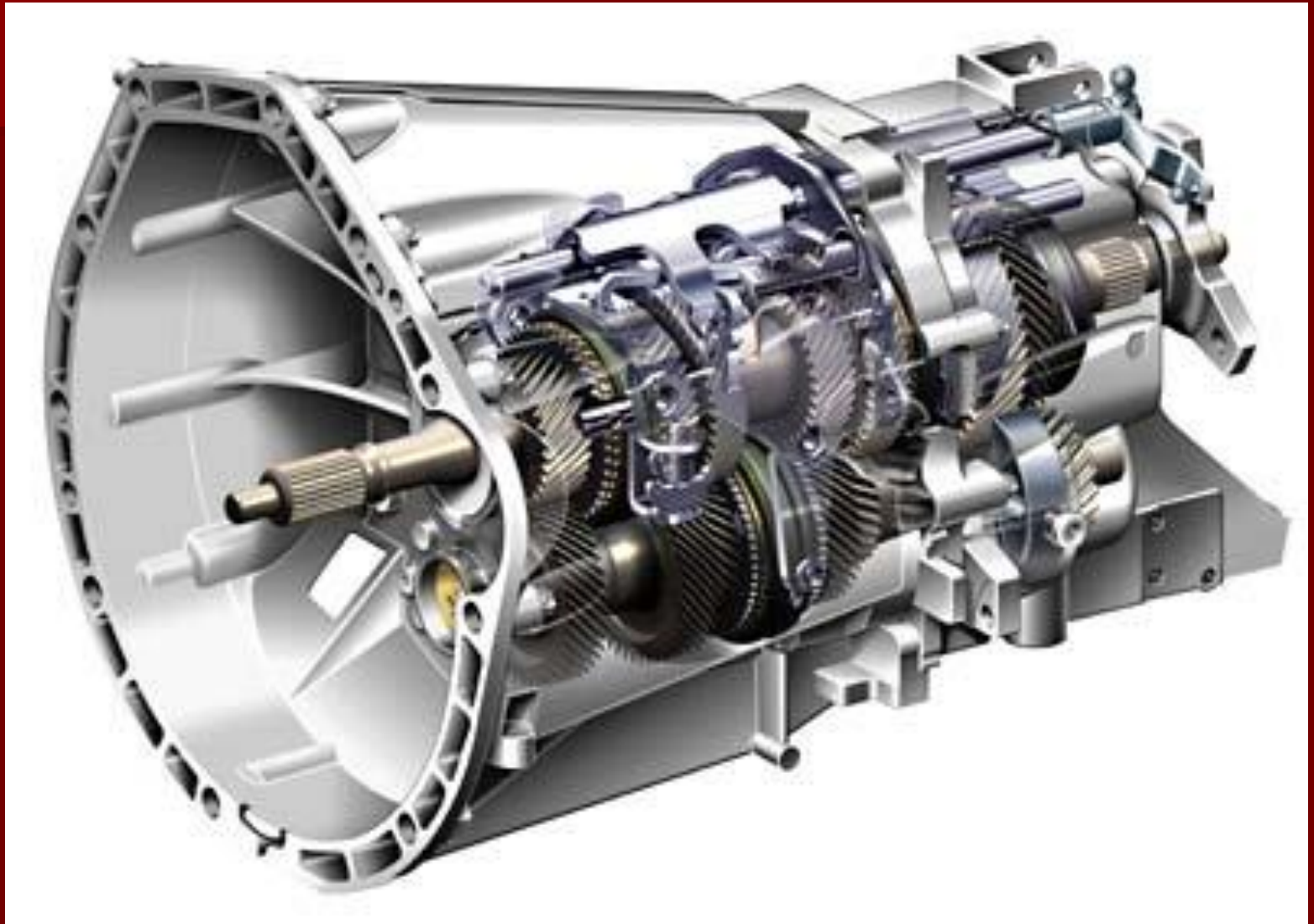
CLUTCH PLATE & PRESURE PLATE



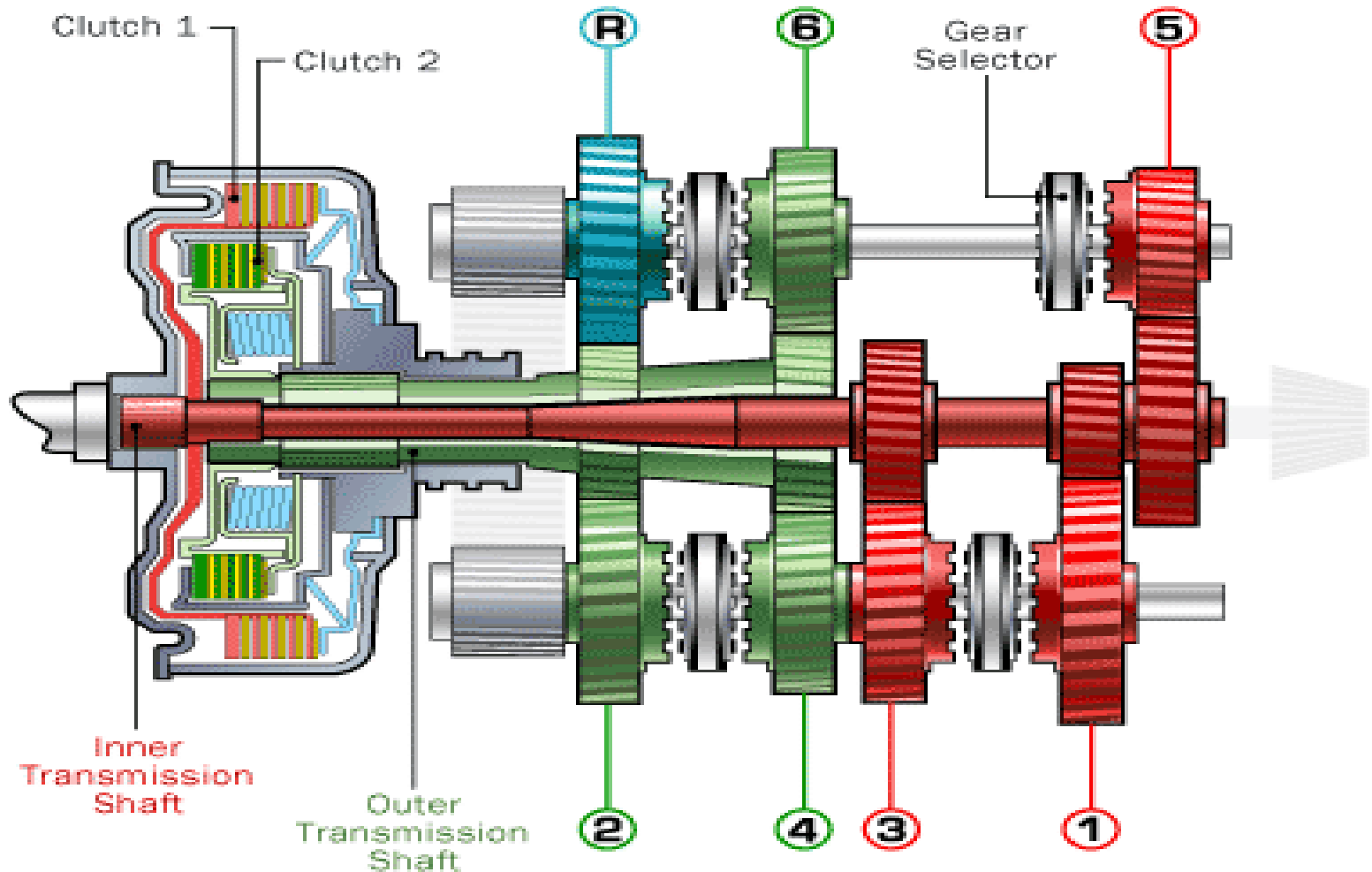
DIPHARAM CLUTCH ASSEMBLY



GEAR BOX



DUAL CLUTCH & GEAR BOX



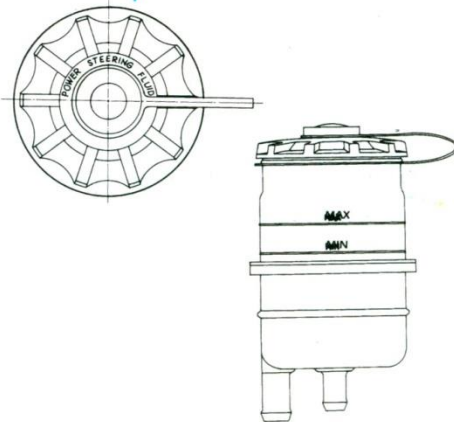
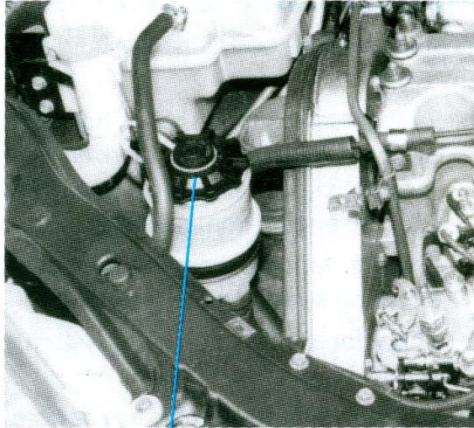
TO STUDY AND SERVICE THE STEERING AND SUSPENSION SYSTEM OF A CAR.

- **The steering geometry & adjustment of steering linkages.**
- **Study of steering gear box.**
- **Study and service of power steering system.**
- **Study of independent front and rear axle suspension system.**

INDEPENDENT SUSPENSION SYSTEM



PROCEDURE FOR OIL FILLING AND BLEEDING OF POWER STEERING



Procedure for Oil Filling and Bleeding of Power Steering

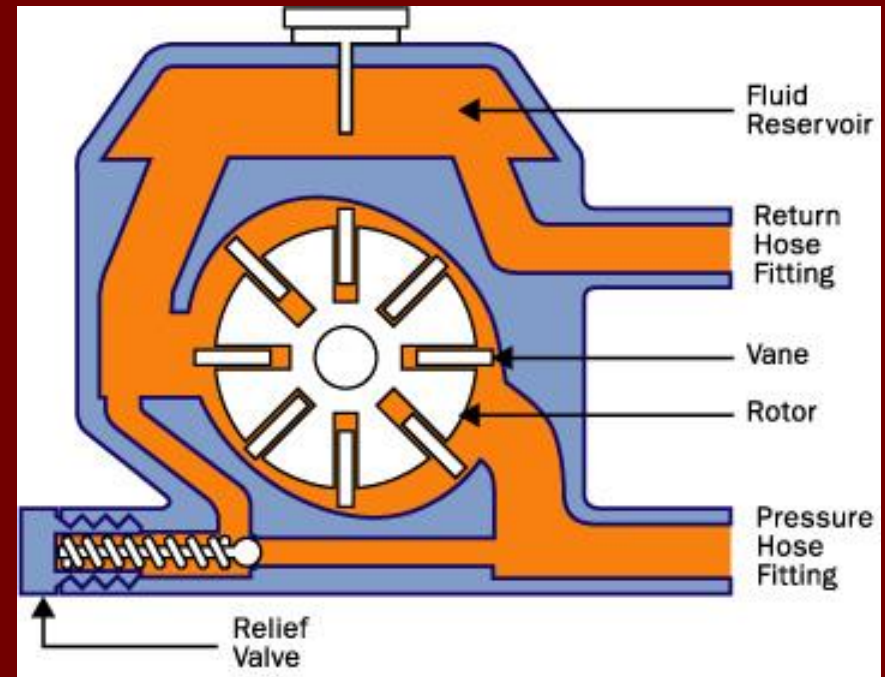
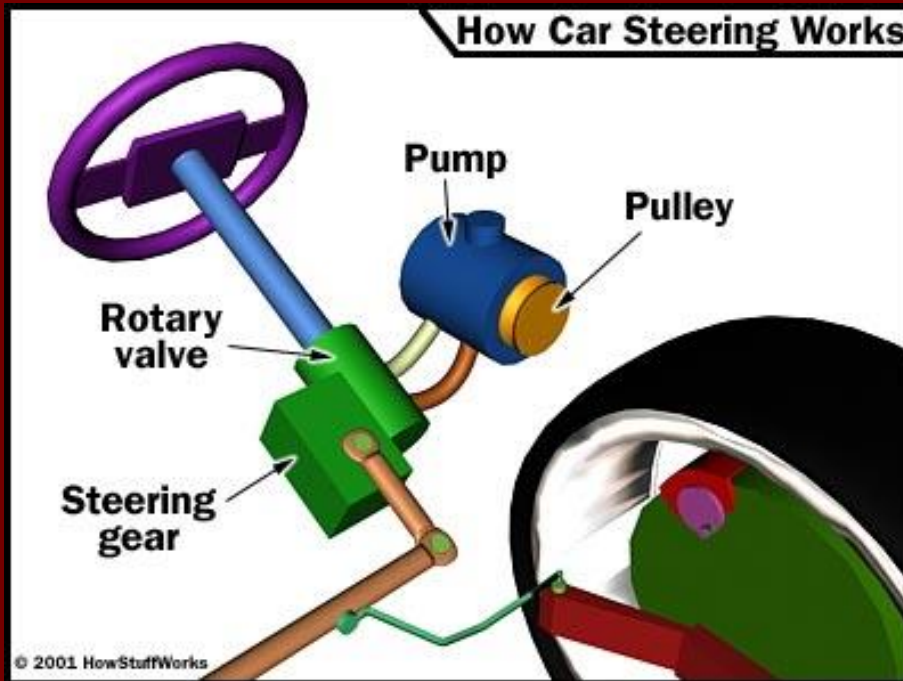
(Ensure that the Power Steering fluid reservoir is clean before starting any work)

1. Fill the reservoir till it is nearly full, when the system is newly installed otherwise fill up to 'Max' mark on reservoir. Crank the engine for 10 seconds without allowing it to start (if possible). If engine does start, shut the engine immediately.

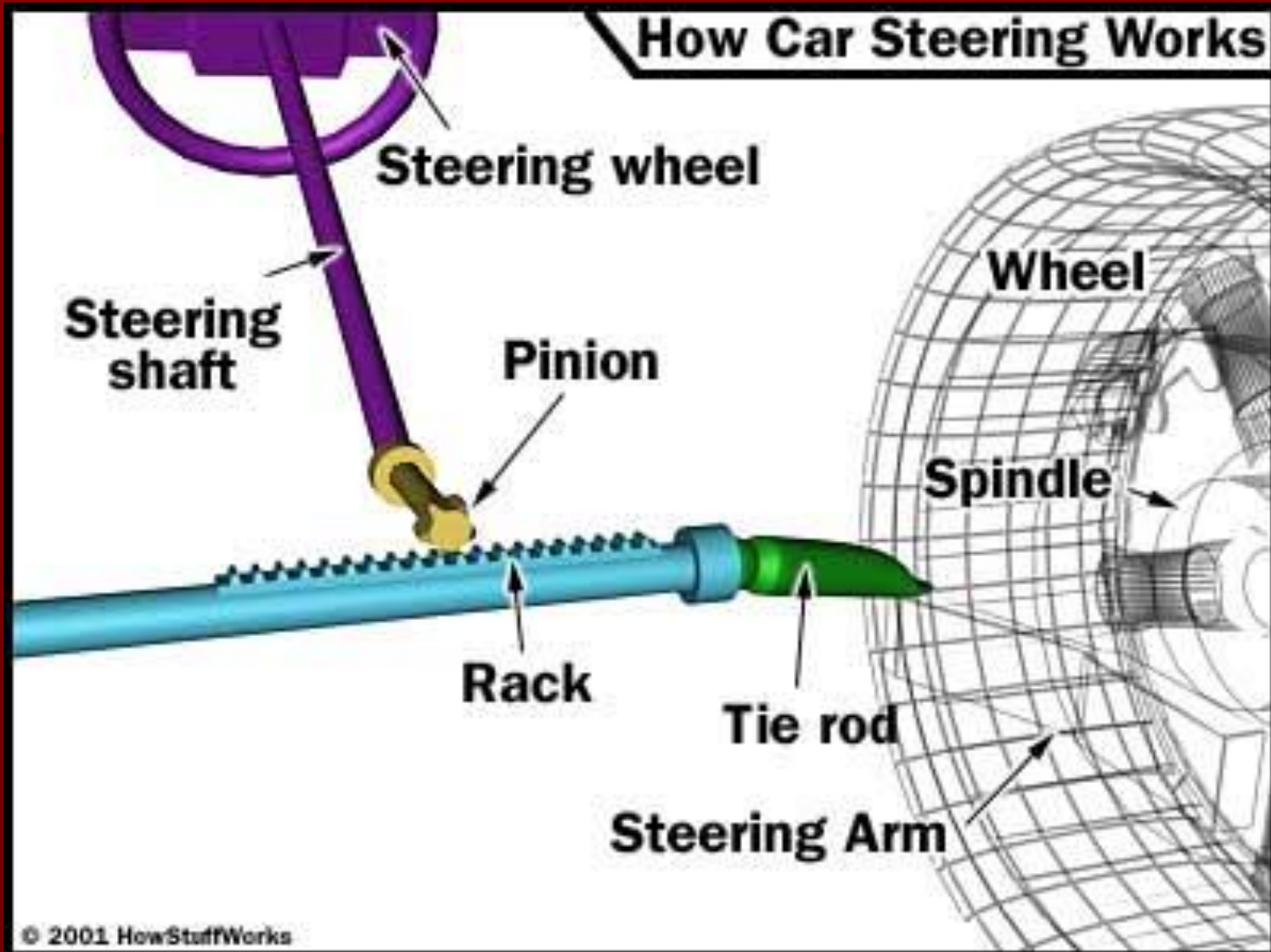
Check & refill the reservoir. Repeat at least three times, each time checking & refilling the reservoir.

2. Check for any leakage in the system and if noticed take corrective action.
3. Start the engine & steer the car from full left to full right turn 3-4 times.
4. Add fluid if necessary to maintain the level upto 'Max' mark on reservoir.
5. When the engine is at steady speed, check for bubbles or foaming in the oil. If present it indicates that air is getting sucked into the system. Check the suction line/fittings and correct if necessary.
6. Once the system is bled properly and free from foaming, there should not be any appreciable change in the oil level in the reservoir, when the engine is started or stopped repeatedly.
7. Now the car is ready to be driven.

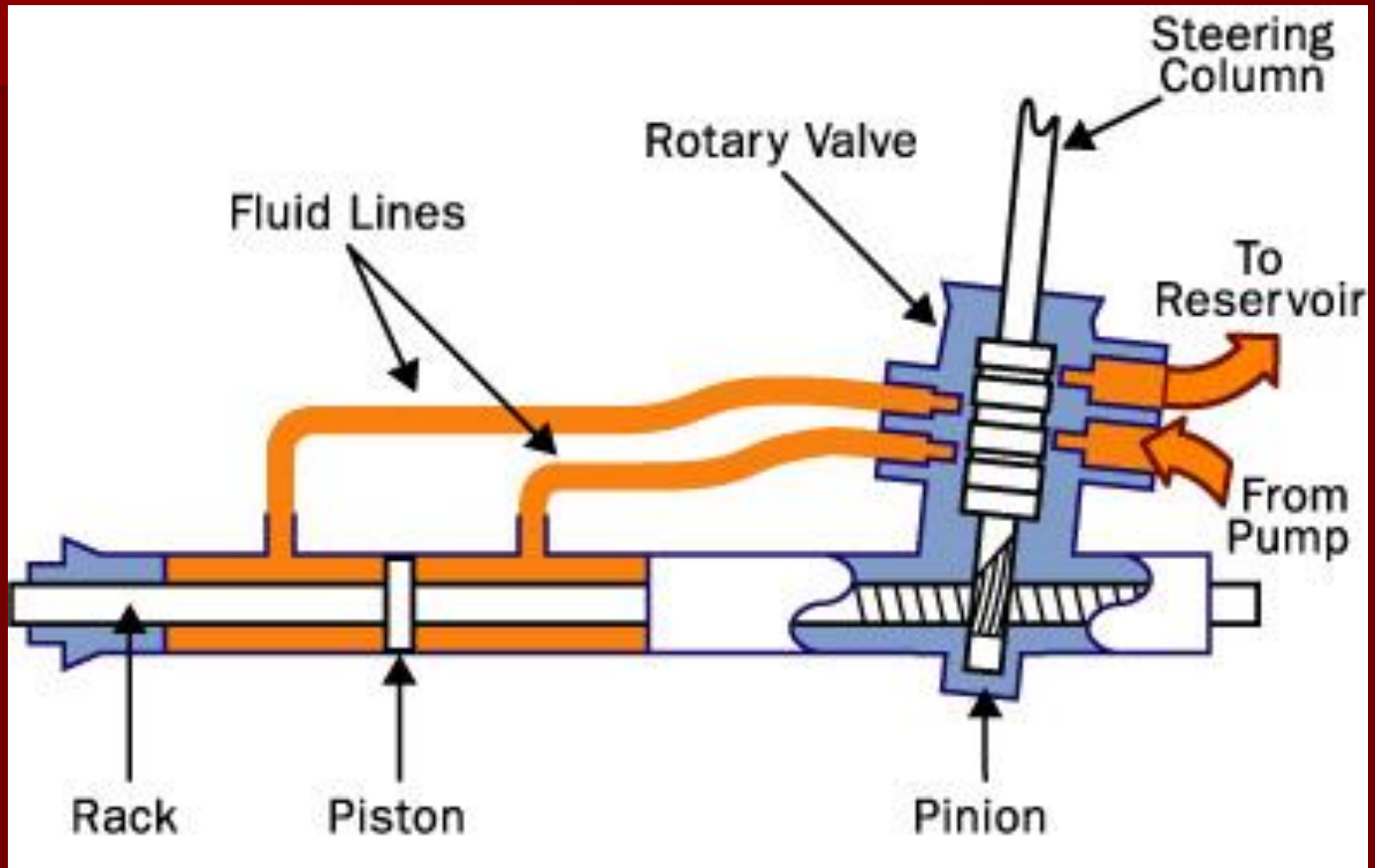
POWER STEERING



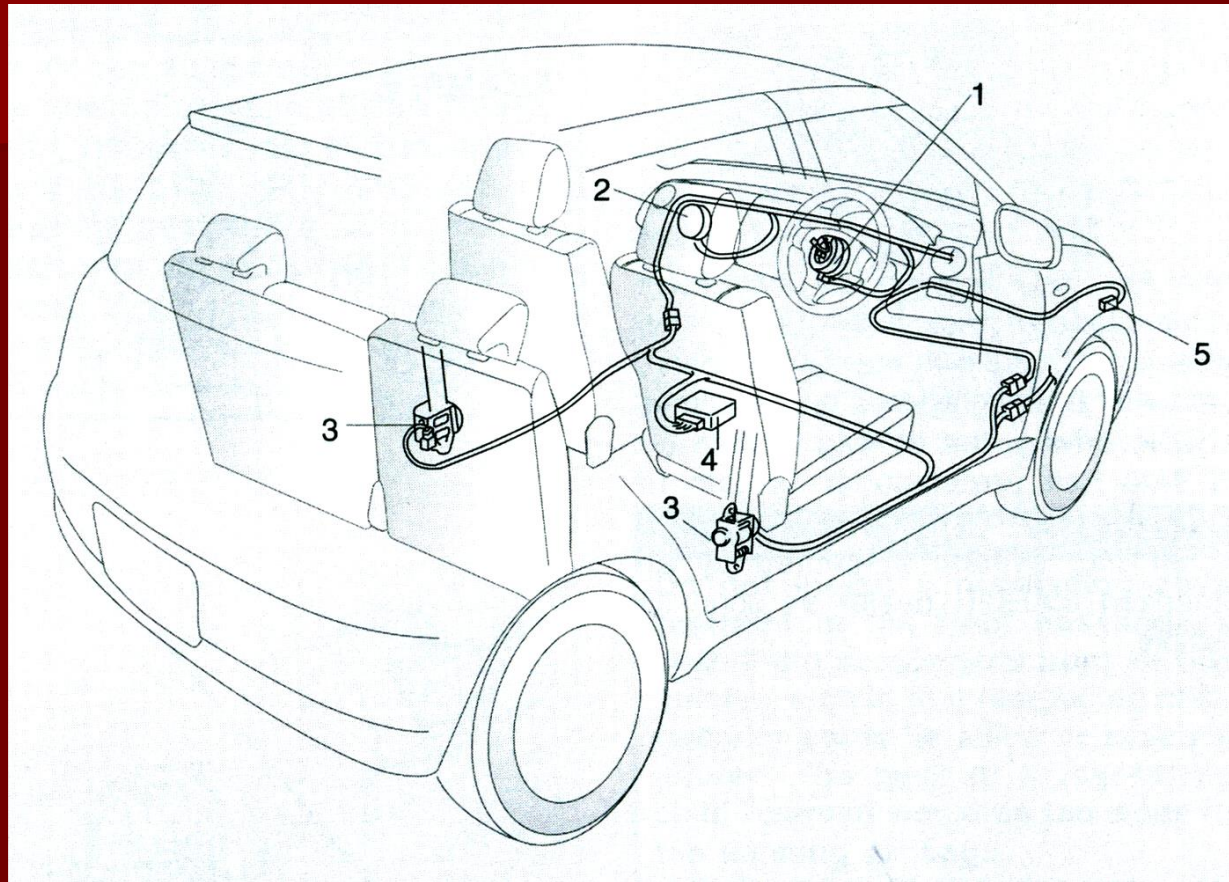
RACK-AND-PINION STEERING



POWER RACK-AND-PINION



SUPPLEMENTAL RESTRAINT SYSTEM (AIR BAGS)

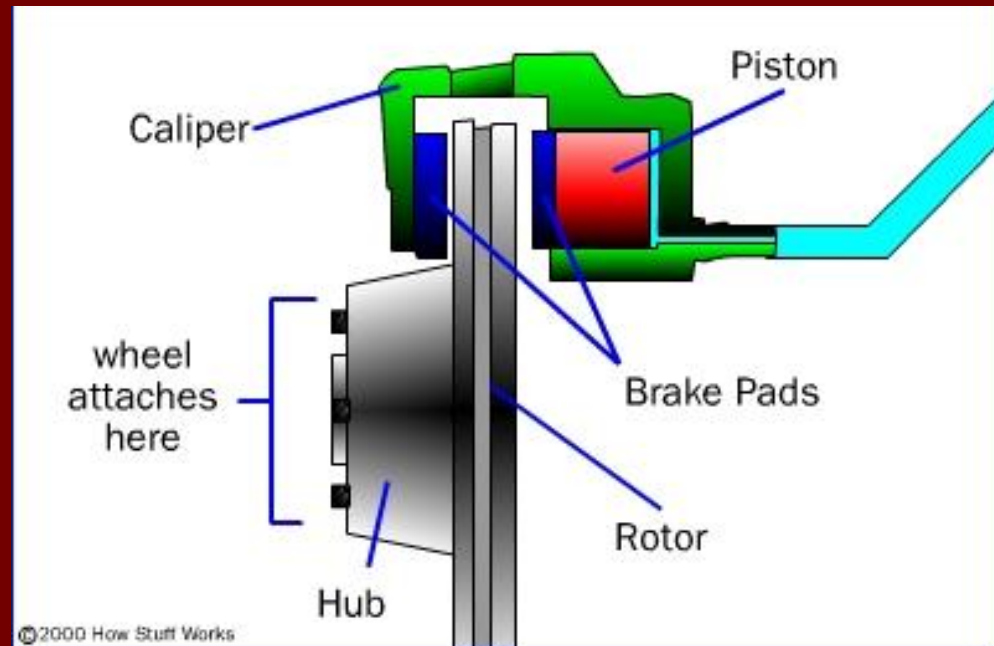
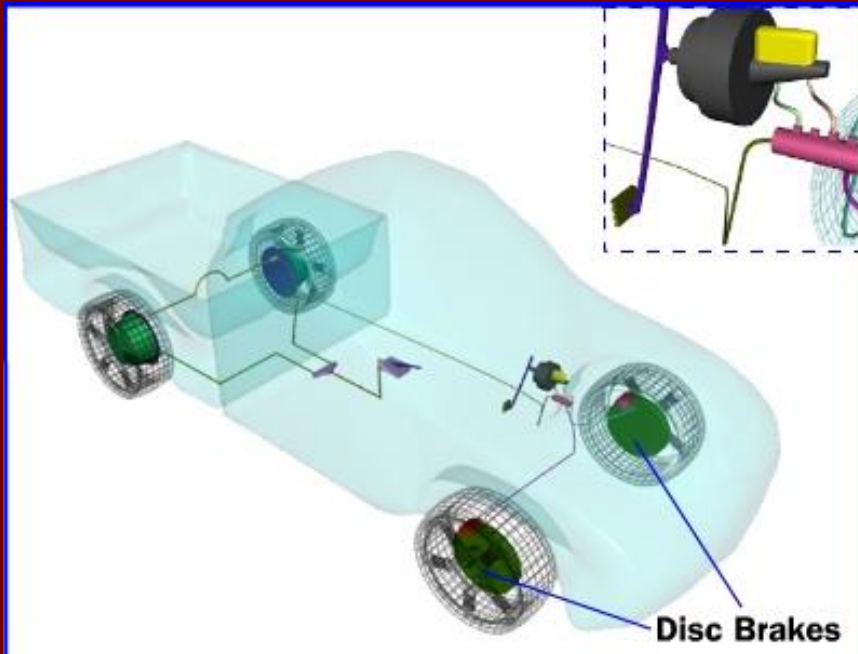


1. Driver's front air bag module
2. Front passenger's air bag module
3. Seat belt pretensioners
4. Air bag controller
5. Forward crash sensor

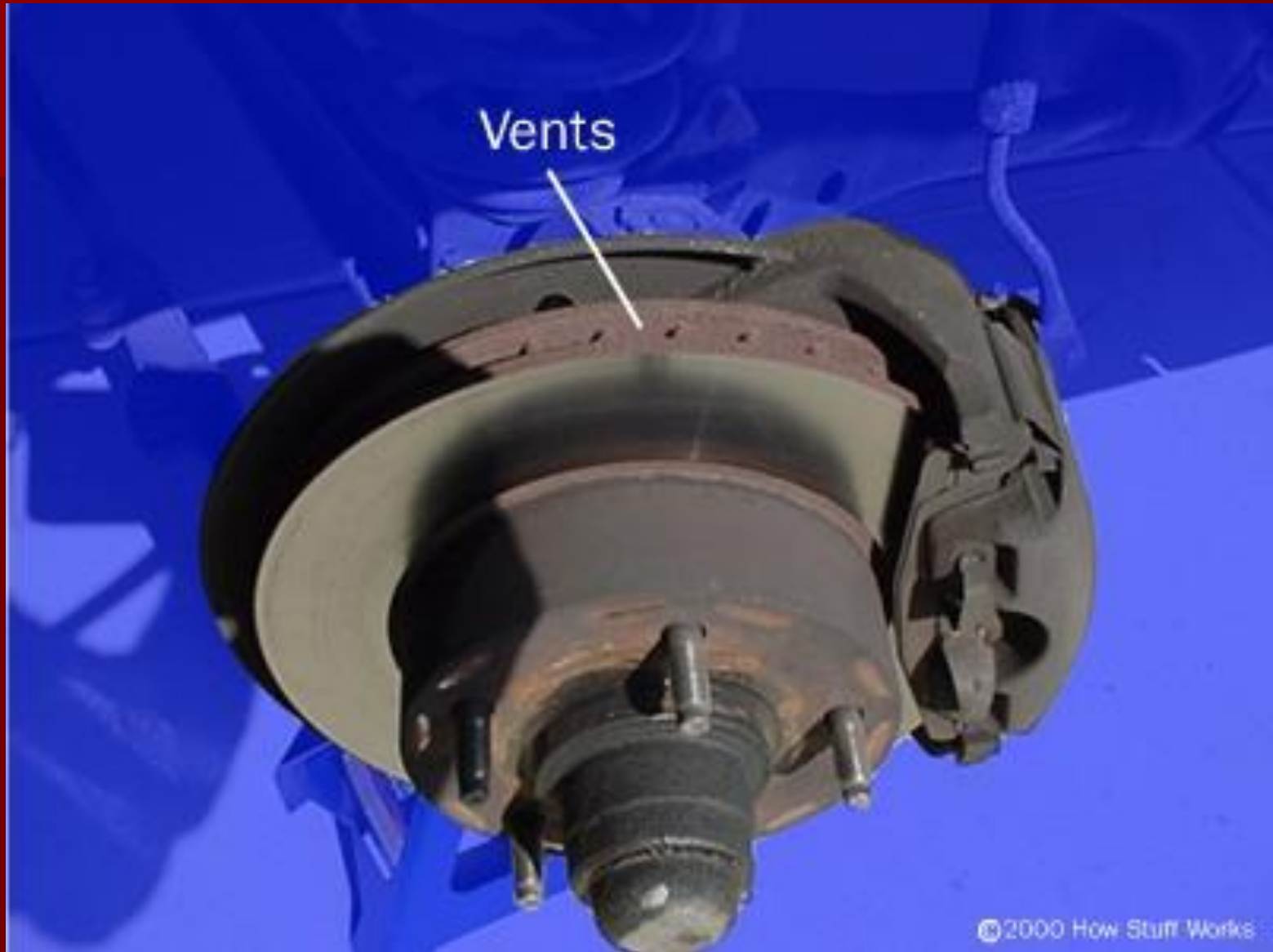
TO STUDY & SERVICE OF BRAKE SYSTEM.

- **Study of hydraulic brake system.**
- **Study of tandem master cylinder, wheels cylinder, disc brake and shoe brake.**
- **Study of parking brake**
- **Service and adjustment of brake system.**
- **Procedure of brake bleeding.**

DISC BRAKE



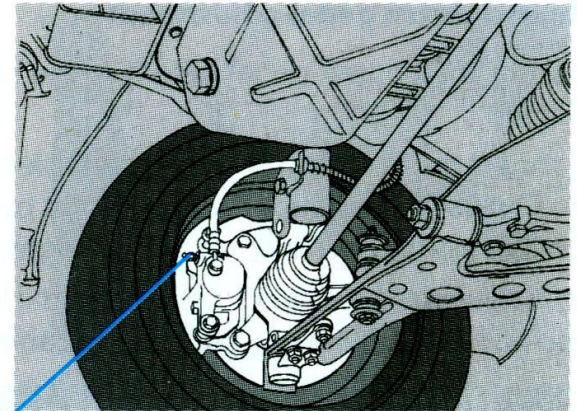
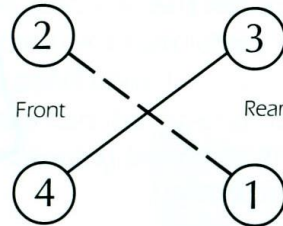
DISC BRAKE VENTS



BLEEDING PROCEDURE FOR BREAK SYSTEM

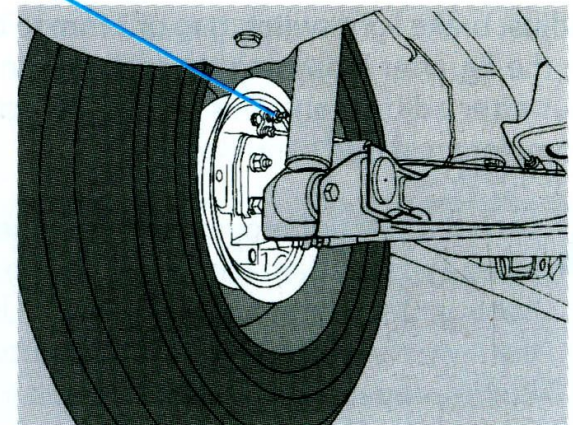
BLEEDING PROCEDURE FOR BRAKE SYSTEM :

1. Use, IS:8654 / DOT 3 brake fluid. (system capacity-265cc)
2. The hydraulic brake lines of the brake system are based on the diagonally split circuit.
3. For bleeding operation of the system, the bleeding of the wheel cylinder farthest from the tandem master cylinder (i.e. rear) should be carried out first, followed by the front caliper of the same brake line. Repeat the same procedure on the other brake line. Bleeding should be done before adjusting the brake switch on the pedal.
4. For effective brake bleeding, use pressurised system & transparent bleeder tube. The bleeding bottle must be held below the level of wheel cylinders for effective scavenging of air from the system.
5. Check brake pedal for sponginess. Repeat bleeding if necessary.



Bleeding Nipple

Front wheel



Rear wheel


CLUTCH & BRAKE PEDAL ADJUSTMENT

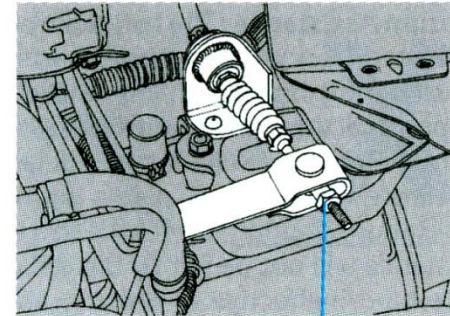
Brake and clutch pedal adjustment :

1. Ensure that clutch pedal height is the same as the brake pedal height.
2. Connect the front end of the clutch cable to the clutch release lever and adjust the cable by setting the nut by hand so as to get clutch pedal height same as brake pedal height, and cable is tight.
3. Due to wear of the clutch disc, the pedal lever will lift up. Readjust the pedal height again, using clutch cable.

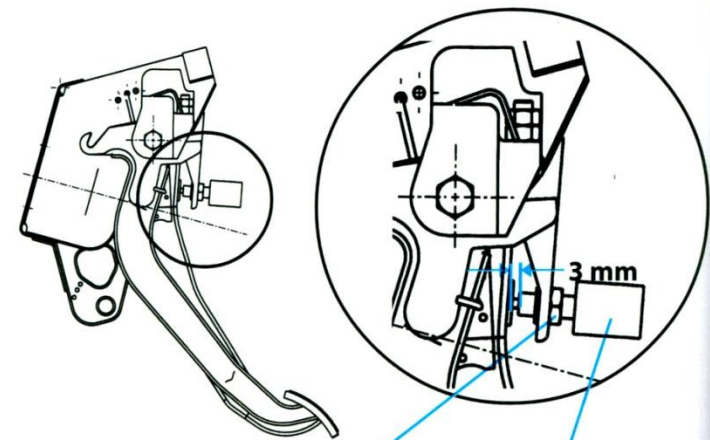
Note : Brake pedal height adjustment is required only in case of component removal, etc. Adjustment is not required during normal maintenance.

4. Adjust brake light switch, gap of 3 mm to be maintained as shown in the fig. after loosening the lock nut on the switch. Tighten the nut after adjustment. This should be done with brake pedal in complete released condition.

 Do not apply tightening force over the switch body/terminal block as it may damage the switch. Electrical supply for brake lights is 'ON' without ignition switch. Under normal condition the switch shall be 'OFF' and the lights are not glowing. Any improper adjustment may result in either brake grabbing unnecessarily or spongy brakes.



Clutch Adjustment Nut



Lock Nut

Brake Light Switch

TO STUDY THE CONSTRUCTION AND MAINTENANCE OF WHEELS AND TYRES.

- **Study the construction of wheel.**
- **Study the construction of tyres.**
- **Study the procedure of removing puncture.**
- **Study the hot and cold patch work,**
- **Vulcanizing and retarding.**

MAINTENANCE OF TYRE

Tyres :

Check for inflation and condition of your car tyres periodically.

Inflation :

Check the pressure in the tyres when they are cold.

Refer to the tyre information label fitted on the driver side doorpost for correct cold tyre pressure.

Recommended Tyre Pressures : (with cold tyres)

Front/Rear 30 PSI (2.1 bar) / 28 PSI (1.9 bar)

You should have your own tyre pressure gauge and use it at all times. This makes it easier for you to tell if pressure loss is caused by a tyre problem and not by variation between gauges.

Keeping the tyres properly inflated gives you the best combination of riding comfort, handling and tyre life.

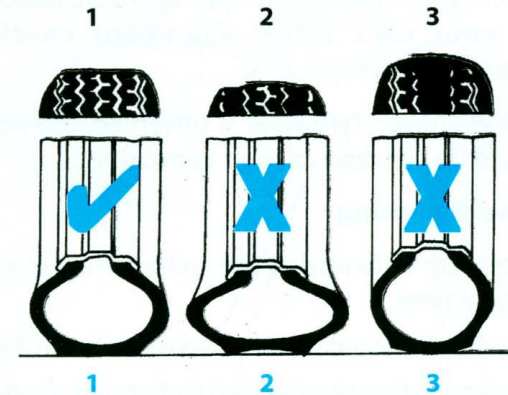
Over inflation of tyres makes the car ride bumpy and harsh. Tyres are more prone to uneven wear and damage from road hazards.

Under inflated tyres reduce your comfort in car handling and are prone to failures due to high temperature. They also cause uneven wear and more fuel consumption.

Inspection :



Every time you check inflation pressure, you should also examine tyres for leakage, damage, foreign objects & wear.



1. Correct Tyre Pressure

2. Underinflation

3. Overinflation

1. Uniform Tyre Wear

2. Excessive Side Tread Wear

3. Excessive Centre Tread Wear

TYRE ROTATION & CAR CARE

You should look for :



- Bumps or bulges in the tread or the side of the tyre. Replace the tyre if you find either of these conditions.
- Cuts, splits or cracks in the side of the tyre. Replace the tyre if you see this on the fabric or cord.
- Excessive tread wear or non uniform tyre wear.

Tyre Rotation :

To help increase tyre life and distribute wear more evenly you should have tyres rotated every 10,000 km. or earlier depending on the operation of car and tyre wear pattern.

The illustration shows how to rotate tyres when a normal spare wheel is included in tyre rotation.

Spare Wheel :

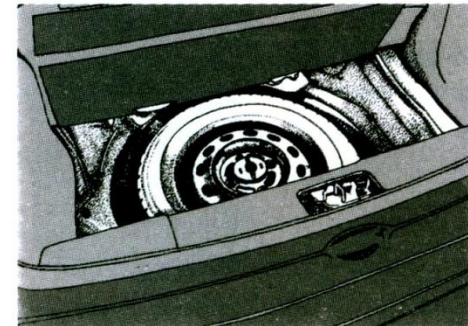
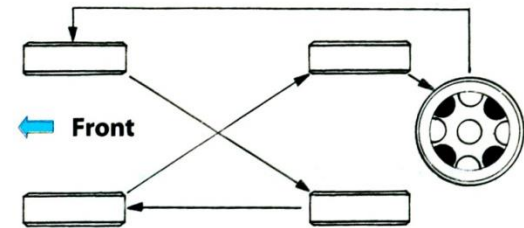
It is located in the luggage compartment.

- To take out the spare wheel, first fold in and lift up the floor cover.
- Unscrew and remove retaining bolt, at the centre.
- Lift and take out the spare wheel.

Repairing a Tyre/Tube :

Mark the tyre position suitably. (if original colour dot mark is not visible) with respect to valve stem hole to ensure that the tyre is refitted in the original location on the wheel rim.

Tyre Rotation



THANK YOU !
Goilkar V. S