+2 – Basic Automobile Engineering - Practical

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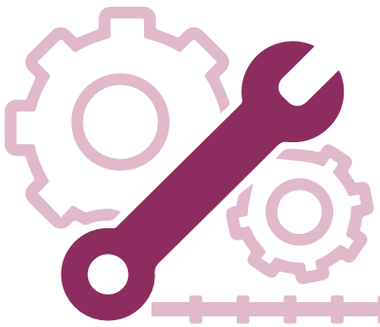


Practical – 1
Clutch Unit

Aim:

Dismantling, inspecting and assembling the given clutch.

Equipments:

Given Clutch

Tools Required:

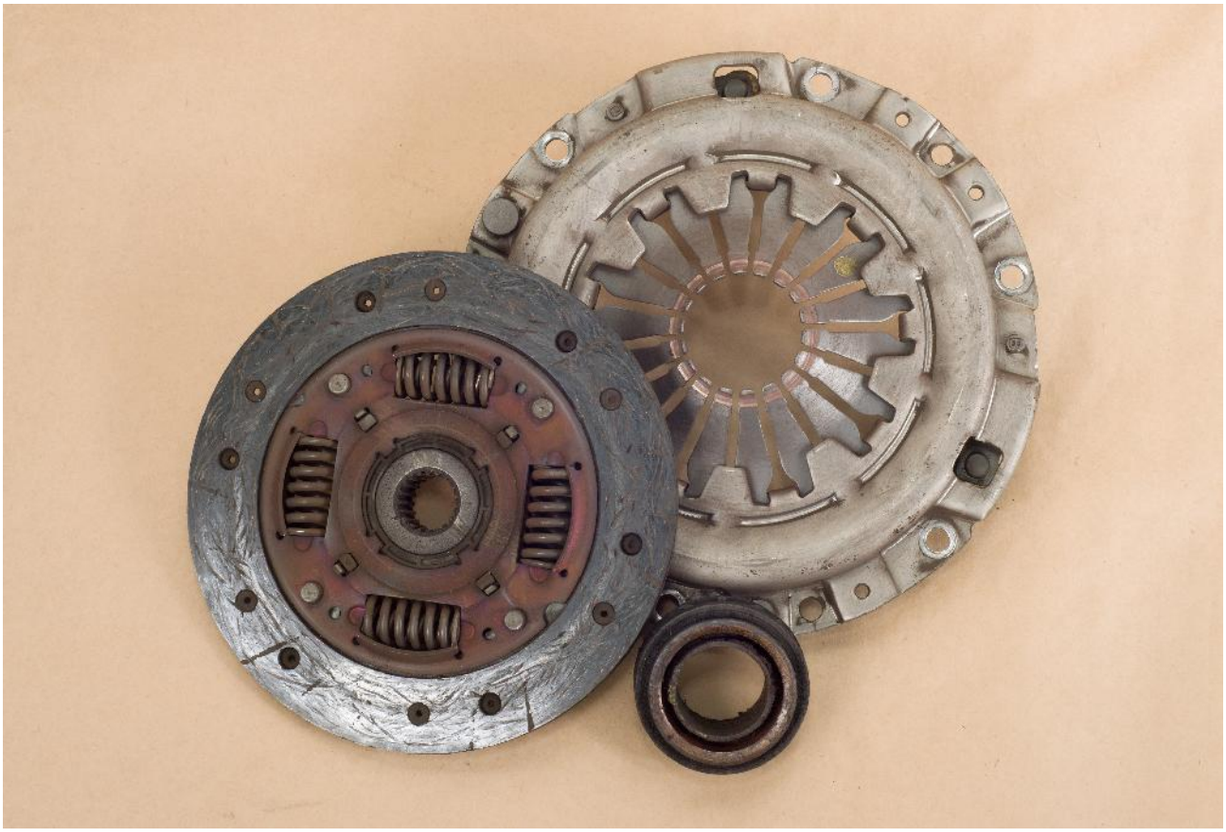
1. Box Spanner
2. Arber press
3. Reverting machine
4. Spring Tester
5. Long nose pliers
6. Double end spanner

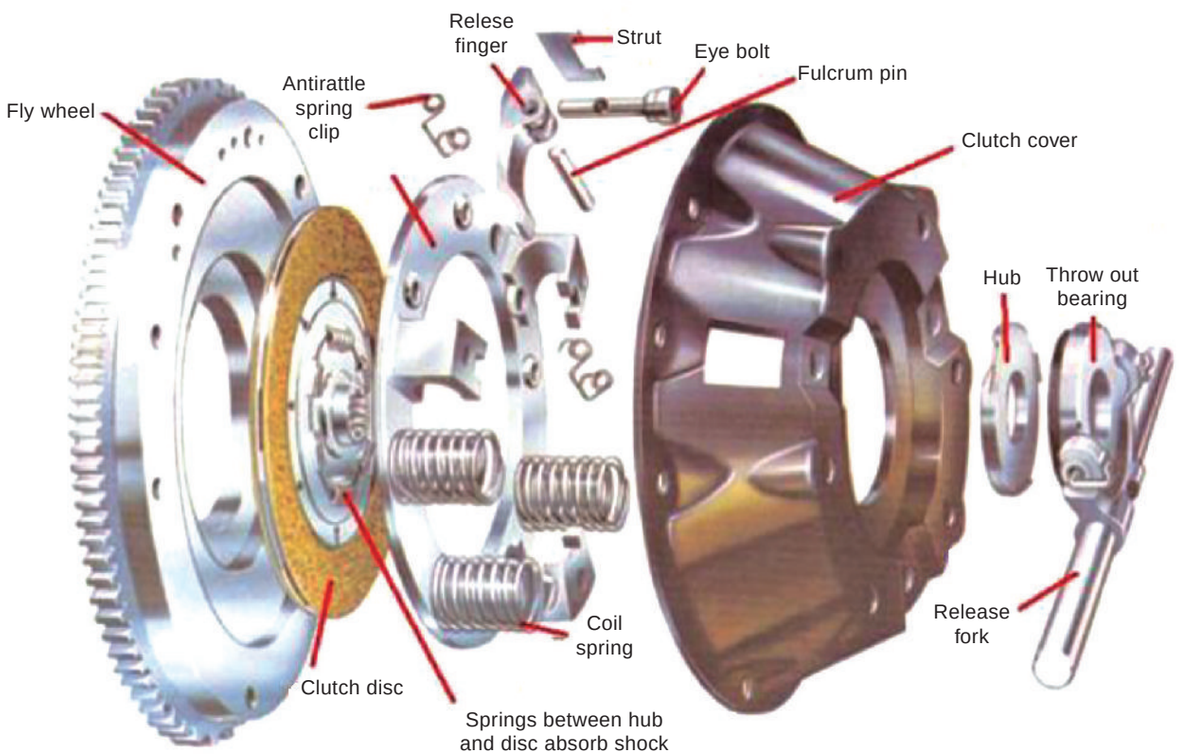
Materials Required

1. Cotton waste
2. Kerosene
3. Petrol
4. Emery sheet
5. Metal tray

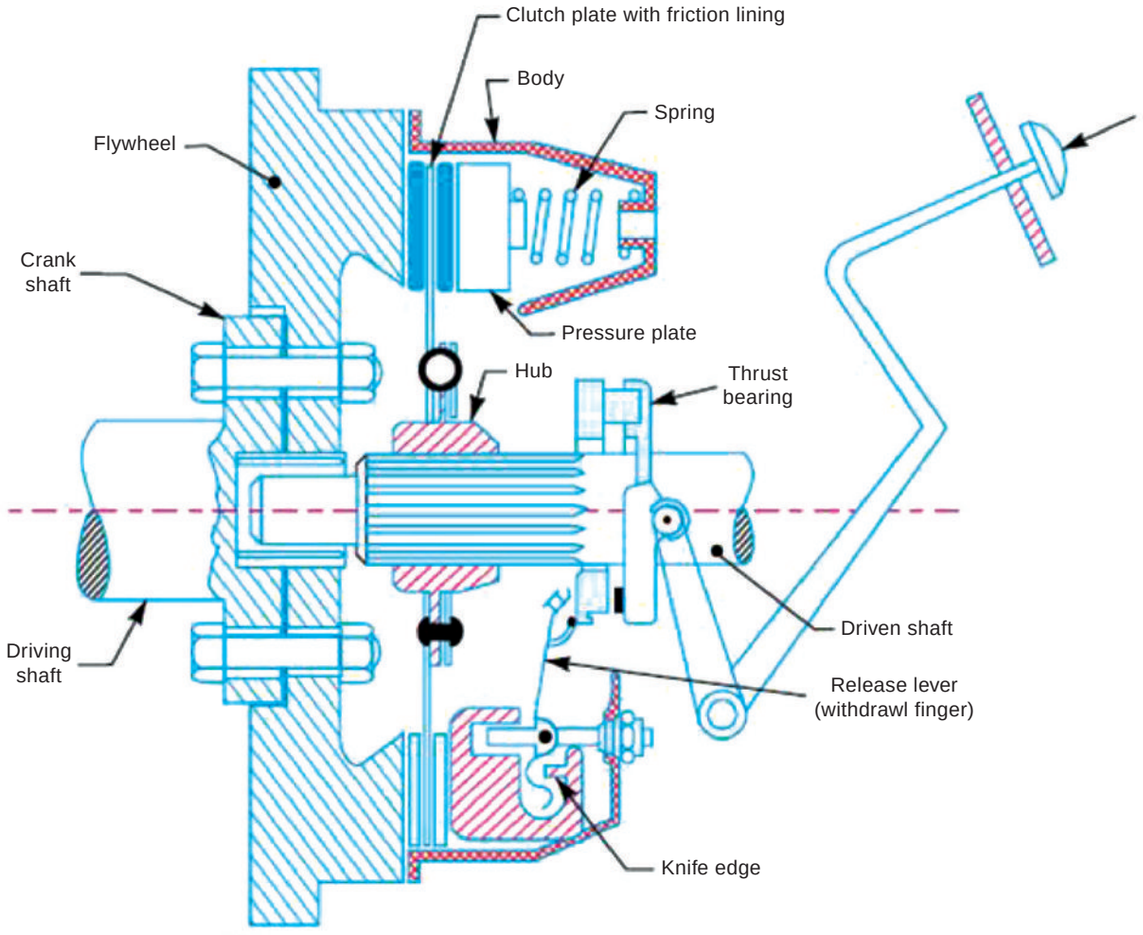
Reason for dismantling:

- Clutch is not disengaged when the clutch pedal is pressed.
- Difficult to press the clutch pedal.
- More noise in clutch.
- Vehicle speed is low even engine is in good condition.
- Manufacturer POI (Pencil of Inspection)





Single plate clutch



Dismantling:

- Remove the universal joint bolts, center bed bolts, propeller shaft assembly and speedometer cables from the gear box.
- Remove clutch fork connection, gear box, clutch mounting bolts.
- Remove the gear box from the vehicle with the help of rope.
- Place the clutch in the Arber press and remove the clutch casing bolts.
- Remove pressure springs, release lever finger, pressure plate, clutch plate and etc…

Inspection:

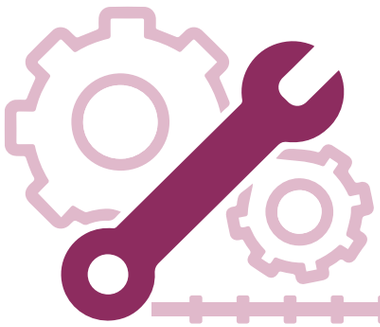
- Inspect the clutch plate, pressure plate, linings, release lever, pressure spring, bolt, nuts, washer and etc… for any damage.
- Check the release lever spring tension it is more than 5 pounds replace by new one.
- Check the coil spring length before and after compression by using coil spring tester.
- Check the clutch free pedal play.

Assembling

- Assembling is the reversing process of dismantling.
- Place the clutch cover on the fly wheel and tighten the bolts. [Marking on clutch cover and flywheel should be in coincide].
- Check the clutch and gear box is working properly.

Result:

Thus the given clutch unit was dismantled, inspected and reassembled.



Practical – 2
Gear box

Aim:

Dismantling, inspecting and assembling the given gear box.

Equipments:

Given Gear box

Tools Required

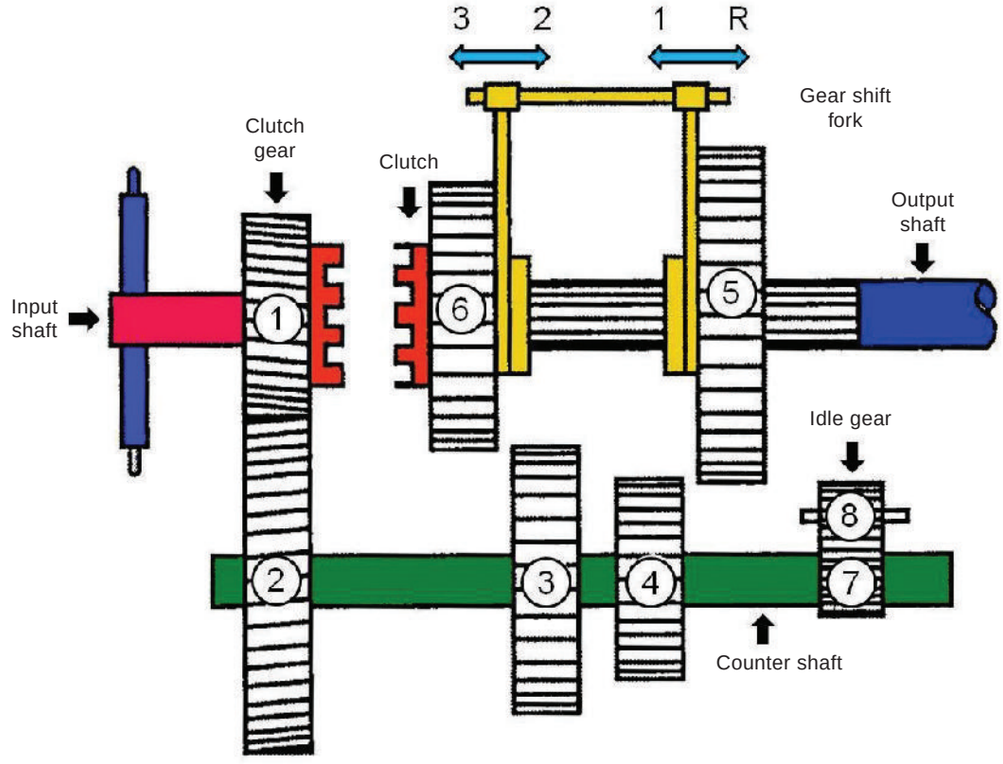
1. Ring spanner
2. Double end spanner
3. Screw driver
4. Ball pein hammer
5. Drift punch
6. Wooden hammer

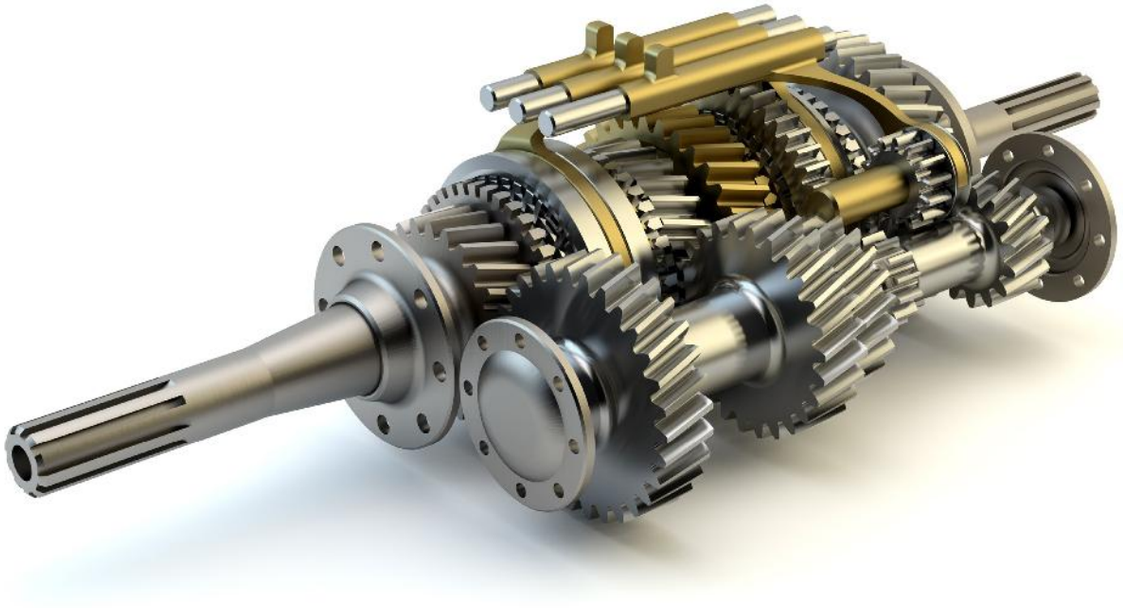
Materials Required:

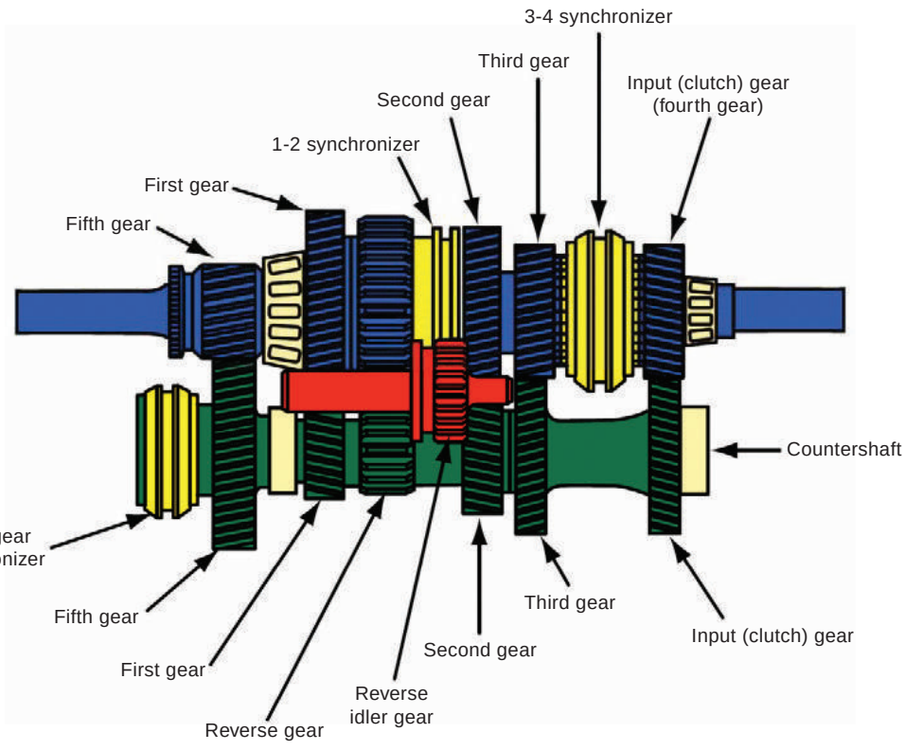
1. Cotton waste
2. S.A.E 90 oil
3. Metal tray
4. Grease
5. Kerosene

Reasons for Dismantling

- Gear slip
- More noise in neutral position
- Difficult to operate gear shifting lever
- Gear changing is very hard
- Manufacturer POI is over







Speed	Gear Ratio
First gear	7:1
Second gear	3:3:1
Third gear	1:7:1
Top gear	1:1

Dismantling procedure:

- Remove the gear box from the vehicle and place it on the work bench.
- Drain the gear box oil.
- Remove the gear shifting lever, selector rod mechanism, end cover, bearings, main shaft gears, main shaft, clutch shaft with gear, counter shaft and etc…

Inspection:

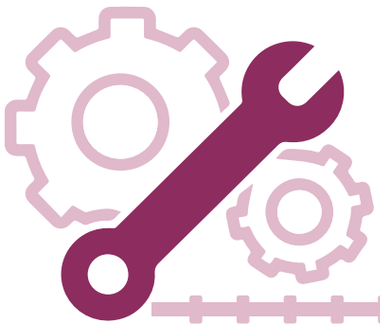
- Clean all the pants.
- Clean the gear box casing and inspect for any damage.
- Check the main shaft, gears, counter shaft gears and clutch gear for any damage and replace the new one if any damage.
- Check the clutch shaft, main shaft and counter for any damage.

Assembling:

- Assembling is the reverse process of dismantling.

Result:

Thus the given gear box was dismantled, inspected and reassembled.



Practical – 3
Differential

Aim:

Dismantling, inspecting and assembling the given differential.

Equipment:

Given differential unit.

Tools Required:

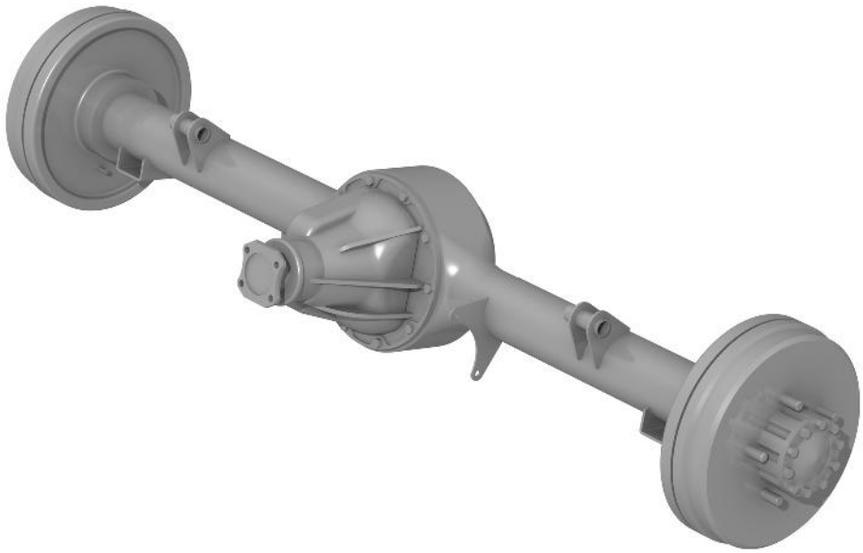
1. Ring spanner
2. Double ended spanner
3. Copper hammer
4. Iron hammer
5. Drift punch

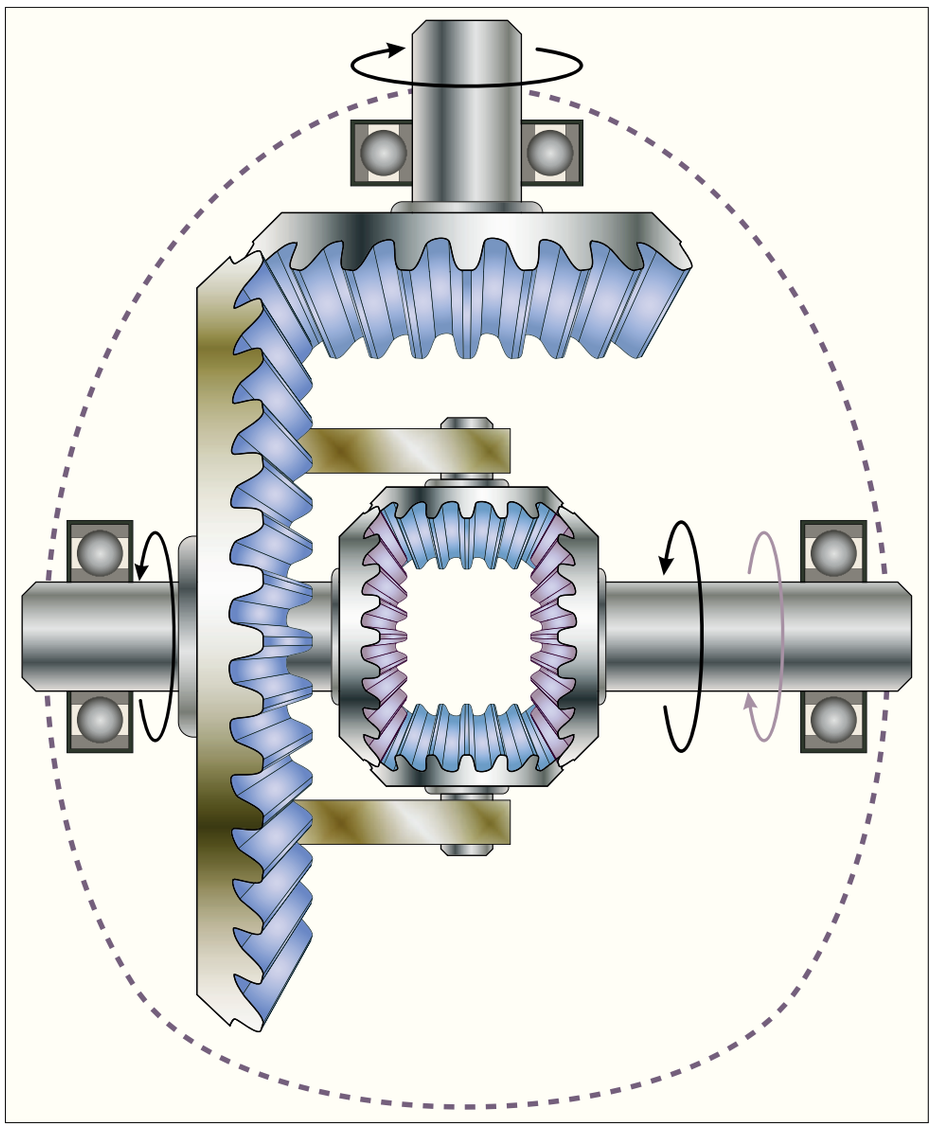
Materials Required:

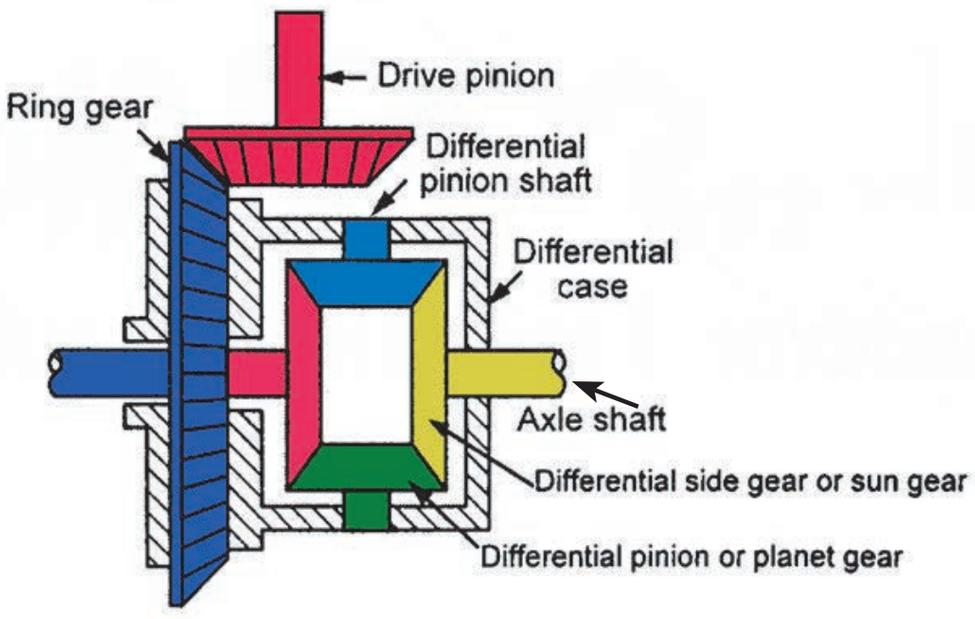
1. Cotton waste
2. S.A.E 90 oil
3. Metal tray
4. Grease
5. Kerosene
6. Degreaser

Reasons for Dismantling:

- More noise in differential
- Rear wheel rotate in low speed
- Rear wheel does not turns easily
- Low power transmits to rear wheel
- Manufacturer POI is over.







Dismantling:

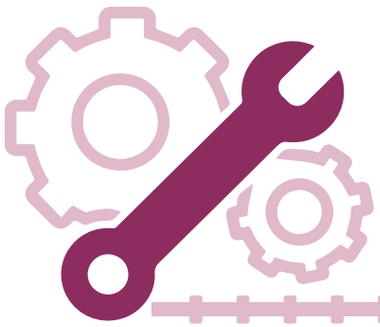
- Place the differential unit on the work bench.
- Remove the crown wheel.
- Remove the differential cage.
- Remove the sun gear, planet gears.
- Clean all the parts with kerosene.

Assembling:

Assembling is the reverse process of dismantling.

Result:

Thus the given differential was dismantled, inspected and reassembled.



Practical – 4
Steering Gear Box

Aim:

Dismantling, inspecting and assembling the given steering gear box

Equipments:

Given steering gear box

Tools Required

1. Double end spanner
2. Ring spanner
3. Box spanner
4. Plastic hammer
5. Ball Peen hammer
6. Screw driver
7. Plier
8. Drift punch
9. Feeler gauge
10. Torque wrench
11. Metal tray

Materials Required:

1. Cotton waste
2. Kerosene

Reasons for Dismantling:

- Hard steering wheel
- More vibration
- Movement of steering arm is not transmitted to stub axle
- Manufacturer POI is over.

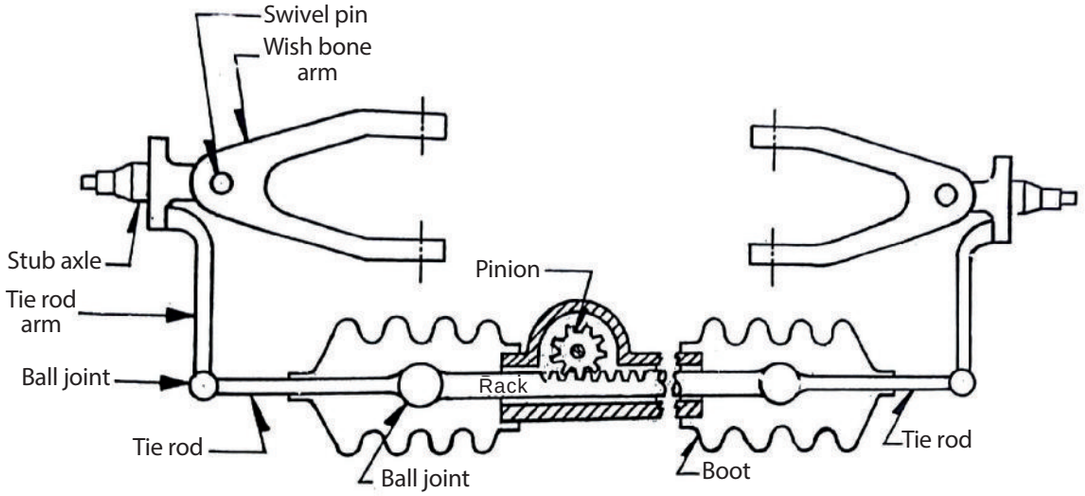
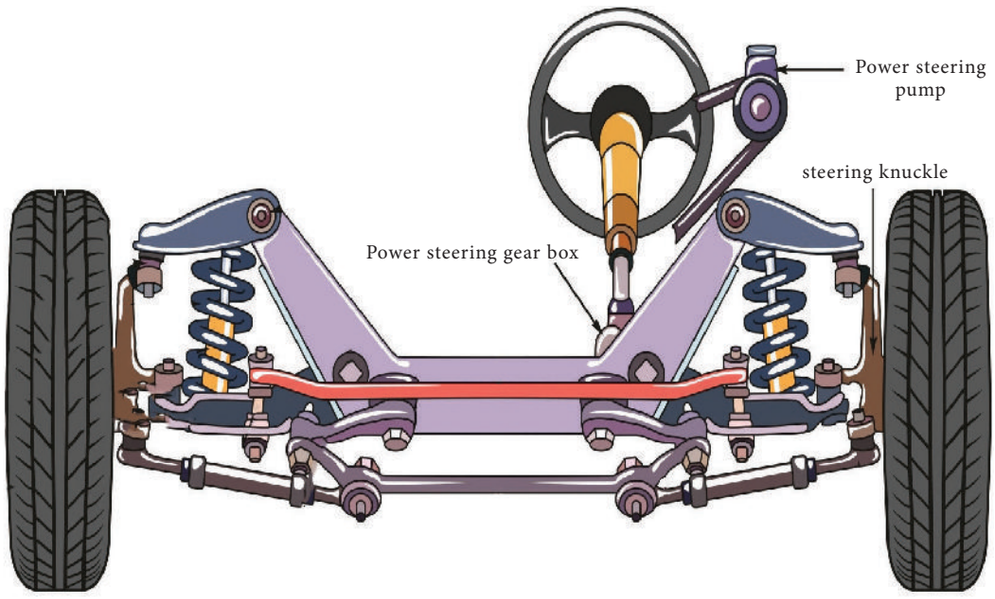
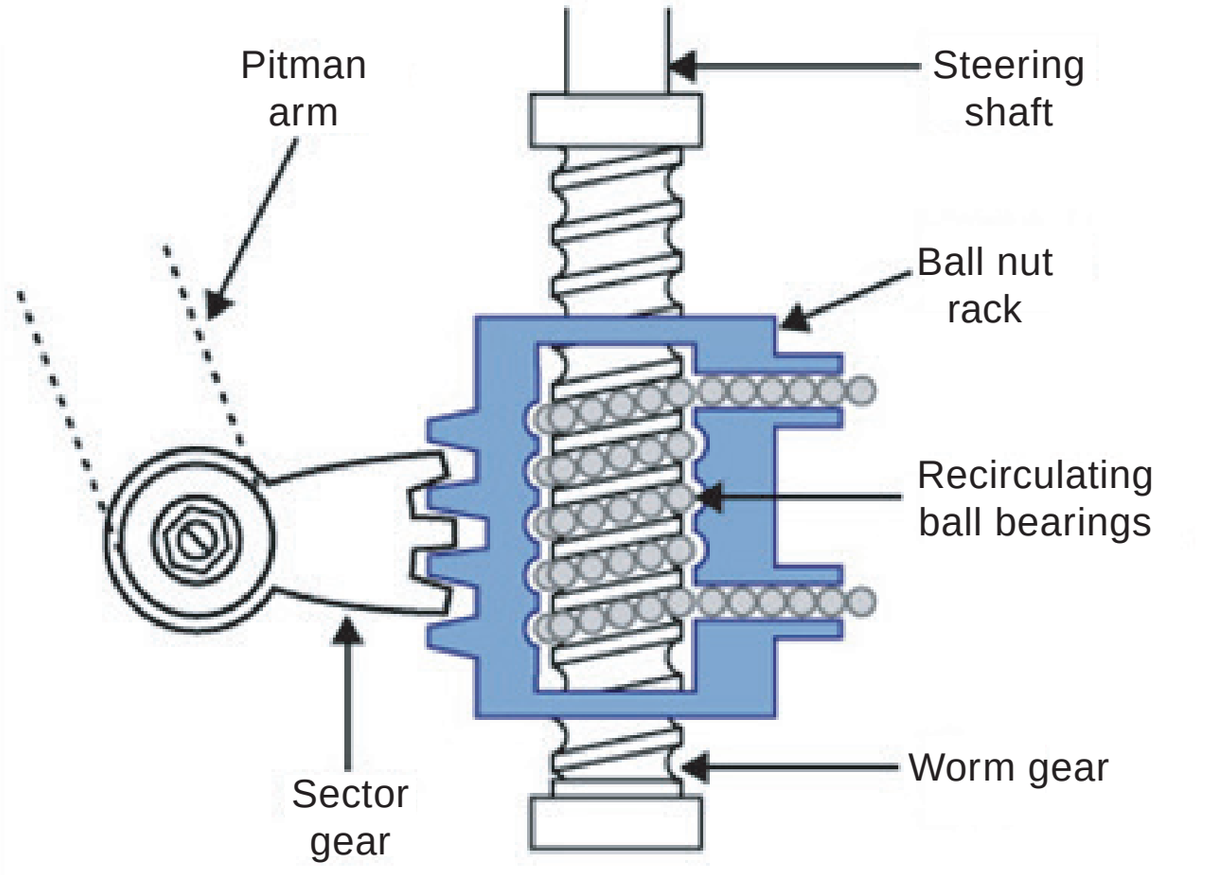


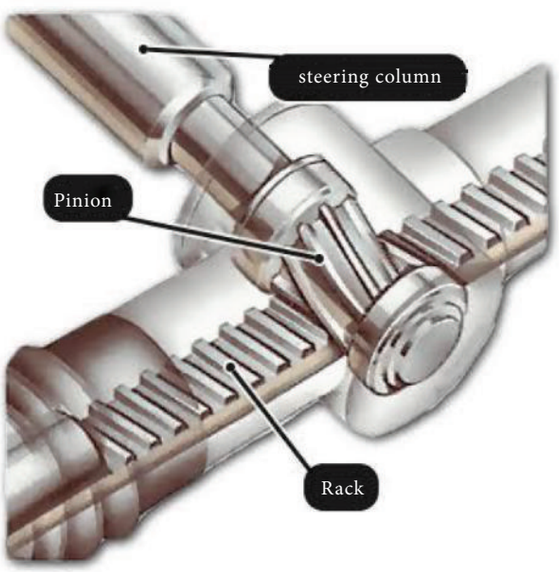
Fig (a) Rack and pinion type steering gear box



Dismantling

- Remove the horn switch.
- Remove the steering wheel by loosening the wheel lock nut.
- Remove the end play column, thrust bearing and shaft.
- Remove the steering column, thrust bearing, and shrin
- Remove the drop arm drag link
- Remove the steering gear.





Inspection

- Clean all the parts by kerosene.
- Inspect the, steering wheel steering shaft and worm gear for any damage.
- Inspect the cross shaft and drop arm.

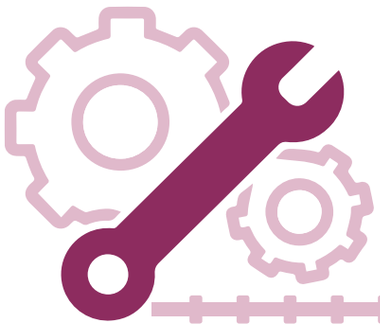
- Inspect the bolts, nuts and screw.
- Inspect the thrust bearing shim and housing for any damage.
- Inspect the roller for any damage.
- Replace all the damaged parts by new one.

Assembling

Assembling is the reverse process of the dismantling.

Result

Thus the given steering gear box was dismantled, inspected and reassembled.



Practical – 5
Master Cylinder

Aim

Dismantling, inspecting and assembling the given master cylinder.

Equuipments

Given master cylinder

Tools required

1. Ring spanner
2. Double end spanner
3. Screw driver
4. Wooden hammer

Material required

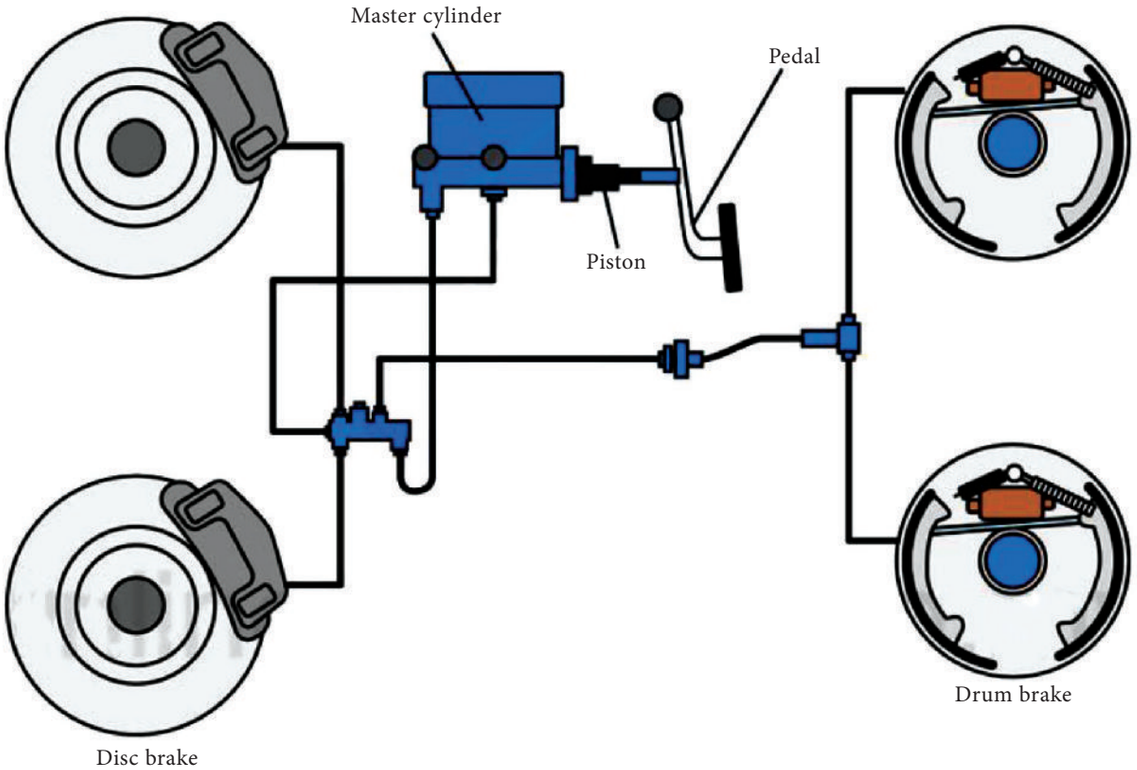
1. Cotton waste
2. Diesel
3. Brake oil

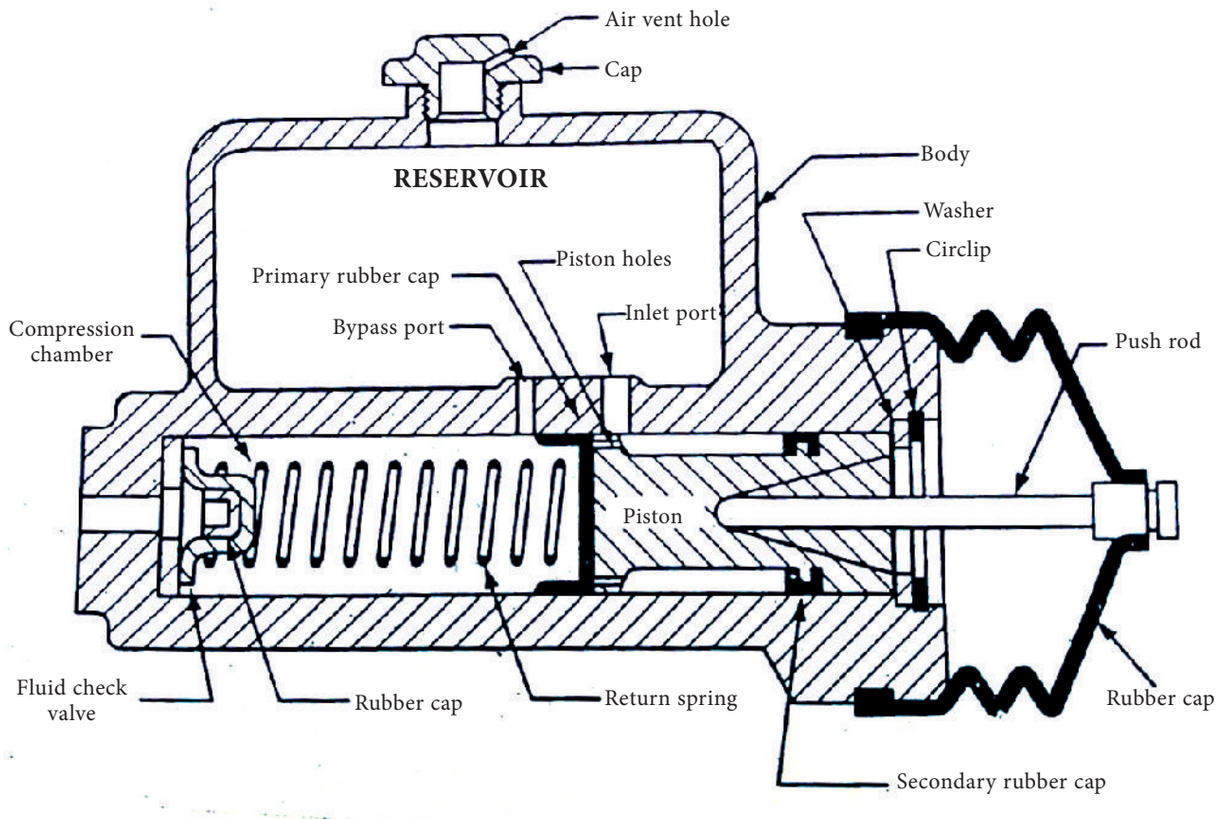
Reason for dismantling

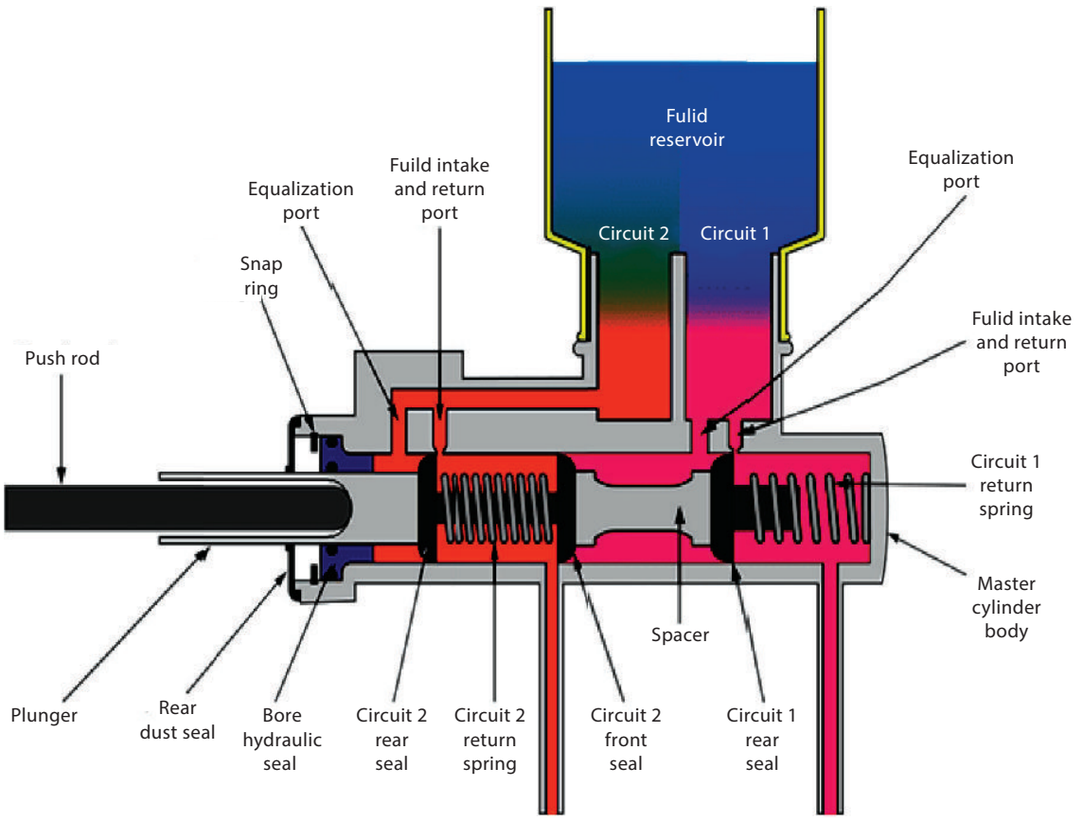
1. Braking system not functioning properly.
2. Leakage if brake fluid from master cylinder.
3. Less braking efficiency.

Dismantling

- Remove the oil lines from the master cylinder.
- Disconnect the brake pedal connection from the master cylinder from the chassis.
- Drain out the brake fluid from the master cylinder.
- Remove the circlip by using the circlip plier.
- Remove the piston assembly and spring from the master cylinder by using wooden hammer.







Inspection

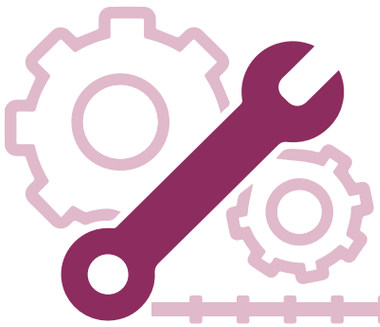
- Clean all the parts.
- Check the inlet port and by pass port for any blockage.
- Check the spring force.
- Check the piston hole.
- Piston spring, force, value, rubber cups, and brake, pedal linkage.
- Replace the defective parts by a new one.

Assembling

Assembling is the reverse process of dismantling.

Result

Thus the given master cylinder dismantled, inspected and re-assembled.



Practical – 6
Wheel Cylinder

Aim

Dismantling, inspecting and assembling the given wheel cylinder.

Tools Required

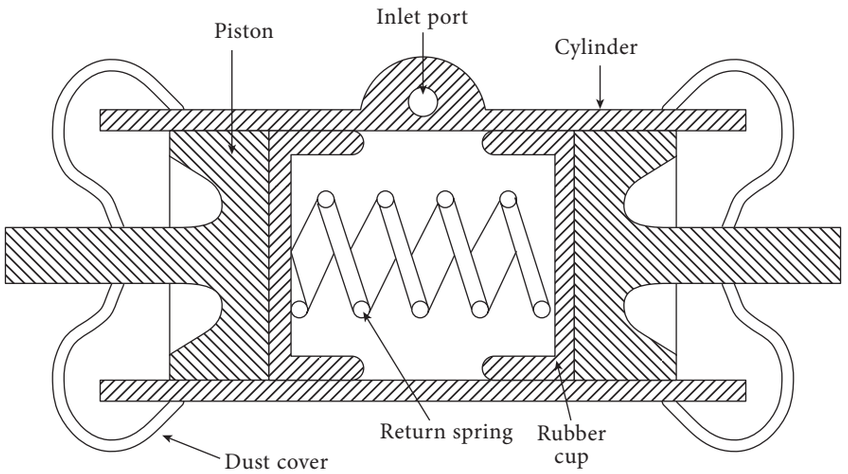
1. Long nose plier
2. Double end spanner
3. Ring spanner
4. Screw driver
5. Brake shoe tongues
6. Wooden hammer

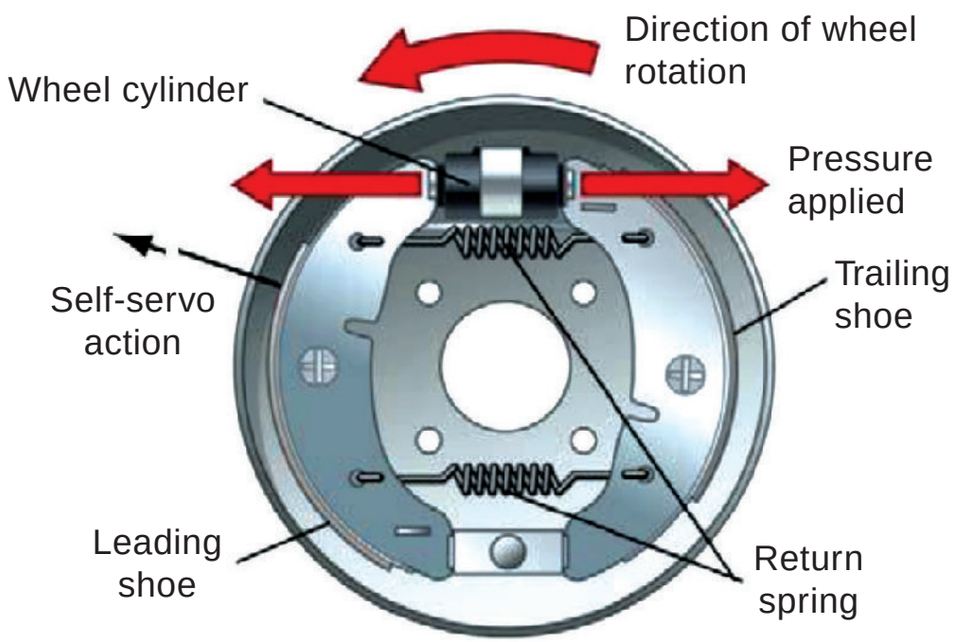
Material required

1. Cotton waste
2. Kerosene
3. Brush

Reason for dismantling

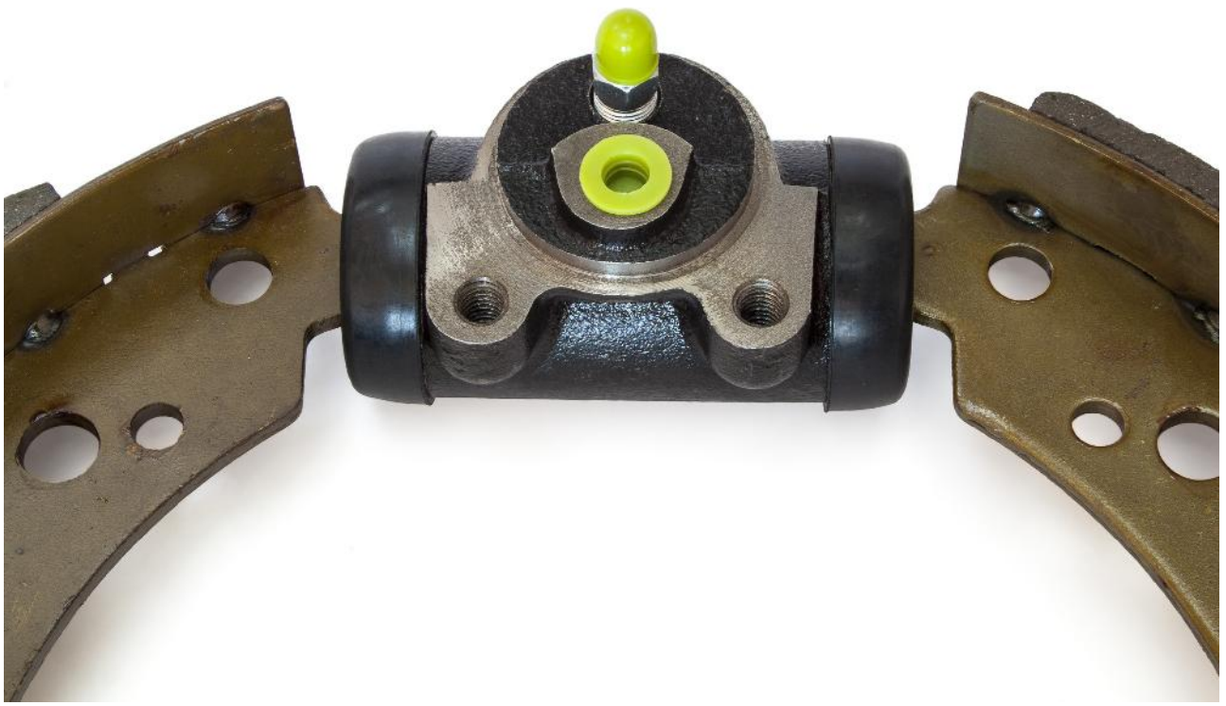
1. Brake is not applied when brake pedal is pressed
2. Brake is not released even return spring is in good condition
3. Leakage of brake fluid through dust cover
4. Less brake efficiency
5. Wear and tear of rubber cup
6. Difficulties in brake pedal operating
7. Manufacture POI is over





Dismantling

- Disconnect the brake fluid pipe line connection
- Remove the wheel
- Remove the brake drum
- Remove the brake shoe return spring & brake shoe
- Remove the brake shoe tappet
- Remove the mounting bolts of the wheel cylinder
- Remove the wheel cylinder from the brake plate
- Place the wheel cylinder on the work bench
- Remove the dust cover
- Dismantled the wheel cylinder
- Remove the piston, rubber cup and spring



Inspection

1. Clean all the parts.
2. Check the wear and tear or any damage in the piston.
3. Check the wheel cylinder body and the condition of inlet port and the bleeder port.
4. Check the condition of the spring.
5. Check the primary and secondary rubber cup.

Assembling

1. Assembling is the reverse process of dismantling.
2. Check the brake condition after assembling.

Result

Thus the given wheel cylinder was dismantled, inspected and re-assembled.

Practical – 7
SHOCK ABSORBER

Aim
Dismantling, inspecting and assembling the given shock absorber.

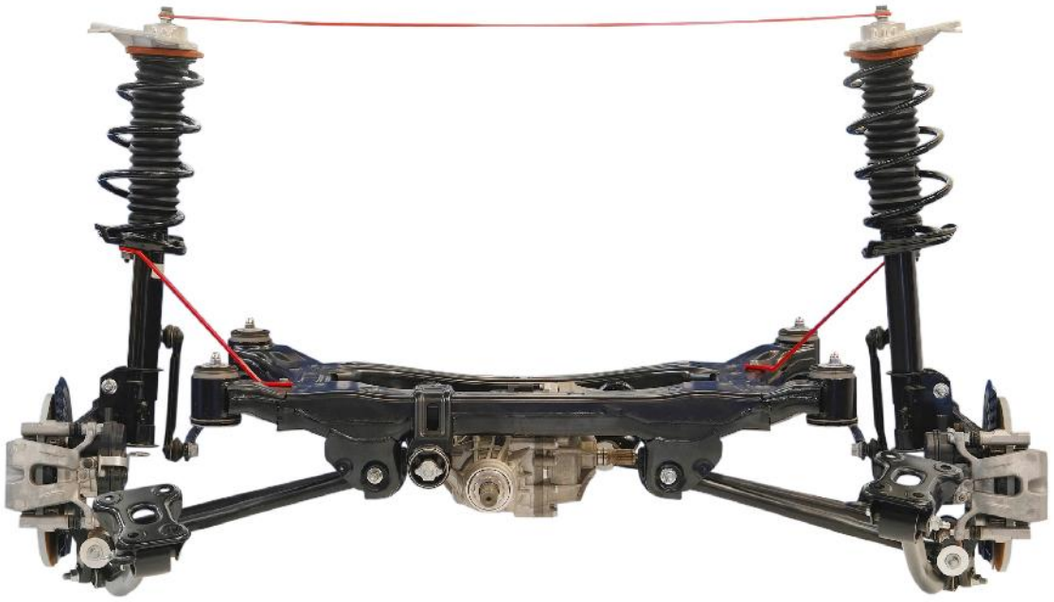
Equipment required
Given shock absorber

Tools required
1. Double end spanner
2. Screw driver
3. Drift punch
4. Wooden hammer

Material required
1. Cotton waste
2. Grease
3. Oil tray

Reasoning for dismantling
- More noise suspension system
- Vehicle pulling to one side
- Improper functioning of shock absorber
- Manufacturing POI is over

Dismantling
1. List the front axle of the vehicle by using jack
2. Remove the lower eye and upper eye mounting bolts of the shock absorber
3. Remove the shock absorber from the vehicle



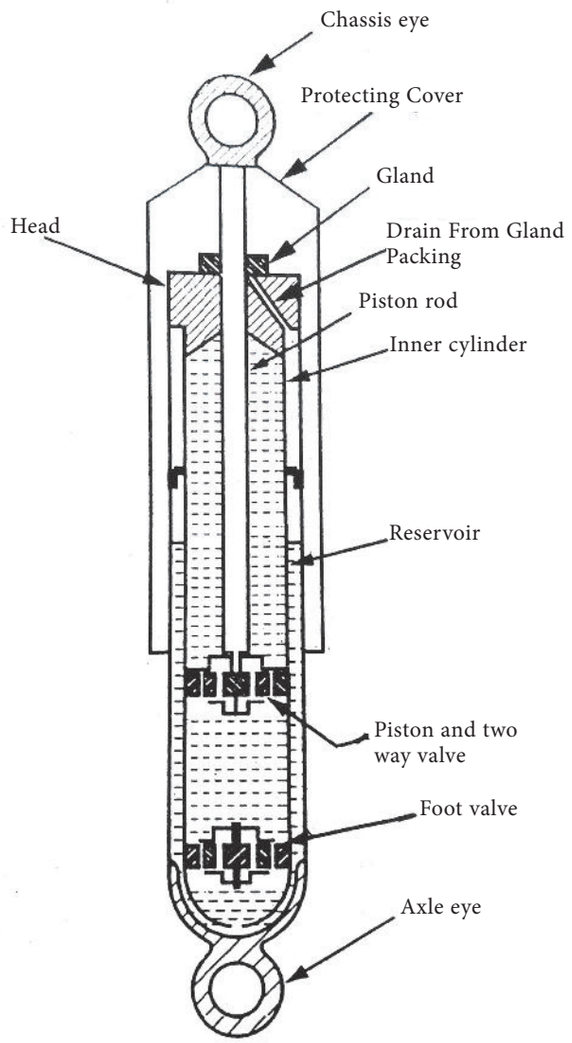


Fig 7.5.2.2 Telescopic type Shock absorber

4. Clean the shock absorber by kerosene or water.
5. Loosen the outer tube nut and remove the foot value in the inner tube.
6. Remove the dust cover.
7. Remove the piston and valve assembly.

Inspection

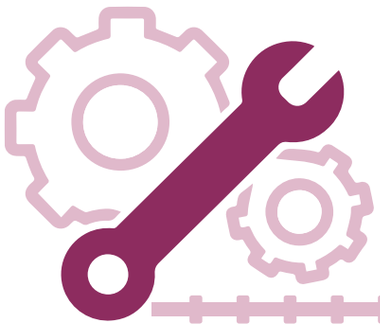
- Inspect the upper eye and lower eye for any damage.
- Inspect the inner tube, outer tube, foot valve, cylinder, piston assembly and etc.
- Replace the defective parts by new one.

Assembling

Assembling is the reverse process of dismantling.

Result

Thus the given shock absorber was dismantled, inspected and assembled.



Practical – 8
SELF STARTER MOTOR

Aim

Dismantling, inspecting and assembling of self starter motor.

Equipment required

Given starter motor.

Tools required

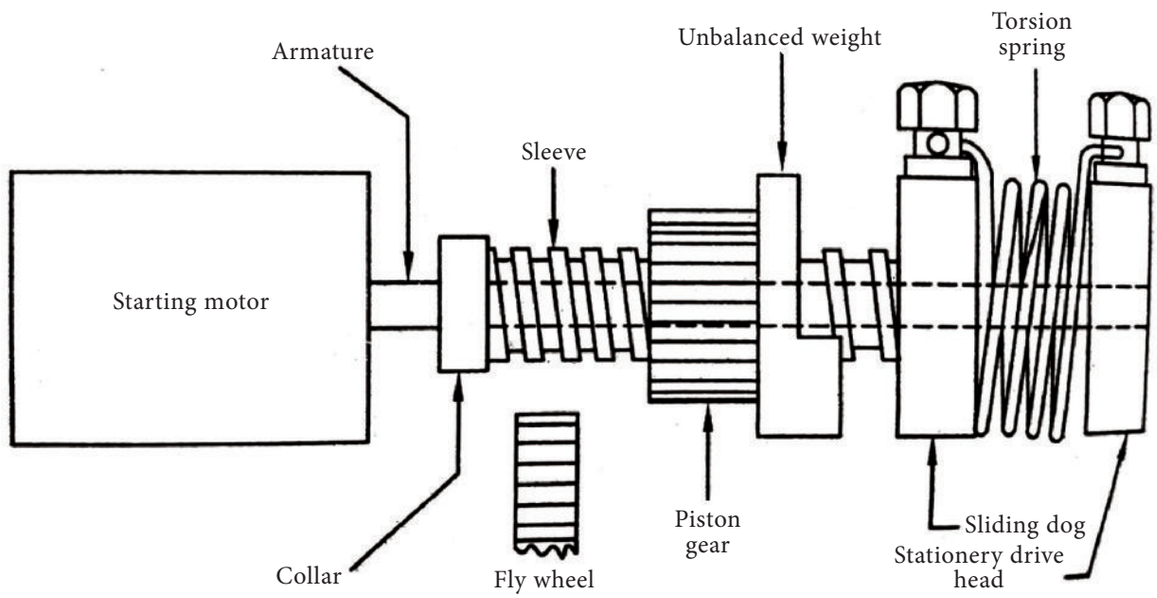
1. Double end spanner
2. Ring spanner
3. Wooden hammer
4. Screw driver
5. Armature growler
6. Insulation tester

Material required

- Fine cloth
- Kerosene
- Fine emery sheet
- Insulation tape
- Metal tray
- Work bench

Reasoning for dismantling

- Armature not rotating
- Armature rotate is slowly
- Armature rotates continuously
- More noise while running
- Manufacture POI is over



Dismantling

- Disconnect all the electrical connections.
- Disconnect the mounting bolts and nuts of the starting motor.
- Remove the starting motor from the vehicle and clean the outer portion.
- Place the starting motor on workbench.
- Remove the end cover.
- Remove the armature shaft.
- Dismantled the drive mechanism [Pinion, Bearing, Spring and etc.]

Inspection

- Clean all the parts.
- Inspect the armature, field winding, collar, sleeve unbalanced weight, pinion, drive mechanism, spring, bearing and etc… for any damage.

Insulation test

- An A.C. circuit containing two poles and one light switch is used for this test.
- One pole is connected with the armature coil and other is with the segment.
- 'ON' the light switch, if the light, glows change the brush plates.
- Connect one pole to the field terminals and other end with the vice, if the light, glows change the field.

Armature glower tester

It used to check any short circuit in the armature.

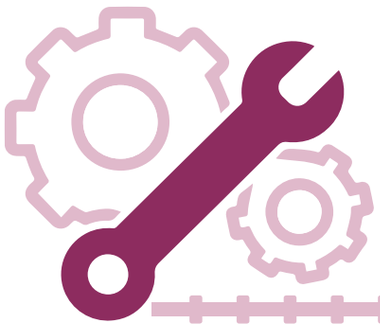
If a growling sound comes, then there is a short circuit in the armature, otherwise if is ok.

Assembling

Assembling is the reverse process of dismantling.

Result

Thus the given self starter motor dismantled, inspected and assembled.



Practical – 9
DYNAMO

Aim

Dismantling, inspecting and assembling the & given dynamo.

Equipments required

Given Dynamo

Tools required

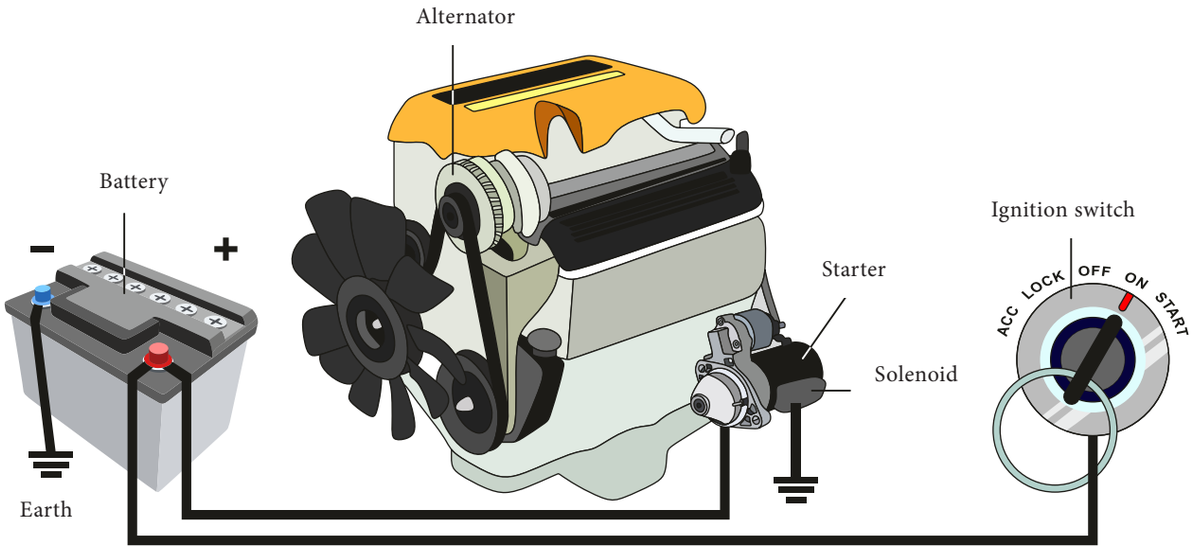
1. Ring spanner
2. Double end spanner
3. Screw driver
4. Drift punch
5. Wooden hammer
6. Armature growler
7. Insulation tester
8. Puller
9. Copper hammer

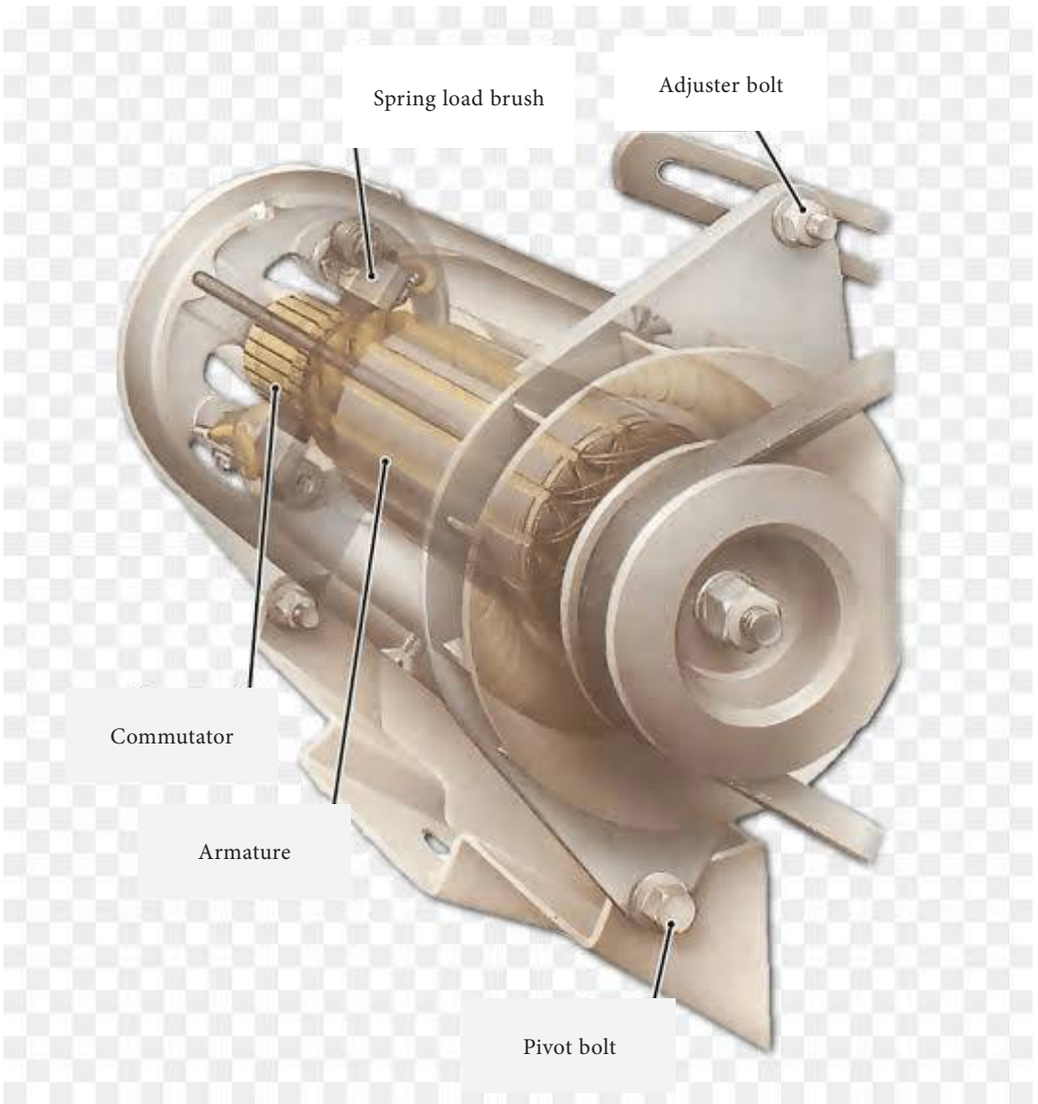
Material required

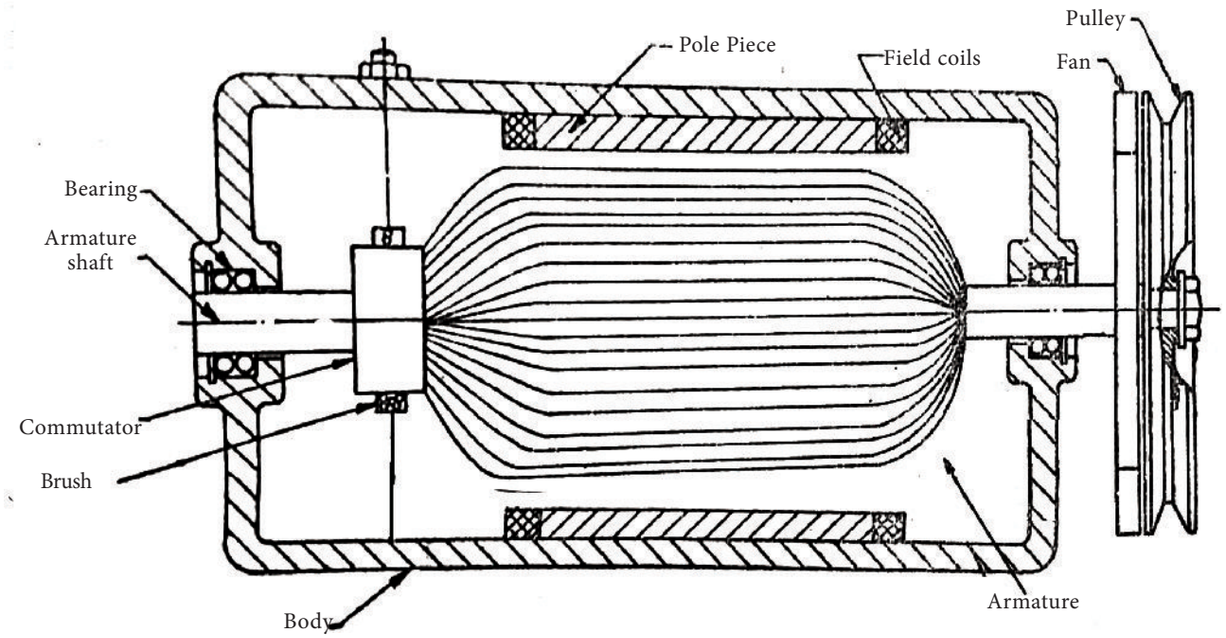
1. Cotton waste
2. Kerosene

Reasoning for dismantling

- No current supply through terminals
- More noise when the generator is running
- Low output current in dynamo
- Damage armature bearing
- Manufacture of POI is over







Dynamo (or) D.C. Generator

Dismantling

- Disconnect the electrical connections.
- Remove the belt from the dynamo pulley.
- Remove the mounting bolts and nuts.
- Place the generator on the work bench.
- Dismantling the following parts from the generator.

1. 'V' Pulley
2. End cover
3. Armature assembly
4. Commutator

Testing

Insulation test

Insulation test

- An A.C circuit containing two poles and one light switch is used for this test.
- One pole is connected with the armature coil and other is with the segment.
- 'ON' the light switch, if the light, glows change the brush plates.
- Connect one pole to the field terminals and other end with the vice, if the light, glows change the field.

Inspections

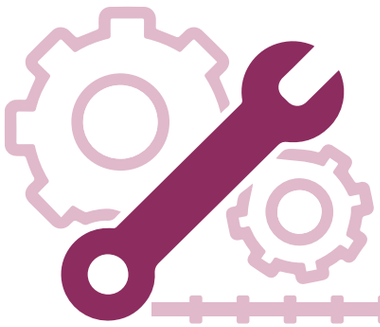
- Inspect the following parts.
- Armature winding, field coils, commutator, carbon brush, bearing, spring force, fan, 'V' pulley and etc…

Assembling

Assembling is the reverse process of dismantling.

Result

Thus the given dynamo was dismantled, inspected and assembled.



Practical – 10
BATTERY

Aim

To check the condition of the battery.

Equipments required

Given battery

Tools required

1. Double end spanner
2. Screw driver
3. Hydrometer
4. Voltage tester

Material Required

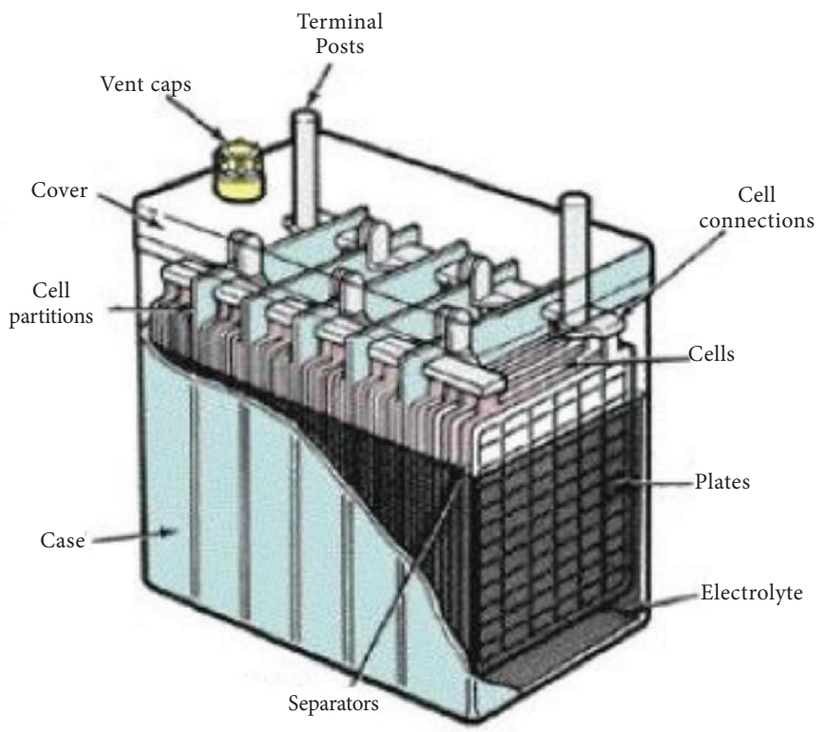
- Cotton waste
- Grease
- Distilled Water

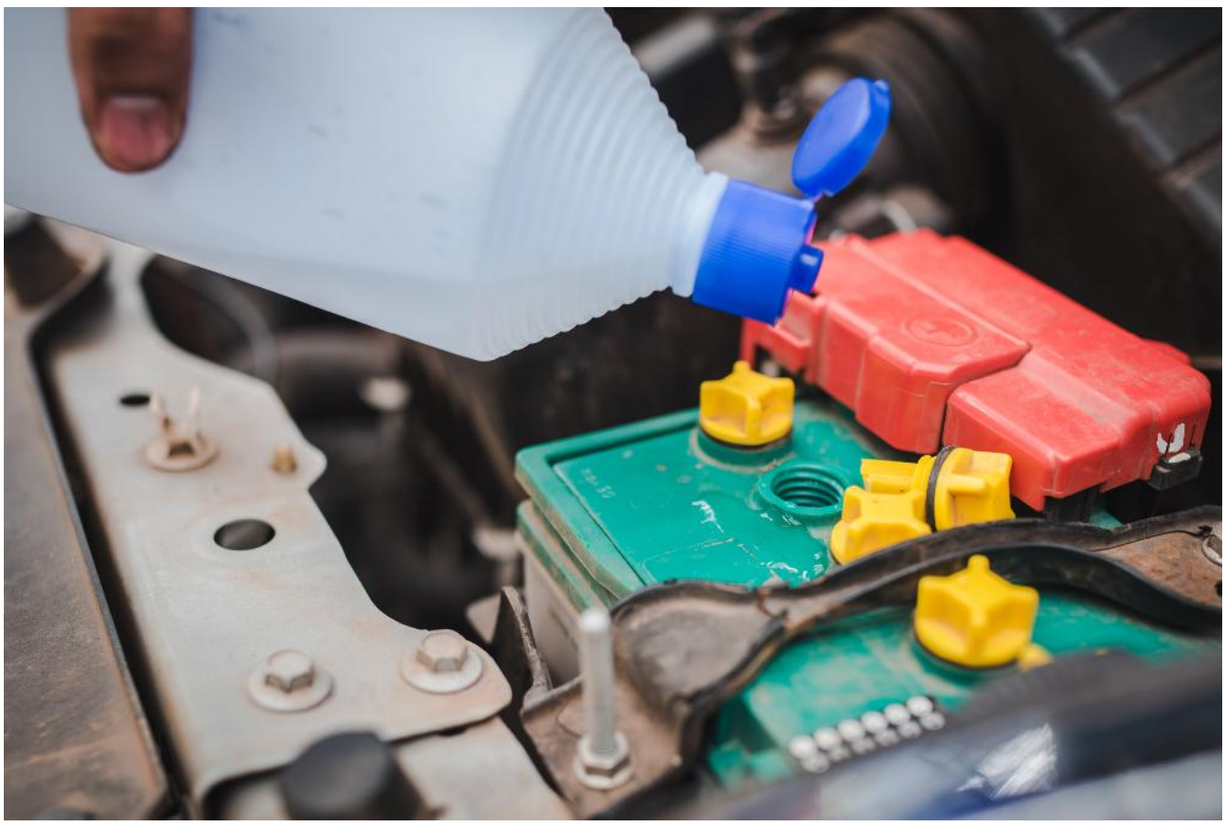
Procedure

Specific gravity test

- Hydrometer is used for this test.
- Remove the vent plug and place the hydrometer hose inside the cell.
- Press and release the rubber bulb.
- Small amount of electrolyte is drawn into the glass tube.
- Now the float is float in the electrolyte.
- Note the reading on the graduate scale.

S. No.	Cell No.	Specific Gravity
1.		
2.		
3.		
4.		
5.		
6.		





- Tabulate the reading.
- Repeat the same procedure for other cells.

Cell voltage tester

Cell voltage tester is used to check the volt for cell.

Remove the vent plug and check the voltage if cell by using voltage tester.

Tabulate the following.

Repeat the same procedure for other cells.

Maximum cell voltage per cell is 2.1.V it depends on specific gravity of the electrolyte.

S. No.	Cell No.	Volt
1.		
2.		
3.		
4.		
5.		
6.		

Result

The charge condition of battery is checked.