Author:Roșu Răzvan Andrei

Day 1

Day 1: Workplace Safety & Equipment

Research safety rules, types of equipment, and PPE.

Create a safety poster or digital presentation in teams.

Understand and apply safety rules, confidently identify equipment.

---

1. Safety Rules:

Follow manufacturer instructions.

Keep the workspace clean and organized.

Never work alone with heavy machinery.

Inspect equipment before use.

2. Types of Equipment:

Hand Tools: Screwdrivers, hammers, saws.

Power Tools: Drills, saws, grinders.

Measuring Tools: Rulers, micrometers, utility knives.

3. PPE (Personal Protective Equipment):

Eye Protection: Safety glasses or goggles.

Hearing Protection: Ear plugs or muffs.

Gloves: For hand protection.

Masks/Respirators: For breathing protection.

Protective Clothing: Aprons or workwear.


WORKSHOP
SAFETY &
TOOLS
Stay Safe. Work Smart.

Author:Roșu Răzvan Andrei

Day 2

Day 2 Measuring Instruments

Research calipers, micrometers, and gauges. Practice measuring different parts with guidance.

Measure components accurately and record the results.

Instruments:

- **Caliper: Measures external, internal dimensions, and depths.**
- **Micrometer: Provides highly accurate thickness or diameter measurements.**
- **Gauge: Checks tolerances, gaps, or thread sizes.**

Conclusion:

Using measuring instruments correctly ensures precise results and helps maintain quality control.

Author:Roșu Răzvan Andrei

Day 3

Day 3: Fasteners & Torque

Objective:

Explore various types of nuts, bolts, threads, and torque tools. Practice proper tightening using a torque wrench. Use fasteners correctly and understand the importance of torque in mechanical assemblies.

Activities:

- Identify main types of bolts, nuts, and thread types (metric, UNF, UNC, etc.).
- Present fastening tools: torque wrenches, ratchets, open-end wrenches.
- Demonstrate proper use of a torque wrench.
- Hands-on practice: tightening fasteners using correct torque values.

- Discuss consequences of under- or over-torquing fasteners.

Skills Acquired:

1. Ability to recognize and select proper fasteners for specific applications.
2. Proper use of torque wrenches.
3. Understanding of the relationship between torque and assembly safety.
4. Prevention of failures caused by incorrect torque application.


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Author : Roșu Răzvan Andrei

Day 4

Title: 2-Stroke vs. 4-Stroke Engines: A Concise Comparison

Introduction:

2-stroke and 4-stroke engines are used in various applications, from motorcycles to gardening equipment. This project aims to compare the two types of engines, highlighting the main differences and advantages/disadvantages.

2-Stroke Engines:

* Operating Principle: The complete cycle (intake, compression, combustion, exhaust) is completed in two piston movements.
* Advantages:
    * Higher power-to-weight ratio.

* Simpler construction.

* Disadvantages:

* Higher fuel consumption.

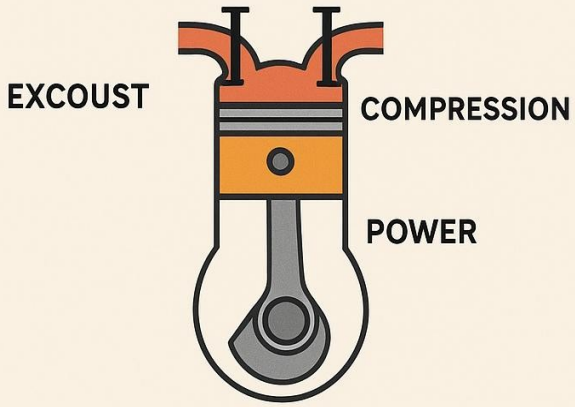
* Higher pollutant emissions.

4-Stroke Engines:

* Operating Principle: The complete cycle is completed in four piston movements.
* Advantages:
    * Lower fuel consumption.
    * Lower pollutant emissions.
    * Longer lifespan.
* Disadvantages:

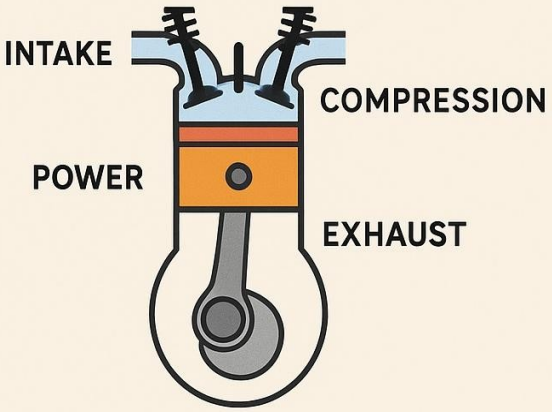
* Lower power-to-weight ratio.
* More complex construction.

2-STROKE ENGINE



- Higher power
- Lower efficiency
- Higher emissions
- Oil mixed with fuel

4-STROKE ENGINE



- Lower power
- Higher efficiency
- Lower emissions
- Separate oil lubrication

Conclusion:

The choice between a 2-stroke and a 4-stroke engine depends on the specific application and the user’s priorities. 2-stroke engines are preferred for their power-to-weight ratio, while 4-stroke engines are more efficient and environmentally friendly.

Author:Roșu Răzvan Andrei

Day 5

Engine Parts Project

Day 5 – Internal Engine Parts

Research:

To understand the internal parts of an engine, I watched educational videos about how a four-stroke internal combustion engine works. I also looked at diagrams in an automotive repair manual.

Main Engine Parts Identified and Labeled:

1. **Piston**

Function: Moves up and down inside the cylinder to compress the air-fuel mixture and transfer energy to the crankshaft.

2. **Crankshaft**

Function: Converts the piston’s up-and-down

motion into rotational motion that powers the vehicle.

3. Camshaft

Function: Controls the opening and closing of the engine’s intake and exhaust valves at the correct times.

4. Valves

Function: Allow air and fuel to enter the combustion chamber (intake valve) and exhaust gases to exit (exhaust valve).

5. Cylinder Head

Function: Seals the top of the cylinder and houses

components like valves and spark plugs.

6. **Spark Plug**

Function: Creates a spark that ignites the air-fuel mixture inside the cylinder.

7. **Connecting Rod**

Function: Connects the piston to the crankshaft and transfers the motion.

8. Oil Pan

Function: Holds the engine’s oil supply and helps to cool and lubricate engine components.

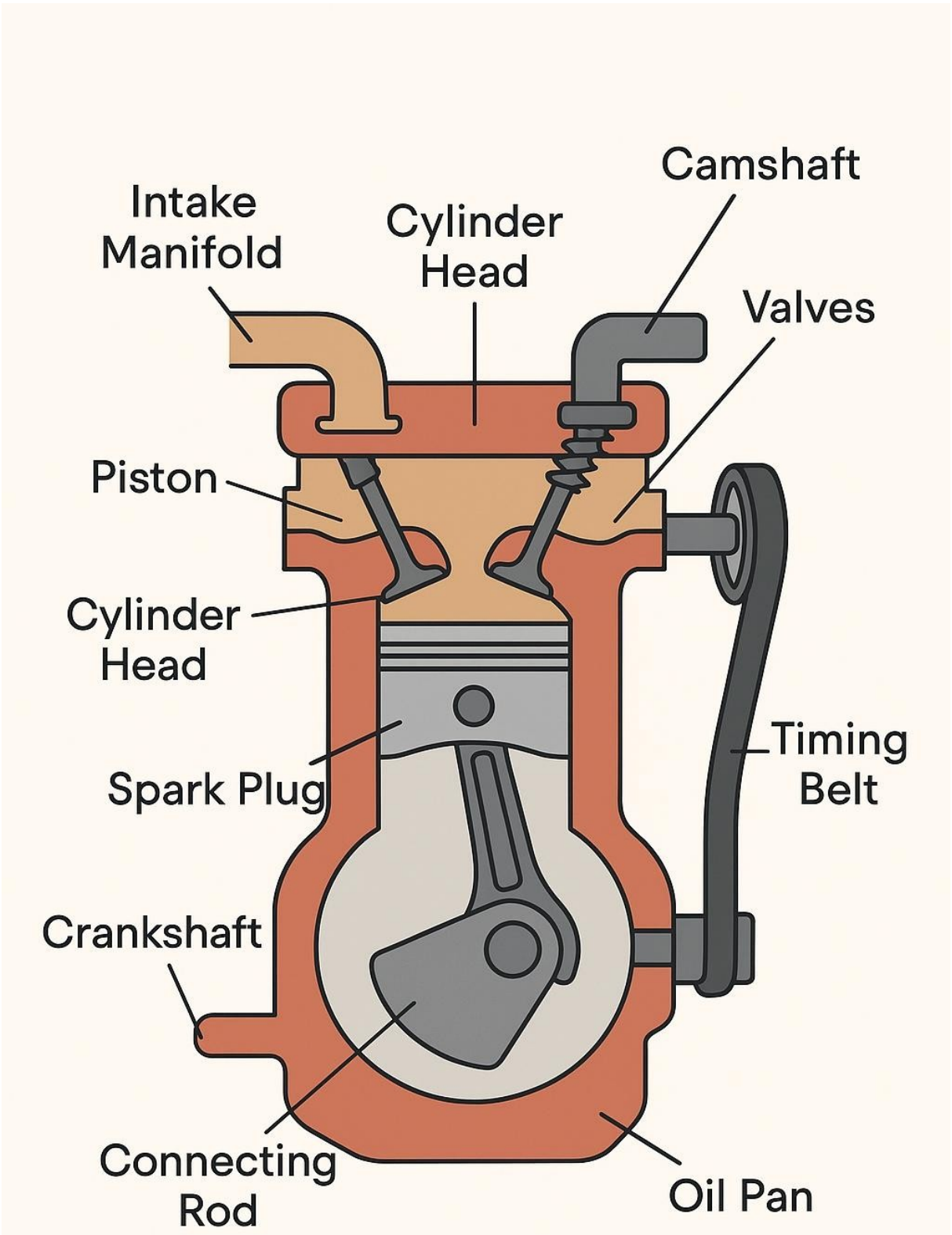
9. Timing Belt

Function: Synchronizes the rotation of the crankshaft and camshaft to ensure valves open and close at the right time.

10.Intake Manifold

Function: Distributes air (or air/fuel mixture) evenly to each cylinder.

Diagram :


Intake Manifold
Cylinder Head
Camshaft
Valves
Piston
Cylinder Head
Spark Plug
Timing Belt
Crankshaft
Connecting Rod
Oil Pan

Conclusion:

The internal parts of an engine work together precisely to create combustion and power. Each part has a specific role, and if one part fails, the whole engine may

stop working properly. Understanding these parts helps in diagnosing engine problems and maintaining vehicles.

Author : Roșu Răzvan Andrei

Day 6

Day 6: Lubrication Systems

Project Goal:

On this day, we will focus on researching and

understanding engine lubrication systems, including oil types, oil pumps, and filters. We will also observe or perform an oil change, explaining the oil system flow and its importance in engine performance.

1. **Research on Engine Oils:**

Engine oils are crucial for the smooth operation of the engine by reducing friction between moving parts, cooling the engine, and cleaning it.

- **Types of Engine Oils: Mineral Oils: Derived from crude oil, these**

are traditionally used in older engines.

- **Synthetic Oils: Designed for superior performance, these oils are more stable at high temperatures and provide better protection.**

- **Semi-Synthetic Oils:**
  A mix of mineral and synthetic oils, offering a balance between performance and cost.

- **Viscosity Rating:**

Oils are classified based on viscosity, measured by SAE (Society of Automotive Engineers). For example, a 5W-30 oil

is suited for varying temperature conditions, providing good performance both in cold and hot temperatures.

2. Oil Pumps:

- **The oil pump plays a crucial role in circulating oil throughout the engine, maintaining pressure, and ensuring that all moving parts are lubricated correctly.**

Types of Oil Pumps:

- **Gear Pumps: The most common type, used in most automotive engines, where two gears mesh together to move oil.**
- **Rotor Pumps: Used in high-performance engines to provide more consistent oil flow.**

- **Vane Pumps: Often used in diesel engines, providing steady oil pressure and flow.**

3. Oil Filters:

- **Oil filters are essential for protecting the engine as they remove impurities and**

particles that could cause wear and damage.

Types of Oil Filters:

- **Full-flow Filters:** These filter the entire volume of oil circulating through the engine.

- **Bypass Filters: Filter a portion of the oil, allowing faster oil flow while still keeping it clean.**

4. **Observe or Perform an Oil Change:**

- **Performing an oil change is a vital part of maintaining an engine. Here’s an outline for performing or observing an oil change:**

Preparation:

- **Ensure you have the correct tools, including a new oil filter.**
- **Identify the engine type and select the proper oil.**

Procedure:

- **Warm up the engine to allow the oil to flow more easily.**
- **Drain the old oil by removing the drain plug and letting it completely empty.**
- **Replace the oil filter (ensure the gasket is lubricated).**

- **Refill the engine with the recommended oil type and quantity.**
- **Check for Leaks: After refilling, check for any leaks and ensure the oil level is correct.**

5. **Explanation of Oil System Flow:**

- **The oil is pumped from the oil pan (sump) by**

the oil pump, which pushes it through a series of channels to lubricate the engine's moving parts. After lubricating, the oil passes through the oil filter to remove contaminants before circulating back into the engine. Oil pressure is maintained

to ensure that oil reaches all critical engine parts.

6. Oil Types and Their Application:

- Different engines require different types of oil based on their performance needs, temperature ranges, and load. For example:

- **High-performance vehicles may require synthetic oils for better temperature tolerance and smoother operation.**
- **Older vehicles may benefit from mineral oils due to their simpler composition.**

Author:Roșu Răzvan Andrei

Day 7

Day 7: Cooling Systems

Project Goal:

On this day, we will explore the cooling systems of engines,

focusing on the components such as radiators, coolant, and water pumps. Teams will create a diagram to represent the system, while also understanding the causes of overheating and the flow of the cooling system.

1. **Investigate Radiators, Coolant, and Water Pumps:**

Radiators:

The radiator is a critical component of the engine cooling system. Its main function is to

dissipate the heat absorbed by the coolant, keeping the engine from overheating.

Types of Radiators:

Aluminum Radiators: Lightweight and efficient in heat dissipation.

Copper/Brass Radiators: Older style, providing excellent durability but heavier.

How Radiators Work:

The hot coolant enters the radiator, where it is cooled by air passing through the radiator fins. The cooler coolant is then recirculated back

into the engine to absorb more heat.

Coolant:

Coolant (Antifreeze) is a fluid mixture (usually water and ethylene glycol) used in the cooling system to prevent freezing in cold temperatures and

overheating in hot conditions.

The coolant also contains additives to prevent rust and corrosion within the engine’s cooling system.

Types of Coolants:

Inorganic Acid Technology (IAT): Typically used in older vehicles; it needs to be replaced more frequently.

Organic Acid Technology (OAT): Lasts longer and is used in modern vehicles.

Hybrid Organic Acid Technology (HOAT): A mix of IAT and OAT, offering better protection for newer engines.

Water Pumps:

The water pump circulates coolant through the engine and radiator, ensuring a

continuous flow of coolant to regulate the engine temperature.

How Water Pumps Work:

The pump is usually driven by a belt connected to the engine’s crankshaft. It pulls coolant from the radiator and pushes it

through the engine and back into the radiator.

Signs of Water Pump Failure:

Leaks, strange noises, or overheating can indicate water pump issues.

---

2. Diagram of the Cooling System:

Teams will create a diagram illustrating the cooling system flow. The diagram should include the following components and their relationships:

Engine Block: Where coolant absorbs heat.

Water Pump: Circulates coolant through the engine and radiator.

Radiator: Cools the heated coolant.

Thermostat: Regulates the temperature by controlling coolant flow.

Coolant Reservoir: Stores excess coolant.

The basic flow goes like this:

1. **The water pump circulates coolant from the radiator through the engine.**
2. **The coolant absorbs heat from the engine.**
3. **The heated coolant returns to the**

radiator, where it is cooled.

4. The cooled coolant is recirculated back through the engine, maintaining a consistent temperature.

3. Understand Overheating Causes:

Overheating occurs when the cooling system cannot effectively regulate the engine’s temperature. Some common causes of overheating include:

Low Coolant Levels: Caused by leaks, evaporating coolant, or improper filling.

Faulty Thermostat: If the thermostat is stuck closed, coolant can’t flow properly, leading to overheating.

Broken Water Pump: If the pump fails, coolant will not circulate, causing the engine to overheat.

Radiator Blockages: Dirt, debris, or corrosion can

block the radiator, preventing the heat from being dissipated effectively.

Cooling Fan Failure: If the electric fan (or mechanical fan) isn’t working, the radiator won’t receive enough airflow to cool the coolant.

Incorrect Coolant Mixture: Using the wrong ratio of antifreeze and water can result in poor heat transfer or freezing during colder months.

---

4. **Cooling Flow:**

The cooling flow refers to how the coolant circulates through the engine, absorbing heat and returning to the radiator. The sequence is crucial for maintaining the engine’s temperature:

Coolant flows from the radiator into the engine

block, where it absorbs heat.

The coolant then flows through the water pump and returns to the radiator.

The thermostat ensures that coolant only flows through the engine once it reaches the correct operating temperature.

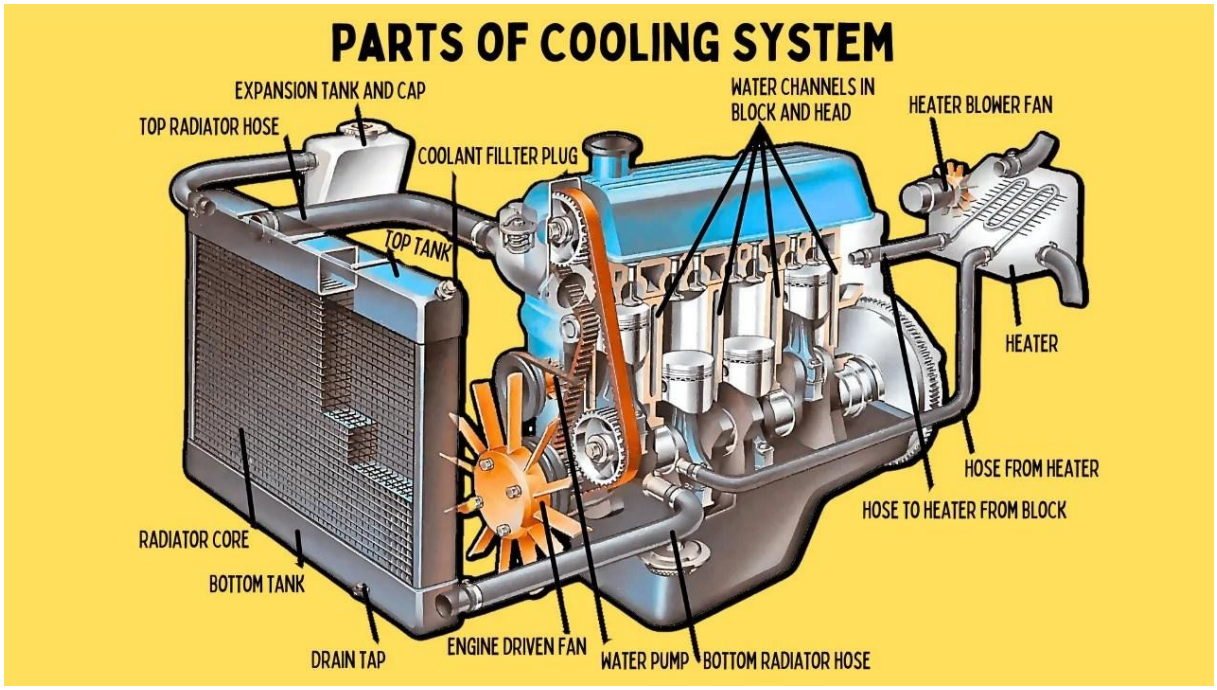
Cooling fans help regulate the air passing through the radiator for effective cooling.

---

5. Conclusion:

Understanding the cooling system is vital for preventing engine damage due to

overheating. By investigating the components like the radiator, coolant, and water pump, as well as creating a diagram to visualize the system, we gain a deeper appreciation for how engines stay cool and operate efficiently.


PARTS OF COOLING SYSTEM
EXPANSION TANK AND CAP
TOP RADIATOR HOSE
COOLANT FILLTER PLUG
TOP TANK
WATER CHANNELS IN BLOCK AND HEAD
HEATER BLOWER FAN
HEATER
HOSE FROM HEATER
HOSE TO HEATER FROM BLOCK
RADIATOR CORE
BOTTOM TANK
DRAIN TAP
ENGINE DRIVEN FAN
WATER PUMP
BOTTOM RADIATOR HOSE

Author:Roșu Răzvan Andrei

Day 8

Day 8: Fuel System

Project Goal:

In this activity, students will research carburetors, fuel

injectors, and fuel filters. They will observe or perform a fuel filter replacement, and explain how the fuel delivery process works.

---

1. **Research Carburetors, Fuel**

Injectors, and Fuel Filters:

Carburetors:

The carburetor is a mechanical device that mixes air and fuel in the correct ratio before sending it into the engine’s combustion chamber.

How it works: As air flows through the

carburetor, it draws fuel into the airstream via a venturi effect (narrowed passage creating suction).

Used in: Older vehicles, motorcycles, lawnmowers, small engines.

Advantages: Simple design, easy to maintain.

Disadvantages: Less precise fuel control compared to modern systems.

Fuel Injectors:

Fuel injectors are electronically controlled valves that spray fuel directly into the engine’s intake manifold or combustion chamber.

How they work:

Controlled by the ECU (Engine Control Unit), fuel injectors deliver a precise amount of fuel depending on engine speed, load, and temperature.

Types of injection systems:

Port Injection: Fuel is sprayed into the intake ports.

Direct Injection: Fuel is injected directly into the combustion chamber.

Advantages: More efficient, better emissions control, improved performance.

Fuel Filters:

The fuel filter cleans the fuel before it reaches the engine, removing dirt, rust, and contaminants that could clog the injectors or damage the engine.

Where it is located:

Typically along the fuel line or inside the fuel

tank (especially for newer vehicles).

Importance: Clean fuel ensures better combustion and prevents engine problems.

2. **Observe or Perform a Fuel Filter Replacement:**

Steps to replace a fuel filter:

Preparation:

Wear gloves and safety glasses.

Relieve fuel system pressure by disconnecting the battery or using the fuel pump fuse.

Procedure:

1. **Locate the fuel filter (under the car, along**

the frame, or inside the fuel tank).

2. Remove the old filter by loosening the clamps or quick-connect fittings.
3. Install the new filter in the correct direction (marked by an arrow showing fuel flow).

4. **Reconnect everything tightly and safely.**
5. **Reconnect the battery and start the engine to check for leaks.**

Safety Tip: Fuel is highly flammable; work in a well-ventilated area away from sparks or open flames.

3. Explain the Fuel Delivery Process:

Step 1: Fuel is drawn from the fuel tank by the fuel pump.

Step 2: It passes through the fuel filter where impurities are removed.

Step 3: In carbureted engines, fuel enters the carburetor where it is mixed with air and then delivered to the engine.

Step 4: In fuel-injected engines, the fuel injectors spray fuel directly into the intake manifold or combustion chamber.

Step 5: The air-fuel mixture enters the combustion chamber where it is ignited, powering the engine.

Important Concepts:

Pressure: Modern fuel injection systems require high pressure (30–60 psi) for correct operation.

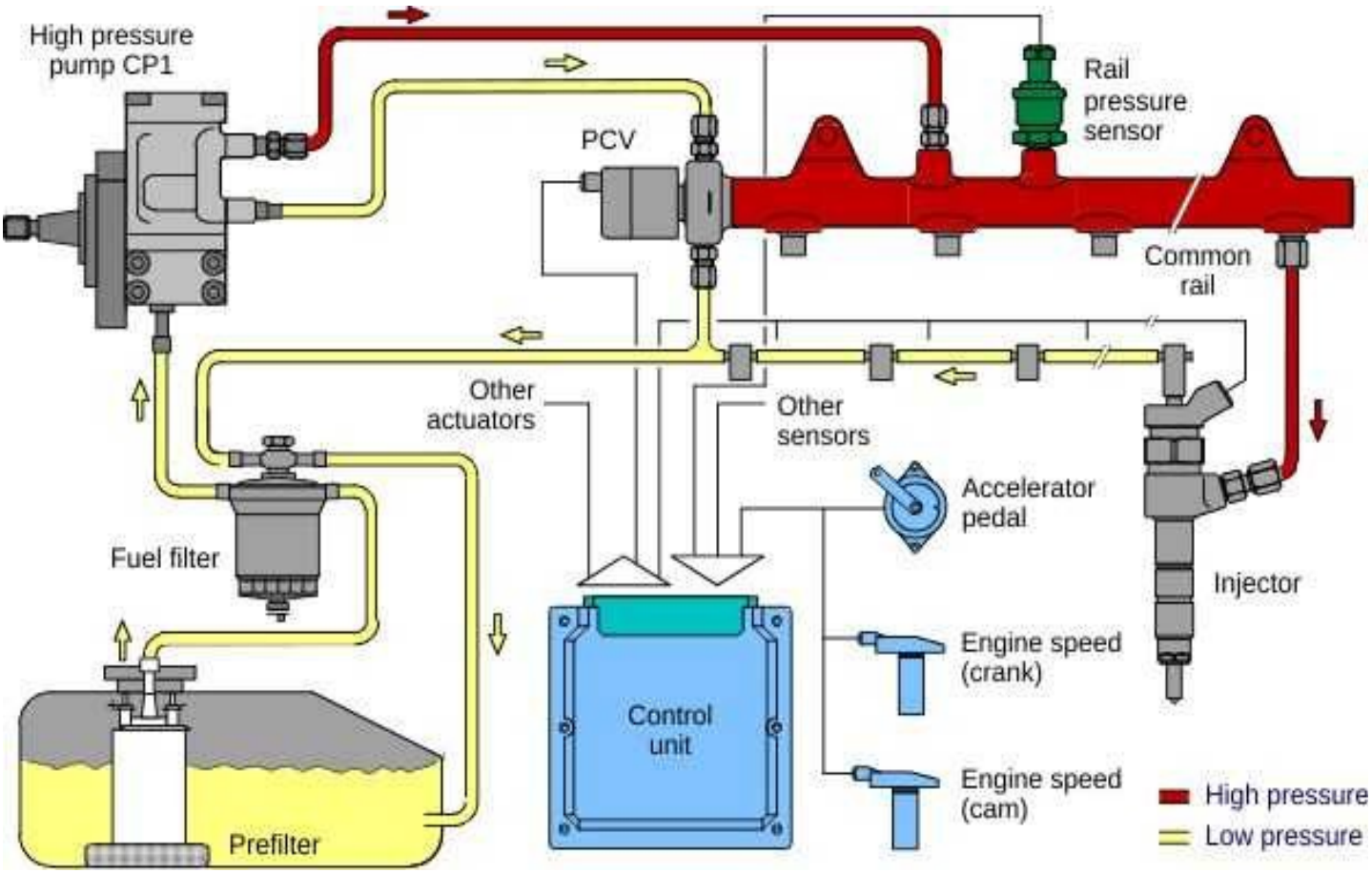
Precision: Accurate fuel delivery is crucial for performance, efficiency, and emissions.

---

4. Conclusion:

Understanding the fuel system is essential because it ensures the

engine receives the right amount of fuel for combustion. Whether using a traditional carburetor or a modern fuel injector system, clean fuel and precise delivery are key for proper engine function.


High pressure
pump CP1
PCV
Rail
pressure
sensor
Common
rail
Other
actuators
Other
sensors
Accelerator
pedal
Fuel filter
Injector
Engine speed
(crank)
Control
unit
Engine speed
(cam)
Prefilter
High pressure
Low pressure

Author:Roșu Răzvan Andrei

Day 9

Day 9: Electrical Systems I

Project Goal:

Today we will explore the main components of a vehicle’s electrical

system: batteries, starters, and alternators.

We will watch tutorials, inspect a real system, test a battery, and identify all components.

---

1. **Explore Batteries, Starters, and Alternators:**

Battery:

Purpose: The battery provides electrical power to start the engine and run electrical systems when the engine is off.

Common types:

Lead-acid batteries (traditional)

AGM (Absorbed Glass Mat) batteries – used in modern or Start-Stop vehicles

Important details:

Standard voltage: 12V (for most cars).

Capacity is measured in Ampere-hours (Ah).

Starter:

Purpose: The starter is an electric motor that cranks the engine to start it.

How it works:

When the ignition key is turned, electricity from the battery powers the starter motor.

The starter spins the engine flywheel to begin the combustion process.

Alternator:

Purpose: The alternator generates electricity

while the engine is running and recharges the battery.

How it works:

The alternator converts mechanical energy (via a belt drive) into electrical energy (AC current, then rectified to DC).

It powers lights, the radio, air conditioning, and other systems during engine operation.

---

2. **Watch Tutorials and Inspect a Real System:**

Activity:

Watch a video tutorial explaining how the battery, starter, and alternator work together.

Inspect a real vehicle:

Locate the battery (usually in the engine bay).

Find the starter motor (attached near the engine and flywheel).

Identify the alternator (connected by a belt to the engine).

---

3. **Test a Battery and Identify Components:**

Testing a Battery:

Use a multimeter:

1. **Set the multimeter to DC Voltage.**

2. **Connect the red probe to the positive (+) terminal and the black probe to the negative (–) terminal.**
3. **A fully charged battery should read around 12.6 volts or higher.**
4. **If the voltage is below 12.4V, the battery may be weak and**

need charging or replacement.

Load Testing (optional advanced step):

Test the battery under a load (e.g., headlights on) to see if it maintains voltage.

Identifying Electrical Components:

Battery: Heavy box usually marked with (+) and (–) signs.

Starter Motor: Smaller motor attached near the engine with thick wires.

Alternator: Round device with a belt running to it, usually near the top/front of the engine.

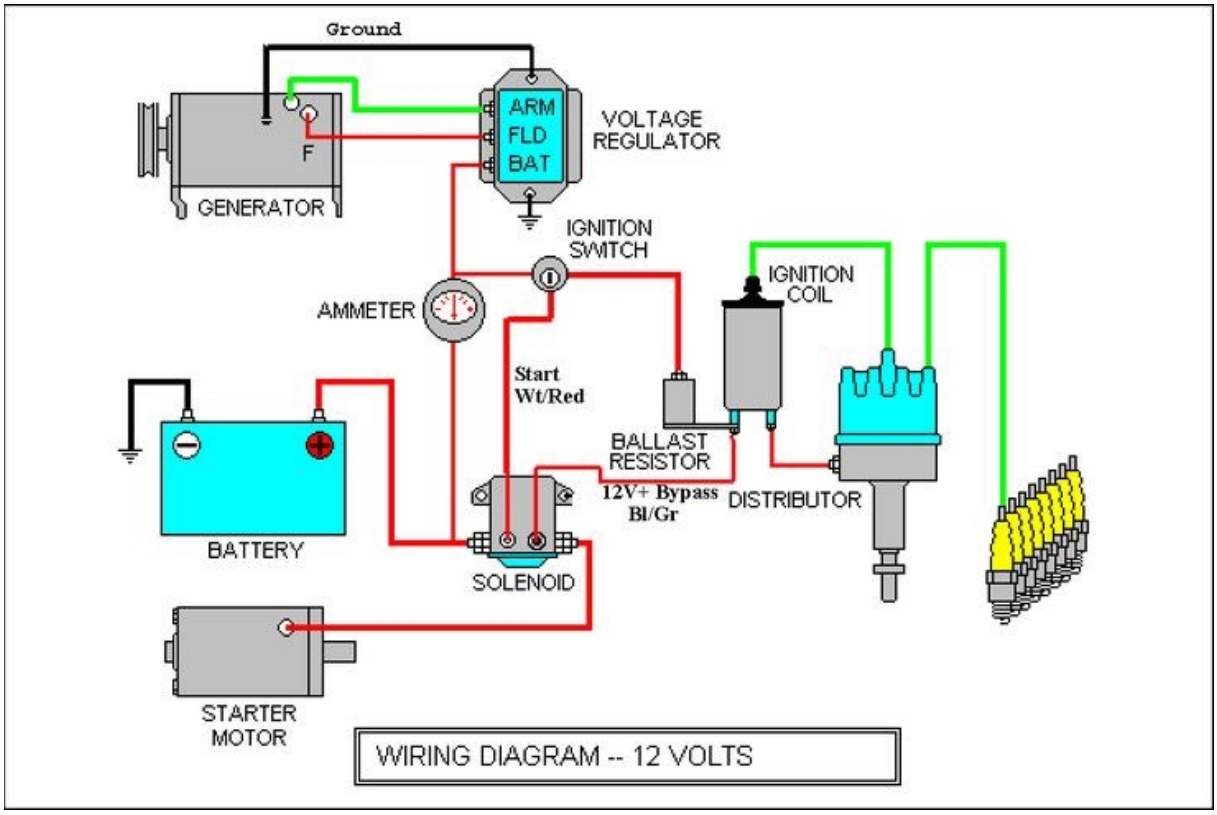
---

5. Conclusion:

Understanding the electrical system is crucial because it powers every electronic component in the vehicle.

A healthy battery, a working starter, and a functioning alternator

are essential for reliable vehicle operation.



Author:Roșu Răzvan Andrei

Day 10

Day 10: Electrical Systems II

Project Goal:

Today we will learn about fuses, lights, and relays.

We will test bulbs and fuses on a demo board or real vehicle, practice safe replacement, and understand basic circuits.

1. **Learn About Fuses, Lights, and Relays:**

Fuses:

Purpose: Fuses protect electrical circuits by breaking the circuit if the current is too high (overload or short circuit).

Types:

Blade fuses (common in vehicles)

Glass tube fuses (older cars)

How they work: A thin metal strip inside the fuse melts when too much current passes through, stopping the flow of electricity.

Lights (Bulbs):

Purpose: Provide illumination (headlights, brake lights, indicators, interior lights)

Types:

- **Halogen bulbs (traditional)**
- **LED bulbs (modern)**
- **Important details:**

- **Correct voltage and wattage are needed for each specific light.**
- **Faulty bulbs must be replaced with the same type to avoid electrical issues.**

Relays:

Purpose: A relay is an electrically operated switch. It allows a low-

current circuit to control a high-current load (like headlights or cooling fans).

How they work:

A small current activates an internal electromagnet.

The magnet closes (or opens) a switch to allow high current to flow.

2. Students Test Bulbs and Fuses:

Activity:

Use a multimeter or a test light to check bulbs and fuses:

For bulbs: Check for continuity — if the

multimeter beeps, the bulb filament is intact.

For fuses: Remove the fuse and check continuity. A good fuse will show continuity.

Hands-on Practice:

On a demo board or real vehicle, students:

Identify different types of fuses and bulbs.

Safely remove and replace a fuse.

Test and replace a faulty bulb.

---

3. **Replace Bulbs and Fuses Safely:**

Safety Steps:

Turn off the vehicle ignition and disconnect the battery if necessary.

Use the correct replacement parts (same rating for fuses; same type and wattage for bulbs).

Wear gloves when handling new bulbs (especially halogen) to

prevent oils from damaging the glass.

---

4. Understand Circuits:

Basic Circuit Concept

Power Source (Battery) → Fuse → Switch/Relay → Load (Bulb) → Ground

A complete circuit must exist for the component to work.

Simple Example:

When you flip the headlight switch:

A small current energizes a relay.

The relay closes, sending full current through the fuse to the headlights.

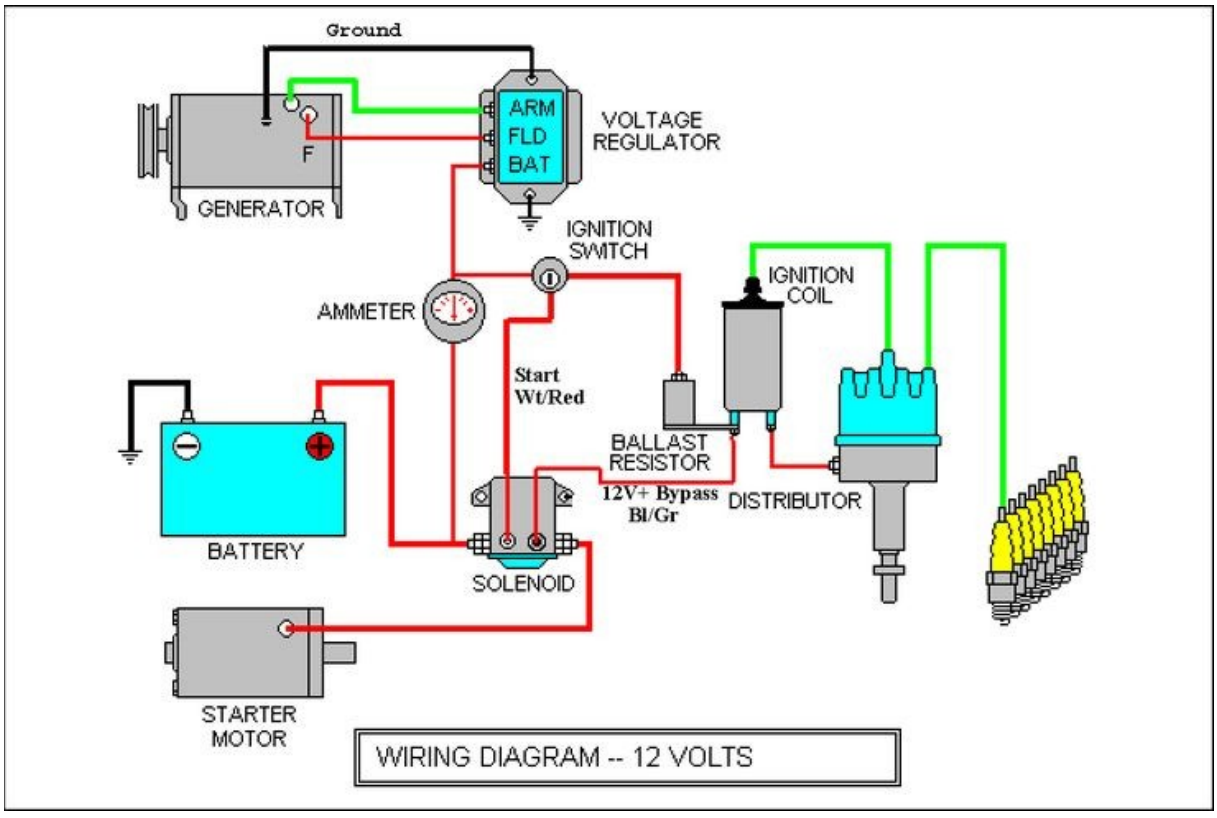
The headlights turn on.

---

5. Conclusion:

Fuses, bulbs, and relays are critical for the safe and reliable operation of a vehicle’s electrical system.

Testing and replacing them correctly ensures the vehicle remains functional and prevents more serious electrical problems.



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Day:11

Project: Brake System

1. **Research: Types of Brakes**

Disc Brakes

Main Components: rotor (disc), caliper, brake pads.

How It Works:

When the brake pedal is pressed, hydraulic pressure pushes the brake pads against the spinning rotor. The friction slows down the wheel.

Drum Brakes

Main Components: brake drum, wheel cylinder, brake shoes.

How It Works:

When braking, hydraulic pressure forces the brake shoes outward against the inner surface of the drum, creating friction that slows the wheel.

ABS (Anti-lock Braking System)

Main Components:

wheel speed sensors, control module (ECU), hydraulic modulator.

How It Works:

ABS prevents the wheels from locking during hard braking by automatically

pulsing the brakes. This helps maintain steering control.

---

2. Group Activity: Brake System Inspection

Tasks:

- **Inspect a real vehicle’s brake system (both**

front and rear if possible).

- Identify key components:
- Brake rotor
- Caliper
- Brake pad
- Brake lines
- Master cylinder
- Brake drum (if the vehicle has rear drum brakes)

- **Wheel cylinder**
- **ABS sensors and wires**

Things to observe:

Check for worn brake pads or shoes.

Look for leaking brake fluid around lines or cylinders.

Find signs of rust or damage on the rotors or drums.

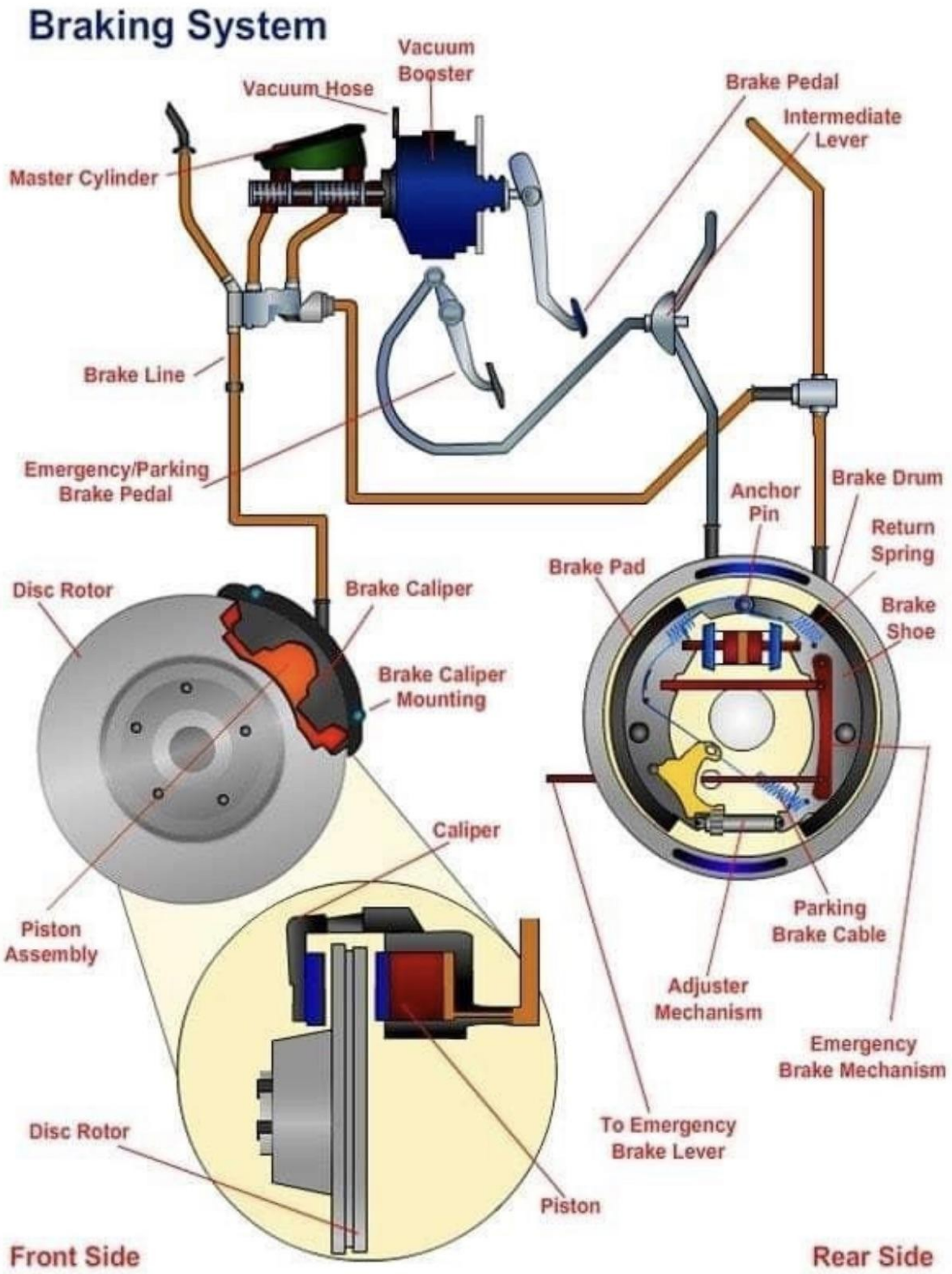
---

3. Key Observations and Questions

What are the differences between disc brakes and drum brakes?

How does ABS improve braking safety?

What parts are more exposed to wear and need frequent maintenance?


Braking System
Vacuum Booster
Vacuum Hose
Brake Pedal
Intermediate Lever
Master Cylinder
Brake Line
Emergency/Parking Brake Pedal
Anchor Pin
Brake Drum
Return Spring
Brake Pad
Brake Shoe
Disc Rotor
Brake Caliper
Brake Caliper Mounting
Caliper
Piston Assembly
Parking Brake Cable
Adjuster Mechanism
Emergency Brake Mechanism
To Emergency Brake Lever
Disc Rotor
Piston
Front Side
Rear Side

Author:Roșu Răzvan Andrei

Day 12

Day 12: Transmission

1. Study: Manual and Automatic Transmissions

Manual Transmission

Main Parts: clutch, flywheel, gears, shift lever, synchronizers.

How It Works:

The driver presses the clutch pedal to disconnect the engine from the wheels, selects a gear with the shift lever, and then releases

the clutch to reconnect power

Automatic Transmission

Main Parts: torque converter, planetary gear sets, hydraulic system, transmission control module.

How It Works:

- **The transmission automatically shifts gears based on vehicle speed, engine load, and throttle position, using hydraulic pressure and computer control.**

2. Key Concepts to Explain

Gear Shifting:

In manuals: the driver manually changes gears by engaging/disengaging the clutch.

In automatics: the system selects gears automatically without driver input.

Basic Transmission Parts:

Gears: different sizes change speed and torque.

Diagram of manual transmission

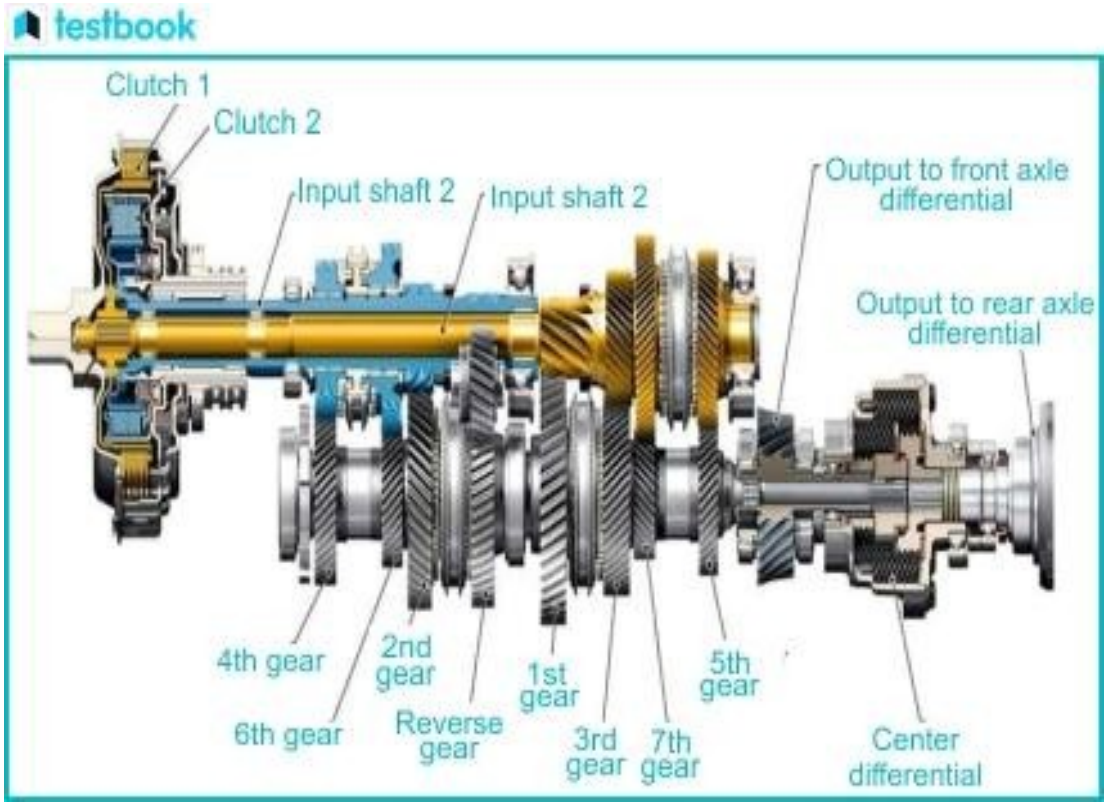
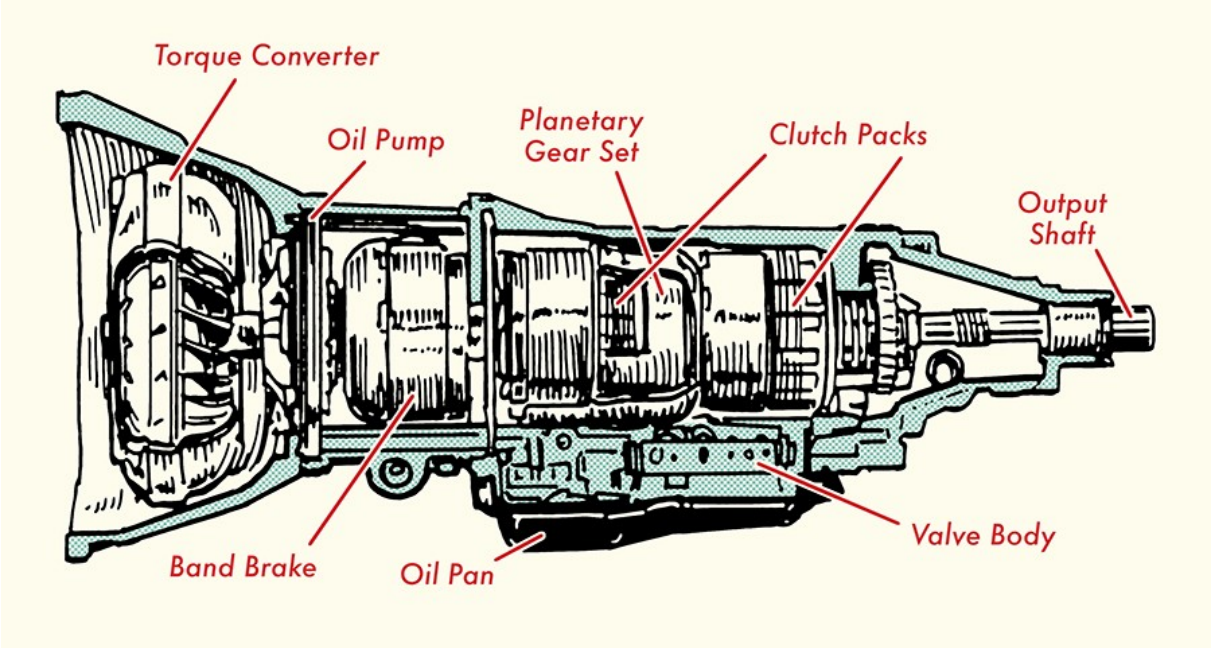


Diagram of automatic transmission



Author:Roșu Răzvan Andrei

Day 13

Day 13: Suspension & Steering

1. Study: Suspension and Steering Systems

Suspension System

Main Components: shock absorbers, struts, springs, control arms.

Purpose:

Suspension keeps the tires in contact with the road, absorbs bumps, and improves comfort and handling.

Steering System

Main Components: steering wheel, steering column, rack and pinion (or steering box), tie rods.

Purpose:

Allows the driver to control the direction of the vehicle accurately and safely.

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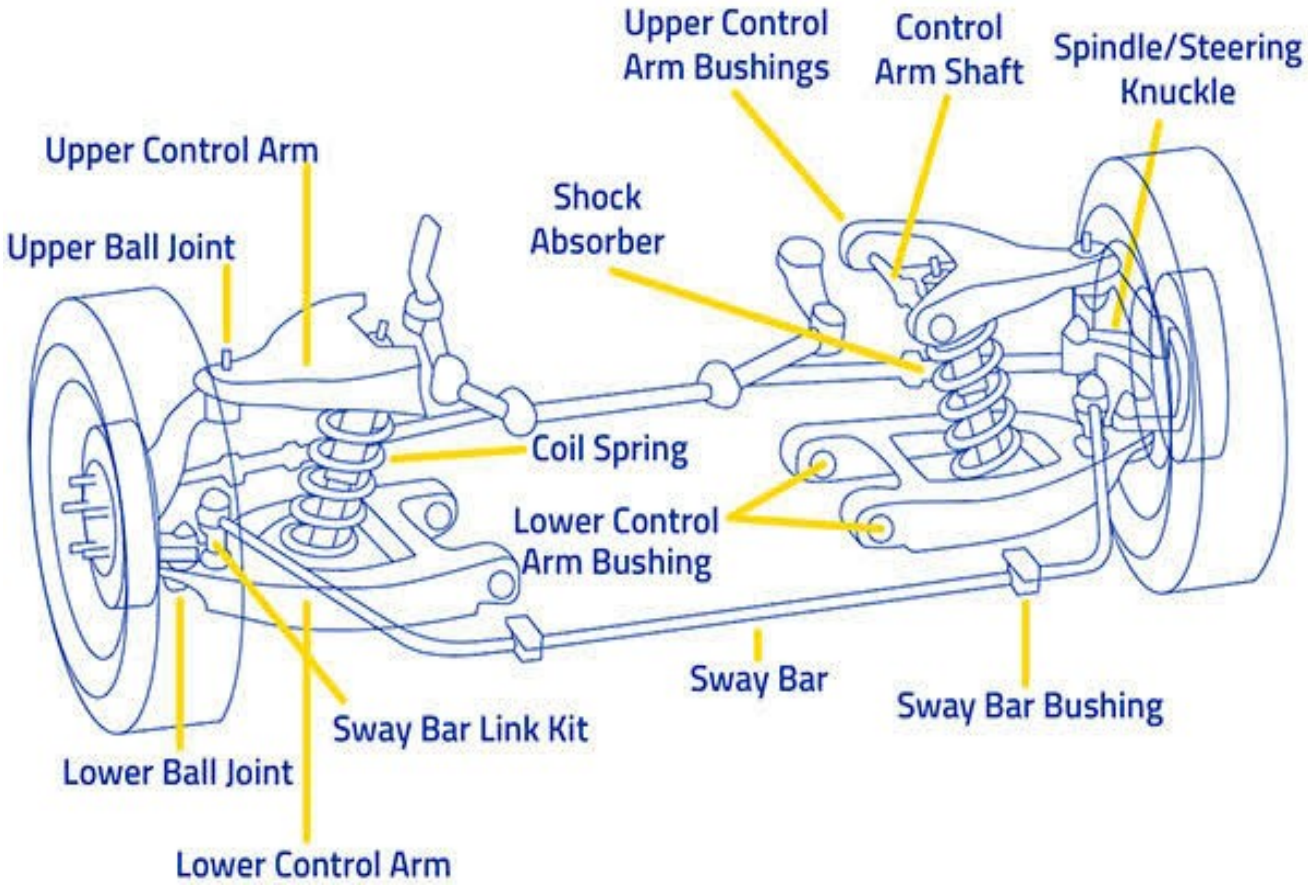
2. Key Concepts to Explain

Shock Absorbers:

Control the up-and-down motion of the wheels after hitting a bump.

Steering Mechanisms:

Convert the driver’s steering wheel movement into the turning of the wheels.


Upper Control Arm Bushings
Control Arm Shaft
Spindle/Steering Knuckle
Upper Control Arm
Upper Ball Joint
Shock Absorber
Coil Spring
Lower Control Arm Bushing
Sway Bar
Sway Bar Bushing
Sway Bar Link Kit
Lower Ball Joint
Lower Control Arm

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Day 14

Day 14: Diagnostics

1. Learning About OBD Scanners and Error Codes

- **OBD-II (On-Board Diagnostics II) is a system used in cars to detect and report problems.**

- **Diagnostic Trouble Codes (DTCs) are special codes that tell you what is wrong with the vehicle.**

- **Each code points to a specific part or issue, like the engine, transmission, or sensors.**

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2. Using an OBD-II Scanner

Steps:

1. **Find the OBD-II port (usually under the dashboard).**

2. **Plug in the OBD-II scanner.**

3. **Turn on the ignition (don’t start the engine).**

4. **Read the codes using the scanner’s display.**

5. **Write down or save the codes.**

Interpreting Simple Error Codes

- First Letter:
- P = Powertrain (engine, transmission)
- C = Chassis (suspension, steering)
- B = Body (doors, airbags)
- U = Communication (network errors)

Common Codes:

- **P0300: Engine misfire detected.**
- **P0171: Engine running too lean (too much air, not enough fuel).**
- **P0420: Catalytic converter efficiency is too low.**

3. Key Concepts

- **Basic Fault Finding:**
- **Read the code.**
- **Understand the area of the problem.**
- **Look at possible causes (dirty parts, broken sensors, leaks, etc.).**

Error Reading:

- **Always check if the problem is simple before replacing expensive parts.**
- **Clear the code after fixing and see if it comes back.**

A photo of a OBD-II scanner

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Day 15

Day 15: Project & Presentation

1. Day 1: My mentor showed me how to work on the CNC lathe, explaining step by step

how to mount the piece onto the lathe.

2. Day 2: I had the opportunity to work on several pieces on my own and then check them with the micrometer and calipers to ensure their accuracy.
3. Day 3: I continued working on more

pieces, under my mentor’s supervision, who guided and corrected me when necessary.

4. Day 4: My mentor and I worked together, each on a separate lathe, to learn and observe more techniques.

5. **Day 5: I was allowed to work independently on both lathes, demonstrating that I could work efficiently on my own.**
6. **Day 6: My mentor was changed to another colleague, who familiarized me with different**

approaches to working on the lathe.

7. Day 7: In the afternoon, my mentor had an obligation, so I continued working alone on both lathes. I checked the pieces in the inspection room and obtained correct results.