🛠 LESSON 3 – PERFORM STARTING SYSTEM DIAGNOSIS

INTRODUCTION

A faulty starting system doesn't always mean the starter motor itself is the issue. A proper diagnosis involves checking the entire starting circuit, including the battery, solenoid, cables, switches, and electronic control units. This lesson teaches how to systematically identify faults using tools like a multimeter, amp clamp, and OBD-II scanner to avoid guesswork and costly part replacements.

🎯 LEARNING OBJECTIVES

By the end of this lesson, students should be able to:

1. Identify common symptoms and causes of starting system problems.
2. Use diagnostic tools, including multimeters and OBD-II scanners.
3. Interpret voltage, current, and code readings to isolate faults accurately.

⚙️ SECTION 1: COMPONENTS OF THE STARTING SYSTEM

- Battery
- Ignition switch
- Starter relay / solenoid
- Starter motor
- Ground/power cables
- ECU/immobilizer (in modern vehicles)

Any failure in this chain can prevent the engine from starting.

🚩 SECTION 2: COMMON SYMPTOMS & CAUSES

Symptom	Possible Cause
No crank, no click	Dead battery, faulty ignition switch
Clicks only	Weak battery, bad solenoid
Slow crank	Corroded terminals, poor ground
Crank but won't start	Not a starting issue—fuel or spark fault
Starts intermittently	Faulty switch, relay, or control module

🔧 SECTION 3: DIAGNOSTIC TOOLS

Tool	Use
Multimeter	Voltage, resistance, continuity checks
Battery tester	Battery health and load test
Amp clamp	Measure starter current draw
Test light	Check power at terminals
OBD-II scanner	Read electronic fault codes (DTCs)

🧰 SECTION 4: DIAGNOSTIC PROCEDURE

- ✅ Step 1: Visual Inspection

  Check for loose or corroded terminals

  Ensure battery cables are tight and clean

  ✅ Step 2: Battery Voltage Test

  Multimeter should read ≥12.6V at rest

  During cranking: should not drop below 9.6V

🧰 SECTION 4: DIAGNOSTIC PROCEDURE

✅ Step 3: Check Voltage at Starter
Probe the starter terminal during crank
If power is present but no crank → bad starter
If no power → check relay, ignition switch, or wiring

✅ Step 4: Voltage Drop Test
Positive side: <0.5V
Ground side: <0.2V during cranking
High readings = corroded or damaged cables

✅ Step 5: Amp Draw Test
Normal draw: 125–250 amps (depending on engine size)
High draw + no crank = starter motor binding
Low draw = weak battery or high resistance

🧩 SECTION 5: USING AN OBD-II SCANNER FOR DIAGNOSIS

In modern vehicles, the ECU stores fault codes related to:

- Starter relay
- Ignition switch
- Immobilizer or anti-theft system
- Low voltage or starter circuit failure

Steps:

1. Connect scanner to OBD port
2. Turn ignition ON (don't crank)
3. Scan for DTCs (e.g., P0615 – Starter Relay Malfunction)
4. Use codes + live data to check starter request status

✅ OBD-II tools enhance diagnostic accuracy, especially on push-start vehicles or newer models with electronic start controls.

🧠 TROUBLESHOOTING MATRIX

Issue	Likely Fault
No crank, all lights OK	Faulty starter or relay
Click but no spin	Bad solenoid or internal starter fault
Engine starts then dies	Immobilizer or ECU issue
Cranking is weak or slow	Battery or high cable resistance

RECOMMENDED VIDEO TUTORIAL

- Video: How to Diagnose Starting System Problems
  YouTube Channel: ProDemand Training
  https://www.youtube.com/watch?v=sfuEKQBWsIc

  Shows:
  Live system diagnosis
  Use of multimeter & scanner
  Fault isolation techniques

✅ LESSON SUMMARY

- A good diagnosis checks electrical and electronic components
- Combine visual checks, electrical testing, and OBD code scanning
- High resistance, weak batteries, or ECM faults can all mimic starter issues
- Always follow a step-by-step test flow to avoid misdiagnosis

REFERENCES

- Auto Electrical System Module – TESDA Learning Material
  https://www.scribd.com/document/601714455/Auto-Electrical-System-Module-PDF
- TESDA Training Regulations – Automotive Servicing NC II
  https://www.tesda.gov.ph
- YouTube – ProDemand Training
  How to Diagnose Starting System Problems
  https://www.youtube.com/watch?v=sfuEKQBWsIc