



# LESSON 4 – REMOVE, SERVICE, AND INSTALL STARTING SYSTEM

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# INTRODUCTION

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A failing starter motor may need to be removed for testing or replaced entirely. With modern vehicles incorporating computer-controlled starting circuits, it is important to combine mechanical removal skills with the use of OBD scanners to verify electrical control. This lesson teaches the safe and proper removal, servicing, and reinstallation of a starter motor—and how to confirm functionality using both tools and technology.



# LEARNING OBJECTIVES

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

1. Perform safe removal and reinstallation of a starter motor from a vehicle.
2. Inspect and service the starter motor on the bench using basic tools.
3. Verify starting system function using an OBD-II scanner.

# SECTION I: SAFETY PRECAUTIONS

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- Disconnect the negative battery terminal first
- Wear insulated gloves and safety goggles
- Support vehicle securely if raised
- Keep all electrical connections clear of grounding points during removal
- Never test a starter in a flammable environment

## SECTION 2: TOOLS & EQUIPMENT

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Tool/Material	Purpose
Socket/wrench set	Removing starter bolts and brackets
Multimeter/test light	Verifying power at starter
Jumper cables	Bench testing starter
Wire brush	Cleaning corroded terminals
<b>OBD-II Scanner</b>	Reading ECU signals and starter circuit errors



## SECTION 3: STARTER REMOVAL STEPS

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1. Disconnect battery – always remove the negative cable first
2. Locate the starter motor (near transmission bell housing)
3. Label and disconnect:
  - Battery cable (main power)
  - Signal wire (from ignition switch or ECU)
4. Remove starter mounting bolts
5. Carefully extract the starter—support its weight to avoid pulling wires



## SECTION 4: SERVICE & BENCH TESTING

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- Check pinion gear teeth for wear
  - Test manual gear extension—should move and return smoothly
  - Perform a bench test:
    - Positive to starter terminal, negative to case → motor should spin and extend gear
  - Clean terminals and inspect for cracks, burns, or wear
- ⚠ Weak spin or loud clicking = faulty starter (replace or rebuild)



## SECTION 5: INSTALLATION PROCEDURE

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1. Clean all surfaces and terminal connections
2. Reinstall starter motor and tighten bolts evenly
3. Reconnect:
  - Power cable (torque appropriately)
  - Signal wire (snug, not overtightened)
4. Reconnect negative battery terminal
5. Start vehicle and check for:
  - Smooth engine crank
  - No grinding noise
  - Secure and vibration-free installation



# SECTION 6: USE OF OBD-II SCANNER (MODERN SYSTEMS)

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After installation, use an **OBD scanner** to confirm system readiness:

## Steps:

1. Plug into **OBD-II port** under the dash
  2. Turn key to **ON** (don't start)
  3. Select "Scan Codes" or "ECU"
  4. Look for:
    1. **P0615**: Starter Relay Malfunction
    2. **P2534**: Ignition Switch Run/Start Circuit
    3. **B2799**: Immobilizer Fault (some models)
  5. Clear any stored codes
  6. Monitor **live data** to verify ignition switch and starter control input
- ✓ Ensures complete **electrical and mechanical integrity** of the starting system.

# RECOMMENDED VIDEO TUTORIAL

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- Video: How to Replace a Starter – DIY Car Starter Replacement

YouTube Channel: Interstate Batteries

 <https://www.youtube.com/watch?v=JHo9RG0FXwQ>

Covers:

- Safe disconnection
- Step-by-step removal and reinstallation
- Testing and result confirmation





# LESSON SUMMARY

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- Safe removal and installation of a starter motor requires methodical disconnection and reconnection
- Bench testing confirms mechanical function before reinstallation
- OBD-II scanning verifies electronic control path and helps clear old fault codes
- Proper service reduces risk of repeat failures or ECU miscommunication



# REFERENCES

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- Auto Electrical System Module – Competency-Based Learning Material (TESDA)  
<https://www.scribd.com/document/601714455/Auto-Electrical-System-Module-PDF>
- TESDA Training Regulations – Automotive Servicing NC II  
<https://www.tesda.gov.ph>
- YouTube – Interstate Batteries  
How to Replace a Starter – DIY Car Starter Replacement  
<https://www.youtube.com/watch?v=JHo9RG0FXwQ>