ADVANCED ENGINE PERFORMANCE DIAGNOSIS

SEVENTH EDITION

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Pearson
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X CONTENTS
Advanced Engine Performance Diagnosis combines topics in engine performance (ASE A8) and the advanced engine performance (ASE L1) topics into one practical, comprehensive textbook that is easy for instructors to teach with, and an affordable option for students.

This hands-on introduction to the diagnosis and troubleshooting of automotive engine control systems serves students as a single source for information on digital storage, oscilloscopes, fuel injection and ignition system diagnoses, five-gas exhaust analysis, emission testing, and more.

The book is formatted to appeal to today’s technical trade students with a technical, but easy-to-read and understand presentation that uses helpful real-world tips and visuals to bring concepts to life and guide students through the procedures they’ll use on the job.

The following changes and updates have been made to the new seventh edition based on requests from instructors and reviewers from throughout North America:

- The content was reorganized to make it flow smoothly form beginning to the end.
- The chapters have been rewritten to be more concise.
- Over 75 new full color line drawings and photos have been added to the new edition to help bring the subject to life.
- Case studies have been added to many chapters that include the “three Cs” (Complaint, Cause, and Correction).
- Updated throughout and correlated to the latest ASE tasks.

- A new chapter title Oscilloscopes and DSOs (Chapter 4) has been greatly enhanced.
- The chapter Valve and Variable Valve Timing Diagnosis (Chapter 7) has been rewritten and updated to include Fiat-Chrysler Multiair systems and additional diagnosis procedures.
- Chapter 20, Fuel Trim Diagnosis, has been expanded and enhanced.
- The new Tier 3 emission standards have been added to Chapter 26 (Vehicle Emissions Standards and Testing).
- Module Programming (Chapter 28) has been added to the new edition.
After studying this chapter, the reader will be able to:

1. List the steps of the diagnostic process.
2. Discuss the type of scan tools that are used to assess vehicle components.
3. Describe how to retrieve diagnostic information from a vehicle.
4. Explain the troubleshooting procedures to follow if a diagnostic trouble code has been set.
5. Describe diagnostic trouble code retrieval, diagnosis, and testing for OBD-II vehicles.
6. Explain the troubleshooting procedures to follow if no diagnostic trouble code has been set.
7. List the steps in most manufacturers' diagnostic routines.
8. Describe how to verify the repair and conduct a universal drive cycle.
9. Describe how to run OBD-II monitors on a light duty diesel vehicle.

**LEARNING OBJECTIVES**

**KEY TERMS**

- Data link connector (DLC) 6
- Drive cycle 20
- Flash code retrieval 11
- Pending code 5
- Smoke machine 4
- TECH TIPS
- Technical service bulletin (TSB) 6
- Trip 16

**TECH TIP**

**Smoke Machine Testing**

Vacuum (air) leaks can cause a variety of driveability problems and are often difficult to locate. One good method is to use a machine that generates a stream of smoke. Connecting the outlet of the smoke machine to the hose that was removed from the vacuum brake booster allows smoke to enter the intake manifold. Any vacuum leaks will be spotted by observing smoke coming out of the leak. **SEE FIGURE 1–6.**

**CASE STUDY**

The Chevrolet Pickup Truck Story

The owner of a Chevrolet pickup truck complained that the engine ran terribly. It would hesitate and surge, yet there were no diagnostic trouble codes (DTCs). After hours of troubleshooting, the technician discovered while talking to the owner that the problem started after the transmission had been repaired. However, the transmission shop said that the problem was an engine problem and not related to the transmission.

A thorough visual inspection revealed that the front and rear oxygen sensor connectors had been reversed. The PCM was trying to compensate for an air–fuel mixture condition that did not exist. Reversing the O2S connectors restored proper operation of the truck.

**Summary:**

- **Complaint**—Vehicle owner complained that the pickup truck ran terribly.
- **Cause**—During a previous repair, the upstream and downstream oxygen sensor connectors were reversed.
- **Correction**—The connectors were moved to their correct locations which restored proper engine operation.

**REAL WORLD FIXES**

**TECH TIPS** feature real-world advice and “tricks of the trade” from ASE-certified master technicians.
FREQUENTLY ASKED QUESTIONS are based on the author’s own experience and provide answers to many of the most common questions asked by students and beginning service technicians.

NOTE: A cam-within-a-cam is used on the 2008 + Viper V-10 OHV engine. This design allows the exhaust lobes to be moved up to 36° to improve idle quality and reduction of exhaust emissions.

NOTES provide students with additional technical information to give them a greater understanding of a task or procedure.

CAUTION: Do not use more than three squirts oil from a hand-operated oil squirt can. Too much oil can cause a hydrostatic lock, which can damage or break pistons or connecting rods or even crack a cylinder head.

CAUTIONS alert students about potential to the vehicle that can occur during a specific task or service procedure.

WARNINGs alert students to potential dangers to themselves during a specific task or service procedure.

THE SUMMARY, REVIEW QUESTIONS, AND CHAPTER QUIZ at the end of each chapter help students review the material presented in the chapter and test themselves to see how much they’ve learned.
**INSTRUCTOR RESOURCES**

These resources are provided to help you teach your course, and can be found at pearsonhighered.com/automotive. Search for this title there.

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**RESOURCES IN PRINT AND ONLINE**

*Advanced Engine Performance Diagnosis*

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<th>PRINT</th>
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<tr>
<td>Instructor Resource Manual</td>
<td>✔</td>
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<td>Instructors</td>
<td>NEW! The Ultimate teaching aid: Chapter summaries, key terms, chapter learning objectives, lecture resources, discuss/demonstrate classroom activities, and answers to the in text review and quiz questions.</td>
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<td>Slides include chapter learning objectives, lecture outline of the text, and graphics from the book.</td>
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All online resources can be downloaded from the Instructor’s Resource Center: www.pearsonhighered.com/irc
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The following people reviewed the manuscript before production and checked it for technical accuracy and clarity of presentation. Their suggestions and recommendations were included in the final draft of the manuscript. Their input helped make this textbook clear and technically accurate while maintaining the easy-to-read style that has made other books from the same author so popular.

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