Use with Composite Vehicle Type 4

TEST INFORMATION

FOR THE

ADVANCED ENGINE PERFORMANCE SPECIALIST (L1) TEST

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National Institute for
AUTOMOTIVE
SERVICE
EXCELLENCE

ASE Advanced Engine Performance Specialist (L1) Test

Contents

Introduction

IMPORTANT! This guide must be used in conjunction with the *L1 Composite Vehicle Type 4 Reference Booklet* (download at www.ase.com/ase-study-guides). The booklet describes a generic vehicle powertrain control system. It will be available as a pop-up reference during the test but familiarizing yourself with the contents beforehand is a key to success. A significant number of the test questions will require you to use this reference.

Use this *Official ASE Study Guide* to prepare for the ASE Advanced Engine Performance Specialist (L1) Test. This document contains general information, the Test Specification, the Task List, sample questions, a glossary of specialized terms, and test preparation resources for this ASE test.

The Test Specification in this study guide is determined by working professionals and technical experts and lists the main content covered by the test and the number of test questions devoted to each topic.

The Task List for this test is developed by working professionals and technical experts, and it spells out the technical knowledge and skills required for success on this test. The Task List provides a valuable checklist of what you should know. Every question on the test represents one or more of these tasks, although some tasks may not appear on the version of the test that you see. To improve chances of success, use the Task List to identify weak areas and to select learning resources.

The sample questions show the several types of multiple-choice question formats used on an actual ASE test. Some questions have special instructions; those same instructions will appear with similar questions on the ASE tests. If you are a native Spanish speaker, be aware that all ASE tests have a pop-up English-to-Spanish glossary.

ASE certification requires successful completion of the test and documentation of relevant work experience (3 years for this test). Appropriate vocational training may count toward part of the work experience requirement. Visit workexp.ase.com/FormInstr.aspx for more details.

To register for the L1 Test, you must have previously passed the Automobile Engine Performance (A8) Test. **For more information about ASE tests in general and the ASE Certification process, download *ASE Certification: Need to Know* at www.ase.com/ase-study-guides.**

How Long are the Tests?

Advanced Engine Performance Specialist Test			
Test	**Name**	**Number of questions**	**Testing time**
L1	Advanced Engine Performance Specialist	60 total/50 scored*	2.5 hrs/150 mins
L1R	Advanced Engine Performance Specialist Recertification	50	2.25 hrs/135 mins

* To gather the performance statistics required for use in the scored section of future tests, each CERTIFICATION test contains 10 questions that are not counted for score. Since you don't know which questions those are, you need to answer every question. The RECERTIFICATION test does not include unscored questions. Both the L1 and L1R tests have the same number of scored questions.

Test Specifications
Advanced Engine Performance Specialist (L1) Test

	Content Area	Questions in Test	Percentage of Test
A.	General Powertrain Diagnosis	6	12%
B.	Computerized Powertrain Controls Diagnosis (including OBD II)	16	32%
C.	Ignition System Diagnosis	6	12%
D.	Fuel Systems and Air Induction Systems Diagnosis	8	16%
E.	Emission Control Systems Diagnosis	8	16%
F.	I/M Failure Diagnosis	6	12%
	Total	50*	100%

*Note: The L1 CERTIFICATION test will have 60 total questions. This includes 10 unscored questions included to gather statistics needed for future possible inclusion as scored items. Your answers to these questions will not affect your score, but since you do not know which ones they are, you should answer all questions in the test.

The L1 CERTIFICATION and RECERTIFICATION tests both cover the same content areas and have the same number of scored questions.

Task List
Advanced Engine Performance Specialist
(L1) Test

A. General Powertrain Diagnosis (6 questions)

1. Verify customer concern; determine if the concern is the result of a malfunction or normal system operation.
2. Inspect and test for missing, modified, inoperative, or tampered powertrain mechanical components.
3. Locate relevant service information.
4. Research system operation using technical information to determine diagnostic procedure.
5. Use appropriate diagnostic procedures based on available vehicle data and service information; determine if available information is adequate to proceed with effective diagnosis.
6. Determine the relative importance of observed vehicle data.
7. Differentiate between powertrain mechanical and electrical/electronic problems, including variable valve timing (VVT) and variable valve lift (VVL) systems.
8. Diagnose driveability problems and emission failures caused by cooling system problems.
9. Diagnose driveability problems and emission failures caused by engine mechanical problems.
10. Diagnose driveability problems and emission failures caused by problems or modifications in the transmission and final drive, or by incorrect tire size.
11. Diagnose driveability problems and emission failures caused by intake or exhaust system problems or modifications.
12. Determine root cause of failures.
13. Determine root cause of multiple component failures.
14. Determine root cause of repeated component failures.
15. Verify effectiveness of repairs.

B. Computerized Powertrain Controls Diagnosis - including OBD II (16 questions)

1. Verify customer concern; determine if the concern is the result of a malfunction or normal system operation.
2. Inspect and test for missing, modified, inoperative, or tampered computerized powertrain control components.
3. Locate relevant service information.
4. Research system operation using technical information to determine diagnostic procedure.
5. Use appropriate diagnostic procedures based on available vehicle data and service information; determine if available information is adequate to proceed with effective diagnosis.
6. Determine current version of computerized powertrain control system software and updates; perform reprogramming procedures.
7. Research OBD II system operation to determine the enable criteria for setting and clearing diagnostic trouble codes (DTCs) (including permanent DTCs) and malfunction indicator lamp (MIL) operation.
8. Interpret OBD II scan tool data stream, diagnostic trouble codes (DTCs), freeze frame data, system monitors, monitor readiness indicators, and trip and drive cycle information to determine system condition and verify repair effectiveness.
9. Determine the relative importance of displayed scan tool data.
10. Differentiate between electronic powertrain control problems and mechanical problems.
11. Diagnose no-starting, hard starting, stalling, engine misfire, poor driveability, incorrect idle speed, poor idle, hesitation, backfire, surging, spark knock, power loss, reduced fuel economy, illuminated MIL, and emission problems caused by failures of computerized powertrain controls.
12. Diagnose failures in the data communications bus network; determine needed repairs.
13. Diagnose failures in the anti-theft/immobilizer system; determine needed repairs.
14. Perform voltage drop tests on power circuits and ground circuits.
15. Perform current flow tests on system circuits.
16. Perform continuity/resistance tests on system circuits and components.
17. Test input sensor/sensor circuit using scan tool data and/or waveform analysis.

L1 Task List (continued)

18. Test output actuator/output circuit using scan tool, scan tool data, and/or waveform analysis.
19. Confirm the accuracy of observed scan tool data by directly measuring a system, circuit, or component for the actual value.
20. Test and confirm operation of electrical/electronic circuits not displayed in scan tool data.
21. Determine root cause of failures.
22. Determine root cause of multiple component failures.
23. Determine root cause of repeated component failures.
24. Verify effectiveness of repairs.

C. Ignition System Diagnosis (6 questions)

1. Verify customer concern; determine if the concern is the result of a malfunction or normal system operation.
2. Inspect and test for missing, modified, inoperative, or tampered components.
3. Locate relevant service information.
4. Research system operation using technical information to determine diagnostic procedure.
5. Use appropriate diagnostic procedures based on available vehicle data and service information; determine if available information is adequate to proceed with effective diagnosis.
6. Determine the relative importance of displayed scan tool data.
7. Differentiate between ignition electrical/electronic and ignition mechanical problems.
8. Diagnose no-starting, hard starting, stalling, engine misfire, poor driveability, backfire, spark knock, power loss, reduced fuel economy, illuminated MIL, and emission problems caused by failures in the electronic ignition (EI) systems; determine needed repairs.
9. Test for ignition system failures under various engine load conditions.
10. Test ignition system component operation using waveform analysis.
11. Confirm ignition timing and/or spark timing control.
12. Determine root cause of failures.
13. Determine root cause of multiple component failures.
14. Determine root cause of repeated component failures.
15. Verify effectiveness of repairs.

D. Fuel Systems and Air Induction Systems Diagnosis (8 questions)

1. Verify customer concern; determine if the concern is the result of a malfunction or normal system operation.
2. Inspect and test for missing, modified, inoperative, or tampered components.
3. Locate relevant service information.
4. Research system operation using technical information to determine diagnostic procedure.
5. Evaluate the relationships between fuel trim values, oxygen sensor readings, air/fuel ratio sensor readings, and other sensor data to determine fuel system control performance.
6. Use appropriate diagnostic procedures based on available vehicle data and service information; determine if available information is adequate to proceed with effective diagnosis.
7. Determine the relative importance of displayed scan tool data.
8. Differentiate between fuel system mechanical and fuel system electrical/electronic problems.
9. Differentiate between air induction system mechanical and air induction system electrical/electronic problems, including electronic throttle actuator control (TAC) systems.
10. Diagnose hot or cold no-starting, hard starting, stalling, engine misfire, spark knock, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, backfire, surging, power loss, reduced fuel economy, illuminated MIL, and emission problems on vehicles equipped with multiport fuel injection and direct injection fuel systems; determine needed action.
11. Inspect fuel for quality, contamination, water content, and alcohol content; test fuel system pressure and fuel system volume.
12. Evaluate mechanical and electrical operation of fuel injectors and fuel pump (including digitally controlled fuel pump systems).
13. Determine root cause of failures.

L1 Task List (continued)

14. Determine root cause of multiple component failures.
15. Determine root cause of repeated component failures.
16. Verify effectiveness of repairs.

E. Emission Control Systems Diagnosis (8 questions)

1. Verify customer concern; determine if the concern is the result of a malfunction or normal system operation.
2. Inspect and test for missing, modified, inoperative, or tampered components.
3. Locate relevant service information.
4. Research system operation using technical information to determine diagnostic procedure.
5. Use appropriate diagnostic procedures based on available vehicle data and service information; determine if available information is adequate to proceed with effective diagnosis.
6. Determine the relative importance of displayed scan tool data.
7. Differentiate between emission control systems mechanical and electrical/electronic problems.

   NOTE: Tasks 8 through 12 refer to the following emission control subsystems: positive crankcaseventilation, ignition timing control, idle and deceleration speed control, exhaust gas recirculation,catalytic converter, secondary air injection, and evaporative emission control which includesonboard refueling vapor recovery (ORVR) and engine off natural vacuum (EONV).

8. Differentiate between driveability or emissions problems caused by failures in emission control systems and other engine management systems.
9. Perform functional tests on emission control subsystems; determine needed repairs.
10. Determine the effect on exhaust emissions caused by a failure of an emission control component or subsystem.
11. Use exhaust gas analyzer readings to diagnose the failure of an emission control component or subsystem.
12. Diagnose hot or cold no-starting, hard starting, stalling, engine misfire, spark knock, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, backfire, surging, power loss, reduced fuel economy, illuminated MIL and emission problems caused by a failure of emission control components or subsystems.
13. Determine root cause of failures.
14. Determine root cause of multiple component failures.
15. Determine root cause of repeated component failures.
16. Verify effectiveness of repairs.

F. I/M Failure Diagnosis (6 questions)

1. Verify customer concern; determine if the concern is the result of a malfunction or normal system operation.
2. Inspect and test for missing, modified, inoperative, or tampered components.
3. Locate relevant service information.
4. Evaluate emission readings obtained during an I/M test to assist in emission failure diagnosis and repair.
5. Evaluate HC, CO, NOx, CO2, and O2 gas readings; determine the failure relationships.
6. Use test instruments to observe, recognize, and interpret electrical/electronic signals.
7. Analyze HC, CO, NOx, CO2, and O2 readings; determine diagnostic test sequence.
8. Diagnose the cause of no-load I/M test HC emission failures.
9. Diagnose the cause of no-load I/M test CO emission failures.
10. Diagnose the cause of loaded-mode I/M test HC emission failures.
11. Diagnose the cause of loaded-mode I/M test CO emission failures.
12. Diagnose the cause of loaded-mode I/M test NOx emission failures.
13. Evaluate the MIL operation for onboard diagnostic I/M testing.
14. Evaluate monitor readiness status for onboard diagnostic I/M testing.
15. Diagnose communication failures with the vehicle during onboard diagnostic I/M testing.
16. Perform functional I/M tests (including fuel cap test).
17. Verify effectiveness of repairs. □

Advanced Engine Performance Specialist (L1) Test Glossary of Terms

The reference materials and questions for this test use electronic and emission terms and acronyms that are consistent with the industry-wide SAE standards J1930 and J2012. Some of these terms are listed below.

Calculated Load Value - The percentage of engine capacity being used, based on current airflow divided by maximum airflow.

Data Communications Bus - A communications network that allows peer-to-peer communications between electronic control modules on the vehicle (including scan tools and interface devices).

Data Link Connector (DLC) - The standardized plug that is used to connect the scan tool, or other testequipment, to the vehicle's data communications bus network.

Diagnostic Trouble Codes (DTC) - When an electronic control modules detects a problem, a code may be stored and may be read using a scan tool. Each code corresponds to a particular problem. When a DTC is referred to in an L1 test question, the number and description will both be given. For instance, P0114 "Intake Air Temperature Circuit Intermittent".

Driver - A solid state switch contained in an electronic module used to control an electrical/electronic component.

Electronic Ignition (EI) - An ignition system that has coils dedicated to specific spark plugs and does not use a distributor; e.g., distributorless ignition, coil-on-plug (COP), and coil-near-plug (CNP).

Electronic Throttle Control - The system that opens and closes the engine throttle plate using an electric throttle actuator control (TAC) motor. Accelerator pedal position (APP) sensors provide input from the vehicle operator, while the position of the TAC motor is monitored using throttle position (TP) sensors. This system is also commonly known as "drive-by-wire."

Enable Criteria - Operating parameters that must be achieved under specific conditions in order for a System Monitor to run a self-diagnostic test.

Engine Control Module (ECM) - The electronic computer that controls operation of the engine; similar to a PCM, VCM, ECA, or ECU.

Freeze Frame - Operating condition information which is stored in the memory of the ECM at the instant an emissions-related DTC is stored.

Fuel Trim (FT) - Fuel delivery adjustments based on closed-loop feedback. Values above the central value (>0%) indicate increased injector pulse width. Values below the central value (<0%) indicate decreased injector pulse width. Short Term Fuel Trim is based on feedback from the A/F Ratio sensor or oxygen sensor. Long Term Fuel Trim is a learned value used to compensate for continual deviation of the Short Term Fuel Trim from its central value.

Gasoline Direct Injection (GDI) - A fuel injection system that provides the fuel charge directly into the combustion chamber.

Generator - J1930 term for alternator (generating device that uses a diode rectifier).

Immobilizer System - The electronic system that verifies the validity of the ignition key that is used to start the engine.

GLOSSARY (CONTINUED)

I/M Tests - Inspection and Maintenance Tests; vehicle emissions tests required by federal, state, or local governments. Some common types of I/M tests include:

- *No-Load* - Emissions test using exhaust pipe measurements of concentrations of hydrocarbon (HC) emissions in parts per million (ppm) and carbon monoxide (CO) emissions in percent, while the vehicle is in neutral. Examples are Idle and Two-Speed.
- *Acceleration Simulation Mode (ASM)* - A loaded-mode, steady-state, emission test using exhaust pipe measurements of concentrations of hydrocarbon (HC) in ppm, carbon monoxide (CO) in percent, and oxides of nitrogen (NOx) in ppm while the vehicle is driven on a dynamometer at a fixed speed and load. Version ASM5015 tests at 15 mph with a load equivalent to 50% of the power needed to accelerate the vehicle at a rate of 3.3 mph per second. Version ASM2525 tests at 25 mph with a load equivalent to 25% of the power needed to accelerate the vehicle at a rate of 3.3 mph per second.
- *IM147* - A loaded-mode, transient emission test using exhaust pipe measurements of concentration and exhaust mass flow of hydrocarbon (HC), carbon monoxide (CO), carbon dioxide (CO2), and oxides of nitrogen (NOx), while the tested vehicle is driven at various speeds and loads on a dynamometer. Results are displayed in grams/mile for the total 147 seconds of the test.
- *IM240* - A loaded-mode, transient emission test using exhaust pipe measurements of concentration and exhaust mass flow of hydrocarbon (HC), carbon monoxide (CO), carbon dioxide (CO2), and oxides of nitrogen (NOx), while the tested vehicle is driven at various speeds and loads on a dynamometer. Results are displayed in grams/mile for the total 240 seconds of the test.
- *OBD* - A test performed by connecting a cable to the vehicle's data link connector (DLC) and communicating with the engine control module/powertrain control module (ECM/PCM). Malfunction indicator lamp (MIL) operation and other information stored in the ECM determine the pass/fail status for the vehicle.

NOTE: All of the tests listed above may include a visual inspection of emissions control system components, and functional tests on some components as a part of the I/M test procedures.

Malfunction Indicator Lamp (MIL) - A lamp on the instrument panel that lights when the ECM detects an emission-related problem.

Manifold Absolute Pressure (MAP) - The pressure in the intake manifold referenced to a perfect vacuum. Since manifold vacuum is the difference between manifold absolute pressure and atmospheric pressure, all the vacuum readings in the Composite Vehicle Preparation/Reference Booklet are taken at sea level (where standard atmospheric pressure equals 101 kPa or 29.92 in. Hg).

Mass Airflow (MAF) System - A fuel injection system that uses a MAF sensor to measure the mass (weight) of the air drawn into the intake manifold, measured in grams per second.

Monitor - The onboard diagnostic system that actively tests circuits or components for failure by comparing various input and output signals to specifications that are stored in the ECM.

On-Board Diagnostics (OBD) - A diagnostic system contained in the ECM which monitors computer inputs and outputs for failures. OBD II is an industry-standard, second generation OBD system that monitors emission control systems for degradation as well as failures.

On-Board Refueling Vapor Recovery (ORVR) - An evaporative emissions (EVAP) system that prevents the escape of HC vapors to the atmosphere by directing fuel tank vapors to the EVAP charcoal canister during fueling. The ORVR system also prevents fuel from leaking in the event of a vehicle rollover.

GLOSSARY (CONTINUED)

Pulse Width Modulation (PWM) - An electronic signal with a variable on/off time (duty cycle).

Reprogramming - The updating of electronic control system software and OBD diagnostic procedures using factory supplied calibration files.

Root Cause of Failure - A component or system failure which, if not repaired, can cause other failures. If the secondary failure is repaired, but the root cause is not repaired, the secondary failure will reoccur. For example, a plugged PCV passage can cause high crankcase pressure, resulting in leaking gaskets and seals. Replacing the gaskets and seals may stop the oil leak, but if the root cause (the PCV restriction) is not diagnosed and repaired, the oil leak will eventually return.

Scan Tool - A test instrument that is used to read information from the control modules on the vehicle, perform system tests, and perform software program updates.

Scan Tool Data - Information from the computer(s) that is displayed on the scan tool, including data stream, DTCs, freeze frame, systems monitors, and readiness monitors.

Secondary Air Injection - A system that provides fresh air to the exhaust system under controlled conditions to reduce emissions.

Sequential Multiport Fuel Injection (SFI) - A fuel injection system that uses one electronically pulsed fuel injector for each cylinder. The injectors are pulsed individually.

Speed-Density System - A fuel injection system that calculates the amount of air drawn into the engine using engine rpm, air temperature, manifold vacuum and volumetric efficiency, rather than measuring the mass or volume of air directly with an airflow meter.

Three Way Catalytic Converter (TWC) - A catalytic converter system that reduces levels of HC, CO, and NOx emissions.

Transmission Control Module (TCM) - The electronic computer that controls the operation of the automatic transaxle.

Trip - A key-on cycle in which all enable criteria are met and the diagnostic monitor runs to completion. A “good trip” in the ASE Composite Vehicle Type 4 occurs when the necessary enable criteria are met, the monitor runs, no failures are detected, and the key is turned off.

Variable Force Solenoid - An electro-hydraulic device that controls fluid pressure proportionally or inversely proportionally to a signal received from a control module.

Variable Valve Timing (VVT) - The control of valve timing achieved by advancing and/or retarding the camshaft(s) relative to the crankshaft.

Sample Questions
Advanced Engine Performance Specialist (L1) Test

Questions 1 through 4 will require the use of the *Composite Vehicle Type 4 Reference Booklet*. This booklet describes the engine control systems and diagnostic parameters referred to in these questions. Review the booklet before you continue, and then use it as a reference as you answer these questions.

Accelerator Pedal Position Sensor 1 (APP 1) 0 % / 0.50 V	Accelerator Pedal Position Sensor 2 (APP 2) 0 % / 1.50 V	Crankshaft Position Sensor (CKP) 300 rpm	Engine Coolant Temp. Sensor (ECT) -40 °F/ -40 °C / 5.0 V
Fuel Enable YES	Ignition Switch START	Intake Air Temperature Sensor (IAT) -40 °F / -40 °C / 5.0 V	Manifold Absolute Press. Sensor (MAP) 101 kPa / 0 in.Hg / 5.0 V
Mass Airflow Sensor (MAF) 175 gm/sec / 5.0 V	Throttle Actuator Control Motor (TAC) 15 %	Throttle Position Sensor 1 (TP 1) 0 % / 5.0 V	Throttle Position Sensor 2 (TP 2) 100 % / 5.0 V

1. The engine in the composite vehicle cranks, but will not start. Using the scan tool readings shown, which of these could be the cause?

   (A) A short-to-ground at ECM pin 1
   (B) An open circuit at ECM pin 2
   (C) An open circuit at ECM pin 50
   (D) A short-to-ground at ECM pin 60

Question #1 Explanation:

Each parameter of data displayed on the scan tool must be analyzed to determine the potential cause of why the engine will not start.

Answer (A) is wrong. A shorted ECM pin 1 would cause a loss of the 5 volt reference to the sensors. This would cause multiple sensor voltages in the data display to read 0 volts.

Answer (B) is wrong. An open circuit at ECM pin 2 would cause a loss of battery voltage to the ECM in the START and RUN position of the ignition switch. If pin 2 were open circuit, the sensors would indicate 0 volts in the data display because there would be no 5 volt reference from the ECM to the sensors. The fuel pump relay would indicate OFF in the data display as well, because the relay driver would not close during cranking.

Answer (C) is correct. An open circuit at ECM pin 50 would cause a loss of ground to the sensors. A loss of sensor ground would cause the sensor voltages to read reference voltage, which is what is indicated on the data display.

Answer (D) is wrong. A shorted ECM pin 60 would provide an additional path to ground for the ECM ground, which would not cause a fault in ECM operation.

L1 Sample Questions (continued)

2. The engine on the composite vehicle has a misfire on cylinder #1. The technician measures battery voltage at ECM pin 120 while the engine is running.

   Technician A says that this reading indicates an open cylinder #1 fuel injector coil.

   Technician B says that this reading indicates fuel injector #1 is on continuously.

   Who is right?

   (A) A only
   (B) B only
   (C) Both A and B
   (D) Neither A nor B

MAF Sensor	
Terminal	**Voltage**
a	12.6 V
b	0.05 V
c	3.2 V

3. The composite vehicle has a stored P0101 “Mass Airflow Sensor Circuit Range/Performance” DTC. With the key ON/engine OFF and the sensor connected, the voltage readings shown are measured at the mass airflow (MAF) sensor. These readings indicate:

   (A) excessive reference voltage to the MAF.
   (B) a poor MAF circuit ground.
   (C) a failed MAF sensor.
   (D) normal MAF circuit operation.

4. The composite vehicle has a stored P0442 “EVAP System - Small Leak Detected” DTC. Which of these could be the cause?

   (A) A failed fuel level sensor
   (B) A failed fuel cap
   (C) An open circuit at EVAP purge solenoid terminal b
   (D) A short-to-ground at EVAP vent solenoid terminal b

L1 Sample Questions (continued)

Questions 5, 6, and 7 are to be answered <u>without</u> using the *Composite Vehicle Type 4 Reference Booklet*.

5. An engine runs rough at all times and a P0301 "Cylinder 1 Misfire Detected" DTC is stored. Which of these could be the cause?

   (A) A broken valve spring
   (B) A failed CKP sensor
   (C) Low fuel pressure
   (D) High fuel pressure

Engine Speed	Idle	2000 rpm
HC (ppm)	500	15
CO (percent)	0.3	0.1
CO2 (percent)	13.0	14.2
O2 (percent)	0.2	0.5

6. An engine with multiport fuel injection runs rough at idle, but smooths out as engine speed increases. The emissions readings shown above were taken during diagnosis. Which of these could be the cause?

   (A) A leaking intake manifold gasket
   (B) A partially clogged fuel injector
   (C) A secondary ignition wire shorting to ground
   (D) An EGR valve pintle that does not fully close

7. A vehicle lacks power at high speeds and under heavy engine load conditions. Which of these could be the cause?

   (A) A stuck-closed fuel pressure regulator
   (B) An intake valve adjusted too tight
   (C) Low fuel pump delivery volume
   (D) A stuck-open EGR valve

Answers: 1. C 2. D 3. C 4. B 5. A 6. D 7. C

Industry Training
Advanced Engine Performance Specialist Test

The training sources listed in this guide are designed to help you sharpen your technical skills in advanced emission and driveability diagnostics. Since the L1 Test reflects these skills - the more you learn, the better your chances are of passing this test.

Please contact the listed organizations for availability, schedules, and prices. In addition, many new sources of training in this area are being developed. You may wish to check with auto manufacturers, community colleges, tool and equipment suppliers, and technical training organizations for the latest training information. Training resources can also be found on ASE's home page at www.ase.com, the International Automotive Technicians Network (iATN) at www.iatn.net, or the Diagnostic Network at www.diag.net.

ACDelco offers a blended learning approach with instructor-led and web-based training. Advanced driveability training covers OBD II, fuel system diagnostics, emissions control system diagnosis, engine performance, and emerging technologies.For more information about all training offerings,visit www.acdelco.com/training-programs or call ACDelco at (800) 825-5886.

The **ASE Training Managers Council** is a professional organization of individuals responsible for the development and delivery of training in the auto and truck industries. ATMC administers the ASE Accredited Training Provider of Continuing Automotive Service Education program. A list of ASE accredited training providers can be found at the ATMC website. www.atmc.org

Automotive Technician Training Services offers seminars, webinars, and self-study training courses all designed to help technicians stay in touch with the latest driveability and electrical systems diagnostic and repair procedures. Technician-trainers deliver the instructor-led seminars and webinars. Self-study materials deliver information that will both teach, and enhance diagnostic skills. ATTS Training Center, 10 Lupi Plaza, Mahopac, NY 10541 Call: (845) 628-1062. Internet: www.attstraining.com

AVI OnDemand offers video training programs that cover advanced engine performance testing and diagnosis, emissions control system diagnosis, computer controlled ignition systems diagnosis, electrical/electronic systems testing and diagnosis, as well as manufacturer-specific systems. Programs covering the use of scan tools are also offered. Ph: (800) 718-7246. Internet: www.aviondemand.com

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Industry Training (continued)

Motor Age Training for ASE Certification is a self-study training guide that is updated regularly and contains both technical information and sample questions. For ordering information, write: Motor Age Training, P.O. Box 6310, Duluth, MN 55806.Phone: (800) 240-1968; Internet: www.motoragetraining.com

NAPA Autotech provides a broad self-study curriculum, including electronic engine management systems, strategies of exhaust and emission control, no-code driveability diagnosis, distributorless ignition systems, lab scope diagnostics, use of four- and five-gas analyzers, and automotive electrical/electronic diagnosis. There are also specialized courses in European and Asian engine management systems, OBD II, and fuel injection system diagnosis. To get more information about prices, specific course content, or to order any of these courses, call (800) 292-6428. Internet: www.napaautotech.com/learn

Robert Bosch LLC provides a selection of training aids and reference material for gasoline and diesel fuel injection systems, starting and charging systems, and antilock braking systems on automotive and heavy duty applications. Technical hands-on training is also available. For more information, see www.thegrouptrainingacademy.com/bosch-training/

Standard Motor Products, Inc. offers professional technician seminars that focus on real-world problems and solutions, not just theory. Engage in actual diagnosis using case studies in the shop to apply what you've learned. An ASE-Certified professional instructor conducts the four-hour seminars during the evening, with a heavy emphasis on diagnostics and troubleshooting. Each seminar includes a workbook for your reference after the class. SMP also offers 70 live, as well as a number of archived, one-hour long webinars. These can be viewed anywhere an internet connection is available, including at home. Internet: http://www.standardbrandtraining.com

VEEJER Enterprises offers training in automotive electrical diagnosis and repair and vehicle electronics troubleshooting. Training programs are designed to teach step-by-step methods used for performing electrical repairs, as well as the skills necessary for troubleshooting electrical and electronic problems. Training programs cover the use of a DMM, current clamp, digital logic probe, scope meter, and dual-trace lab scope when testing and diagnosing electrical and electronic circuits. Training is offered through home-study programs, as well as hands-on instructor led electrical/electronics trouble-shooting training workshops. For more information, contact: Veejer Enterprises, 3701 Lariat Lane, Garland, TX 75042-5419, or call (972) 276-9642. Internet: www.veejer.com