
***With Composite
Vehicle Type 3***



TEST INFORMATION
FOR THE
ADVANCED ENGINE
PERFORMANCE
SPECIALIST TEST (L1)

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Advanced Engine Performance Specialist Test

Overview

Introduction

The Advanced Engine Performance Specialist (L1) Test was the first advanced level test offered by ASE. It is designed to measure a technician's knowledge of the skills needed to diagnose emission failures and driveability problems on computer-controlled engine systems. It is an extension of the basic repair and diagnostic skills tested on the automobile Engine Performance (A8) test. *To register to take the L1 test (regular or recertification), you must be currently certified in A8 Engine Performance, and meet the two-year experience requirement.*

The L1 test (both regular and recertification) consists of 50 scored multiple choice questions. Some of the questions require the use of supplied reference materials. ASE recommends that you do not register for other tests given the same night as the L1 test. This will give you plenty of time to carefully read, evaluate, and answer all the questions.

You can request a current *Registration Booklet* by calling the ASE Toll-Free Automated Information Line at 1-888-ASE-TEST. The *Registration Booklet* will give you the test dates, locations, and other important information. You can also view test information, as well as register for the tests on the ASE website at www.ase.com.

Who Writes the Questions?

Each question has its roots in an ASE "question-writing" workshop, where service representatives from automobile manufacturers, aftermarket trainers, working technicians and vocational educators meet to share ideas and translate them into test questions. Each test question written by these experts must survive review by all members of the group. The questions deal with practical problems experienced by technicians in their daily work. Naturally, the failures described in the advanced level questions are more complex and challenging.

From there, all questions are pre-tested and quality-checked on a national sample of technicians. Those questions that meet ASE standards of quality and accuracy are included in the scored sections of future tests; the "rejects" are sent back to the drawing board, or are discarded altogether.

How Do I Prepare for the ASE L1 Test?

To prepare for the test, we suggest the following steps be taken:

Step 1. Study the content areas listed in the Test Specifications, noting which areas have more questions in the test.

Step 2. Carefully read the Task List, noting the areas in which your skills are strong or weak. You can do this by checking off each task that you do not perform often or do not understand completely.

Step 3. Practice on the sample questions that follow. Although these same questions will not appear in the test, they are similar in style and difficulty to the actual test questions. Practice using the Composite Vehicle Type 3 Reference Booklet to answer the questions that refer to the Composite Vehicle Type 3.

Step 4. Use steps 1 through 3 to identify any skill areas where you need additional study or training. Then refer to the Industry Training reference section to locate the training sources that are right for you.

What is the "Composite Vehicle"?

The Composite Vehicle represents a generic vehicle powertrain control system. The technology included in the Composite Vehicle has been updated over time to remain current with the technology found in most all of today's vehicles. Composite Vehicle Type 1 was originally developed in 1994 to be used specifically for the ASE L1 test, and contained the components and system operations that were representative of OBD I technology. In 1999, Composite Vehicle Type 2 was introduced, and it represented a platform that was consistent with early OBD II technology. Composite Vehicle Type 3, introduced in 2006, incorporates the technological enhancements that are found in more advanced OBD II systems. It has been specially engineered to include a complete OBD II diagnostic system that is equipped with sensors and actuators that are used in many manufacturers' vehicles, so you should already be familiar with most of the components and how they work. It is described in detail in the *Composite Vehicle Type 3 Reference Booklet*. By answering questions about the Composite Vehicle, you will be simulating the real-world activities of using reference materials and diagnosing problems based on your understanding of a specific engine system.

In the test, there will be a clearly marked section of questions that specifically deal with the Composite Vehicle. To answer these questions correctly, you will need to use the information given in the question and the information contained in the *Composite Vehicle Type 3 Reference Booklet*, plus your own understanding of computerized engine controls and engine operation. *The Composite Vehicle Type 3 Reference Booklet should be used only with this group of questions.* Please take the time to become familiar with the Composite Vehicle specifications before the actual test.

Before the Tests

Try to be well rested for the test so you will be alert and efficient. Bring several sharpened #2 pencils with you; pencils are not available at the test center. To keep track of the time, bring a watch. Finally, be sure to bring along your admission ticket and some form of current (unexpired) government- or school-issued photo identification, like a driver's license. *You don't need to bring your Composite Vehicle Type 3 Reference Booklet with you. A copy is included with the test booklet, and will be collected when you finish your test.*

At the Test Center

Once the test begins, be sure to read each question carefully, (twice, if necessary) so that you understand exactly what is being asked. There are no "trick" questions. *Each question tests a specific diagnostic skill and has a single correct answer.*

If you are unsure of an answer, don't get stuck. Mark the answer that you think is correct and flag the question in the test. Then go on to the next question. If you finish before the allotted time is up, you can go back to the questions that you flagged. *It is to your advantage to answer every question. Do not leave any answers blank. Your score is based on the total number of correct answers that you give.*

**Test Specifications
for the ASE
Advanced Engine Performance Specialist Test (L1)**

Content Area	Questions in Test	Percentage of Test
A. General Powertrain Diagnosis	6	12%
B. Computerized Powertrain Controls Diagnosis (Including OBD II)	14	28%
C. Ignition System Diagnosis	6	12%
D. Fuel Systems and Air Induction Systems Diagnosis	7	14%
E. Emission Control Systems Diagnosis	9	18%
F. I/M Failure Diagnosis	<u>8</u>	<u>16%</u>
Total	50*	100%

**Note:* The L1 test could contain additional questions that are included for statistical research purposes only. 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.

Advanced Engine Performance Specialist Task List

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. Establish relative importance of observed vehicle data.
7. Differentiate between powertrain mechanical and electrical/electronic problems, including variable valve timing (VVT) systems.
8. Diagnose engine mechanical condition using an exhaust gas analyzer.
9. Diagnose driveability problems and emission failures caused by cooling system problems.
10. Diagnose driveability problems and emission failures caused by engine mechanical problems.
11. Diagnose driveability problems and emission failures caused by problems or modifications in the transmission and final drive, or by incorrect tire size.
12. Diagnose driveability problems and emission failures caused by intake or exhaust system problems or modifications.
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.

B. Computerized Powertrain Controls Diagnosis - including OBD II (14 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), 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. Establish 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.
18. Test output actuator/output circuit using scan tool, scan tool data, and/or waveform analysis.

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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. Establish 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 on vehicles equipped with distributorless electronic ignition (EI) systems; determine needed repairs.
9. Diagnose no-starting, hard starting, stalling, engine misfire, poor driveability, backfire, spark knock, power loss, reduced fuel economy, illuminated MIL, and emission problems on vehicles equipped with distributor ignition (DI) systems; determine needed repairs.
10. Test for ignition system failures under various engine load conditions.
11. Test ignition system component operation using waveform analysis.
12. Confirm base ignition timing and/or spark timing control.
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.

D. Fuel Systems and Air Induction Systems Diagnosis (7 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/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. Establish 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, poor driveability, spark knock, incorrect idle speed, poor idle, flooding, hesitation, backfire, surging, power loss, reduced fuel economy, dieseling/run-on, illuminated MIL, and emission problems on vehicles equipped with fuel injection fuel systems; determine needed action.
11. Verify fuel quality/composition, fuel system pressure, and fuel system volume.
12. Evaluate fuel injector and fuel pump performance (mechanical and electrical operation).
13. Determine root cause of failures.

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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 (9 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. Establish relative importance of displayed scan tool data.

Note: Tasks 8 through 12 refer to the following emission control subsystems: Positive crankcase ventilation, ignition timing control, idle and deceleration speed control, exhaust gas recirculation, catalytic converter system, secondary air injection system, intake air temperature control, early fuel evaporation control, and evaporative emission control (including ORVR.)

8. Determine the need to diagnose emission control subsystems.
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, poor driveability, spark knock, incorrect idle speed, poor idle, flooding, hesitation, backfire, surging, power loss, reduced fuel economy, dieseling/run-on, 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 (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. Evaluate emission readings obtained during an I/M test to assist in emission failure diagnosis and repair.
5. Evaluate HC, CO, NO_x, 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, NO_x, 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 NO_x 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 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 various electronic control modules and on-board computers.

Data Link Connector (DLC) - The standardized plug that is used to connect the scan tool, or other test equipment, to the vehicle's powertrain control system.

Diagnostic Trouble Codes (DTC) - Codes stored by a powertrain control system computer(s) when a problem is detected, and are 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.

Distributor Ignition (DI) - An ignition system that uses a distributor.

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; often referred to as distributorless ignition.

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 the 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 on-board computer(s), at the instant an emissions-related diagnostic trouble code 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 rapidly switching oxygen sensor values. Long Term Fuel Trim is a learned value used to compensate for continual deviation of the Short Term Fuel Trim from its central value.

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

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

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** - Tests that measure HC emissions in parts per million (ppm) and CO emissions in percent, while the vehicle is in neutral. Examples are idle- and two-speed.
- **Acceleration Simulation Mode (ASM)** - Loaded-mode steady-state tests that measure HC, CO and NO_x emissions while the vehicle is driven on a dynamometer at a fixed speed and load. ASM5015 is a test at 15 mph with a load equivalent to 50% of the power needed to accelerate the vehicle at 3.3 mph per second. ASM2525 is a test at 25 mph with a load of 25% of the same power.
- **IM240** - A loaded-mode transient test that measures HC, CO, CO₂, and NO_x emissions in grams/mile second-by-second, while the tested vehicle is driven at various speeds and loads on a dynamometer for 240 seconds. Another transient load test is the...
- **BAR31** - a 31-second test cycle that includes an acceleration ramp similar to the IM240.
- **OBD** - A steady-state test that is performed by connecting a cable to the vehicle's data link connector (DLC) and communicating with the on-board computer(s). MIL operation and information stored in the on-board computer(s) determine the pass/fail status for the vehicle.

NOTE: All of the tests listed above typically 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 on-board computer(s) detect an emission-related problem; similar to a "CHECK ENGINE" light.

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 powertrain control system computer.

On-Board Diagnostics (OBD) - A diagnostic system contained in the on-board computer(s) 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 EVAP system also prevents fuel from leaking in the event of a vehicle rollover.

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

Reprogramming - The updating of electronic computer 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 computerized powertrain control system information.

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; can be either pulse or air-pump type.

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 NO_x 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 3 occurs when the necessary enable criteria are met, the monitor runs, no failures are detected, and the key is turned off.

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

Advanced Engine Performance Specialist Test Sample Questions

Questions 1 through 4 will require the use of the *Composite Vehicle Type 3 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.

SCAN TOOL DATA

Engine Coolant Temp. Sensor (ECT) -40°F / -40°C / 5.0 v.	Intake Air Temperature Sensor (IAT) -40°F / -40°C / 5.0 v.	Mass Airflow Sensor (MAF) 175 gm/sec / 5.0 v.	Throttle Actuator Control Motor (TAC) 15 percent
Throttle Position Sensor 1 (TP 1) 0 percent / 5.0 v.	Throttle Position Sensor 2 (TP 2) 100 percent / 5.0 v.	Accelerator Pedal Position Sensor 1 (APP 1) 0 Percent / 0.50 v.	Accelerator Pedal Position Sensor 2 (APP 2) 0 percent / 1.50 v.
Crankshaft Position Sensor (CKP) 300 rpm	Heated Oxygen Sensor Bank 1 (HO2S 1/1) 0.0 v.	Heated Oxygen Sensor Bank 2 (HO2S 2/1) 0.0 v.	Heated Oxygen Sensor Post-Cat (HO2S 1/2) 0.0 v.
Manifold Absolute Press. Sensor (MAP) 101 kPa / 0 in.Hg / 5.0 v.	EVAP Canister Purge Solenoid 0 percent	EVAP Canister Vent Solenoid OFF	Fuel Pump Relay (FP) ON

- The engine cranks, but will not start. Using the scan tool readings shown above, which of these is the most likely cause?
 - A short to ground at ECM pin 1
 - An open circuit at ECM pin 2
 - An open circuit at ECM pin 31
 - A short to ground at ECM pin 32

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 31 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 32 would provide an additional path to ground for the ECM ground, which would not cause a fault in ECM operation.

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2. A vehicle's engine has a miss on cylinder #1. The technician measures battery voltage at ECM pin 38 while the engine is running.

Technician A says that this reading indicates an open circuit on fuel injector #1.

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	12.6v
b	0.05v
c	3.2v

3. With the key on and engine off, the voltage readings shown above are measured at the mass airflow (MAF) sensor. These readings indicate:

- (A) excessive reference voltage.
(B) a poor circuit ground.
(C) a bad MAF sensor.
(D) normal circuit operation.

4. A vehicle has a stored P0442 "EVAP system small leak detected" diagnostic trouble code (DTC). Which of these is the most likely 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.

Questions 5, 6, and 7 are to be answered without using the *Composite Vehicle Type 3 Reference Booklet*.

5. An engine runs rough at all times, and a P0301 “Cylinder 1 Misfire Detected” diagnostic trouble code (DTC) is stored. Which of these is the most likely 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
CO ₂ (percent)	13.0	14.2
O ₂ (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 is the most likely 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 is the most likely 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

Answer Key : 1. C 2. D 3. C 4. B 5. A 6. D 7. C
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Advanced Engine Performance Specialist Test Industry Training

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 (<http://www.ase.com>), or the iATN Technician's Network (<http://www.iatn.net>).

ACDelco offers a blended learning approach with instructor-led and web-based training. Advanced drivability training covers OBD II, fuel system diagnostics, emissions control system diagnosis, engine performance, and emerging technologies. For more information about all training offerings, call ACDelco at 1-800-825-5886. Internet: www.acdelcotechconnect.com

ASPIRE Inc.'s FAST PASE preparation series is a complete set of video-based training programs for ASE test preparation. The L1 program consists of a videotape and workbook with ASE-style questions. ASPIRE also offers other self-study training programs. For more information on all of these programs, write: ASPIRE, Inc., 925 Lincoln Highway, Morrisville, PA 19067, or call (800) 247-1099. Internet: www.aspireinc.com

Automotive Video, Inc. offers video training programs covering 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. For more information, call: (800) 718-7246. Internet: www.auto-video.com

Delmar Learning provides training textbooks and online, interactive courseware covering many areas of automotive repair, including a Preparation Guide for the ASE L1 Test. There is also an online interactive computer program, called Technician Test Preparation (TTP), designed to help prepare technicians for the ASE tests, including L1. For a free catalog, write: Delmar Learning, P.O. Box 8007, Clifton Park, NY 12065, or call (800) 347-7707. Internet: www.trainingbay.com

EAST Training Inc. is an ASE CASE provider offering over 60 hands-on, instructor led classes covering electricity, electronics, engine performance, OBD-II, and enhanced I/M failure diagnosis and repair. EAST also offers a series of ASE test preparation classes, including L1. All instructors are full time professionals, and hold a minimum of ASE CMAT and L1 certifications. Classes are held at the EAST R&D center in New Jersey, and at remote locations in the US. For information on current classes and locations, write: EAST Training Inc., 2 Coleman Court, Southampton, NJ 08088; or call (888) 979-9920. Internet: www.easttraining.com

Linder Technical Services provides 'real world' technician training on underhood electronics. LTS currently offers class sessions in Indianapolis, as well as remote seminars tailored to your needs. One week 'Guru' school covers advanced driveability and emissions diagnosis methods. Write: Linder Technical Services, 4-D Gasoline Alley, Indianapolis, IN 46222, or call (317) 487-9460. Internet: www.lindertech.com

The **Mechanic's Education Association (MEA)** is a technician-based organization in New Jersey that offers over 90 instructor-led courses (including the latest on I/M failure diagnosis), a telediagnostic hotline, and an on-site diagnostic van to help with the toughest problems. For information, contact: MEA, 1805 Springfield Ave., Maplewood, NJ 07040, or call (973) 426-9001. Internet: www.meatraining.com

Mitchell Repair Information Company publishes the Mitchell ASE Test Preparation Series of books, including an L1 book. The books may be ordered separately, or as a set. For more information, call: (888) 724-6742 ext. 7012, or write: Mitchell Repair Information Co., 14145 Danielson St., Poway, CA 92064. Internet: www.mitchellrepair.com

Motor Age Training for ASE Certification is a self-study training guide that was completely updated in 1999 and contains both technical information and sample questions. For ordering information, write: Motor Age Training, P.O. Box 6310, Duluth, MN 55806, or call (800) 240-1968. Internet: www.motorage.com

MOTOR/Chek-Chart offers an L1 Test Study Guide, which covers all test areas and includes a 65-question practice test with explanations for all answers. Write: Motor/Chek-Chart, 5600 Crooks Road, Suite 200, Troy, MI 48098, or call (800) 426-6867. Internet: www.CHEKCHART.com

The **NAPA Institute of Automotive Technology (N.I.A.T.)** 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, write to: N.I.A.T., 121 N. River St., Fenton, MI 48430 or call (800) 292-6428. Internet: www.niat-training.com

The **National Center for Vehicle Emissions Control and Safety (NCVECS)** at Colorado State University offers three courses, dealing with IM240 and ASM diagnosis and catalytic converters. NCVECS also publishes a series of I/M training manuals covering IM Testing, and Catalytic Converter Testing. NCVECS is also conducting extensive OBD II research. For information, write: NCVECS, Colorado State University, Room 100 Industrial Sciences - MTCM, Fort Collins, CO 80523, or call (970) 491-7240. Internet: www.ncvecs.colostate.edu

Standard Motor Products, Inc. offers professional technician seminars that focus on real-world problems and solutions, not just theory. Engage in actual diagnosis using virtual vehicles to apply what you've learned. An ASE-Certified professional instructor conducts the eight-hour seminars over two nights, with a heavy emphasis on diagnostics and troubleshooting. The registration fee includes a diagnostic manual based on typical driver complaints and vehicle symptoms. Internet: www.smp-training.com

Target Training Systems, Inc. has a Technical Mastery Series of video programs that cover subjects such as L1 test preparation and 5-gas failure analysis. They also offer manufacturer-specific training videos, instructor-led classes, and diagnostic manuals that employ specification-based test procedures. For a catalog, write: Target Training Systems, Inc., 751 Main Street East, Owatonna, MN 55060. Internet: www.target-training.net

Tools For Education, Inc. offers interactive computer-based training software on CD-ROM. The SMOGHOUSE program includes five-gas theory, failed vehicle case studies, and diagnostic flow charts. The ATACS program covers theory, analysis, and case studies of automotive current waveforms using a digital storage oscilloscope. The EDDI program teaches the use of five-gas analysis to diagnose emission failures. For information, contact: Tools For Education, 140 N. Ridge Ave., Ambler, PA 19002, or call (888) 404-8320. Internet: www.toolsforeducation.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 troubleshooting training workshops. For more information, contact: Veejer Enterprises, 3701 Lariat Lane, Garland, TX 75042-5419, or call (972) 276-9642. Internet: www.veejer.com



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