

*With Medium/Heavy Composite Vehicle Type 3*



***TEST INFORMATION***  
***FOR THE***  
***ELECTRONIC DIESEL ENGINE***  
***DIAGNOSIS SPECIALIST TEST (L2)***

***OVERVIEW***  
***TEST SPECIFICATIONS***  
***TASK LIST***  
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# **ASE**

## **ELECTRONIC DIESEL ENGINE DIAGNOSIS SPECIALIST TEST**

### **OVERVIEW**

#### **INTRODUCTION**

The Electronic Diesel Engine Diagnosis Specialist test (L2) is the first advanced level test offered by ASE for medium and heavy vehicle technicians. It is designed to measure a technician's knowledge of the skills needed to diagnose sophisticated engine performance problems on computer-controlled diesel engines. It is an extension of the repair and diagnostic skills tested by the light vehicle, medium/heavy truck, school bus and/or transit bus Diesel Engines and Electrical/Electronic Systems tests. *To register to take the L2 test, you must be currently certified in both Diesel Engines (A9, T2, S2, or H2) and Electrical/Electronic Systems (A6, T6, S6, or H6), and meet the two-year experience requirement.*

The L2 test (both regular and recertification) consists of 45 scored multiple choice questions, many of which are detailed and require the use of reference materials. ASE recommends that you do not register for other tests given the same night as the L2 test. This will give you plenty of time to carefully answer all the questions.

You can receive the current *Registration Booklet* by mailing the coupon contained on the back page of this booklet, or by calling the ASE Toll-Free Information Line at 1-888-ASE-TEST. Registration information is also available on the ASE website ([www.ase.com](http://www.ase.com)) on the Internet. The *Registration Booklet* will give you the test dates, locations, and other important information.

#### **WHO WRITES THE QUESTIONS?**

Each question has its roots in an "ASE question writing workshop" where service representatives from vehicle and engine 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.

After the question writing workshop, 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 L2 TEST?**

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

- Step 1. Study the content areas of the Test Specification, 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. For practice, use 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. Be sure to use the Medium/Heavy Composite Vehicle Reference Booklet on the questions that refer to the Composite Vehicle.

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

### ***WHAT IS THE "MEDIUM/HEAVY COMPOSITE VEHICLE"?***

The Composite Vehicle has an electronic unit injector diesel fuel system, **and was updated in 2009 to include new sensors, actuators, emission control devices, and control logic.** It contains computer circuits, sensors, and actuators 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 enclosed *Medium/Heavy Composite Vehicle Type 3 Reference Booklet*. As you answer the 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 *Reference* booklet, plus your own understanding of computer controls and diesel engine operation. *The Medium/Heavy 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 operation before taking the test.

### ***BEFORE THE TEST***

Try to be well rested for the test so you will be alert and efficient. Bring several sharpened #2 pencils with you; pencils usually 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) photo identification, like a driver's license. *Do not bring your Medium/Heavy Composite Vehicle Type 3 Reference Booklet with you. Another copy is included in 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 best answer.*

If you are unsure of an answer, don't get stuck. Mark the answer that you think is correct and put a check by the question in the test book. 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 checked. *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.*

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**TEST SPECIFICATIONS  
FOR THE MEDIUM/HEAVY VEHICLE  
ELECTRONIC DIESEL ENGINE DIAGNOSIS SPECIALIST TEST (L2)**

|    | <b>Content Area</b>                         | <b>Questions in Test</b> | <b>Percentage of Test</b> |
|----|---------------------------------------------|--------------------------|---------------------------|
| A. | General Inspection and Diagnosis            | 4                        | 9%                        |
| B. | Electronic Engine Controls Diagnosis        | 27                       | 60%                       |
| C. | Air Induction and Exhaust Systems Diagnosis | 6                        | 13%                       |
| D. | Fuel Systems Diagnosis                      | 8                        | 18%                       |
|    | Total                                       | <u>45*</u>               | <u>100%</u>               |

\*Note: The L2 test could contain up to fifteen 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 L2 Certification and Recertification tests cover the same content areas and have the same number of scored questions.

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## ***ELECTRONIC DIESEL ENGINE DIAGNOSIS SPECIALIST TASK LIST***

### **A. GENERAL INSPECTION AND DIAGNOSIS (4 QUESTIONS)**

1. Identify engine model and serial number to research applicable vehicle and service information, service precautions, technical service bulletins; and service campaigns/updates; determine needed actions.
2. Verify operational complaint.
3. Determine if problem is electrical/electronic or engine mechanical.
4. Evaluate engine mechanical condition based on a visual inspection of the exhaust output. (Applies to engines with a damaged diesel particulate filter (DPF) and to engines not equipped with a DPF)
5. Check and record electronic diagnostic codes, freeze frame and/or operational data; interpret live engine data; download/save ECM data (image); determine further diagnosis.
6. Diagnose performance complaints caused by engine cooling system problems.
7. Diagnose performance complaints caused by engine lubrication system problems.
8. Evaluate the integrity of the air induction system.
9. Evaluate the integrity of the exhaust system.
10. Listen for and isolate engine noises; determine needed actions.
11. Diagnose performance complaints caused by drivetrain and tire problems or modifications.
12. Diagnose performance complaints caused by vehicle operation and/or configuration of mechanical and electronic components.
13. Diagnose no-crank, cranks but fails to start, extended cranking, and starts then stalls; determine needed actions.
14. Visually inspect engine compartment wiring harnesses and connectors; check for proper routing, condition; and mounting hardware; determine needed actions.
15. Diagnose surging, rough operation, misfiring, low power, slow acceleration, slow deceleration, and shutdown problems; determine needed actions.
16. Determine root cause of current, multiple and/or repeat failures.
17. Verify effectiveness of repairs and clear diagnostic codes (if applicable).

### **B. ELECTRONIC ENGINE CONTROLS DIAGNOSIS (27 QUESTIONS)**

1. Inspect and test for missing, modified, or damaged engine control components.
2. Check and record electronic diagnostic codes, freeze frame and/or operational data; interpret live engine data; download/save ECM data (image); determine further diagnosis.
3. Connect diagnostic tool to vehicle/engine; access, verify and update parameters and calibration settings. Perform updates as needed.
4. Determine if the control system problem is electrical/electronic or mechanical.
5. Use a diagnostic tool to inspect and test electronic engine control system, sensors, actuators, electronic control modules (ECMs), and circuits; determine further diagnosis
6. Test and confirm operation of electrical/electronic circuits not displayed on diagnostic tools.
7. Diagnose engine problems resulting from failures of inter-related systems (for example: cruise control, security alarms/theft deterrent, transmission controls, electronic stability control, non-OEM installed accessories).
8. Measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM) or appropriate test equipment.
9. Inspect and repair/replace electrical connector terminals, pins, harnesses, seals, and locks.
10. Diagnose failures in the data communications bus network; determine needed repairs.
11. Determine root cause of current, multiple, and/or repeat failures.
12. Verify effectiveness of repairs and clear diagnostic codes (if applicable).

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### **C. AIR INDUCTION AND EXHAUST SYSTEMS DIAGNOSIS (6 QUESTIONS)**

1. Perform air intake system restriction, pressure, and leakage tests; determine needed actions.
2. Inspect, test and replace intake air temperature and pressure sensors.
3. Inspect and test turbocharger(s) (including variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, actuators; and sensors. Inspect, test, and replace wastegate and wastegate controls.
4. Perform exhaust back pressure and temperature tests (if applicable); determine needed actions.
5. Inspect and test preheater/inlet air heater and/or glow plug system and controls.
6. Inspect and test the exhaust aftertreatment system; verify regeneration operation. Replace aftertreatment mechanical and electronic components as needed.
7. Inspect and test EGR system components, including EGR valve(s), cooler(s), piping, sensors, controls, and wiring.
8. Inspect and test EGR airflow control (throttle) valve systems and controls.
9. Inspect and test variable valve actuator systems and controls.
10. Inspect and test crankcase ventilation system components.
11. Inspect and test engine compression and exhaust brake systems and controls.
12. Determine root cause of current, multiple, and/or repeat failures.
13. Verify effectiveness of repairs and clear diagnostic codes (if applicable).

### **D. FUEL SYSTEMS DIAGNOSIS (8 QUESTIONS)**

1. Determine if the fuel control system problem is electrical/electronic or mechanical.
2. Check fuel system for air; determine needed repairs; prime and bleed fuel system.
3. Inspect and test fuel supply system pressure, restriction, and return fuel rates; check fuel for contamination; determine needed repairs.
4. Inspect, adjust, repair/replace electronic throttle and power take off (PTO) control components, circuits, and sensors.
5. Inspect, test, and replace high-pressure common rail (HPCR) fuel system electronic and mechanical components.
6. Inspect, test, and replace hydraulic electronic unit injection (HEUI) fuel system electronic and mechanical components.
7. Inspect, test, and replace electronic unit injection (EUI) fuel system electronic and mechanical components.
8. Determine root cause of current, multiple, and/or repeat failures.
9. Verify effectiveness of repairs and clear diagnostic codes (if applicable).

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***ELECTRONIC DIESEL ENGINE DIAGNOSIS SPECIALIST TEST***  
***SAMPLE QUESTIONS***

Questions 1, 2, and 3 are to be answered without using the Medium/Heavy Composite Vehicle Type 3 Reference Booklet.

1. An engine cranks, but will not start. During diagnosis, the ECM will not communicate with the diagnostic tool. Which of these could be the cause?
  - (A) A failed data link connector
  - (B) A failed engine speed/timing sensor(s)
  - (C) Low ECM supply voltage
  - (D) Incorrect diagnostic tool software

Question #1 Explanation:

Option (A) is wrong. While a failed data link connector could cause the diagnostic tool to be unable to communicate with the ECM, it would not result in a no-start condition.

Option (B) is wrong. A failed engine speed sensor or timing sensor(s) could cause the ECM to not operate the injectors, resulting in a no-start problem. However, the loss of the speed/timing signal(s) would not cause a diagnostic tool communication problem.

Option (C) is correct. A low supply voltage could result in the ECM shutting down. In this case, the ECM would not operate the injectors or communicate with the diagnostic tool.

Option (D) is wrong. If the diagnostic tool software did not match the ECM being diagnosed, it would result in a loss of communications only.

2. A driver complains of low power. Technician A says that a leaking intake manifold gasket could be the cause. Technician B says that a failed boost pressure sensor could be the cause. Who is right?
  - (A) A only
  - (B) B only
  - (C) Both A and B
  - (D) Neither A nor B

Question 3 is not like the other questions. It contains the word EXCEPT. For this question, look for the choice that could NOT cause the described situation. Read the entire question carefully before choosing your answer.

3. A HEUI engine stumbles and lacks power on acceleration. Any of these could be the cause EXCEPT a:
  - (A) leaking charge air cooler.
  - (B) plugged air cleaner element.
  - (C) faulty injection pressure regulator.
  - (D) faulty camshaft position sensor.

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Questions 4, 5, and 6 require the use of the Medium/Heavy Composite Vehicle Type 3 Reference Booklet. This booklet describes the engine control system and diagnostic parameters referred to in questions 4, 5, and 6. You need to use this information to correctly answer these questions. Take time to review the content of the booklet before you continue, and then use it as a reference as you answer these questions.

4. A composite vehicle will start, but will not go above idle speed when the accelerator pedal is depressed. This could be caused by an open circuit:
- (A) in wire 175.
  - (B) in splice S44.
  - (C) at ECM pin 78.
  - (D) at ECM pin 80.
5. A diesel engine has a DTC for “exhaust back pressure signal above normal or shorted high.” During diagnosis, the EBP sensor signal displays 5 volts on the diagnostic tool. With connector AX disconnected and the key ON, 0 volts are measured between harness pins 3 and 2. ECM connector 2 is removed and 5 volts are measured between ECM pins 204 and 203 with the key ON. Which of these could be the cause?
- (A) A short to ground in wire 303 between connector AX pin 2 and splice S62
  - (B) An open wire 303 between connector AX pin 2 and splice S62
  - (C) An open internal ECM ground circuit for pin 203
  - (D) A short between connector AX harness wires 301 and 303
6. A composite vehicle has an intermittent “voltage below normal Cylinder 5” diagnostic trouble code. Which of these could be the cause?
- (A) Loose wires at the injector
  - (B) A loose wire at injector hold down
  - (C) An open circuit at splice S13
  - (D) An open circuit at connector A pin 5

|                                            |
|--------------------------------------------|
| Answer Key : 1. C 2. C 3. D 4. A 5. B 6. A |
|--------------------------------------------|

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## ***ELECTRONIC DIESEL ENGINE DIAGNOSIS SPECIALIST TEST INDUSTRY TRAINING***

The training sources listed in this guide are designed to help you sharpen your technical skills in diesel engine fuel systems and driveability diagnostics. Since the L2 test reflects these skills - the more you learn, the better your chances of passing this test.

Please call or write the listed organizations for availability, schedules, and prices. You may wish to check with truck and engine 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.i-atn.com>).

### **Caterpillar, Inc.**

Caterpillar, Inc., Engine Div., Service Training, Bldg. JJ, 600 W. Washington St., East Peoria, IL 61630; Attn: Supervisor, Service Training.

Many Caterpillar dealers have on-site training. A fee is charged. For further info, contact the training department of your local Caterpillar dealer.

### **Cummins**

Courses conducted at Cummins Distributor Training Centers in the U.S. and Canada.

For details on course locations, schedules, and costs, contact nearest Cummins Distributor Training Center, or write: Cummins Engine Co., Inc., Box 3005, Columbus, IN 47202-3005, Attn.: Service Training MC91300.

### **Delmar Cengage Learning**

P.O. Box 6904  
Florence, KY 41022  
1-800-487-8488  
[www.autoed.cengage.com](http://www.autoed.cengage.com)  
[www.cengage.com/delmar](http://www.cengage.com/delmar)

### **Detroit Diesel & Freightliner Corp.**

Diamler Trucks North America service training and Detroit Diesel service technician training programs are offered through the corporate training center and distributors. Training is provided in the areas of overhaul, engine electronic controls, and other vehicle systems. Classes are a combination of web-based and instructor-led courses.

For information contact: Detroit Diesel Corp., 13400 Outer Drive, Detroit, MI 48329. Ph: 313-592-5000. Internet [www.DDCSN.com](http://www.DDCSN.com)

### **Mack and Volvo Trucks North America, Inc.**

The North American Training Institute provides service, sales, warranty, parts, and other training for Mack and Volvo Trucks. Training is available to dealer and fleet personnel in several ways:

Classroom Training - Learn from instructors at one of several NAI Class Facilities throughout the United States.

Field Training - NAI instructors come to your facility.

Classes on Demand - Get instructor led classes at a time that fits your schedule.

eLearning - Training materials are available online through the eMedia Center.

For course availability and scheduling contact: Volvo Trucks North America, Inc., Registrar's Office, NAI-34, 7900 National Service Rd., Greensboro, NC 27409. Ph: 336-393-3711. Internet [www.n-a-institute.com](http://www.n-a-institute.com)

### **Motor Age Training for Certification**

131 West First Street  
Duluth, MN 55802  
800-240-1968  
[www.motorage.com](http://www.motorage.com)

### **Navistar, Inc.**

International Trucks conducts training classes on diagnosis/overhaul of MaxxForce diesel engines, brakes, steering, and other vehicle systems.

For information, contact your local International Truck Dealer. For dealer locations, go to [www.internationaltrucks.com](http://www.internationaltrucks.com).

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**Robert Bosch LLC**

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.

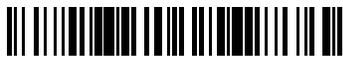
Technical hands-on training is also available.

For more information, visit the Bosch site at [www.boschtechinfo.com](http://www.boschtechinfo.com)



National Institute for  
**AUTOMOTIVE  
SERVICE  
EXCELLENCE**  
101 Blue Seal Dr. SE, Suite 101  
Leesburg, VA 20175  
(703) 669-6600 [www.ase.com](http://www.ase.com)

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