

# Light Vehicle Diesel Engines

## Chapter 20 OBD-II Diesel Monitors

### Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This Light Vehicle Diesel Engines 1st text provides complete coverage of light duty diesel engine components, operation, and diagnosis. It correlates material to task lists specified by ASE and NATEF and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, and Real World Fixes: <a href="http://www.jameshalderman.com">www.jameshalderman.com</a> contains Videos, Animations, and Task Sheets for use in the lab and classroom.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain the chapter learning objectives to the students as listed: <ol style="list-style-type: none"> <li>1. Prepare for the Light Vehicle Diesel Engine (A9) ASE certification fuel system diagnosis and repair test content area.</li> <li>2. Identify the major monitors on a modern light-diesel vehicle</li> <li>3. Understand the information obtained from an on-board diagnostics monitor and the criteria to enable an OBD monitor.</li> <li>4. Discuss continuous vs. non-continuous monitors.</li> <li>5. Describe the comprehensive component monitor (CCM).</li> <li>6. Explain enabling conditions</li> </ol>
Establish the Mood or Climate	Provide a <b>WELCOME</b> , Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

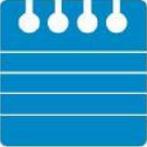
**NOTE:** This lesson plan is based on the 1<sup>st</sup> Edition Chapter Images found on Jim's web site @ [www.jameshalderman.com](http://www.jameshalderman.com)

**LINK CHP 20 Chapter Images USE BELOW LINK**

[http://www.jameshalderman.com/books\\_a9.html](http://www.jameshalderman.com/books_a9.html)

**NOTE:** You can use Chapter Images or Power Point files: Though out Power Point Presentations, you will find questions and answers on slides that can be used for discussion.

ICONS	CH20 OBD-II Diesel Monitors
	<p><b>1. SLIDE 1 CH20 OBD-II Diesel Monitors</b></p> <p>Check for <b>ADDITIONAL VIDEOS &amp; ANIMATIONS</b>  @ <a href="http://www.jameshalderman.com/">http://www.jameshalderman.com/</a>  <b>WEB SITE IS CONSTANTLY UPDATED</b></p> <p><b><u>Light Diesel (111 Links)</u></b></p> <p><a href="http://www.jameshalderman.com/books_a9.html">http://www.jameshalderman.com/books_a9.html</a>  <b>Crossword Puzzle (Microsoft Word) (PDF)</b>  <b>Word Search Puzzle (Microsoft Word) (PDF)</b></p> <p><b><u>SAFETY</u></b> Always be very careful when working on a Diesel engine that is running with air intake removed. Because most diesel <b>ENGINES DO NOT USE</b> a throttle plate, objects can very easily be sucked into engine, causing serious engine damage. <b>MOST OEMs</b> offer intake covers.</p> <p><b>2. SLIDE 2 EXPLAIN FIGURE 20–1</b> Snap-On Solus scan tool screen capture of the menu to check for the monitor data. All factory scan tools and enhanced aftermarket scan tools can be used to check diesel OBD-II monitors</p> <p><b><u>DEMONSTRATION:</u></b> Connect a scan tool to OBD-II vehicle &amp; show students how to access monitor status. Then demonstrate Comprehensive Component Monitor operation by disconnecting a sensor such as engine coolant temperature with the key on. Show illuminated MIL &amp; stored</p> <p><b><u>DISCUSSION:</u></b> Have students talk about purpose of onboard diagnostic systems. How did computer control systems function prior to OBD-I? Have the students discuss OBD-I. What were some of shortcomings/problems of OBD-I?</p> <p><b><u>HANDS-ON TASK:</u></b> Have the students locate the <b>diagnostic link connector (DLC)</b> on several OBD-I vehicles using component locators. Ask students to compare various locations to standardized locations on an OBD-II vehicle</p>

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 	<p><b><u>ON-VEHICLE TASK</u></b> Locate and interpret vehicle and major component identification numbers; Diagnose causes of emissions or driveability concerns with stored or active DTCS; obtain, graph, &amp; interpret scan tool data: Describe importance of running all <b><u>OBDII Monitors</u></b> for repair verification</p>
	<p>3. <b>SLIDE 3 EXPLAIN</b> <b>FIGURE 20–2</b> misfire monitor is enabled on Duramax diesel as seen on Tech 2 scan tool. PCM set P0300, meaning random misfire code because it was not able to detect which of eight cylinders was cause of misfire.</p>
	<p><b><u>DEMONSTRATION:</u></b> Dementsstrate operation of <b><u>misfire monitor</u></b> by closing electrode gap on spark plug and operating the engine. Once misfire has been detected, connect scan tool &amp; show DTC</p>
	<p>Depending on PCM's determination of misfire's severity, misfire monitor may set pending code until ignition is cycled OFF &amp; engine is operated 2<sup>nd</sup> time. After 2<sup>nd</sup> failure, matured DTC sets, with MIL on</p>
  <p>QUESTION</p>	<p><b><u>DISCUSSION:</u></b> <b>CHART 20-1</b> Summary showing details of how PCM handles each of mentioned monitors and what it takes to turn off MIL.</p>

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	4. <b>SLIDE 4 EXPLAIN FIGURE 20-3</b> Diesel oxidation catalyst with a temperature sensor on 6.7 liter Power Stroke diesel engine used in F-250 pickup truck.
	5. <b>SLIDE 5 EXPLAIN FIGURE 20-4</b> NOx absorber catalyst used by some OEMS usually before 2010 when NOx emission standards were greatly reduced, requiring most manufacturers to start using SCR
	6. <b>SLIDE 6 EXPLAIN FIGURE 20-5</b> boost system monitor information as displayed on a Tech 2 scan tool used on Duramax diesel.
	<b>EXPLAIN TECH TIP: Boost Pressure Failure</b>
	7. <b>SLIDE 7 EXPLAIN FIGURE 20-6</b> failed particulate filter that was so hot from being over-fueled it caused the substrate to melt.
	8. <b>SLIDE 8 EXPLAIN FIGURE 20-7</b> A partially clogged EGR cooler. While they may be able to be cleaned, most are simply replaced because the time needed to clean them exceeds the cost of a new part.
	<b>DISCUSS FREQUENTLY ASKED QUESTION: What Are the Monitors for Diesels?</b>
	<b>DISCUSSION: CHART 20-2 Diesel OBD readiness monitors</b>
	9. <b>SLIDE 9 EXPLAIN FIGURE 20-8 (a)</b> To get access to crankcase breather filter, top plastic cover has to be removed from this Cummins 6.7 liter diesel engine.
	10. <b>SLIDE 10 EXPLAIN FIGURE 20-8 (b)</b> crankcase breather filter is attached to cylinder head cover and can be replaced if needed based on reading from the crankcase pressure sensor.
	<b>ON-VEHICLE NATEF TASK</b> Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable



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 	<p><u>ON-VEHICLE NATEF TASK</u> Diagnose emissions or driveability concerns <u>W/O stored diagnostic trouble codes</u>; determine necessary action</p>