

Light Vehicle Diesel Engines

Chapter 21 OBD II Diagnosis

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: www.jameshalderman.com 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, which translates into more money.
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 learning objectives to students as listed below: <ol style="list-style-type: none"> 1. Prepare for the ASE Diesel engine controls diagnosis (A9) certification test content area "A"(General Diagnosis). 2. Discuss the steps of the diagnostic process. 3. Describe the simple preliminary tests that should be performed at the start of the diagnostic process. 4. List six items to check as part of a thorough visual inspection. 5. Explain the troubleshooting procedures to follow if no diagnostic trouble code has been set. 6. Explain the troubleshooting procedures to follow if a diagnostic trouble code has been set. 7. Discuss the type of scan tools that are used to assess vehicle components. 8. Describe the methods that can be used to reprogram (reflash) a vehicle computer.
Establish the Mood or Climate	Provide a WELCOME , 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 1st Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 21 Chapter Images USE BELOW LINK

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

CH21 OBD II Diagnosis



1. SLIDE 1 CH21 OBD II DIAGNOSIS

Check for **ADDITIONAL VIDEOS & ANIMATIONS**
@ <http://www.jameshalderman.com/>
WEB SITE IS CONSTANTLY UPDATED

Light Diesel (111 Links)

http://www.jameshalderman.com/books_a9.html

Crossword Puzzle (Microsoft Word) (PDF)

Word Search Puzzle (Microsoft Word) (PDF)














SAFETY ALWAYS BE VERY CAREFUL WHEN WORKING ON A DIESEL ENGINE THAT IS RUNNING WITH AIR INTAKE REMOVED. BECAUSE MOST DIESEL ENGINES DO NOT USE A THROTTLE PLATE, OBJECTS CAN VERY EASILY BE SUCKED INTO ENGINE, CAUSING SERIOUS ENGINE DAMAGE. MOST OEMS OFFER INTAKE COVERS.











2. **SLIDE 2 EXPLAIN** Figure 21-1 funnel is one way to visualize diagnostic process. The purpose is to narrow possible causes of a concern until root cause is determined and corrected.












3. **SLIDE 3 EXPLAIN** Figure 21-2 Step #1 is to verify customer concern or problem. If problem cannot be verified, then repair cannot be verified

DISCUSSION: HAVE THE STUDENTS DISCUSS THE 8-STEP DIAGNOSIS PROCEDURE. WHY IS IT IMPORTANT TO BEGIN DIAGNOSIS WITH VERIFICATION OF COMPLAINT?

INTERMITTENT PROBLEMS CAN BE DIFFICULT TO DIAGNOSE. IT IS IMPORTANT TO GATHER AS MUCH INFORMATION AS POSSIBLE FOR ACCURATE DIAGNOSIS. FIND OUT TEMPERATURES, SPEEDS, OR OPERATING CONDITIONS WHEN PROBLEMS OCCUR. TRY TO DUPLICATE OPERATING CONDITIONS & CAUSE PROBLEM TO OCCUR.

ICONS	CH21 OBD II Diagnosis
 	<p>DISCUSS FREQUENTLY ASKED QUESTION: Why Check the Oil First?</p>
	<p>4. SLIDE 4 EXPLAIN Figure 21-3 Form that customer should fill out if there is a driveability concern to help the service technician more quickly find the root cause.</p>
 	<p>5. SLIDE 5 EXPLAIN Figure 21-4 Step 3 in diagnostic process is to retrieve any stored diagnostic trouble codes.</p>
<p><u>DEMONSTRATION: GIVE COPIES OF DIAGNOSIS WORKSHEET LIKE FIGURE 21-3 ON PAGE 241. HAVE STUDENTS COMPLETE WORKSHEET USING PROBLEM THEY MAY BE EXPERIENCING, OR MAY HAVE EXPERIENCED IN PAST FIGURE 21-3</u></p>	<p><u>DISCUSSION: DISCUSS CHART 21-1 EXCESSIVE EXHAUST SMOKE COLORS & POSSIBLE CAUSES</u></p>
	<p><u>DEMONSTRATION: SHOW HOW TO PERFORM A THOROUGH VISUAL INSPECTION, STARTING WITH BASIC FLUID LEVEL CHECKS. RAISE & SUPPORT VEHICLE, AND CONTINUE WITH A THOROUGH UNDERCAR INSPECTION BY CHECKING ITEMS SUCH AS SUSPENSION, & BRAKE & EXHAUST COMPONENTS AND SYSTEMS.</u></p>
 	<p><u>HANDS-ON TASK: HAVE THE STUDENTS PERFORM THOROUGH VISUAL INSPECTIONS ON EACH OTHER'S VEHICLES OR LAB VEHICLES. GRADE THEM ON THEIR ABILITY TO FIND DEFECTS OR PROBLEMS.</u></p>
	<p><u>DISCUSSION: HAVE STUDENTS TALK ABOUT INFORMATION FROM CUSTOMER THAT MIGHT BE USEFUL IN DIAGNOSING A CONDITION LIKE AN OBJECTIONABLE NOISE. WHAT SPECIFIC QUESTIONS SHOULD BE ASKED OF CUSTOMER FOR EFFICIENT AND ACCURATE DIAGNOSIS?</u></p>
  <p>QUESTION</p>	<p><u>DISCUSSION: DISCUSS HOW A ROAD TEST WITH CUSTOMER MIGHT HELP WITH PROBLEM DIAGNOSIS.</u></p>
  <p>QUESTION</p>	

ICONS	CH21 OBD II Diagnosis
 	<p>DEMONSTRATION: CREATE <u>DTC</u> ON TRUCK; E.G. DISCONNECTING ECT SENSOR. SHOW STUDENTS HOW TO CONNECT SCAN TOOL AND ACCESS DTC. RECONNECT SENSOR & DEMONSTRATE PROCEDURE FOR ERASING DTC.</p>
	<p>LOOKING CAREFULLY AT SCAN TOOL DATA IN LOCATING SOURCE OF PROBLEM.</p>
	<p>DISCUSS FREQUENTLY ASKED QUESTION: Why Check DTCs before Checking TSBs?</p>
	<p>AFTER CHECKING FOR STORED DTCS, CHECK SERVICE INFORMATION FOR ANY TECHNICAL SERVICE BULLETINS THAT MAY RELATE TO TRUCK BEING SERVICED.</p>
	<p>5. SLIDE 5 EXPLAIN FIGURE 21-5 TECH 2 scan tool is factory scan tool used on General Motors vehicles.</p> <p>6. SLIDE 6 EXPLAIN FIGURE 21-6 Bluetooth adapter that plugs into DLC and transmits global OBD-II information to a smart phone that has a scan tool app installed.</p>
	<p><u>Scan Tool (View) (Download)</u></p>
	<p><u>DISCUSSION:</u> DISCUSS CHART 21-2 CUMMINS 5.9 & 6.7 LITER. VALUES OBTAINED BY USING SCAN TOOL AND BASIC TEST EQUIPMENT. ALWAYS FOLLOW OEM RECOMMENDED PROCEDURES.</p>
	<p><u>DISCUSSION:</u> DISCUSS CHART 21-3 GM DURAMAX. VALUES USING SCAN TOOL AND BASIC TEST EQUIPMENT. ALWAYS FOLLOW OEM RECOMMENDED PROCEDURES</p>
	<p><u>DISCUSSION:</u> DISCUSS CHART 21-4 FORD POWER STROKE. VALUES OBTAINED USING SCAN TOOL AND BASIC TEST EQUIPMENT.</p>

ICONS	CH21 OBD II Diagnosis
 	<p>ALWAYS FOLLOW OEM RECOMMENDED PROCEDURES</p> <p><u>DEMONSTRATION: PENDING DTC</u> CAN BE SET BY DISCONNECTING AN EMISSION COMPONENT. DRIVE THE VEHICLE TO MEET ENABLING CRITERIA FOR EGR MONITOR. ONCE CONDITIONS HAVE BEEN MET, RECONNECT. SHOW HOW TO ACCESS AND DISPLAY PENDING DTC.</p>
	<p><u>DISCUSSION: DISCUSS CHART 21-5 CHECK MODE \$06 DATA IF DTCS DISPLAYED TO SEE LIMITS AND WHY DTC WAS SET</u></p>
	<p><u>HANDS-ON TASK: ASK STUDENTS TO RESEARCH WIRING DIAGRAMS FOR THEIR OWN VEHICLES OR LAB VEHICLES. THEN HAVE THEM SELECT A SPECIFIC FUSE AND LIST HOW MANY INDIVIDUAL CIRCUITS WOULD NOT OPERATE IF THAT FUSE WERE TO OPEN OR BURN.</u></p>
 	<p><u>DEMONSTRATION: DISCONNECT CRITICAL SENSORS, LIKE CRANK SENSOR AND AIRFLOW SENSOR, ON RUNNING ENGINE TO DEMONSTRATE ENGINE STALLING. RESTART ENGINE & DISCONNECT SENSORS SUCH AS AN OXYGEN SENSOR AND COOLANT TEMPERATURE SENSOR TO DEMONSTRATE ENGINE OPERATION WITHOUT THIS DATA.</u></p>
	<p><u>HANDS-ON TASK: HAVE THE STUDENTS CONNECT AN OEM SCAN TOOL TO A RUNNING VEHICLE AND RECORD ALL DATASTREAM PARAMETERS AVAILABLE.</u></p>
 	<p><u>DISCUSSION: HAVE THE STUDENTS DISCUSS DATA PARAMETERS. WHAT <u>DATA PARAMETERS</u> ARE NECESSARY FOR ENGINE OPERATION? WHAT DATA PARAMETERS ARE CONSIDERED FUEL TRIM SENSORS OR MONITORS FOR EMISSIONS SYSTEMS?</u></p>
 	<p><u>ON-VEHICLE TASK:;) PERFORM ACTIVE TESTS USING A SCAN TOOL.</u></p>

ICONS



CH21 OBD II Diagnosis

ON-VEHICLE TASK: RETRIEVE AND RECORD STORED OBD II DIAGNOSTIC TROUBLE CODES; CLEAR CODES.

7. **SLIDE 7 EXPLAIN FIGURE 21-7** The first step in the reprogramming procedure is to determine the current software installed using a scan tool. Not all scan tools can be used. In most cases using the factory scan tool is needed for reprogramming unless the scan tool is equipped to handle reprogramming
8. **SLIDE 8 EXPLAIN FIGURE 21-8** Follow the on-screen instructions
9. **SLIDE 9 EXPLAIN FIGURE 21-9** An Internet connection is usually needed to perform updates although some vehicle manufacturers use CDs which are updated regularly at a cost to the shop
10. **SLIDE 10 EXPLAIN FIGURE 21-10** battery charger that does not introduce any alternating current (AC) when charging battery is extremely important when programming a PCM.
11. **SLIDE 11 EXPLAIN FIGURE 21-11** Connecting cables and a computer to do off-board programming
12. **SLIDE 12 EXPLAIN FIGURE 21-12** J2534 pass-through reprogramming system does not need a scan tool to reflash the PCM on most 2004 and newer vehicles
13. **SLIDE 13 EXPLAIN FIGURE 21-13** A typical J2534 universal reprogrammer that uses the J2534 standards.

DEMONSTRATION: DEMO J2534 REPROGRAMMING

HANDS-ON TASK: BASED ON ABOVE DEMO, HAVE STUDENTS REPROGRAM A PCM