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What's new with Jim?



As everyone knows, these times have been tough, especially when trying to teach automotive topics online. Most students learn best with hands on instruction and

Where's Jim?

Due to the Coronavirus, all events have been canceled and I have no travel plans planned for the rest of the year.

Keep up with me at:

www.jameshalderman.com

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Puzzle of the month

Find this month's puzzle of the month at this [link](#) and test your students knowledge on Diesel.

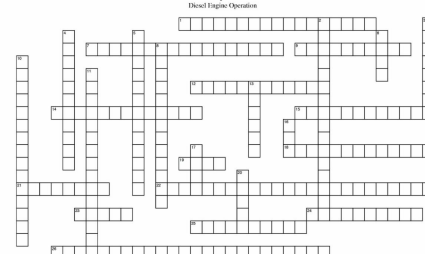
this is often not possible. In the meantime, we can't stop trying.

We all have to move forward because our success is based on what we do today, not what we do tomorrow. I am moving forward with the idea that there will be an electric vehicle in my future. I took the first step by having a NEMA 14-50 220-volt outlet installed in my garage so I will be ready to plug in a charger.

For resources that can be downloaded and used in your learning management system (LMS), check out the extensive resources on my website at www.jameshalderman.com

If you or the school personnel need to see what all is included, please write to Glen, my assistant for a free 2-week trial experience. You can contact Glen directly at glen@jameshalderman.com.

HALDERMAN
Chapter 1
Diesel Engine Operation



ACROSS

1 Used in older diesel engines, fuel is injected into a small pre-chamber, which is connected to the cylinder by a narrow opening. This design is called an indirect injection (IDI) diesel engine.

7 A power chamber where the chemical energy of the diesel fuel is converted into heat.

9 design A term used to describe an overhead valve or pushrod design valve train.

12 The valve that opens to allow exhaust gases to escape the combustion chamber.

14 An engine where the combustion is in the block and the valves are located in the cylinder head.

15 _____ in the side and (in ICI) or cubic centimeter (cc) volume displaced, or how much air is moved by air of the pistons.

16 A cast-iron rigid flange that connects the piston pin to the crankshaft and transfers engine torque to the crankshaft.

18 When only one overhead camshaft is used, the design is called a single overhead camshaft (SOHC) design.

21 A hole in an engine block where a piston is installed.

22 An engine that burns fuel outside of the engine itself, such as a steam engine.

23 A term used to express the opposing movement of the piston through 4-stroke equals one cycle.

24 A process where chemical energy (fuel) is converted to heat energy by the burning of the fuel in a controlled rapid design valve train.

25 A cast or forged shaft that converts the rotational motion of the pistons to rotary motion.

26 An engine where engine combustion occurs above the piston.

DOWN

2 The ratio of the difference in the cylinder volume when the piston is at the bottom of the stroke to the volume in the cylinder above the piston when the piston is at the top of the stroke.

3 A steel or cast iron shaft that has slots designed to open and close intake and exhaust valves.

4 A valve used to allow air into the combustion chamber in a diesel engine.

5 Engines with the camshaft in the block using pushrods to transfer the motion of the camshaft lobes to the valves, using pushrods and roller arms.

6 When two overhead camshafts are used, the design is called a double overhead camshaft (DOHC) design with one cam operating the intake valve and the other operating the exhaust valve.

8 The position of the piston at the very top of either the compression or exhaust stroke.

10 In a diesel engine where fuel is injected directly into the cylinder.

11 The four strokes of the four-stroke cycle are intake, compression, power, and exhaust.

13 The stroke of an engine is the distance the piston travels from top dead center (TDC) to bottom dead center (BDC).

16 The second position when it is at the bottom of the stroke.

17 The diameter of a cylinder is called the bore and is measured in inches or millimeters (mm). The larger the bore, the greater the piston head area on which the gases have to work.

20 All automotive and truck engines are constructed using a cast iron or aluminum and provides the foundation for most of the engine components and their machined to very close tolerances to allow other parts to be installed.

Auto Trivia

What does the “SIX PACK” on the hood scoop refer to?

- The number of cylinders
- Number of ignition coils
- Number of carburetors
- Number of carburetor venturis



**Answer at the bottom*

FAQ

Why Use Premixed Coolant When Water is So Cheap?

Water makes up for half of the coolant and can have an effect on the corrosion protection of coolant due to variations in its quality, which is often unknown. The main reason why premixed coolant is often recommended by vehicle manufacturers is because it can control the following:

- Water/coolant ratio
- Quality of the water can be controlled. Tap water could and does have chemicals or impurities that can cause problems in an engine if used with the coolant. These chemical and impurities includes:

- Chlorine
- Fluorine
- Iron (rust)

- Lead
- Nitrates

Even though premix coolant is more expensive, what is an engine worth? Also consider that coolant is only replaced after many years, miles, or hundreds of hours of operation. This makes the difference in price between pre-mix and non-pre-mix coolant a minor issue.

Sample ASE certification-type question

When checking the fuel of a light diesel vehicle, what color should the fuel be on diesel used for highway use?

- Purple
- Red
- Clear or amber
- Greenish/blue

Answer/Explanation

The correct answer is c. Diesel fuel should be clear or amber in color if it is taxed for highway use. Answer a is not correct because if the fuel is dyed, this means that it is for off-highway use and purple is only used in Canada for gasoline designed for off-road use and not for diesel fuel. Answer b is not correct because if diesel fuel is dyed red, this means that it is non-taxed and should only be used for off-road. Answer d is not correct because if the fuel is dyed, this means that it is for off-highway use and while normal on-road diesel may appear to be greenish/ blue, it is usually clear (no color) or amber in color for on highway use (taxed)

Tech Tip

The “Simple Green” Treatment

EGR passages and valves are often clogged with carbon on a diesel engine so that the entire assembly is often replaced instead of having a technician spend hours cleaning the part. Some shops have discovered that if the part is soaked in a container of concentrated Simple Green cleaner overnight, the part often looks like new.

According to the Safety Data Sheet (SDS), the only active ingredient is Butoxyethanol, a colorless organic liquid, which acts as the main cleaning solvent in Simple Green. The carbon is removed not by dissolving the carbon because no chemical is able to dissolve carbon. Instead, the active ingredient acts as a detergent and dispersant. A dispersant is able to break the bond that causes carbon particles to adhere to each other. There is natural tendency for “carbon to attract carbon.” By causing the carbon particles to become separated, they simply become mixed with the Simple Green solution and can be disposed of down a sanitary sewer because there are no hazardous materials associated with this cleaning process.

Case Study

The Case of the Tuner Program Gone Bad

The owner of a two-year-old Duramax complained to the dealer service department that the engine was not running smoothly and had a check engine light on. A check of the diagnostic trouble codes indicated a stored P0300 (random misfire code) DTC. The service technician verified that the engine had a noticeable misfire, plus noticed some engine noise. When one of the valve covers was removed to check for possible valve train-related issues, several bent pushrods were discovered. Because the engine was still under the factory warranty, the factory service rep was called in for help. The district rep discovered the following:

1. The PCM had been reflashed 5 times, yet the factory program was currently installed.
2. The engine had been operated up to 5,500 RPM, which is much higher than the factory programming allowed.

Based on these findings, the warranty was canceled on the engine. The customer was notified that while a hand-held tuner can be used to recalibrate the PCM to increase engine power, it does so by “taking the emissions out of compliance” and can often cause engine damage as in this case. The owner decided to have the engine repaired and left the programming of the PCM the same as when it left the factory.

SUMMARY:

- **Complaint** – The owner complained of a rough running engine and the check engine light was on.
- **Cause** – The engine had been operated at a speed that was higher than it was designed to operate, which caused several pushrods to be bent.
- **Correction** – The bent pushrods were replaced, at the customer’s expense, which corrected the rough running engine concern.

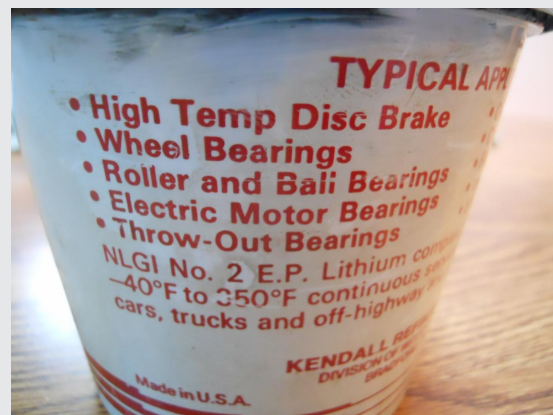
Straight Talk

Readers respond to a previous column

From the November 20Wheels Section of the Dayton Daily News

Wheels:

In a previous column I answered some concerns that Steve C, wrote me about the extra charge he was asked to pay for “shop supplies” on his car repair bill. The charge is usually based on the percentage of the labor to account for the supplies used during the repair that are difficult to itemize.



The responses included:

Many wrote and said- I don't pay for the salt and pepper when I eat at a restaurant.

Greg T. wrote- I have an additional answer to the questions about shop supplies. In my first automotive job (Goodyear store), we were lucky enough to get audited for state sales tax. At that time the shop charged a straight \$7.50 for wheel balance, labor only, which wasn't taxable in that state at that time. But as you can imagine, a tire store buys a lot of wheel weights, and the state said since we bought those wheel weights without paying tax and couldn't show we resold them, we owed sales tax on them (and many other supplies). So we changed the rate to \$5.00 labor + \$2.50 parts, which makes a weird total after tax, but at least we were compliant. Shops need a way to charge out difficult to measure items like wheel weights, brake cleaner, wheel bearing grease, etc. as parts for sales tax purposes. Body shops do it similarly, with paint and materials as a taxable item. Imagine trying to itemize masking tape...

Mike G wrote- Customers just hate that added-on charge. I don't charge any shop fees as a regular charge. I do charge for chemicals I use in the repair and they are billed-out on the invoice. Even Sil glide, push-pin fasteners, wheel bearing grease. It all gets billed.

Halderman:

As these people said, the extra charge is not liked by many customers and people like Steve C said "I don't want to have to pay for their shop towels. I can but a stack of shop towels at the local big box store for a lot less than they charged me." I think Greg T, explained that the shop supplies used are a taxable item and therefore need to be billed to the customer to keep them compliant with state tax laws. Mike G. itemizes everything, but for a large shop, this might not be feasible. I think using a percentage of the labor charge is one way for shops and dealers to meet their legal requirements efficiently.

Have an automotive question? Get a straight answer by writing to Jim at jim@jameshalderman.com



**Answer To This Month's Trivia:
D. The number of carburetor venturis**

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