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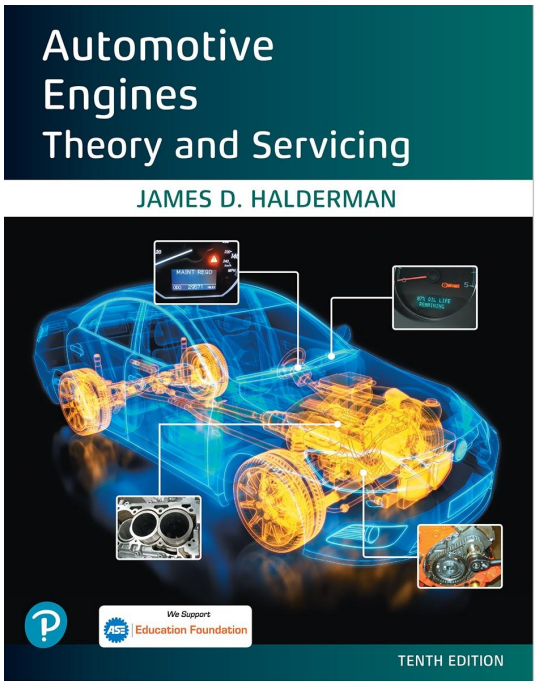
Author & Automotive Expert James D. Halderman

What's new with Jim?

I am pleased to announce that the new edition of Automotive Engines-10th has been published and is ready to be used for summer or fall classes. **Order ISBN 978-0-13-746963-6.**



If you have not seen the resources posted on my website, send Glen, the website manager, an email and ask for a FREE access for a limited time. Email Glen at **Glen@jameshalderman.com.**

Where's Jim?

Finally, events and conferences are starting back again after two years. I will be attending the following event in April. **California Automotive Teachers (CAT) conference** – April 23, 2022

Keep up with me at:
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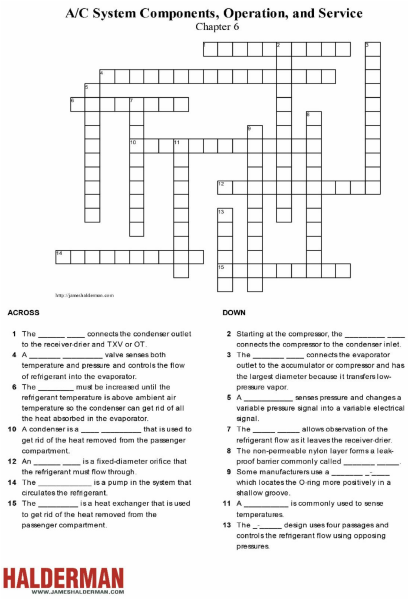
Puzzle of the month

Find this month's puzzle of the month at this link and test your students knowledge on AC Systems.



A/C System Components, Operation, and Service

Chapter 6

ACROSS

1 The _____ ____ connects the condenser outlet to the receiver-drier and TXV or OT.
4 A _____ _____ valve senses both temperature and pressure and controls the flow of refrigerant into the evaporator.
6 The _____ must be increased until the refrigerant temperature is above ambient air temperature so the condenser can get rid of all the heat absorbed in the evaporator.
10 A condenser is a _____ _____ that is used to get rid of the heat removed from the passenger compartment.
12 An _____ ____ is a fixed-diameter orifice that the refrigerant must flow through.
14 The _____ _____ is a pump in the system that circulates the refrigerant.
15 The _____ is a heat exchanger that is used to get rid of the heat removed from the passenger compartment.

DOWN

2 Starting at the compressor, the _____ ____ connects the compressor to the condenser inlet.
3 The _____ ____ connects the evaporator outlet to the accumulator or compressor and has the largest diameter because it transfers low-pressure vapor.
5 A _____ _____ senses pressure and changes a variable pressure signal into a variable electrical signal.
7 The _____ _____ allows observation of the refrigerant flow as it leaves the receiver-drier.
8 The non-permeable nylon layer forms a leak-proof barrier commonly called _____ _____.
9 Some manufacturers use a _____ _____ which locates the O-ring more positively in a shallow groove.
11 A _____ _____ is commonly used to sense temperatures.
13 The _ _____ design uses four passages and controls the refrigerant flow using opposing pressures.

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Auto Trivia

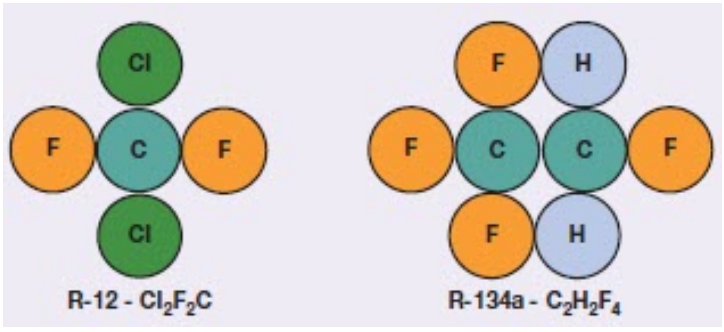
The front view is of a _____ Chevrolet.

a. 1954
b. 1955
c. 1956
d. 1957

**Answer at the bottom*

FAQ

How Are Refrigerants Named?



The procedure for determining the refrigerant number is rather tedious and is of no value to the refrigerant technician. It is included in this text to reduce some misconceptions and wild stories that have passed through the industry. The system is based on the number of carbons, hydrogen, and fluorine atoms in the refrigerant molecule. Other suffix letters are added for different variations of the molecule. It is a four-character system with the letter “a” added to indicate a nonsymmetrical or asymmetrical molecule. The most common method of numbering system is:

C (MINUS 1), H (PLUS 1), and F.

R-12 has 1 C (1 − 1 = 0), O H (0 + 1 = 1), and 2 F (2), to get 012, or 12.

• The R-12 molecule is symmetrical, which means that both sides are the same.
• The R-134a molecule is asymmetrical (the reason for the “a” in the name), which means that the left and right sides are different. The chemical name for CFC-12, dichlorodifluoromethane, indicates that the molecule has two (di) chlorine atoms and two fluorine atoms, and the suffix methane indicates there is one carbon atom.

Sample ASE certification-type question

A strong pungent odor comes out of the air-conditioning vents. Technician A says that mouthwash should be poured into the air inlet near the windshield to stop the odor. Technician B says that fungicide should be sprayed onto the evaporator to stop the odor. Which technician is correct?
a. Technician A only
b. Technician B only
c. Both Technicians A and B
d. Neither Technician A nor B

Answer/Explanation
The correct answer is b. Technician B is correct because a fungicide is necessary to kill fungus and mildew growth that can grow on the evaporator fins due to the moist environment. Technician A is not correct because even though most mouthwash contains alcohol, it will not be effective killing fungus and mildew. Answers c and d are not correct because Technician B only is correct.

Tech Tip

Always Follow the Vehicle Manufacturer's Recommended Procedure

The cooling system will not function correctly if air is not released (burped) from the system after a refill. On some vehicles the radiator cap is on the overflow bottle and is not the highest point. The manufacturer may have a very specific bleed procedure or the air will NEVER come out. If the system has had the coolant replaced and there is a complaint for lack of heat from the heater, it is possible that air is trapped in the heater core.

Case Study

The Case of The Collapsed Upper Radiator Hose

An automotive student asked the automotive instructor what brand of radiator hose is the best. Not knowing exactly what to say, the instructor asked if there was a problem with the brand of hose used. The student had tried three brands and all of them collapsed when the engine cooled. The instructor then explained that the vehicle needed a new pressure cap and not a new upper radiator hose. The student thought that because the lower hose did not collapse the problem had to be a fault with the hose. The instructor explained that the lower radiator hose has a spring

inside to keep the lower hose from collapsing due to the lower pressure created at the inlet
to the water pump. The radiator cap was replaced and the upper radiator hose did not collapse when the engine cooled.

Summary:

- **Complaint**—Vehicle owner complained the upper radiator hose would collapse when the engine cooled.
- **Cause**—A defective radiator cap.
- **Correction**—Replacing the radiator cap solved the collapsing upper hose concern.

Straight Talk

Reader Has Concerns About Electric Vehicles

From the March 26 Wheels Section of the Dayton Daily News

Wheels:
Bruce L. writes by email:
"I have owned several Mustangs and I have been seeing what Ford calls a Mustang electric vehicle, but to me it is not a real Mustang. It does not make any good engine sounds and instead they make an annoying beeping sound while traveling slowly or backing up. I am also concerned about charging an electric car and here are some of my questions:

1. *Does each car brand use their own charging plug? In other words, do I have to find a Ford charging station to charge an electric Ford?*
2. *Can I use a Tesla Supercharger to charge a Ford EV?*
3. *What do I need to charge from my home?*
4. *How do I find charging stations if I travel from Florida to another state to visit friends or family?"*

Halderman:
Thanks for writing and I too have owned several Mustangs, all with V8s and I too love the sound they make. The beeping or whining sounds that electric and hybrid electric make is required by Federal Law to warn pedestrians that a moving vehicle is nearby. This system is called acoustic vehicle alerting system (AVAS). It creates the sound whenever the vehicle is traveling at low speed. The U.S. National Highway Traffic Safety Administration (NHTSA) requires the device to emit warning sounds when traveling at speeds less than 19 MPH (30 km/h). While easily heard from outside the vehicle, it is usually not heard inside the vehicle unless the windows are down. Regarding charging, it is relatively easy as there are standards so that most electric vehicles can use most charging stations. The only exception is the

Tesla superchargers that are designed to be used only by Tesla vehicles. The three levels and estimated charging times include:

· **Level 1- 110/120 volts**. This is the standard electrical outlet that most home and garages have available. This can be used to charge any electric vehicle without special charging equipment. However, it can only supply enough electrical energy to allow fives miles of travel per hour of charging. If using a Level 1 outlet, the vehicle can be charged to supply a range of 50 miles if charged overnight (10 hours).

· **Level 2 –210/220 volts**. A level 2 charger can be installed at home and can supply 12 to 25 miles of range per hour of charging. Most commercial charging stations at stores and hotels (often free to use) are level 2. Most EVs include a cable to plug into 220-volt outlet. An electrician is often needed to make sure that the circuit and wiring is up to code to allow the use of a level 2 charger at home.

· **Level 3**- **440/480 volts**- Level 3 charging stations are expensive to install and therefore require a charge to use, but they can charge most electric vehicles in less than an hour.

Most EVs (except Tesla) use a standard SAE J1772 plug. This means that any EV can be charged from any charging station. Level 3 charging stations usually use the SAE Combo Charging System (CCS) connector.

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

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Answer To This Month's Trivia:
C. 1956

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