

Specific Purpose: After my speech the audience will know the 4 major components of a HVAC system and have a basic understanding of refrigeration process.

Introduction

- I. This room has an absence of heat in it. In other words, it's cool in here but my first statement is more precise from a thermal dynamic point of view. If you don't understand that now you will by the time I finish.
- II. Have you ever had your car or home's HVAC (furnace or central air) system serviced for maximum efficiency? While you should! With today's energy cost an efficient HVAC system in your home or car could save you HUNDREDS of dollars a year.
- III. I have worked as an ASE Certified Automotive and Truck Mechanic for 15 years. I also spent 3 years working and training soldiers Air Conditioning repair on tactical vehicles in Iraq. Yes, I was everyone's best friend. There are few hells similar to that of driving an armored vehicle through the desert without A/C. Generally, the inside of a Humvee will reach 165 degrees with on a summer day, in that environment, without it!
- IV. I will teach you how the refrigeration process works by briefly going over some basics of thermo-theory and the major components of an Air Conditioning system to arm you with some key facts that may help you avoid being taken by dishonest Service Technicians.

Body

- I. Theory: To better understand an A/C system you must first understand the logic behind it.
 - A. First we must understand that, heat is energy and cold is nothing; therefore heat is attracted to cold. Refrigeration is the removal of heat (heat transfer) from a material or space, so that its temperature is lower than that of its surroundings. Example; the inside of your home, this classroom, a refrigerator, the cabin area of a car, etc.... This is based on the physical principle, or **Latent Heat Theorem**, that a liquid extracts heat from the surrounding area as it expands (boils) into a gas. Perrot (1998) Latent heat is the heat released or absorbed by a body or a thermodynamic system during a constant-temperature process.
 - B. R134A (the refrigerant most commonly used in automobiles) has a Boiling Temperature of -15.34°F at atmospheric pressure.
 1. Meaning that as the point where the boiling is acquiring the temperature is just that, about -15 degrees.
 2. The boiling point does increase as pressure increases, thus make that boiling temperature controllable with pressure.
 3. Two different pressures exist within your car's A/C system, Low pressure & High Pressure. The low pressure is generally around 20 - 40 psi (pounds per square inch), giving a boiling temperature of 22 - 45 degrees F.

- C. To accomplish this, the refrigerant is pumped through a closed looped pipe system. The Closed Loop System stops the refrigerant from becoming contaminated and controls its stream. The refrigerant will be both a vapor and a liquid in the loop.
- II. Two different pressures exist in the refrigeration cycle allowing for two different states, Liquid and Gas. There are four main components in a refrigeration system: The Compressor, The Condensing Coil, The Metering Device & The Evaporator.
 - A. The Compressor, which is the heart of the system, pulls vapor from the low pressure side of the system and compresses it (temperature increases with pressure) into high pressure vapor which it then pushed to the Condenser.
 - B. The hot, high pressure vapor travels through the passages of the condenser where it is cooled and flashes (changes state) to a liquid, much like the droplets forming on the outside of a cold pop can, before it is forced to the Metering Device.
 - C. Metering devices regulate how much liquid refrigerant enters the evaporator . This device lets small amounts of refrigerant out into the line and loses the high pressure it has behind it. The cooler liquid refrigerant entering the evaporative coil (pressure went down – so temperature goes down).
 - D. The evaporator is where the heat is removed from the area in which it is not wanted.
 1. A fan will move warm air from the conditioned space across the evaporator finned coils that is filled with cool liquid refrigerant.
 2. The cooler refrigerant in the evaporator tubes, absorb the warm room air. The change of temperature causes the refrigerant to “flash” or “boil”, and changes from a low pressure liquid to a low pressure cold vapor.
 3. The low pressure vapor is pulled into the compressor and the cycle starts over.
- III. Now that you know your car’s A/C system is a closed loop system, if anyone tells you it just needs recharged they are either lying or don’t know that they are talking about. The same goes for someone trying to tell you the reason your car’s A/C isn’t putting out cold air is because blah, blah, blah; well it extracts heat, not produces cold air.

Conclusion

- I. Now that I've explained how the refrigeration process works by briefly going over some basics of thermo-theory and the major components of an Air Conditioning system you are armed with some key facts that may help you avoid being taken by dishonest Service Technicians.

- II. You now know why the statement, "this room has an absent of heat in it" has more logic to it then stating that, "the room is too cold!" I'll be available for questions after class if you're still unsure of how an A/C system works or have any other questions for me after reviewing the handout.

References

Perrot, P. Latent Heat. (1998). Retrieved October 10, 2013 from
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