EXCLUSIVELY
VOLKSWAGEN

CAR FACTS – Diesel Specific

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1. Cars are built for Profit

Car companies – ALL CAR COMPANIES – build cars as a way of making money.

Call it planned obsolescence or engineering for changing regulations – cars are not meant to last.

Post WW II cars WERE built to last. They were churned out in restructured weapons factories by people who had been building with the safety of G.I.s at the risk of war still ingrained into the work ethic. AND there was a pent up demand from the public who hadn't seen a new car in nearly SIX YEARS. The demand was high, the supply slow – the market place was unending. So the thought of making a car that would not last had yet to enter the automotive scheme.

Next came the Baby Boomers. In the 1960's and they too wanted cars. Once more the rush was on. But this second wave of car consumer was not only twice the number of the post war demand, these people wanted power, looks and variety. So again, cars were made without a thought given to rapid depletion. Lots of fast, gas guzzling "Lead Sleds" were built.

At it's height, in the early 1970's 75% of the American economy was dependent on the automobile – design, materials, manufacture, sales, upkeep, reselling and redistribution of wrecked cars. Seventy Five Percent of every dollar generated in America came from those areas of industry.

Today the world demand for cars has flattened. There are nearly fifty car brands around the planet and the population is saturated with cars, trucks, vans and SUVs. Demand has dropped. The economic engine has also shifted and the once all encompassing American Transportation Industry now represents a mere 25% of our money making. That's a BIG drop in income! So around the year 2000 ALL car makers began building the FIVE YEAR AUTOMOBILE. In other words, for every used car available, a new car cannot be built – so don't build cars that can be resold! Warranty over, car finished. Period.

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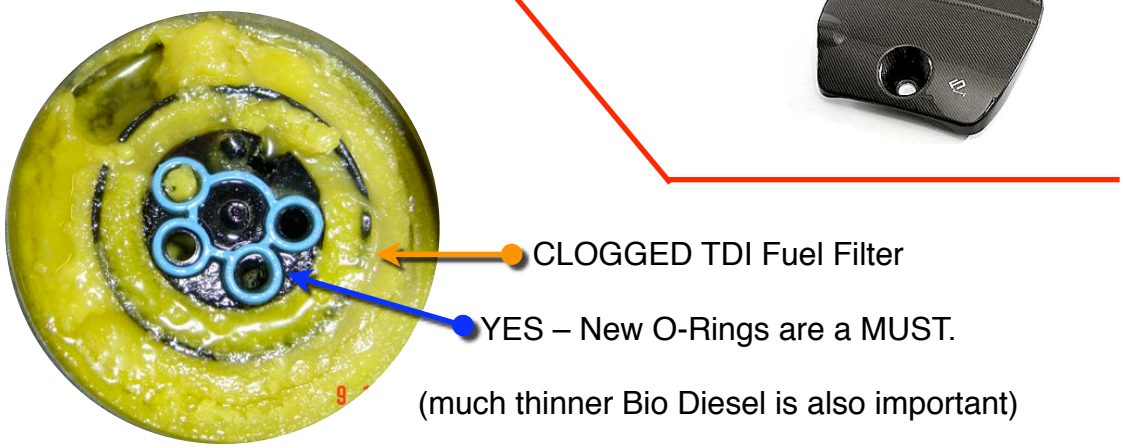
2. What is Installed Must Stay Installed

With their philosophy of money spent equals money not made, car manufacturers are very prudent with the pieces that make up their products. For example, it there is a cowl or cover on a car today, it is most likely an expensive item costing millions of profit dollars.

Take the plastic engine cover on a TDI. This cover, on average costs VW about One Hundred Dollars per car. That includes discovery, design, manufacture, installation and a calculation for warranty replacements. By discovery I mean this - it is known that no matter how many computers are used to design a modern car, once a prototype is built, there are surprises – discoveries, as in "I had no idea this would do that when it was put so close to these – we GOTTA fix it!"

At $100.00 for each engine cover that is made to fit just two car types and one engine variation (Golf and Jetta TDIs), we can calculate their financial effect on a minimum 1,000,000 unit world wide run. This cover, then cost VW $100,000,000.00. ONE HUNDRED MILLION DOLLARS! Is this cover important? Ask a shop who has broken one, or left it loose to break or laying on the work bench as you drive away. When queried, they will most likely tell you "Oh, that thing doesn't do anything. It's just extra trim". But ask the VW engineers who had to come up with the cover and then justify it's Hundred Million Dollar profit sucking cost and they will explain that it helps stabilize engine temperature to effect a more controlled exhaust pollution environment in order to pass EPA and International pollution standards.

No matter how small or seemingly insignificant a part is on a modern car, especially given the drive for profits in a shrinking market, that part is NECESSARY!



CLOGGED TDI Fuel Filter

YES – New O-Rings are a MUST.

(much thinner Bio Diesel is also important)

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3. Cars are Computer Controlled

A computer that is designed by a car company is made of components with logic circuits that are MANDATED by Government agencies and Insurance regulations.

A car cannot start or run unless a computer issues permission. Why?

The EPA assigns pollution limits. The DOT is responsible for general safety guidelines. And the Insurance Institutions require anti-theft and collision cost specifications.

Within the first tenth of a second after turning your key to the ON position, the Central Computer (CAN Bus Gateway) has communicated with all of the other ECU's (Electronic Control Units) and decided if the car is being stolen. It talks to door lock computers, the battery, the engine and transmission computers, seat belt sensors and Airbag controllers. If all computers report as required, then the Gateway permits the starter to activate when you twist the key to the START position. In start mode a second round of queries are sent and retrieved to see if safe running standards can be met – if all is well, air, fuel and spark (or Glow Plugs) are allowed to function and the car starts. If not, the Enabler-Disabler Circuit is called into the DISABLE mode.

If a car fails to start it is most likely the Enabler-Disabler Circuit that is behind the cause. There is always the chance it is a mechanical problem too. But either way, a "JUMP" from another car's battery or coasting down a hill will NOT work. As a matter of fact, either of these measures CAN do damage to the computer system or the mechanicals of the drive train.

Even if your battery has just gone dead and you "JUMP" the car, the Gateway and other ECUs may have lost their adaptive memories and will most likely cause problems later as they are asked to perform. VW also uses a proprietary batter built by Johnson Controls (it can be bought as a non VW item through Interstate Batteries).

A car that will not start should be taken (TOWED) to a competent VW repair shop. The best accessory ANY car owner can purchase is a membership with AAA (unless you are already graced with some other form of "FREE TOWING").

1969 Volkswagen 412 EFI Controller

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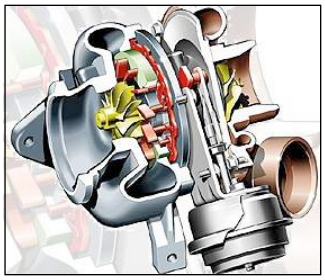

4. Turbo Chargers Boost Intake Air

A Turbo Charger is an air pump driven by exhaust gases. Engine exhaust is routed through a turbine fan, then out the tail pipe. This TURBINE FAN is connected by a common shaft to another fan that “BLOWS” or compresses the air pushing it into each cylinder. This extra air can then be mixed with extra fuel to give a boost in output power from the engine.

Each TURBO SYSTEM is designed and computer controlled to allow the exact amount of extra air and fuel to be introduced at just the right time so that engine life will not be appreciably shortened. There are additional computer sensors and controllers added to a Turbo Charged engine for this very reason.

Exhaust gasses can reach 1200º F while in the winter intake air can be below freezing. The shaft that connects the “HOT” section and “COLD” section of a turbo averages the diameter of a common pencil. The distance between these two chambers is about an inch. These extremes place added loads on the engine’s oil system and the car’s coolant, not to mention the seals in the TURBO.

5. Power Boosts Cost Longevity

Modifying a computer controlled car for added performance or even economy may or may not give the desired results. Referring to the section on Cars are Computer Controlled, we see that nearly EVERY aspect of the car is controlled by computers. Changing the "Chip" in an engine ECU will send different instruction sets to the engine. But it will also send different data to the Gateway (Server Computer or Master Controller). But let's imagine that the after-market parts installed on a Five Year Car do interact with the CAN Bus AND improve performance.

If you threaten an average 65 year old person at gun point to run at their top capacity for 5 miles, you most likely will be pushing a corpse for last few yards. Sure, older, out of shape humans can run at breakneck speed when the situation is life threatening. But is it a good idea? The same analogy can be applied to the Five Year Car when Performance Parts are added. The car CAN run faster, but at what cost? Usually it WILL shorten the power trains life span. Further, will the brakes be up to the added power and speed?How about the suspension and steering?

The last thing to consider when contemplating modifications to a Five Year Car is cost benefit. The amount spent on modifications should return an overall cost benefit when applied. This too usually proves to be the inverse when applied in real life. It may have been Einstein or Freud who said "The more power available to the driver, the more likely it is that the driver will go faster, thus endangering both themselves and others on the roadways. Not to mention increasing the chance of speeding tickets." Now that I think about it, perhaps it was Pablo Picasso's quote. *Whatever*.

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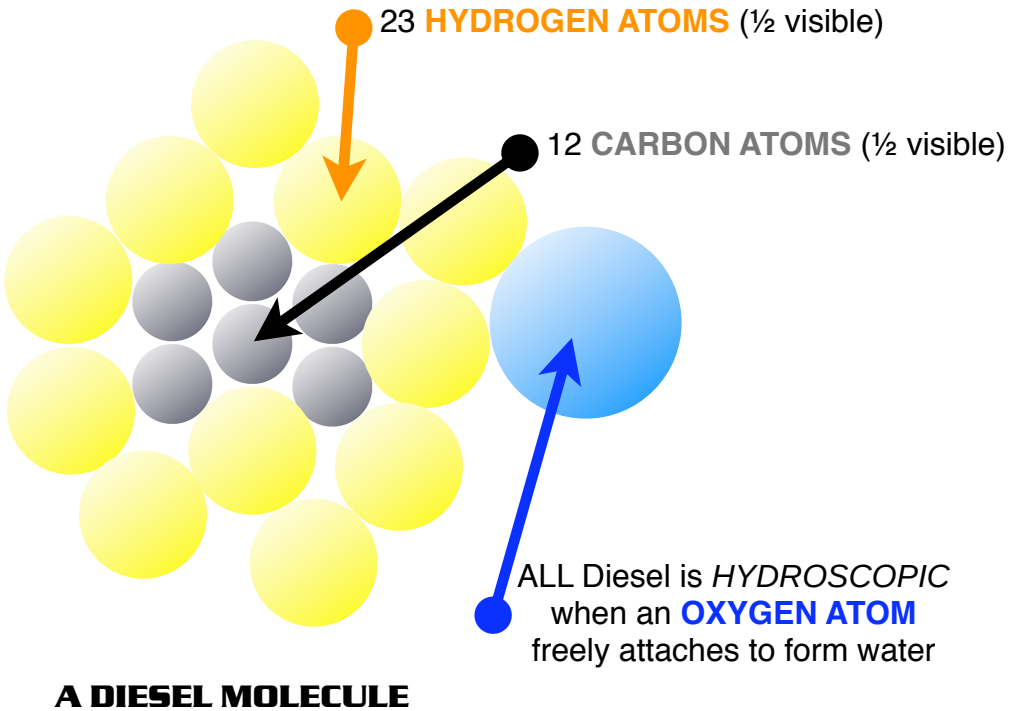
6. Diesel is about Hydrogen and Carbon Rated in Centanes

Diesel fuel is made of Hydrogen and Carbon – 23 HYDROGEN ATOMS attached to 12 CARBON ATOMS. That's it. In this correct ratio, and under 750 PSI this mixture will self explode (no spark needed). It's ability to self explode at specific pressures and temperatures is measured on the Certain Scale. Diesel was once obtained from crude oil by heating the goo and filtering the thinned out golden liquid. Now it's refined using chemical formulas after the Carbon and Hydrogen have been harvested and reconstituted in exacting quantities.

ALL Diesels are *HYDROSCOPIC* – they attract water. Actually, the Hydrogen atoms on the outer edges of the molecule are naturally attracted to Oxygen. Two Hydrogens and One Oxygen equals WATER (H_2O).

VW TDI engines can generate self ignition at a minimum of 325 PSI. When new, TDI engines average 450 PSI. How can a diesel engine operate at such LOW pressures? VW uses a combination of engineering tricks to permit their LOW PRESSURE Diesel engines to run. Glow plugs are ultra fast heaters. Fuel pressure is boosted at the engine either in the fuel pump or at the injectors to HUNDREDS or THOUSANDS of pounds. Air is PUSHED into the engine via the Turbo Charger. And all TDIs have a Pre Combustion Chamber in each cylinder's piston top. This Pre Chamber uses it's small space, vaporized primary fuel and super heated glow plugs as a "fire starter" for the second MAIN blast of diesel.



A DIESEL MOLECULE

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7. TDI Common Concerns / Issues

- Frequent Oil Changes 4,000 Miles MAX *Turbo Issues
  (Petro or Synthetic Oils)
- Fuel Filter Change 12 months / 15,000 Miles
  (Half that for short runs or sitting)
- Coolant Flushes Once A Year *Turbo Issues
  (Replace Thermostat and 1-Time Housing)
- Keep Fuel Tanks Close To EMPTY If Car Sits
  (ALL Diesel is Hydroscopic – Draws Moisture)
- Glow Plugs Fail
  (ALWAYS replace as Sets)
- Glow Plug Harness Failure
  (Spring Steel Clips on Stainless Connectors Break)
- Mechanical ECU Controlled Fuel Pumps Leak
  (Unrepairable – Parts Unavailable – VW Only – Replace PUMP!)
- Thermostat Housings Fail
  (Pumps Leak Onto Plastic Housing)
- Mass Air Sensors Fail Without Logging a Code in OBD
  (On Board Diagnostic area)
- Battery Must Be at or ABOVE 11.75 VDC with sufficient Amps
  (ECUs will FAIL)
- EGR and Intake Manifolds Clog with Carbon
  (this is NOT Coking)
- ANY Drop in performance or hard starting issues
  should be investigated IMMEDIATELY.
  Early detection and diagnosis will reduce damages.

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