

# 75/ZT/TD4 DIESEL ENGINE FAULT DIAGNOSIS

Most diesel engine faults are due to problems in one of three areas:

1. Fuel supply
2. Electrical / electronic
3. Air supply
4. Mechanical components (pcv, egr, turbo control mechanism)

Rarely these days is there a major mechanical cause such as head gasket, broken crankshaft etc.

It is also a fact that the expensive items such as the injection pump and turbo are very reliable and should ONLY BE CHANGED WHEN ALL OTHER CAUSES HAVE BEEN ELIMINATED.

## 1) FUEL SUPPLY:

**Engine stops minutes or miles after refuelling.** This is becoming quite common due to increases in the biodiesel content of fuel (upto 15% is now a requirement). Biodiesel is a good solvent and dissolves the gunge lining the fuel tank and fuel lines leading to blockage of the fuel filter. Some can get through this and clog and damage the injection pump and injectors. We checked our 4year old Vectra's new filter after 5k miles and it looked like a dirty oil filter.....The older your vehicle the more gunge there will be to dissolve...Once clean, you should have no further problems, but you may have to change the fuel filter several times at monthly intervals.

**Engine stops on a motorway journey even though the fuel gauge shows plenty of fuel.** This is due to failure of the in-tank pump. The engine may have been relying on the underbonnet one for some time and this will soon fail or may have just failed. The tank is a saddle tank and relies on the in-tank pump to also keep the levels in each half the same. When it fails, the underbonnet pump draws fuel from one side until its empty, but the gauge, because it has a sensor in each side, mis reads. (The problem never shows up on normal roads due to cornering sloshing the fuel from side to side and keeping the levels about equal.)

**Engine been running fine until stopped, then won't restart, or only restarts when cold.** Most likely due to either the cam sensor or injector leakback. Try cooling the cam sensor with some frozen food ( its the one near the oil filler cap). Check for leakback - its quite common on older or high mileage vehicles and injector flow & leakback test kits are widely available from Laser & Draper, though not essential. If the engine starts when towed, then its almost certainly injector leakback.

**Starting is taking more cranking than usual, especially when the engine is hot.** Suggests the in-tank pump has failed. Must be replaced asap or the underbonnet one will also fail and the engine will never start or will stop dead. (Could also be due the cam sensor or injector leakback.)

**Engine starts okay but performance is poor or erratic, sometime it seems to be in some sort of limp mode and won't go over 70mph, idling may also be unstable.** This is often a fuel rail pressure sensor or regulator problem. Landrover Technical bulletin LR0052 documents a problem caused by water ingress into the wiring loom between ecu and fuel pressure sensor on the TD4. This corrodes the sensor contacts and damages it, causing the above symptoms as well as poor idle (look at the connectors for signs of moisture and corrosion). Disturbing the connections to fit a tuning box can produce the symptoms falsely leading you to blame the box. If the regulator (the 2 wire circular object bolted onto the end of the injection pump) is sticking or worn, the engine may also cut out. (Failure to reach the expected pressure leads the ecu to stop the engine in case its due to a major fuel leak)

**Engine starts okay but performance below 2000rpm is poor but above this is fine.** Weak maf sensor signal. Disconnect the maf plug and if low down torque is much better, this confirms it.

**Engine performance is fine or very good, but fuel consumption has dropped and there is more exhaust smoke and a sooty deposit on the rear bumper.** The maf sensor is producing too high a signal and overfuelling the engine. If this occurs at idle as well, the exhaust will smell of diesel and be unstable. The engine can even stall as soon as you touch the accelerator if the signal is far too high.

## 2) ELECTRICAL PROBLEMS.

These usually take the form of out of spec or faulty sensors, apart from the water ingress issue on the Freelander Td4 , mentioned in the previous section.

**Cam sensor:** Only used during starting but can fail, especially when hot. Quite common.

**Crank sensor** - if erratic will affect the timing and cause performance problems. Not very common.

**Maf sensor** - sooner or later EVERY vehicle will suffer from problems due to the maf sensor under or overfuelling the engine. Underfuelling manifests as poor or very poor performance below 2000rpm, a drop in mpg, possible hesitation & vibes felt through the steering wheel at about 1800rpm. Autos can stall and pulling out of turning or on to roundabouts is nerve wracking until the rpm reaches 2000 and then you shoot off a high speed! Overfuelling shows up as poor or very poor mpg, rich flat spot - nothing happens, then there's puff of smoke and off she goes, otherwise performance & flexibility can be good - too good in fact! Checkout our website for the Synergy 2.

**Map sensor.** This rarely fails but can become blocked and this can reduce the performance. If the ecu 'sees' a low signal it will not increase the fuelling.

**Low pressure fuel sensor** - its on the fuel filter housing. If the low side pressure is down the engine warning light will stay on and the engine may not start or may cut out as soon as significant power is required. A clogged fuel filter and/or failure of one or both electric pumps is usually indicated..

**Fuel rail pressure sensor.** This can produce a wide range of performance related symptoms if faulty. If dead, or if it has become disconnected, the engine may start but there will be little power - max speed will be 70ish and you'll be down to 30mph or less on hills. See previous section for the known TD4 water ingress problem.

## 3) AIR SUPPLY PROBLEMS.

Lack of air can show up as smoke from the exhaust but in some cases, if boost pressure is down due to a major air leak then the resulting low map sensor signal stops the ecu from increasing the fuel. So no smoke, but no power either.

**75/ZT.** Usually only leaking seals at the intercooler inlet & outlet and occasionally a split in an intercooler hose produce any problems on these vehicles. However it worth removing the map sensor and cleaning it. (requires inlet manifold removal) as a last resort.

**Freelander TD4.** As above and, since the TD4 has a variable geometry turbo, there is more to go wrong. Often the symptom shows up engine warning light illumination and a loss of power at a steady speed (50mph+), whereas no problems occur in town. This is due to the variable geometry mechanism not working properly.

Check the thin tubes from the brake servo line to the solenoid and thence to the actuator capsule. Also check the actuator and make sure the mechanism on the turbo has not seized up. (with the engine idling, connect the solenoid directly to the battery - the actuator and mechanism should move.)

**Clogged catalyst.** Not common but not unheard of - obstructs the exhaust flow and this affects the turbo which may then not produce the required boost pressure.

#### 4) MECHANICAL COMPONENTS

THE PCV - crankcase ventilation valve should be changed every 60K miles /100k km. In extreme cases blockage increases crankcase pressure so much that oil is forced out of the dipstick and past the oil seals. The exhaust can emit blue smoke as a consequence, leading some dealers to tell you that the turbo has failed!

Otherwise excessive crankcase fumes entering the engine increase exhaust smoke & reduce performance since they replace the intake air.

THE EGR VALVE. This should be cleaned at the above intervals and if clogged will obstruct the air flow into the engine, producing smokey exhaust and loss of power. Ditto if the valve jams open.

INJECTORS. These should be serviced once 100k miles or 5years has passed unless the engine is running perfectly. They suffer from several conditions: Leakback - (starting problems) clogged / worn nozzles - (poor spray pattern = knocking & poor mpg, white smoke), worn / sticking valving - (poor atomisation & dribbling = white smoke, knocking, poor mpg ). Just cleaning them is no use at all. They should be stripped down and parts replaced and then all balanced as a set. This will give much smoother running and improved mpg.

We recommend lynxdiesels.com for this job.

INJECTION PUMP. This is most likely to be damaged by accidental fuelling with petrol, as will the injectors. Even if there was no apparent ill effects at the time, its possible that the life expectancy of them will have been drastically reduced.

TURBO. Very reliable and any blue exhaust smoke is probably due to a clogged pcv valve so make sure you replace this BEFORE THE TURBO! On the TD4, confirm the vnt mechanism is working before condemning the turbo.

PREVENTATIVE MAINTENANCE TIPS. These are our personal recommendations for reliable motoring and we practice what we preach. In 30years of motoring we've never broken down nor had major component failure. Nothing can stop some parts from wearing out - the maf sensor and electric fuel pumps, for example but we're convinced you can prolong the life of the others and save yourself a lot of hassle & expense for little outlay.

Change the PCV valve

Clean the EGR valve

Change the oil and all filters twice as often.

Avoid supermarket fuels. (or if you must use them add Millers)

Use Millers Ecomax diesel additive. Visit Millersoils.net for a stockist

Use ZX1 in the oil (also goes in the fuel, power steering and transmission) checkout the videos on their website: team-zx1.co.uk Available from some Halfords or online.

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