

elitedubs.com**Technical => 1.8T Engine Tuning => Topic started by: engineerd on May 26, 2005, 04:43:04 PM**Title: **1.8T Common Troubleshooting Guide**Post by: **engineerd on May 26, 2005, 04:43:04 PM**

Things have been slow at work, so I have had some free time on my hands. I decided to make this guide, and I hope it is helpful.

1.8T Troubleshooting Guide.

We have all seen the common problems that these cars develop, and often know right away what symptom = what problem. Rather than answer all of these posts, I thought a troubleshooting guide was in order. Ill get this started with the basics, and if everyone adds some in the same format we should have a good guide. Add a post, I will copy and paste it into the master. When you see yours copied in, delete your post to keep this clean. Links to sites with how things work, and procedures would also be great. It would also be nice to have a list of codes, and we can link them to the part troubleshooting methods. Part numbers may also be useful.

THIS IS NOT A THREAD TO POST PROBLEMS

Section 1. - Symptom - Possible Problem Parts (in order of likelihood)

Section 2. - Part Troubleshooting Method - Alphabetical

ctrl - F will help you search for keyword in this guide.

Section 1.**Rough Running At Idle** - MAF, Ignition Coil, Spark Plug, VAC Leak, O2 Sensor, TB, CTS**Missfires under Boost Flashing CEL** - Ignition Coils, Spark Plugs**Running Rich** - Boost Leak, MAF, O2 Sensor, Coolant Temp Sensor**Running Lean** - VAC Leak, MAF, O2 Sensor, Fuel Filter**Low Boost** - Limp Mode, MBC, BOV, DV, Boost Leak, N75,**High Boost** - MBC Setting, N75, Spark Plugs, Ignition Coils**Cold Start Problems** - MAF, Spark Plugs, Fuel Pump Relay, CTS**Poor Gas Mileage** - MAF, CTS, O2 Sensor, AIT Sensor**Cat Efficiency Below Threshold** - Down pipe, CAT, Rear O2, RACE FUEL**No Start** - Battery - ECU, Fuel Pump Relay, Ground**Start For 1 Second** - Stall - Immobilizer**Overheating** - Waterpump, Thermostat, Head Gasket**oil in coolant** - Oil Cooler, head Gasket, Water Wetter**Dies While Driving** Timing belt, Boost Leak, MISC**Shorts To ground CEL** Fuel Pump Relay, Bad Grounds**Section 2 - Troubleshooting**

Most of these procedures require a VAG com to scan the car for diagnostic codes. While you can fix things without a VAG you will most likely be replacing parts that really are not bad just to rule them out. A VAG COM is a must have for any 1.8T mechanic. Details here
<http://www.ross-tech.com/vag-com/cars/18T.html>

AIT - Sensor - This is a small sensor located in the intake manifold just after the throttle body. It is responsible for monitoring the intake temperature. It can get coated with oil, and can affect gas mileage, and a loss of power. It is common to remove it and clean it with alcohol, or electronics cleaner.

Boost Leak - View Block 032 with VAG Com. If Fuel Trims are Negative more than 5% in the load range there is a very good chance that there is a leak after the turbo. Visual inspection of clamps, hoses for a loose connection is the best way to look for leaks. A common place for leaks is at the entrance to the pancake pipe located in the passenger side fender. Also the small line on the DV can rip.
 Fuel Trim Details Here - <http://www.ross-tech.com/vag-com/cars/fuel-trim.html>

BOV - Blow off Valve's vent off air metered by the MAF, and can cause many problems, and make it more difficult to troubleshoot a car. Best way to troubleshoot a BOV is to replace it with a DV and see if the problems continue.

CAT – Aftermarket high Flow Cats often sacrifice emissions for power. It is not uncommon for aftermarket cats to give codes for “efficiency below threshold” right away. Some people have had success using O2 adapters to move the rear O2 sensor away from the exhaust gas and eliminating this code. O2 simulators do not work on the 1.8T. Sometimes cats can melt or clog up. Running high exhaust gas temps for extended periods of time can cause this. Usually you will get the cat code, and see that the max boost and sustained boost levels drop off. After checking everything else on the list, remove the down pipe/cat and check to see that light shines through brightly. If there is very little light passing through it is clogged and requires replacement.

CTS – Coolant Temp Sensor – This part is prone to failure. 2002 and older vehicles had a bad coolant temp sensor from the factory that VW updated. It was a black sensor, and now the good one is referred to as a green top coolant temp sensor. Block 011 in the VAG COM can monitor coolant temp for erratic readings. This is a 7\$ part. Do not change while engine is hot.

Down-Pipe – See CAT

DV – Diverter Valve – When the throttle is closed on a turbo car, the turbo is spinning rapidly, and trying to push air into the engine. By closing the throttle the air has nowhere to go, and will cause a large pressure spike. The diverter valve is actuated by a vacuum line, and when the throttle closes creating vacuum behind it, the diverter valve will open and provide a path for the air. The air is returned back to the intake of the car after the MAF. When A DV fails it leaks air in this circular pattern causing boost problems.

2001 and older cars have a weak DV that is prone to failure. 2002 and newer cars have an improved design. It is durable, inexpensive (35\$) and it responds very quickly. The part number for the good valve ends in 710 N. The DV is located at the back right side of the engine, it has 1 large hose, and 1 small line connected to it, and the other end is connected to your intake hose running to the airbox. To test if your DV has failed remove the DV, press the diaphragm up, put your thumb on the top nipple, and then release the diaphragm. There should be suction created on the top of the DV that prevents the diaphragm from returning. If there is no suction then the diaphragm is leaking and the valve should be replaced. IF the valve is good, check the VAC line leading up to the valve for any cut's/ tears.

ECU – The ECU is responsible for nearly all functions on the car. If the ECU is suspected as a bad part, you need to use a scan tool such as a VAG com to attempt to communicate with the ECU. If you can't communicate with the ECU, then the ECU needs replacement. Check all electrical connections. Check your Fuses for blown fuses. Whatever killed the ECU might kill the new one. ECU removal procedure - http://www.goapr.com/VW/support/ecu_tt_golf_gti_jetta.pdf

Fuel pump Relay – The fuel pump relay is located under the driver's side kick panel. Remove the lower panels to gain access to the relay box. When the fuel pump relay goes bad it will trigger many fault codes with electrical shorts to ground. The fuel pump relay is also used to turn on the injectors, and will show injector short to ground failures. If you open your door you hear the pump kick on, if the pump no longer kicks on, and you experience these codes repeatedly, replace the fuel pump relay.

Fuel Filter – The fuel filter on these cars is rated as a lifetime filter by VW. What the aftermarket has found is that high HP applications can run into fuel delivery problems with dirty fuel filters. 30K miles is a more realistic interval for replacement when pushing the system. The fuel filter is located under the car near the gas tank. It has small clip on hoses. To remove the hoses press in on the clip on the end of the hose and it will come off easily. You may need a small screwdriver for this, and be prepared to have fuel leaking out.

Head Gasket Head gaskets can be a cause of overheating, oil consumption or coolant in the oil. I have only heard of one case of a head gasket failure on a 1.8T and it was on a car running 30 lbs of boost and used head bolts. This is a repair better left to an experienced mechanic and is generally a last item to do after all other possibilities have been evaluated. overheating is usually the water pump, and coolant in the oil is usually the oil cooler failing internally.

Immobilizer – These cars are equipped with immobilizers to prevent theft. If you swap an ECU without matching up the ECU and the cluster, it will start briefly and then die repeatedly. There are 2 kinds of immobilizer. Immo II used on pre 2002, and Immo III used on 2002+. Immobilizer and ECU info can be found on the VAG COM Site.

<http://www.ross-tech.com/vag-com/cars/immobilizer2.html>

<http://www.ross-tech.com/vag-com/cars/Immo3-ecu-swapping.html>

If swapping an engine into a car without an immobilizer/cluster, you can get software for swaps from REVO, and Dahlback that remove the immobilizer.

Ignition Coils – These are famous parts for the 1.8T they are very prone to failure. VW has had a recall on these because they were failing rapidly on 2001+ cars. To check for bad coils the best way is with a VAG COM. Log Blocks 015, and 016. This will be a misfire counter. Drive the car or let it run, and look for misfires. If you have a bad coil you will see the counter increase on a cylinder. If you have one counting up then it's probably a bad coil. Turn off engine and take that coil out and swap it with another coil. The cylinders read left to right 1,2,3,4 when looking at the engine from the front. Use the VAG again to see if the misfires have also swapped to another cylinder. If it moved, then you have a bad coil. Replace it. If they do not move, then you likely have a plug problem. On some cars the ignition coils have problems and they will pop up out of the cylinder head and lose contact with the plug. Plugs should be torqued to 22 ft-lbs when changed. If the coils still pop up, and they are torqued properly I have created a bracket kit to hold them down ? – see sig.

Limp Mode – These cars are designed to protect themselves from engine damage. If the engine boosts too much, or the engine does not get enough fuel it will go into a limp mode where boost is limited to protect the engine. It limits boost by controlling a solenoid on the wastegate line (N75), by closing the electronic throttle or by opening the DV valve. If you are experiencing a limp mode the best thing to do is get the car scanned for codes and to see what is wrong. Look at fuel trims for signs of running lean, and to look for MAF problems, or O2 sensor problems. To look for potential boost problems log Block 115 and you can see the specified Vs actual boost. If you exceed the specified then there is a good chance that you will go into this limp mode. Stock specified is a max of 14 psi for a 2002+ car.

MAF – Mass air flow meter is used to measure the air going into the engine. It is located on the outlet of the airbox, and housed in a cylindrical tube. The ECU reads the MAF signal, and injects fuel in proportion to the airflow. There are a few different ways the MAF can fail. The MAF can get coated with oil, and will not read properly. This is common if it happens right after installing a CAI, or a K&N filter. It can be cleaned out with 99% isopropyl alcohol, or a quality electronics cleaner. Remove the sensor from the housing and clean the sensor element.

MAF sensors also go bad due to too much airflow. On a car with a larger turbo the airflow is so high that the MAF element will get burned out from the excess air flow. It is common to increase the size of the housing to prevent this (other modifications required).

To check for a BAD MAF the best way is with a VAG com. Block 002 show air mass from the sensor. At idle the air flow should be 2-4 grams/second. With a wide open throttle run to redline the reading should show up to 170 g/s on a chipped car. Look for jumpy readings in the MAF, which can indicate a problem. More details here <http://www.ross-tech.com/vag-com/cars/fuel-trim.html> if you suspect your MAF is bad, one way to test it is to unplug the MAF, often if the MAF is giving false readings and upsets the fueling. If you unplug it, the ECU will ignore the MAF and run off of baseline tables. Be careful, as a boost leak or a vacuum leak can be miss-diagnosed as a bad MAF, because they will throw off the readings on the MAF. (Air sneaks around the MAF).

MBC – Manual Boost Controller. Often people want more boost from their car, and use a MBC. While MBC's can get you more boost they will cause a jerky part throttle driving, and can cause over boost, often put the car into a limp mode. The way a MBC works is by bleeding off air from the wastegate control line. A wastegate is a mechanical flapper valve in the turbocharger that opens to allow exhaust gas to sneak around the turbo. By bleeding off air from the line, the wastegate opens less, more exhaust goes through the turbo, and you get more boost.

Great details on MBC here - <http://www.boostvalve.com/tech/1.8T-DBW.html>

And general Turbo/Wastegate details here <http://www.streetraceronline.com/articles/turbo/wastegate.php>

N75 – The N75 is an electronic solenoid valve that the ECU uses to control boost. It is located in the intake hose near the back right side of the engine. It has 3 connections.

1. Connects to charge pipe = pressure source
2. Connects to wastegate actuator
3. Connects to intake hose – bleed line.

The ecu will pulse this valve at a high frequency to bleed air off from the wastegate line. It does this based on throttle position and engine load. If the valve, or any of the lines connected to it have leaks then there can be severe boost regulation problems. It's function is similar to the MBC above.

To get more boost people often swap in different N75 valves. These different valves simply have a different response characteristic, and will act different when given the same signal by the ecu. They can get more boost, less boost, or even a big boost spike by swapping N75's.

O2 Sensor – Because of strict emissions these 1.8T's are very sensitive to readings from the O2 sensors. MY 2001+ have a wideband front O2 sensor with high accuracy and a linear response. The car will adjust the fueling based on the readings from the sensor. If the sensor is over heated, exposed to lead (race gas), flooded with soot (too rich) or is just old, it can provide the car with false readings and the car will not provide the proper fueling. When the O2 sensors go bad and the ECU detects this the car will run on reserve fueling maps and will not be able to adjust for boost

leaks, fuel pressure, MAF readings or any other parameter that affects fueling. To check for a bad sensor the first thing to do is run block 032 on the VAG com. If the sensors are bad, the readings will both be 0%, replace the Front O2 sensor. If the sensor is bad, it will also respond slowly, or reach a peak. Logging block 031 will show the lambda reading from the O2 sensor as well as the requested lambda from the ECU. To get air fuel ratio multiply lambda by 14.7. If the Igo shows the lambda jumping wildly when running through a gear, or perhaps it flat lines at an unreasonable level, then the O2 sensor should be replaced. It is a 50\$ part. If the o2 sensors get shorted out or the wires get pulled, they will damage the ECU, be careful with the wiring on these sensors. 2000 and older cars do not have a wideband sensor, however they will still perform some adjustment of fueling based on the sensor.

Oil Cooler The Oil cooler on these cars uses a plate and plate heat exchanger. Oil on one side, coolant on the other side. Often the brazing on the cooler can fail and oil and coolant mix together. This is often misdiagnosed as a bad head gasket. To test this remove the coolant hoses and apply air pressure to the oil cooler and watch for leaks. Oil cooler is located above the oil filter.

Spark plugs - With the weak coil packs that these cars have, and the high boost pressures that they run, the spark plugs are very important. Spark plugs on turbo cars need a nice tight gap 0.028" is recommended. Spark plugs may come "pre-gapped" however you should always check the gap, as the variation can be severe and will cause problems. Plugs are cheap, so the best way to troubleshoot is to replace them or pull them and check the gap. A good cheap replacement plug that is a bit cooler is an NGK-BKR7E copper plug. They need changing more frequently, however they are cheap.

Thermostat - Thermostats can be a source of overheating. Most common is the waterpump. Thermostats are relatively inexpensive, and can be changed in a half hour. If your car overheats, or has a tendency to spike up in temp and then drop down to normal temp, it may be a thermostat.

Timing Belt If your driving along and your 60+K mile car runs great and all of a sudden dies, there is a good chance that your timing belt has broken, or stripped some teeth. This is a very costly repair and could have been prevented had the factory recommended a better service interval for the belt. Damage estimates are anywhere from 600 - 1800\$ to repair this kind of failure. 60K miles is a good time to change the timing belt, some belts have lasted 90K, but it's not worth the risk. To test for this failure, pull off the timing belt cover and crank the engine by hand. If the cam gear doesn't turn you have a bad timing belt. Repair is best left to a good mechanic. - If your going full throttle and the car all of a sudden dies, check for a boost hose blown off -

TB - The throttle on these cars is drive by wire, it is an electronic throttle with a wire attached. Most common TB problem just requires adaptation, or cleaning out with carb cleaner. This procedure shows how to do a TBA. TBA can improve idle, and part throttle operation. <http://www.ross-tech.com/vag-com/cars/throttlebody.html>. To clean the TB remove it, and spray inside with carb cleaner. Wipe out the residue that gets built up in there. NEVER port a TB on a 1.8T it won't idle properly.

Race Fuel - 1.8T engines love high octane fuel, however they can have cold startup problems, and if you run leaded race fuel you will ruin your Cat and your O2 sensors. Always run unleaded fuel in a 1.8T unless you are cat less, and you have extra o2 sensors.

VAC Leak - A VAC leak will cause un-metered air to enter the engine and it will run lean. If the air is not measured by the MAF then the fuel will not be injected. The O2 sensor will compensate for much of this, however it has limits. To check for a VAC leak, log block 032 and check the idle fuel trims. If it's more than +2% you probably have a VAC leak somewhere. Check hoses and connections for loose clamps of cut hoses here are some common areas for VAC leaks. Turbo inlet pipe not secured, DV line leaking, Crank case breather Y pipe split, Line on Fuel pressure regulator gets worn and leaks, intake manifold gasket can leak, and PCV line under intake manifold leaks. To find leaks some people spray ether, or starter spray around in the engine bay and listen for changes in idle speed. If you get a change from spraying in a certain area look for leaks there.

Waterpump - Nearly all overheating problems I have seen on these engines has been from the water pump. VW uses a plastic impeller that is splined/molded onto the shaft. These splines strip, or the pump cracks and the impeller slips on the shaft at high speeds. If your car is overheating best bet is to change the waterpump. You can do the T-stat first to see if your lucky but every time I have seen people try this it's the water pump anyways. This happens as early as 35K miles. While your in there doing the water pump, change the timing belt. Timing belts on these can go as early as 60K miles. There are several companies that make kits to do the timing belt and water pump. www.ecstuning.com is a good one.

Water wetter - Water wetter is an additive used to remove surface tension from water. It improves water's cooling ability in a cooling system as it prevents beading of the water, and raises the boiling point. Water wetter should not be used with G12 coolant. It is best for race cars running only water. If you add this to the coolant reservoir you get a nasty oily sludge in the reservoir. Flush coolant system and remove this.

Title: **1.8T Common Troubleshooting Guide**
Post by: **turbowolf** on **June 25, 2005, 08:44:52 AM**

Excellent reference!

Title: **1.8T Common Troubleshooting Guide**
Post by: **CapeGLS** on **June 28, 2005, 09:58:20 PM**

Let me ask this! Misfires underboost! NO FLASHING CEL!!!! Same possible issues? Plugs and Packs?

Title: **1.8T Common Troubleshooting Guide**
Post by: **Rich** on **July 21, 2005, 08:56:54 PM**

possibly... check the torque and packs again no. 4 seems to go bad the fastest

Title: **1.8T Common Troubleshooting Guide**
Post by: **s18t** on **January 29, 2006, 10:57:42 PM**

here is a fuse list that i think should go here, if not move it

1. Washer nozzle heaters, glove compartment light, memory seat control module (10A).
2. Turn signal lights (10A).
3. Fog light relay, instrument panel light dimmer switch (5A).
4. License plate light (5A).
5. Comfort system, cruise control, Climatronic, A/C, heated seat control modules, automatic day/night interior mirror, control module for multi-function steering wheel, control unit in steering wheel (7.5A).
6. Central locking system (5A).
7. Back-up lights, speedometer vehicle speed sensor (VSS) (10A).
8. Open
9. Anti-lock brake system (ABS) (5A).
10. Engine control module (ECM): gasoline engine (10A); diesel engine, Model Year 2000 > (5A).
11. Instrument cluster, shift lock solenoid (5A).
12. Data Link Connector (DLC) power supply (7.5A).
13. Brake tail lights (10A).
14. Interior lights, central locking system (10A).
15. Instrument cluster, transmission control module (TCM) (5A).
16. A/C clutch, after-run coolant pump (10A).
17. Open.
18. Headlight high beam, right (10A).
19. Headlight high beam, left (10A).
20. Headlight low beam, right (15A).
21. Headlight low beam, left (15A).
22. Parking lights right, side marker right (5A).
23. Parking lights left, side marker left (5A).
24. Windshield and rear window washer pump, windshield wiper motor (20A).
25. Fresh air blower, Climatronic, A/C (25A).
26. Rear window defogger (25A).
27. Motor for rear windshield wiper (15A).
28. Fuel pump (FP) (15A).
29. Engine control module (ECM) gasoline engine (15A); diesel engine (10A).
30. Power sunroof control module (20A).
31. Transmission control module (TCM) (20A).
32. Injectors: gasoline engine (10A); diesel engine (15A).
33. Headlight washer system (20A).
34. Engine control elements (10A).
35. 12 V power outlet (in luggage compartment) (30A).
36. Fog lights (15A).

- 37. Terminal (86S) on radio, Instrument cluster (10A).
- 38. Central locking system (with power windows), luggage compartment light, remote/fuel tank door, motor to unlock rear lid (15A).
- 39. Emergency flashers (15A).
- 40. Dual tone horn (20A).
- 41. Cigarette lighter (15A).
- 42. Radio (25A).
- 43. Engine control elements (10A).
- 44. Heated seats (15A).

Fuse arrangements in fuse bracket/battery:

- S162. Glow plugs (coolant) (50A).
- S163. Fuel pump (FP) relay/glow plug relay (50A).
- S164. Coolant fan control (FC) control module/coolant fan (40A).
- S176. Relays panel interior (110A).
- S177. Generator (GEN) (90 Amp.) (110A).
- Generator (GEN) (120 Amp.) (150A).
- S178. ABS (hydraulic pump) (30A).
- S179. ABS (30A).
- S180. Coolant fan (30A).

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