

Nissan VG30 (Z32) Engine Benchmarking

The VG is a very capable engine and fundamentally very straight forward as to design and the components that control its operation. Inputs and outputs that tell the ECU what's going on and the necessary corrections for changing conditions that it needs to make are fundamentally what keep it in perfect balance. No magic at work here, just the simple philosophy of: Garbage in = Garbage out. It's that simple in nature, just not always that easy to find the condition that needs correcting. If a logical and sequential analysis process is followed, the likelihood of success will be far greater.

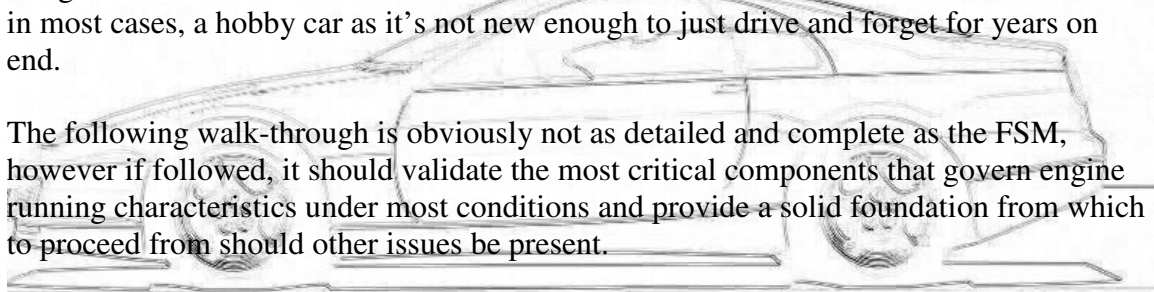
Poor and corroded connections and intake system leaks are the leading cause of less than perfect engine operating conditions. Rubber boots and hoses deteriorate compromising the integrity of the system.

The shot-gun approach of merely changing parts most often doesn't solve issues, just helps empty the wallet.

Taking your car in isn't a guarantee of success either as most of the mechanics at dealerships that knew the 300 are now long gone or have forgotten how they operate. There are still many Z enthusiasts though that are capable, but who are not always accessible.

So, having said that, the best approach is to become knowledgeable about how the Z was designed to work and how to troubleshoot when issues arise. This should be considered in most cases, a hobby car as it's not new enough to just drive and forget for years on end.

The following walk-through is obviously not as detailed and complete as the FSM, however if followed, it should validate the most critical components that govern engine running characteristics under most conditions and provide a solid foundation from which to proceed from should other issues be present.



Validation Procedures

1. Make sure you are using the correct Spark Plugs and they are in good condition. DO NOT USE anything but the Nissan NGK plugs. *Use 1 number colder if you have a modified tt where boost is increased from stock values.

	NA	TT
Hot type	PFR5B-11	
Standard type	PFR6B-11	PFR5B-11B
Colder types	PFR7B-11	PFR6B-11B PFR6B-11C

2. Air filter must be clean and all clamps on air intake system should be checked for tightness.
3. Fuel filter should be known to be good. Change it if in doubt.

4. Fuel Damper and Fuel Pressure Regulator must be in good operating condition. Make sure you have the newer bronze colored units as the old black ones are suspect due to age.
5. Perform a vacuum/boost leak test to ensure no leaks in intake system exist. Repair all leaks before proceeding. A simple PVC plug with air hose pitting tapped into the end can be installed in place of the air filter from which to pressurize the system. *Be careful not to use more than 2 or 3 PSI as crank case and other seals will be seeing this pressure and it will damage them.
6. Pull Coolant Temp Sensor plug and test cold (2.1 to 2.9 kOhm).



7. Check/set Throttle Position Sensor (.4 -.5v closed, 4 – 5v open)
http://www.twinturbo.net/net/viewmsg.aspx?forum=technical&msg_id=960871
8. Pull fuel injector connectors, check contacts for corrosion, test injectors (10 ~ 14 ohms) Replace any that are more than 5 ohms out. *If out of spec they likely won't last long.

9. Pull CAS, PTU, MAF, AAC-FICD, IAA-FICD, Auxiliary Air Valve, Coolant Temp Sensor, Fuel Temp Sensor plugs and check contacts for corrosion. Remove all oxidization (picks, small file, brass wire brush), treat with a good contact cleaner/enhancer, and use dielectric grease as a final moisture inhibitor (MG Chemicals is my favorite). *It is also advisable to check the EGR and Waste Gate solenoid connectors but they are somewhat difficult to access.



10. When connectors are off, test AAC-FICD and IAA-FICD with 12 volts to determine if solenoids “click”. Replace if inoperative.
11. Remove Auxiliary Air Valve and test to ensure it closes when warm. Connect 12 volts to the terminals and wait 3 minutes. You should be able to see through the hole when cold, and not after connecting power and waiting 2 minutes.



12. When connectors are off, test Coil Packs. They should read approximately .7 ohms.

13. When connectors are off, test PTU. See FSM EF&EC 179.

<http://www.300zx-twinturbo.com/cgi-bin/manual.cgi?list=efec&dir=&config=&refresh=&direction=forward&scale=0&cycle=off&slide=179&design=default&total=190>

14. Test MAF as per FSM to ensure is in spec. *See FSM EF & EC 178

<http://www.300zx-twinturbo.com/cgi-bin/manual.cgi?list=efec&dir=&config=&refresh=&direction=forward&scale=0&cycle=off&slide=178&design=default&total=190>

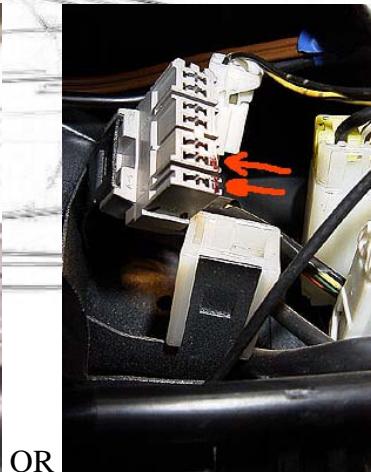
15. Start and warm engine to full operating temperature

16. Set timing to 15 degrees BTDC.

17. Pull Coolant Temp Sensor plug again and test hot (0.30 to 0.33 KOhm @ 176F)

18. Run ECU diagnostics to verify if any codes. The reason this was not done at the beginning is there are too many minor factors that can cause a code. The previous steps should prove out all components except possibly the harness itself. Running the diagnostic now should most like show code 55...all clear!

Turn ignition on and either short the 2 Consult port pins or enable diagnostic mode from ECU by turning screw clockwise, with for 2 seconds and then return to counterclockwise position (Diagnostic Mode II). Watch Check Engine light for # of flashes to read codes.



OR

ECU Diagnostic Codes:

- 11: crank angle sensor circuit
- 12*: air flow meter circuit
- 13*: engine coolant temp. sensor circuit
- 14*: vehicle speed sensor circuit
- 21: ignition signal circuit
- 26*: boost pressure sensor
- 31*: ECU
- 32*: EGR function
- 33*: exhaust gas sensor circuit (left)
- 34: detonation sensor circuit
- 35*: exhaust gas temp. sensor circuit
- 42: fuel temp. sensor circuit

- 43*: throttle position sensor circuit
- 45*: injector leak
- 51*: injector circuit
- 53*: exhaust gas sensor circuit (right)
- 54: signal circuit from A/T control to ECU
- 55: **NO** malfunctions in the above

O2 Sensor Diagnostics

1. Start engine (engine must be up to operating temperature) with the ECU in MODE II to enter MODE II - Heated Oxygen Sensor (O2) Monitor. The ECU is now monitoring the left O2 sensor. Warm the engine to normal operating temperature, then run at 2000 rpm for 2 minutes. Check that the LED blinks (or the check engine light) more than 5 times every 10 seconds at 2000 rpm.
2. To change to right sensor turn the ECU potentiometer clockwise, while engine is still running, wait 2 seconds, turn it back. Check the lights at 2000 rpm again for flashing more than 5 times in 10 seconds.

If the check engine light used for diagnostics is off or on steady and not flashing, the sensor or the wiring is bad.

There should be no codes present and engine should run normally at this point as all EF and EC items should have been confirmed as operating correctly by these procedures just performed.

*If there is a miss at idle, pull coil pack connectors one at a time and replace with engine idling to observe if any do not affect idle. If any are found, it can be the injector wiring/signal or coil pack wiring/signal and further diagnosis will be required.

*If missing under load, fuel pump pressure should be checked to ensure it is putting out correct pressure under all conditions.

This is by no means the end-all document of many authors and my own compiled information so this should be considered but a compass heading in a solid direction!

