

NISSAN FIGARO TURBO PROBLEMS

The installation of a turbocharger is a relatively easy way of increasing the power of an engine – it's an alternative to increasing the size and weight of an engine. On the Figaro, the addition of a turbo about doubles the engine power – it's therefore a vital part of the car!

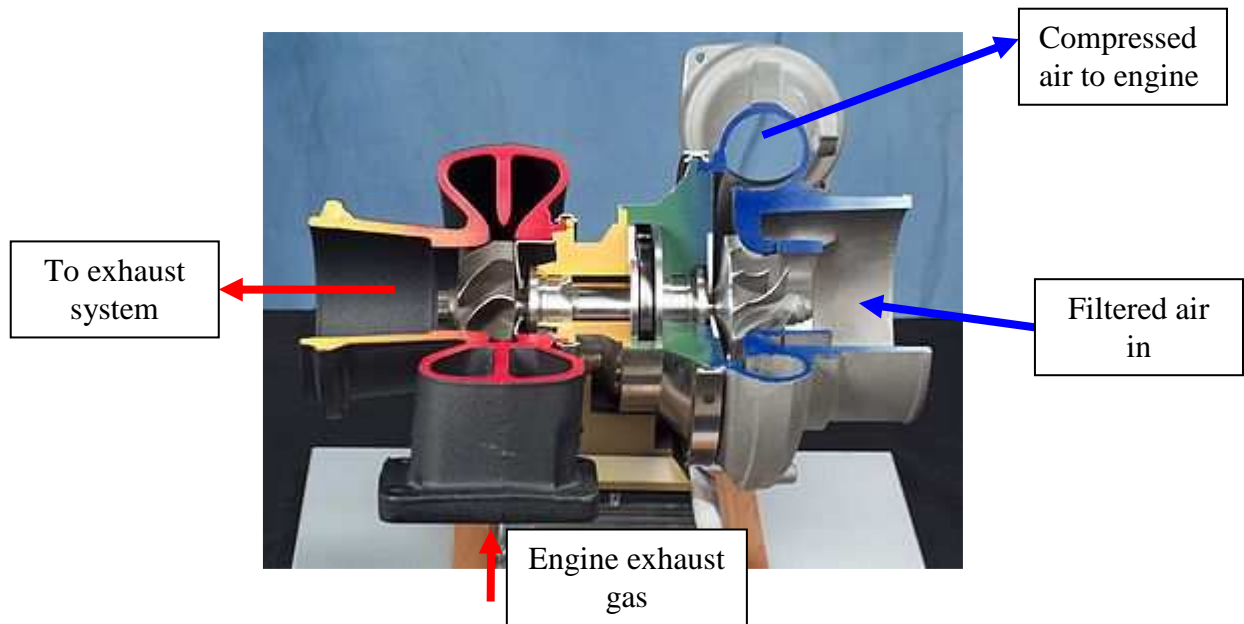
Essentially the energy in the exhaust gases is used to rotate a vaned wheel (known as the turbine) – see cutaway picture below. The turbine is connected via a shaft to another vaned wheel – the compressor wheel. This compresses the air entering the engine. By compressing the air, it's possible to increase the mass of fuel / air mixture entering the engine – this in turn releases more power from the engine.

On the Figaro the compression pressure (often called boost pressure) is controlled at a maximum of 7psi by a system known as the wastegate. This simply allows exhaust gasses to bypass the turbo when the air exit pressure rises above 7psi.

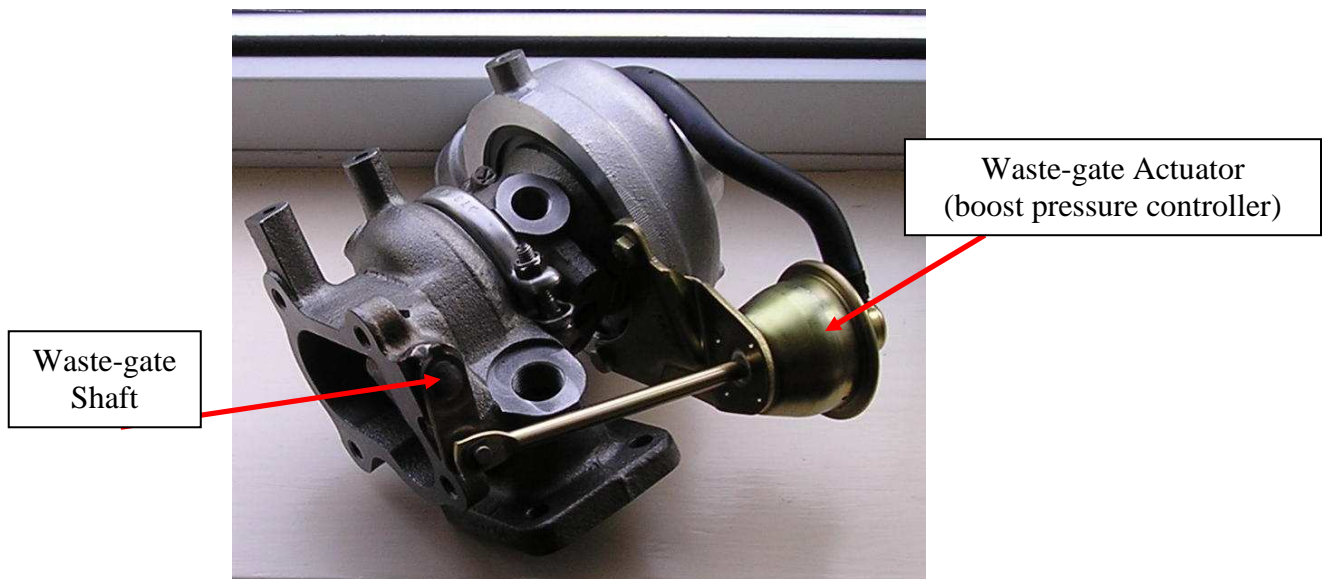
The shaft in the turbo runs in an oil fed bearing arrangement and this section of the turbo also has a cooling jacket.

The turbo shaft rotates continuously when the engine is running – contrary to common belief the turbo doesn't "kick in" at a certain engine speed. When you press the accelerator – the engine speeds up – the exhaust gas increases – the turbo speed increases – the air pressure into the engine increases – engine power output increases. There is therefore a finite time between pressing the accelerator and feeling an increase in engine power – this phenomenon is known as turbo lag.

A cutaway of a typical turbo unit

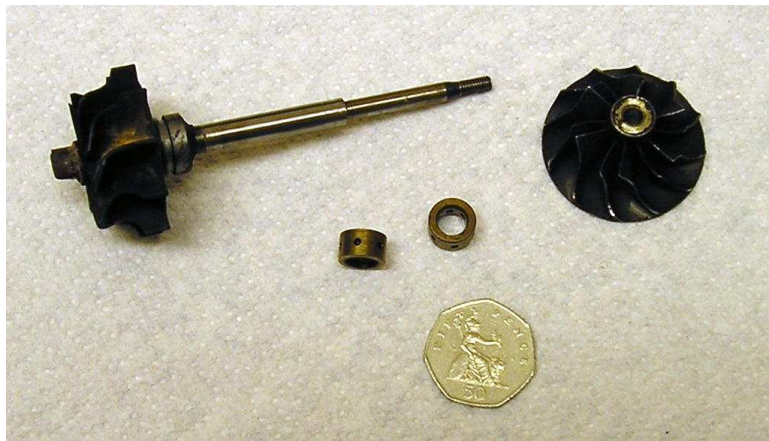


An actual Hitachi turbo as fitted to the Nissan Figaro



Turbos are precision made units.....

It's often thought that turbos are big robust devices – the photo below shows the shaft assembly and the main bearings from a Figaro turbo unit – look at the size of the parts compared to the 50p coin. Looks more like something you'd find in a clock!



It's hard to believe that the shaft assembly rotates at around 100000RPM – around 20 times faster than the engine. This requires the assembly to be precision balanced – otherwise the turbo would wreck itself. The two bronze bearings that support the shaft spin on a film of oil at about half the shaft speed and the shaft spins on a film of oil on the inside of the bearings.

There's virtually nothing that you need to do to the Figaro turbo unit in terms of routine maintenance. Like any other machine – turbos have a finite life and manufacturers quote this to be an average of around 80000 miles for this design of unit. Turbos can last a lot longer, but if they're abused – their life is considerably shortened!

Looking after your turbo.....

Essentially there are two “must do’s” in respect of the Figaro turbo unit

- Ensure that the engine oil and filter are changed every 6000miles / 6 months whichever comes first. Use a good quality, semi synthetic oil – either 10W40 or 10W30. Don’t use additives. Don’t fill above the maximum mark. If you overfill – oil will escape past the turbo seals and can seriously damage the turbo.
- Always allow the engine to idle before switching off and don’t blip the accelerator before stopping the engine! As soon as the engine stops – so does the oil supply to the turbo bearings. The delay before switching off will allow the rotor speed to drop before loosing the oil supply. The oil flow will also help cool the bearing area on the turbo. Clearly there will be occasions where you can’t or you forget to allow the engine to idle. This is fine - persistently not following the procedure will eventually result in turbo failure! A device known as a turbo timer can be installed to automatically delay switch off of the engine.

Diagnosis of Turbo Problems

Turbo problems can be classified into three categories

- **Seizure.** The rotor seizes in its bearings so there’s no turbo action. Essentially caused by lubrication issues! Easily diagnosed by removing the connecting hose from the air inlet and checking the rotation of the compressor wheel. It should turn freely with zero resistance.

The symptom of a seized turbo is that the car lacks power. Surprisingly we have seen Figaros where the owner hasn’t realised that there was anything wrong – the turbo was probably seized since purchase and they simply thought that’s how Figaros performed! If you’re buying a Figaro – test drive at least a couple so you get the feel of how a Figaro should perform!

Of course, there are other issues that can result in poor performance – we have tabulated these on page 8.

Unfortunately there's no quick fix for a seized turbo – it needs to be removed for repair or replacement. Seized turbos often have considerable internal damage.

- **Noise.** A whistling noise when accelerating is due to either an air leak on the induction pipework or turbo imbalance. Rubbing or other mechanical noise on acceleration, results from badly worn bearings. It should be noted that some turbos can make characteristic whistling or whining noises which are not excessive and don't get worse over time. Often these units can cover significant mileage before other problems develop.
- **Oil consumption / smoke.** Heavy oil consumption often associated with a smoking exhaust can signify a badly worn turbo. There can be other causes as listed on page 8. It's easy to mistake other issues for a turbo failure so unless you're sure – seek professional guidance. Turbo wear can often be confirmed by checking the movement on the compressor wheel. This is a simple check carried out by removing the connecting hose from the turbo air inlet. The design maximum sideways and lateral movement on the compressor wheel is a tiny 0.1mm – significant movement means significant wear / damage.

As a rule of thumb:

- ***Blue smoke from the exhaust under heavy acceleration is usually caused by engine problems.***
- ***Light blue smoke from the exhaust when idling is usually caused by a turbo issue.***

Check and if necessary adjust the engine oil level and allow the car to idle for 10 minutes:

- ***Plumes of smoke with a blue tinge that smells “oily” usually signifies turbo problems.***
- ***White smoke (steam) which smells “chemical” is often attributable to a failed cylinder head gasket. This is usually reinforced by a drop in coolant level over time***

Turbo Repair / Replacement

First of all a golden rule – **DON'T REPLACE A TURBO WITHOUT CORRECTING THE ROOT CAUSE OF THE ORIGINAL FAILURE!!**

If the root cause of the failure isn't determined – then the replacement turbo could well suffer the same fate! If we fit a turbo or units are sent to us for repair / replacement – we can, following examination, tell you the likely cause or causes of failure.

We include full instructions with every turbo returned or supplied to a customer. In summary – before fitting a turbo the following steps must be carried out.

- Check the engine PCV system (Positive Crankcase Ventilation)
 - Change engine oil and filter
 - Internally clean or replace the oil feed line to the turbo.
 - Purge and prove the oil feed line for full oil flow.
 - Check the oil return line into the sump for restrictions.
 - Check / replace air filter element.
- Check air induction pipework for foreign bodies, restrictions and potential air leakage eg splits in hoses.

If your Figaro is suffering from Turbo problems – there are five possible avenues.....

Repair

The Hitachi turbo fitted to the Figaro is an obsolete unit – parts have not been available from the manufacturer for many years. Essentially repairs are confined to replacing bearings / seals or rectifying problems with the waste-gate mechanism. Often repair would be false economy given the general condition of other parts of the units.

Fit a 2nd Hand Unit

A very risky strategy! 2nd hand turbos often go for £250 - £300. These units are 18 years old, there's little or no warranty and you've no idea as to the remaining life of the unit.

Reconditioning

Reconditioned turbos are generally offered on a service exchange basis and are re-manufactured to original specification. The proviso is that the unit offered for exchange must be capable of being reconditioned eventually. This precludes units with significant internal damage eg fractured rotors and significant internal casing damage. The term reconditioned is often misused – we've seen lots of so called reconditioned units which have had little more than a clean and new bearings / seals fitted. Often, such units are not rebalanced and future reliability and life is very questionable. Remember, there's no such thing as a cheap reconditioned turbo!

New Hitachi Turbo

New Hitachi turbo units are available from Nissan – but remember that these are obsolete units and are not supported by the manufacturer in terms of spares. However, the fact that large numbers of these turbos have given perfectly good service for the last 18 years is testament to the design and quality of the unit.

The major negative of this option is cost! A new Hitachi turbo with fitting kit and new oil feed line is well over £900 list price!!

Alternative Turbo Design

We supply a Garrett turbo which is a direct replacement for the original Hitachi unit. It's a direct fit unit and fitted – it's almost identical to the original. Garrett is one of the most respected names in turbos and unlike the Hitachi unit – this is a current model fully supported in the UK in terms of spares and service. It comes with a 2 year warranty and is very significantly cheaper than a new Hitachi unit! It comes complete with a new oil feed line and fitting kit!

If you're intending to keep your Figaro for a while – we'd strongly recommend the Garrett option!

In conclusion.....

If your Figaro seems to be suffering from a turbo problem – contact us. We'll work with you or your garage to root-cause the problem and determine the best solution for you. Remember we offer the complete array of turbo services – repair, reconditioning and new turbos.

We look forward to hearing from you!

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ENGINE VS TURBO FAULT-FINDING

Engine lacks power	
Cause	Remedy / Comments
Worn internal engine components	Worn or damaged pistons / rings / cylinder bores / valves
Incorrect engine settings	Tappets, ignition timing, valve timing (timing belt replaced wrongly)
Low boost	Waste-gate sticking / actuator faulty / actuator signal line blocked or disconnected
Damaged turbocharger	Ascertain root cause. Repair / replace
Air filter blocked	Replace air filter
Air pipe into turbo restricted	Clean / replace pipe
Air pipe from filter to turbo leaking	Check hoses for splits and tighten hose clips
Air pipe from turbo to inlet manifold leaking	Check hoses and clips for security
Engine management system fault	Check fault codes
Blockage in exhaust system	Replace silencers or catalytic converter
Turbo noisy	
Damaged turbocharger	Ascertain root cause. Repair / replace
Air pipe into turbo restricted	Replace pipe
Air pipe from filter to turbo leaking	Check hoses for splits and tighten hose clips
Air pipe from turbo to inlet manifold leaking	Check hoses and intercooler for leaks and replace
Carbon build-up in turbo bearing housing	Change engine oil and filter-overhaul or replace turbo
Blockage in exhaust system	Replace silencers or catalytic converter
Exhaust gas leaking from manifold	Replace gasket or manifold - check bolts for tightness
Excessive engine oil consumption	
Worn internal engine components	Worn or damaged pistons / rings / cylinder bores / valves
Fuel system defective or incorrectly adjusted	Replace or adjust faulty components
Damaged turbocharger	Ascertain root cause. Repair / replace
Air filter blocked	Replace air filter
Air pipe into turbo restricted	Clean or replace pipe
Incorrect operation of crankcase breather system (PCV system)	Check breather hoses, pipes and PCV valve
High sump oil level	Drain to correct level
Restricted oil drain pipe from turbocharger	Replace oil drain pipe

White / Blue exhaust smoke at idle	
Worn internal engine components	Worn or damaged pistons / rings / cylinder bores / valves
Cylinder head gasket failure	Replace or adjust faulty components
Damaged turbocharger	Determine reason for failure - repair or replace turbo
Air filter blocked	Replace air filter
Air pipe into turbo restricted	Replace pipe
Restricted oil drain pipe from turbocharger	Replace oil drain pipe
Incorrect operation of crankcase breather system (PCV system)	Check breather hoses, pipes and PCV valve
Excessively high engine oil level	Drain off excess oil. May have already caused turbo damage.

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