TURBO BOOST PRESSURE ADJUSTMENT ON A ROVER 75 OR MG ZT

Why do this?

If you have tuned the engine this means more fuel is being injected during acceleration. To ensure more complete combustion, keep the exhaust clean and maximise the torque, increasing the availability of the air supply is worthwhile. To some extent it is free power, because the same amount of fuel is being used but more of it is being burned more completely which generates the extra torque. Equally importantly, boost pressure is as directly related to torque as fuel is: this is why recent diesels produce more torque than older ones - turbo pressure have been increased over the years from 14psi to 17, then 20 and even 22 on some vehicles with overboost.

There is little point in doing it on a standard engine because it is underfuelled - ie there is little surplus fuel for the extra air to burn and liberate more torque. In fact it is debatable whether the pressure would actually increase because there is not enough energy in the exhaust to spin the turbo any faster.

How to do it?

On these vehicles, the boost pressure is not controlled directly by the engine management system but is simply limited to about 1.2bar (17psi) by the wastegate & its actuator. Therefore the only way to increase the boost is to alter either the force required to open the wastegate using a crude but effective spring, or to bleed off the air going to the actuator using a Boost Control Valve (BCV). This simple device is a spring loaded valve which prevents the actuator responding to the boost pressure until the spring is compressed enough to close the valve and transmit the air pressure to the actuator.

It has two main advantages over a spring: I) It is easy to adjust & ii) it reduces 'boost creep', whereby the wastegate *begins to* open as the desired pressure is reached, rather than staying closed *until* it is reached.

What do you need ? (recommended method - NO springs currently available.)

You need a BCV from gb-ent.com and about 1M of silicon hose, & a means of measuring the boost pressure. I suggest a low cost code reader that can show 'live data' from example, Gendan.co.uk or a Scangauge from scangauge.co.uk because they are so easy to plug-into the diagnostic port and monitor the pressure as you drive. You could use a mechanical gauge but the code reader method offers greater convenience & other uses* for little extra outlay.

(You won't be able to read fault codes nor turn off the engine warning light on pre 2004 diesels, but you view other data or use it on other vehicles, both petrol & diesels)*

I don't have any boost springs so you will have to experiment yourself if you don't want to use a BCV, but you MUST monitor the pressure. If the pressure goes too high the MAP sensor will alert the ecu which will cut the power & turn on the warning light.

To fit the BCV you will have to remove the engine undertray and get under the car so you can reach the turbo actuator. Remove the pipe connecting it to the turbo compressor outlet. Cut the silicon tube in half and attach one half to each of the now vacant connections (turbo & actuator)

Route the tube up the bulkhead so and push onto the BCV as per the diagram. Fix this in an accessible location at the back of the engine with cable ties.

Testing: *TAKE SOME READINGS BEFORE YOU FIT THE BCV OR SPRING!!!*

Plug in the code reader and start the engine. Make sure you can view the map (manifold absolute pressure) sensor data. You may need to choose the units and the reading will be 'absolute' pressure - ie includes ambient air pressure of about 14.5psi or 100kilopascals (kpa). From whatever units you choose, deduct the above figures to determine the actual boost pressure.

Examples, (ignition on, actual boost pressure in red - I prefer psi)

ENGINE STOPPED	IDLING	2000RPM static,	2000rpm full throttle in 5th
14.5psi	13.5 **-1***	17.5 **3**	28 **13.5**
100kpa	98*	120 **20kpa**	200 100kpa

Often there is a slight negative pressure simply due to the engine drawing in more air than the turbo can pump at idle - ie the turbo acts as an obstruction causing a small pressure drop across it. The figures are only an example DO NOT panic if yours are way different.

Take readings in top gear from about 1500rpm using full throttle, noting the pressure at various rpm points. On a standard (untuned) engine the max reading will probably be at around 2200-2500rpm. If it is at a much higher rpm, then the maf sensor signal may be weak. *With a RonBox fitted, the max pressure will be reached at lower rpm due the effect of the extra fuel but will still be limited by the wastegate.*

Next, fit the BCV and retest. Aim for about a 3-4psi increase - no more than about 19-20psi. Note the rpm at which the original max was reached and also the rpm of the new peak pressure - this will probably be at a bit higher rpm. Eg was 17psi @ 2200, now 20psi @ 2400rpm.

You should be able to feel the improved torque as the boost goes above the original max (not from below this pressure since the wastegate would not obviously be open anyway).

RESOURCES:

The BCV is available from gb-ent.com for £42 and listed under Turbo Accessories. Ask for one for a turbo diesel and set to about 19-20psi.

Don't forget to order some hose for it - check the size as it may be 5 or 6mm. The knurled screw adjusts the boost pressure. The inlet goes to the turbo and the outlet to the actuator. I used a cable tie to secure the pipes to the bcv. Keep the hose length as short as possible.

There are various handheld code readers on the market & Ebay can be a good source, BUT you must look for the type that can display LIVE SENSOR DATA. The basic (cheapest) ones cannot do this - they are ONLY for reading and clearing fault codes.

I used a Gendan.co.uk one similar to that opposite. Alternatively, if you have a laptop or Notebook pc you can use the tool below....

This interface & software connects via USB to any laptop or notebook pc and as well as offering the same features as a hand held unit, also allows you to log and chart the sensor data. I use one and find this feature is very useful as you can concentrate on driving and then review the results when you pull over. Set it to record rpm and boost pressure only. *The more datastreams you select, the less readings of each per second are done as the maximum throughput is only about 5 readings per second, and they are done sequentially.*

So use top gear for recording to keep the rate of rpm increase as low as possible - this will give more accurate results, otherwise the rpm readings will not coincide closely with the pressure readings. Ie in a low gear the engine rpm will have increased significantly between the reading of the rpm and the reading of the boost pressure. Driving up a hill in a high gear would be even more accurate and don't forget to allow time for the turbo to spool up. Eg floor the pedal at 1300rpm if logging the data from 1500rpm.

Clearly to measure the high rpm pressure you will need to use a lower gear so a steep hill is really needed to get accurate results.

** WE HAVE A FEW C_READER CODE READERS FOR £60 - MORE LIKE £80 ON EBAY. **

[TOOLS & DASH SWITCH PAGE ON THE NEW WEBSITE]

THE DIGIBOOSTERS

For engines withe ecu controlled turbos, we can supply a Digibooster which electronically controls the turbo and also prevents mil illumination or fuel cutting(limp mode) if the boost pressure spikes over the ecu's threshold. The same technology is built into the RonBox 2b - our 2 channel common rail tuning box.

I have used the companies mentioned above but I have no connection with them other than as a customer so please do not contact me in the highly unlikely event of a dispute. The prices were as per their websites on 23-4-2011