

GBE Boost Control Valve Guide and Instructions

These are the details of the GBE Boost Control Valve (BCV from here on in!).

Please read all these instructions carefully before attempting to install this valve.

I'll start with a Cautionary note:

Increasing the power and performance of any car should be considered carefully. Modifications to your car should only be carried out within and in accordance with the manufacturers safe operating tolerances. Standard suspension and braking systems can often become compromised if the factory engine power output is exceeded or driving characteristics place constant and heavy load on these areas. In addition modifications to your car should be brought to the attention of your insurance company otherwise you may invalidate your insurance policy.

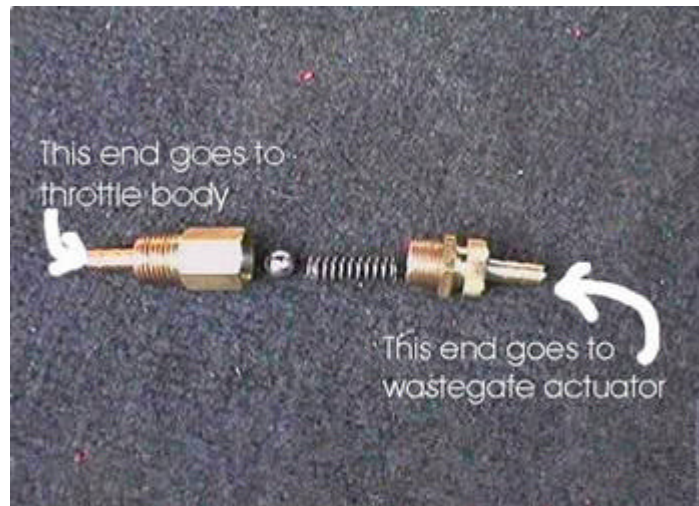
The use of a boost control device such as this places additional stress on the engine, turbocharger and drive-train of your car. Excessive boost levels or incorrect set-up and operation of the BCV could cause serious damage to any of these components. It is not recommended that the factory boost limiter be disabled or that the turbocharger is operated outside of its safe operating range.

GB Enterprises accepts no responsibility whatsoever for any direct or indirect or consequential loss, injury or damage to any persons, equipment or property arising from the use or fitment of this boost controller.

OK, this is what a BCV is:

A BCV is a small device, which essentially acts as a mechanical air pressure switch. A small ball bearing within the valve is held, under pressure, onto a seat by a spring. Air pressure acting on the ball causes it to lift off its seat once a preset pressure has been reached, as determined by the spring pressure on the ball – which can be adjusted of course. Once the ball has lifted off its seat air can flow through the valve. As the air pressure acting on the ball reduces below the spring pressure, the valve closes preventing air flowing through the valve. In essence no air passes through the valve until the spring or 'cracking' pressure has been reached.

This picture shows a BCV opened up...



NB: the end to the right in this picture is the adjuster end and will be fitted pointing the wastegate actuator

[Back to Top](#)

So, here is How it works on a turbo car:

If the BCV is placed in the turbo to waste-gate actuator pipe it acts as a boost controller. The valve can be adjusted to give the desired boost pressure by simply adjusting the spring pressure. (This is done by lengthening (lowering the boost) or shortening (increasing the boost) the spring in the valve.) One of the excellent characteristics of this valve is the way the boost is controlled. Due to the way the valve 'cracks' open once the spring pressure has been reached – no air is acting on the waste-gate actuator until this time. This means that the boost is much more aggressive and rises much more quickly than a standard turbo car. This is because normally a waste-gate actuator actually starts to open the waste-gate at very low boost levels, gradually opening wider as boost rises until it is fully open – at which point maximum boost has been reached. This has the effect of smoothing the boost all the way until maximum boost is reached. Since a BCV prevents air getting to the waste-gate until the preset boost level is reached maximum boost is reached more quickly making for a more exciting launch!

[Back to Top](#)

Is this better than a bleed valve?

OH YES!!!

A bleed valve – as the name suggests, bleeds air from the waste-gate actuator fooling it into thinking there is lower boost than there actually is. This doesn't change the way the waste-gate actuator works, so the waste-gate still begins to open early; meaning that although the boost level is higher, as defined by the amount bleed dialled into the bleed valve, spool time is not as quick as the GBE BCV.

[Back to Top](#)

Are there any exceptions?

Well yes.

I have found that if the BCV is set too low – generally less than 9psi on the T-16 Rover - the effect can be to reduce the aggressiveness of the boost. This can make the valve feel like a bleed valve in that the differences between the two are less detectable. However, the boost level is much more consistent than a bleed type valve, and is not dependant on temperature.

NOTE: Bear in mind that many cars are actually fitted with a bleed valve type of boost controller that is activated by the ECU via a solenoid valve. These forms of boost control device need to be de-activated to gain the full benefit of the BCV. It is worth noting that factory fitted boost control devices are normally fitted to allow the ECU to control boost by reducing it under adverse conditions i.e. low/high engine temperature etc, rather than for the purpose of increasing performance.

Is it obvious when I hit the factory boost limit?

Oh yes!

The engine will cut when the boost limit has been reached, and acceleration will be halted. This can be quite alarming, so it is recommended that testing is performed on closed roads.

NOTE: During the adjustment procedure boost cut is to be expected if you raise boost level considerably, and to experience it is a valuable lesson. Boost cut during overtaking can be an unnerving experience and it is important to set the BCV so as not to trigger boost cut at maximum power and engine load.

[Back to Top](#)

Installation of the BCV

Fitting the BCV is a simple job, but you must take care when installing. Make sure the engine is switched off and cool before you begin, and ensure all tools are removed from the engine bay and all items loosened or moved are replaced and retightened prior to re-starting the engine.

This procedure is written to aid fitting the valve to a Rover T-16 turbo, but the principles are relevant to any turbo car. Please refer to your workshop manual if you are unsure of the location of any parts.

Parts required:

- Boost Control valve
- 2 hose clips (not supplied)
- Cable ties to secure valve (optional)
- Aftermarket boost gauge (not supplied – but HIGHLY recommended)
- 1 bung to block original boost return hose – M6 x 16 bolt recommended (may not be required)

Tools required:

- 1 flat head screwdriver for tightening the hose clips
- Side cutters for cutting the boost sensing hose to the actuator (may not be needed in some applications)
- 8mm spanner for removing the airbox and factory boost controller (dependant on application)
- A selection of spanners and screwdrivers may come in handy.

Positioning of the BCV:

It is worth considering the following when determining the position:

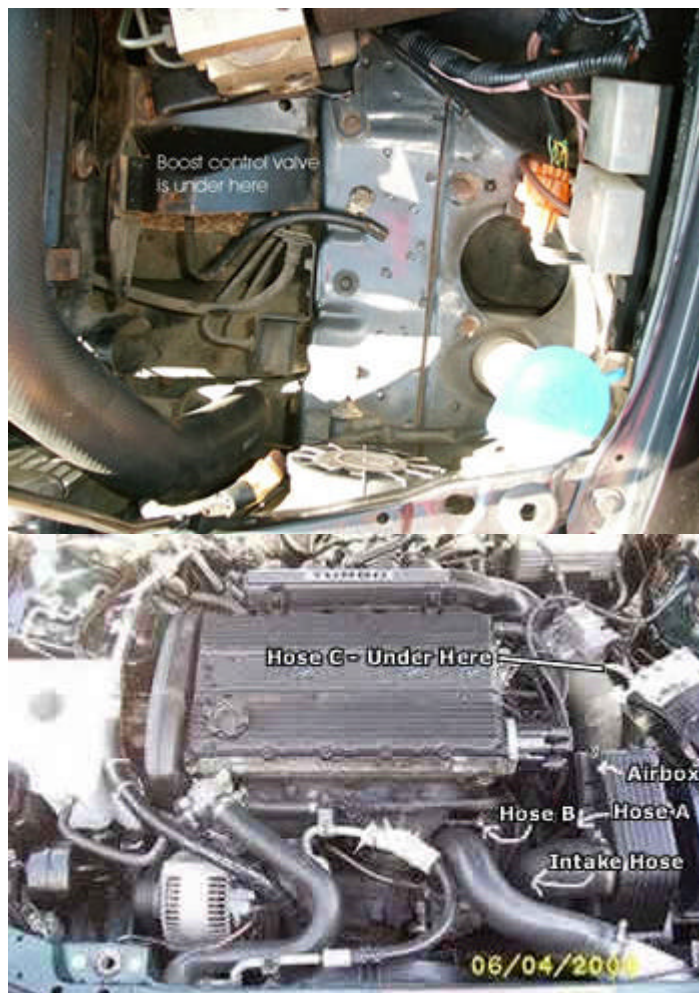
Pipe routing

Can it be hidden out of site?

Can it be accessed easily for adjustment?

I recommend that the valve is cable tied under the airbox when finally adjusted, with the hose to the actuator kept as short as possible.

[Back to Top](#)



Installation steps:

1. Firstly, disconnect the intake hose which goes from the turbo to the airbox – this will make it easier to see all the parts you need.
2. Undo the two bolts in the side of the airbox (passenger side), which allows the airbox to be lifted clear of the car.

3. Now the airbox is removed, pull the hose off the airbox lid which disappears under the airbox. (HOSE A) The plastic nipple sticking out should now be blanked off, with either a piece of rubber pipe with an M6 bolt in the end, or some other airtight bung.
4. If you reach under the airbox (following the line of the hose you have just pulled off the airbox lid) you will find the factory boost controller, which has three tubes going into it
5. Undo the bolt securing this valve to the metal bracket.
6. Withdraw this valve and pull off the two pipes which are still attached to the car.
7. You should now be left with a pipe going back to the throttle body, and a pipe going to the wastegate actuator.
8. Take the GBE BCV and insert the end with the lock nut and serrated adjuster into the pipe which goes to the wastegate actuator. (HOSE B) Secure with a hose clip
9. Insert the other end of the valve with an external thread on it into the pipe which goes to the throttle body. (HOSE C) Secure with a hose clip.

OK, now the valve is installed into the car! I have preset the valve to approximately 10psi. This varies from car to car, so please be very careful.

Now reassemble the parts you had taken off:

1. Refit airbox into metal bracket and re-insert two bolts. Tighten bolts.
2. Refit intake pipe from turbo to airbox.
3. Tighten all clips, nuts and bolts you have disturbed
4. REMOVE ALL TOOLS AND PARTS FROM UNDER THE BONNET!
5. Start engine and check for any air leaks or abnormalities which should be rectified immediately

[Back to Top](#)

Testing and Adjusting the BCV

THESE INSTRUCTIONS ASSUME THE FACTORY BOOST VALVE HAS BEEN DISCONNECTED. IT IS HIGHLY RECOMMENDED THAT THIS VALVE IS NOT USED, BUT IF IT IS CONNECTED DURING THE ADJUSTMENT PROCEDURE BE AWARE THAT THE ECU CAN INDISCRIMINATELY INCREASE BOOST BY AROUND 2-3PSI. IF THE ECU DOES THIS DURING ADJUSTMENT BE CAREFUL NOT TO OVER COMPENSATE OTHERWISE OVER-BOOST WILL OCCUR – YOU HAVE BEEN WARNED.

NOTE: These adjustments can be performed with the pipes connected to the BCV providing the hose clips are not too tight – simply twist/rotate the knurled end of the relief valve inside the pipe as required.

Preparation:

Drive carefully to a suitable straight road or dual carriageway where the car can be accelerated with no danger to you or other road users.

Ensure the engine is at normal operating temperature.

If you haven't done so already, adjust the BCV so just over half of the adjuster threads are showing – be careful not to completely undo the valve as the ball and spring may drop out.

Perform a reference run to determine the current boost pressure – it is unlikely, with the valve as sent to you, that boost will be above the factory limit

If the boost limit is reached proceed to Decreasing the boost

If you want to raise the boost higher proceed to Increasing the boost

Increasing the Boost

Shorten the valve by $\frac{1}{4}$ of a turn for a small increase by backing off the locknut and screwing in the adjuster by turning the knurled nut clockwise, then tighten the locknut.

Perform a power run and determine the current boost pressure.
If more boost is required (DON'T GO TOO FAR!!!) carry on Increasing the Boost
If you have found a happy balance between improved power and the boost limit - stop increasing the boost and see how things go before performing further adjustments !

Decreasing the Boost

Lengthen the valve 1/4 a turn for a small decrease
Perform a test run and determine the current boost pressure.
If more boost is required (DON'T GO TOO FAR!!!) proceed to Increasing the Boost
If you have found a happy balance between improved power and the boost limit - stop increasing the boost and see how things go before performing further adjustments !

One final point:

Due to the construction of the valve and the fact that the internals are made of two different materials, it often takes a week or so for the valve to "wear in" properly, so the boost level may alter (usually goes down). The boost curve also tends to change and become smoother as it wears in.

[Back to Top](#)

Fault Diagnosis

My boost rises and falls a little...

This is fairly normal until the ball bearing seats properly into the brass body of the valve. A few hundred miles are often needed to settle it in.

The boost hits my preset level, then falls, then gradually rises again up to the preset level...

This is usually caused by the small (0.7mm) vent hole in the knurled section of the adjuster being either blocked or too small. Firstly, check the vent hole is not blocked, by removing the valve and inserting a small piece of wire into the hole, then blowing through the hole. You can increase the size of the hole as much as you require, but generally, going above 1mm is pointless, as it tends to reduce the speed at which the boost level builds. Try 0.8mm

The boost hits my preset level, then creeps up slowly by 1-2psi as the revs increase...

I had this problem on my own car. It turned out to be the diameter of the hoses going to and from the BCV was too small. You need either 5mm ID Samco vacuum hose (available from Demon Tweaks) or 1/4" fuel hose from your local motor factor.

The boost rises quickly and I get a "boost spike" - this is where the boost rises above the level you need for a fraction of a second...

It is normal for the boost to spike fractionally, but the boost level should stay +/- 1psi throughout the range. If it spikes more than this, two things can be tried - 1. Move the valve closer to the actuator - ideally within 3-4" (75-100mm). 2. The input (usually taken from the throttle body) can be taken from somewhere closer to the turbo, ideally the turbo outlet. Unfortunately, this may require the turbo to be removed and a 1/4" barbed boss welded on

I cannot get the boost level low enough...

This valve, when the adjuster is backed off completely, allows free flow, so you have another problem!!

I cannot get the boost level high enough...

On a Rover, this valve will allow boost pressures of 20+psi, probably as high as 25psi. If you wind the adjuster right in and it is still not high enough, please

return the valve and I will test it. It is not advisable to have a stronger spring, as adjustment becomes too fine.

For people wishing to run 25psi+, please contact me - boost@gb-ent.com

[Back to Top](#)