



Turbo Compressor Bypass Valve Diaphragm Replacement V70 2001- My car 2001 V70 T5 98,500 miles

Function of the CBV

<http://www.wisegeek.com/what-is-a-compressor-bypass-valve.htm>

I've been having various boost problems resulting in reduced boost so I decided to take some things apart, check everything out and replace the CBV diaphragm and spring in the process. The general condition of the CBV diaphragm can be easily checked for vacuum leaks with a Mityvac hand vacuum pump (see page 10). I don't know how often these diaphragms actually go bad and mine didn't have a vacuum leak but my car is approaching 9 years old now and I planned on replacing it while I had everything apart for other turbo related checks.

Here are some photos and a description of the job. Removing three bolts and the cover to replace the diaphragm and spring would be a 5 minute job with easy access to the CBV, however, there are things to be removed first, limited room to work and having to raise and lower the car for access to one of the cover bolts. It took me a little over 3 hours to complete the CBV diaphragm replacement but I did several other turbo related checks along the way and I could probably do it in less then half the time now that I've done it once. Ratcheting box end wrenches (10mm and 12mm) will make the job easier and faster, see page 11

Things to have before starting...

Replacement hose clamp, ~ 7/8" (22mm) when tightened, I use a standard worm screw light duty hose clamp to replace the original crimp type clamp

Replacement vacuum/boost hose for turbo control valve (TCV, 3 hoses) and CBV (1 hose)- new hoses are optional but recommended since you're removing items that make hose replacement more accessible. About 9 to 10 ft. of 3/16", 5mm hose is needed if 3 TCV and 1 CBV hoses are replaced. I used silicone hose from IPD. New spring clamps are also recommended.

http://www.ipdusa.com/version.asp?strPageHistory=category&numSearchStartRecord=0&strParents=127,387&P_ID=4234&CAT_ID=387&V_ID=10724

Remove Top Engine Mount Cross Brace, Air Filter Box, Turbo to Intercooler Tube Over Engine, Air Intake Tube

CBV is down there somewhere. Begin by removing top engine mount strut brace and air filter box, turbo boost side tube over top of engine, and then the air intake tube between the turbo and air filter box. There are three hoses attached to the air intake tube on the inside elbow near the turbo and one electrical connector to the PTC that must be removed. (Don't forget to plug this connector back in when reinstalling intake tube, I forgot).

Info about the PTC, I've read it can clog and should be cleaned.

<http://www.volvoclub.org.uk/faq/EngineFuelinjection.html#PTCNipple>

One of the three hoses, the hose going to the PTC has a crimp type clamp that needs to be removed and the other two hoses pull off relatively easily. There is a plastic push on type clamp/wire holder on one of the hoses. You can access and remove one of the hoses, the TCV bleed hose, with the air filter box removed by going underneath the intake tube. The other two hoses can be removed from the top side of the intake tube and the intake tube can be removed from the turbo first to enable more room.

Turbo to intercooler tube over the top of the engine needs to be removed first for better access to air intake tube clamp screw at the turbo.



Three hoses are attached to this inside elbow area of the intake tube, one hose is visible here.



Loosening Air Intake Tube Hose Clamp from the Turbo

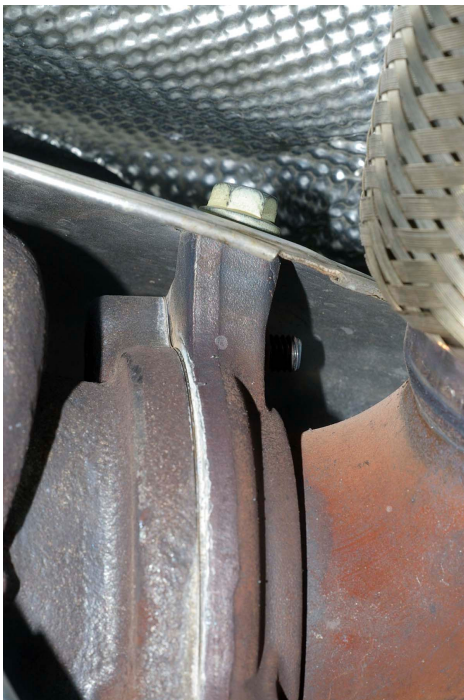
The turbo air intake tube clamp screw is difficult to see and I found the best position is to access from the passenger side of the engine bay and using your left hand fingers as a backstop on the clamp screw while loosening and tightening the screw. This keeps the hose clamp from twisting downward when loose. I used a telescoping mirror to get a better view of the screw. Here is the right place to be for the clamp screw, assuming your clamp is in the same position mine was in. Turbo to intercooler tube over top of engine and heatshield have already been removed in this photo.



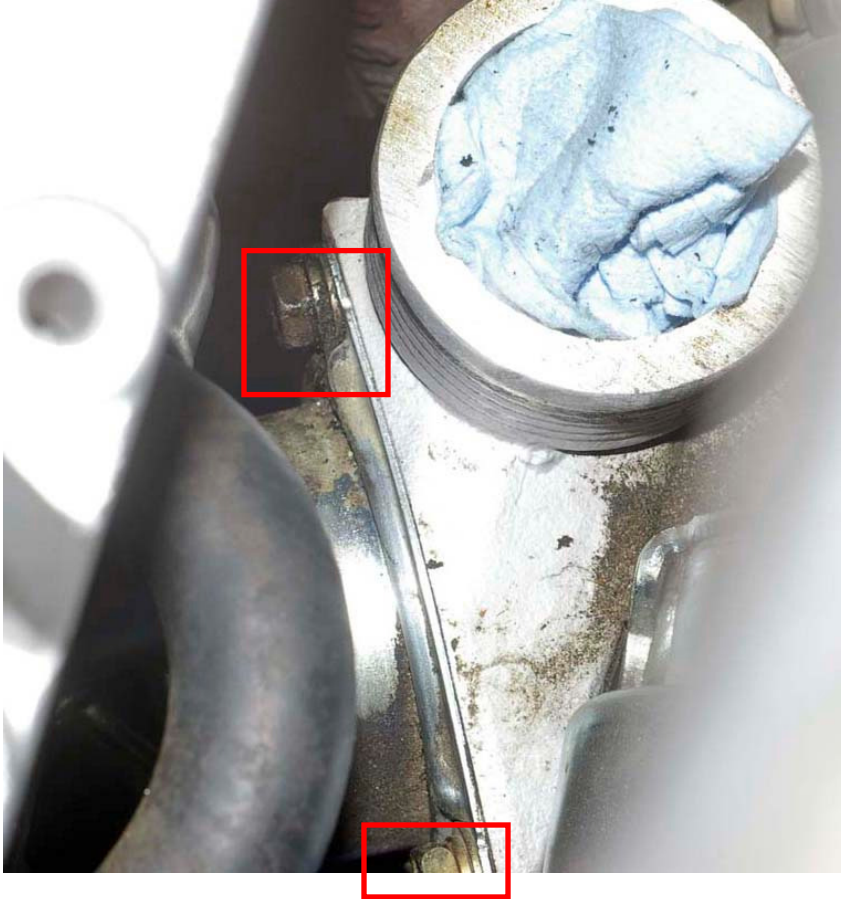
Heat Shield Removal- *removal looks optional for CBV diaphragm replacement alone but I pulled it off to check the wastegate*

Removing the outer heat shield over the exhaust manifold and turbo has three 12mm bolts, two on the top and one below, the lower bolt below (photo) is easy to get at but from underneath the car, a 12mm ratcheting box end would have been nice for the lower bolt. Note: On the passenger side there are two top bolts; the top most bolt is for the inner shield and the bolt just below it is for the outer heat shield, remove the lower top side bolt. For reinstall, a mirror helped line up the holes in heat shield for top two bolts.

Bottom heatshield bolt underneath car, while car is raised remove the lower CBV cover bottom bolt while you're underneath the car, see photos on next two pages. Lower car after heatshield and CBV cover bolts are removed.



After removing the boost side turbo tube over the engine (and covering the turbo opening) you can see the CBV cover looking straight down behind the engine and the top 2 of 3 bolts. A standard 10mm open/box end wrench will remove the bolts but a ratcheting box end wrench would be a much better tool for these bolts due to the limited space. (which I purchased afterwards)



Passenger side view



Under the car

One of the three CBV cover bolts is accessible from underneath the car. Note the convenient location of the coolant tube and hose to limit space around the bolt.



Another view of bottom bolt.



Notice my new blue silicone hose not pushed all the way in, I found a tear in the hose after installing. Not sure if I wasn't careful enough during install or what but I had to cut off the end and now it's too short, need to buy more hose.

CBV cover and diaphragm removed, you can see the by-pass path when the throttle is closed and vacuum pulls the diaphragm back.



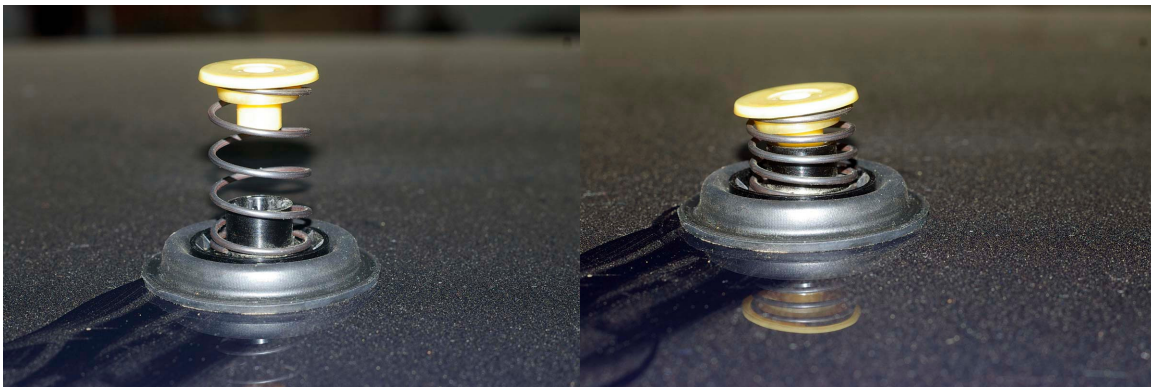
CBV new and old diaphragms. There's a plastic end cap piece with a center catch that holds the spring compressed and the end cap is inserted into the recess of the CBV cover. My new diaphragm and spring acted like a jack-in-the-box and "went off" without notice after compressing it so there was some added fun during the re-install process. Turning the end cap to just the right position seemed to help keep the spring compressed.



New CBV upgrade kit from Viva Performance

Old

Spring compresses and is held with end cap center catch. End cap is inserted into CBV cover.



Reinstalling CBV Cover with New Diaphragm and Spring

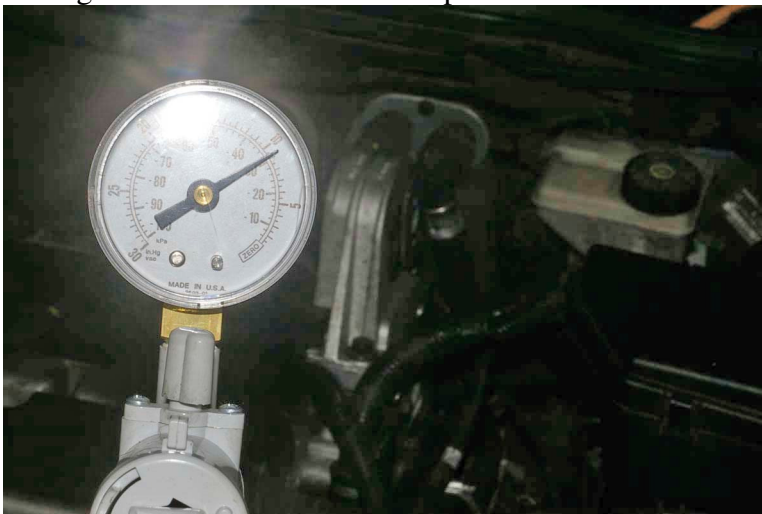
I installed and tightened one bolt just enough to hold the cover in place, otherwise the cover pivots down on one bolt and you have to hold the cover up while starting the 2nd bolt and as you can see there's not a great deal of room. Diaphragm stays in place well but I backed out all the bolts once all were installed to make sure diaphragm was positioned correctly.



Once the CBV diaphragm is installed you can check it with a hand vacuum pump (Mityvac) by removing this hose at the end of the intake manifold, this hose goes directly to CBV. This is also what you would do for an initial check of your existing CBV diaphragm. With the Mityvac hand vacuum pump you can check the diaphragm for leaks and you can also hear the spring loaded diaphragm close when the vacuum is released. I've read if the spring tension is weak it could result in reduced boost. My old spring seemed to have the same tension as the new one.



Checking for vacuum leaks after CBV diaphragm replacement. Also checked the wastegate servo with vacuum and pressure.



If you don't already have these tools they are not required but highly recommended for this job; ratcheting box end wrenches, 10mm for CBV bolts, 12mm for heatshield bolts (purchased afterwards in my case). Ratcheting box end wrenches are also available with a swivel end. Telescoping mirror was handy also.



Once again, my geeky Coleman Max LED headlamp from Wal Mart has proven to be a very useful and pinpoint light source in the dark recesses behind the engine. Highly recommended but others will likely make fun of you. Rechargeable ratchet was a gift and it is also a handy tool, especially for the bottom pan bolts.



Like I mentioned before, I don't know how often the CBV diaphragm or spring actually go bad but if you have to replace these items I hope this write up and photos are helpful.