

DIGIBOOSTER S -FK FROM TUNING-DIESELS. JULY '18 30psi

Another great product from tuning-diesels.

Please read disclaimer on page 5 before fitting.

Switch off ignition, remove key & wait a few minutes.

- Connect the map sensor to the inlet manifold via a tube or via a tee from the existing map sensor tube.
(adaptors that fit between existing map sensor and intake manifold are available on ebay for boost gauge take off)
- Mount the map sensor above the take off point on the engine and preferably with no loops in it which can collect condensate. The thread on the sensor is 1/8" NPT **BUT DO NOT MOUNT THE SENSOR DIRECTLY ON THE ENGINE, use a tube to prevent heat soak and vibration damaging the sensor.**
- Plug the map sensor cable into the sensor.
- The sensor is rated to 30psi of boost so please ensure you do not exceed this.
- Connect the red and black/brown wires via the inline fuse of 3amp rating & an ignition controlled relay to the battery. RED IS +VE POSITIVE AND BLACK/BROWN ARE -VE NEGATIVE. **DO NOT POWER UP THE UNIT UNLESS ALL CONNECTIONS HAVE BEEN MADE, INC THE PRESSURE SENSOR.**
- Connect the 2pin female plug to the boost control solenoid valve.
- For Throttle position sensor (tps) use see page 4.
- Connect the vac input of the bcv to the brake line using the hose and tee supplied.
- Finally connect a hose from the bcv output port to the turbo actuator. (the ports have arrows near them to indicate the flow direction, smaller one is vac supply)
- Attach the module with the velcro supplied to a dry surface away from hot or moving parts. Use the cable ties to route the cable away from similar areas and also to secure the silicon hose to the tee and bcv.

ADJUSTMENTS. *(The switch does not choose a specific boost pressure - you must monitor this with a boost gauge and choose a suitable setting)*

TO ACCESS THE CONTROLS, CAREFULLY SLIDE THE END PANEL OFF. (depress the left hand end slightly to release the catch whilst sliding the cover to the right)

TIP: TAKE A PHOTO OF THE SETTINGS BEFORE MAKING ANY ADJUSTMENTS SO YOU CAN START AGAIN IF YOU LOSE TRACK OF THEM.

There are 16 settings 0-F, arranged in 4 groups of 4, coloured dark blue, black, mid blue, & red, selected by the permutations of the last 4 slide switches - numbered 5,6,7,8 in the block of 8. Use a screwdriver to gently slide the white tabs to the marked 'on' setting or back to off as required.

Now, referring to the table below, the dark blue band has least boost at low rpm, and the red band, the most. The max boost settings are the same for each band - low, med, high, very high. We suggest starting on setting 4 (off, off, on, off) so you can then adjust it either way depending on what result you want. (don't forget to restart after altering the switches)

The DGB starts off at just above idle rpm with the vanes moved to the low rpm setting - ie vacuum applied for maximum low rpm boost, and then changes the vane angle to regulate the boost as the rpm rises and the pressure approaches the value determined by the fine adjuster and the settings 0 to F. The actual starting angle (low rpm boost) depends **on the band chosen** and the final angle (for max boost at higher rpm) on depends on the setting chosen **within that band.**

The pressure reached will depend on many factors as well as the setting, but the maximum will be what you have

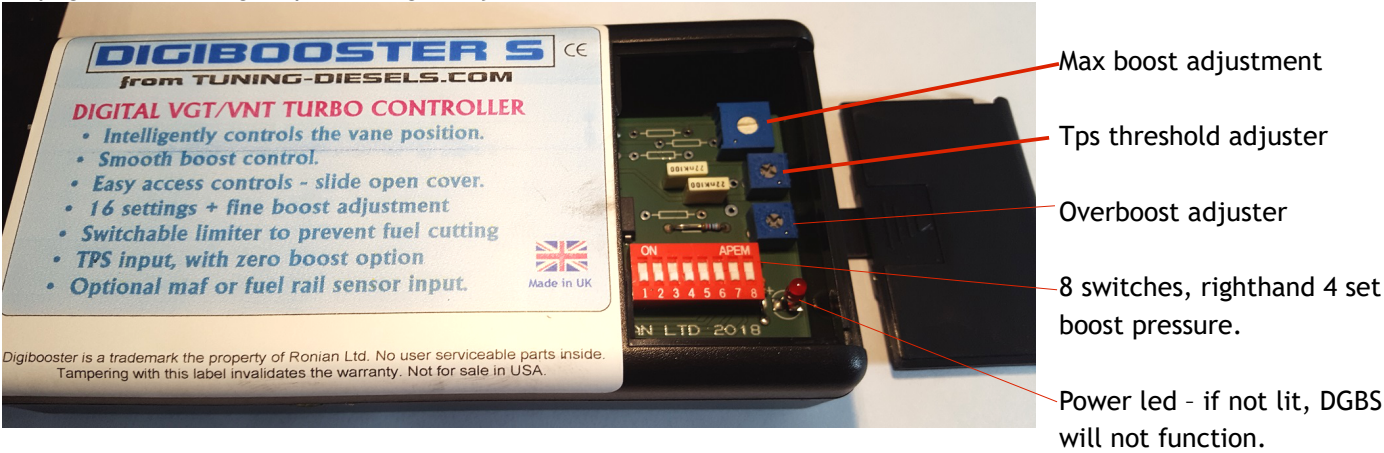
asked for, or around 19-22psi if you haven't specified. If the max boost is too high or too low on all settings, try adjusting the linkage - see notes below.

Fine max boost adjustment can be made by turning the upper right preset. Turn **slightly right (clockwise)** to increase the **maximum** boost For more low down boost, use a different band using switches 5,6,7,8

It is set mid way for about 1.5bar / 22psi boost when we ship, turn only a few degrees to the right to increase the MAX BOOST or to the left to reduce it. (Use the switches 5-6-7-8 to adjust the low rpm boost.)

Since the switches do not choose a specific boost pressure, you will need to take your own measurements as the results will vary depending on make & spec of turbo and state of tune of the engine.

See page 4 for TPS signal processing & adjustment.



**NB YOU NEED TO SWITCH OFF AND THEN RESTART THE ENGINE AFTER CHANGING SETTING
OR IT WILL NOT BE RECOGNISED. (WAIT UNTIL THE LED IS OFF)**

SWITH SETTING	START BOOST (low rpm vane pos)	MAX BOOST (high rpm vane pos)
Switches 5,6,7,8	VAC PSI	VAC PSI
0, off, off, off, off	LOW	LOW
1, off, off, off, on	LOW	MED
2, off, off, on, off	LOW	HIGH
3, off, off, on, on	LOW	V HIGH
4, off, on off, off	MED	LOW
5, off, on, off, on	MED	MED
6, off, on, on, off	MED	HIGH
7, off, on, on, on	MED	V HIGH
8, on, off, off, off	HIGH	LOW
9, on, off, off, on	HIGH	MED
A, on, off, on, off	HIGH	HIGH
B, on, off, on, on	HIGH	V HIGH

C, on, on, off, off	V HIGH	LOW
D, on on, off, on	V HIGH	MED
E, on, on, on, off	V HIGH	HIGH
F, on, on, on, on	V HIGH	V HIGH

Throttle Position Sensor Connection.

We recommend connecting this unless your boost requirement is modest (about 1-1.5bar)

The red crimp is for the tps signal input. < 1.3v pedal up, to > 3.6v pedal fully down. Threshold can be raised with the middle preset.

Switch 4 enables the tps processing when moved to the ON position. So leave in the OFF position when no tps is connected.

The middle preset adjuster allows the pedal threshold to be set. Above the threshold, there is an 5 stage vane position change to give more boost in relation to pedal position. Range is 1 to 4v

**** NEW ****. From May'18, it is now possible to adjust the amount of extra boost (OVERBOOST) on full throttle (> ¾ pedal travel) using the preset adjuster closest to the led.

NB: MUST BE MONITORED WITH A BOOST GAUGE TO ENSURE THE BOOST IS NOT EXCESSIVE. Turn clockwise to increase the amount of extra boost. The max boost will now be increased over that set by switches 5,6,7,8 so you may need to change these to a lower setting.

Switch 3 enables the zero load back pressure reduction. This greatly reduces the vacuum when you lift fully off the accelerator.

Switches 1 and 2 not used.

IMPORTANT: The boost control solenoid is a critical component and we strongly recommend you avoid the cheap clone or counterfeit ones sold on Ebay and elsewhere as they either leak vacuum to the actuator, or vent it or fail after a short time. (we bought five marked like the genuine VW N75 part, 4 were faulty, and the 5th failed after a short time)

NOTES TO HELP YOU FIND THE BEST DGBS SETTING.

Because there are many variables when a non standard turbo is fitted we cannot guarantee instant 100% perfect results since we have no way of testing it without access to your vehicle, but we are always willing to customise the firmware if non of the settings nor adjustment of the actuator rod prove suitable, although we have never been asked to do this as the results have been excellent, with over 120, happy customers.

On older turbos, eg Borg Warner, there are mechanical stop screws on the turbo which limit the movement of the vanes at either end of their travel for setting the low rpm boost and limit the max boost at higher rpm, so you can liken the settings as the equivalent of adjusting these.

Without the control at low rpm as well as high, if the vanes are too far closed this can produce a flat spot & hesitation due to increased exhaust back pressure.

The 4 coloured bands adjust the low rpm boost (appox 12-1800rpm) and the 4 settings within each band adjust the max boost which usually peaks at around 2-2500rpm on most diesels.

You should aim for a setting which allows a sensible maximum boost pressure (eg around 22psi / 1.5bar) at about 2-2500rpm (or whatever rpm it peaks at in 4th gear under load). Typically you would expect to see around 10psi at about 12-1500rpm, rising rapidly above this. On part throttle at a steady 70mph on a level road, 8-12psi is common.

The boost may tend to drop off as revs increase and this is not unusual, especially over 3500rpm* as the torque starts to tail off quite steeply on most diesels, however it does depend on fuel availability, the size and spec of turbo & the make of engine.

ACTUATOR ROD SETTING

If fitting a turbo off another engine, the actuator rod will have been factory set for that engine. This means you may have to adjust the linkage either way.

So if you find the boost is too high on all the switch settings, you can try adjusting the nut to lengthen the rod. The converse also applies if the max boost is low even on max setting, however the adjustment should be small and assumes there is still some free movement of the vnt lever - ie its not already against the end stop.

Too much initial vane movement (rod too short) can cause excessive exhaust back pressure resulting in a flat spot and lag at very low rpm as well as too much boost.

FIRST STEPS:

- 1) Always start on setting 0.
- 2) Monitor the boost carefully. If the boost builds smoothly and quickly to maximum around 1500-2000rpm but you'd like it to be a bit higher at higher rpm, turn the fine boost control anticlockwise.
- 3) If this does not give the required boost, reset the fine adjuster and then switch to setting 1, then 2 then 3. Use the fine adjuster each time to vary the high rpm boost.

BOOST SLOW TO BUILD:

- 4) If the boost is slow to build but the maximum boost is okay, choose the first setting in the next band - ie setting 4 and again try the fine boost adjuster to get more high rpm boost.
- 5) If this does still not give enough max boost, increase the setting by 1, 2 or 3 positions (ie until you have tried all the settings in the band) Reset the fine adjuster fully clockwise each time.
- 6) Don't forget to try the fine adjuster after each change - but no more than ½ turn.
- 7) Repeat steps 3 to 5 after switching to the lowest setting in the next band (8 - 11) and so on until you reach the last band - i.e settings 12 -15

TOO RAPID A BOOST BUILD UP AND TOO MUCH BOOST:

- 8) If the boost builds up too quickly and too high even on setting 0, you need to adjust the actuator rod to lengthen it.
- 9) Otherwise repeat steps 2 to 7.
- 10) You can also try switching to the 3bar map sensor setting by turning on switch no. 1. This will reduce the vane movement across the range.

IMPOSSIBLE TO GET ENOUGH BOOST AT LOW RPM EVEN ON MAX SETTING.

Try shortening the actuator linkage a small amount at a time but bear in mind the turbo may be unsuitable for your engine. You cannot rely on the vnt mechanism to make an oversized turbo work well at low rpm.

You can tell if this is the case by disconnecting the linkage, manually turning the vane lever to an almost closed position and seeing what boost you get. If you cannot get good boost at any setting* of the vane lever, the turbo is too large or spec is wrong. (or inadequate fuelling)

**don't assume fully closed vanes means max boost - excessively closed vanes can cause too much backpressure which has a negative effect on the boost & causes a flat spot, so try various positions and make a note of the position that gives the best result.*

FUELLING.

You will need to take steps to increase the fuelling as this ultimately generates the exhaust energy required to drive the turbo.

PART THROTTLE BOOST CONCERNS.

Do not worry about the boost on part throttle unless the engine is misfiring. If you think about it, with a wastegate turbo, there is no control of part throttle boost so it is what it is, and depends entirely on engine load. EG on my

Rover 45 which had a none ecu controlled wastegate turbo, the part throttle boost would often reach or exceed 10psi / .7bar at a steady 70mph on a level road and increase further on inclines and of course decrease on down hills as the engine load varied.

Unlike on a gasoline engine, a diesel can run on a great excess of air without any damage. Indeed, excess air will have a cooling effect and reduce the exhaust gas temperature. This also has a self regulating effect on the boost pressure because the turbo speed will drop due to the cooler exhaust.

However Nitrogen Oxides will increase and as part of the emissions control strategies, manufacturers needed a more accurate control over the boost pressure and this is why there was a switch to electronically controlled vnt actuators. They offer no advantages when swapping a wastegate turbo for a vnt type.

If you do encounter excessive boost which is actually causing symptoms (misfirng), then connect a tps, turn on switch 4 and choose a lower main setting - ie. One that does not cause excessive part throttle boost. The boost will still increase as you open the throttle more and you can now adjust the extra full throttle boost with the preset nearest the led.

BOOST V RPM.

We sometimes are asked for specific boost pressures at specific rpms. Even with an rpm input, this is not possible because the Digibooster cannot control the fuelling or engine load, and it is this above all else that determines the turbo rpm and hence boost pressure. Load sensing is the best option and this can be achieved by using the tps connection.

TURBO SIZE V ENGINE CC

We often get the impression that some owners believe a *much* larger turbo can be fitted and the vnt mechanism will still allow good low down torque. This only true upto a point so a bad choice of turbo can lead to a disappointing result at low rpm.

The best results are achieved when a turbo from a similar sized but higher power engine is used, when the vnt mechanism works as intended to provide good rpm torque whilst still giving the higher bhp (assuming the fuelling is also increased).

Over adjusting the vane angle to try and increase low rpm boost just increases exhaust back pressure so is counterproductive.

DESIGN LIMITATIONS. *As there is no way for us to know how your engine's boost pressure is related to the turbo's vane position, the DGBS can only alter the vacuum. Since this is itself another possible variable, it is impossible for us to predict just how far the vanes will move for any particular setting.*

Also, the results will depend on the spec of turbo & actuator used and hence it can take some time for you to find a suitable setting.

DISCLAIMER AND ADDENDUM TO OUR TERMS OF BUSINESS (full version available on our website, tuning-diesels.co.uk)

THE DIGIBOOSTER IS AN EXPERIMENTAL DEVICE SOLD AS IS AND IS MANUFACTURED TO ORDER FOR YOU USING THE DATA & PARAMETERS SUPPLIED BY YOU AT THE TIME OF ORDERING.

Since we have no control over the modifications, what they involve and how implemented, we neither guarantee the results nor are liable for any consequences whatsoever when you use this product on any modified vehicle or engine.

By definition, the engine is modified if it is no longer as it left the vehicle manufacturer's factory and any modifications may yield unpredictable or unexpected results.

It is your responsibility to ensure modifications are safe and thorough testing is conducted in an appropriate location eg a test track.

There is no money back guarantee available as the product is made to order, but we will modify the hardware or firmware in an attempt to have it perform to your expectations, free of charge if the product is returned to us at your expense.

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