



Note 1: Since writing this guide we have found a better choice of turbo upgrade, it is slightly more work to fit but the results are well worth while. [See the link here.](#)

Note 2: When tuning a car for power you must use good quality parts.

DO NOT buy an extremely cheap turbo as it will not be built to factory specifications and the VNT will not be calibrated, this will cause boost problems/turbo failure. Buy a new original Garrett Turbo, or buy a turbo from a professional refurb shop (we use Midland Turbo). It is very important that the VNT has been set on a flow bench. If you buy a new turbo for less than £250, you can assume it is not good quality.

1.6 HDI or TDCI (up to 2010) Turbo and injector upgrade

The 1.6 90 and 110 16v engines are the same apart from the turbo charger and the injectors. The injectors both use the same body however the 110 injectors have higher flowing nozzles. This helps to reduce injection times meaning they can supply a higher rate of fuel without smoking.

The 90 BHP model uses a waste gated MHI TD025 turbo whilst the 110 BHP model comes fitted with a Garrett GT1544V turbo charger. This is a much bigger turbo and it also utilises a VNT mechanism. When remapped the GT1544V is good for a safe 145 BHP. The TD025 turbo on the other hand will struggle to get past 120 BHP. As both engines use the same manifold this turbo bolts straight on, also the intake and outlet pipes are the same so it's a very easy swap.

Before you start

This guide has been written for those with a decent level of mechanical skills. If you don't understand these instructions, then pay somebody else to do it for you as you don't want to run in to problems.

WARNING: As the VNT turbo uses a completely different control method, it is important that you don't drive the car under full throttle once fitted until the ECU has been remapped. It is however acceptable to drive with the vacuum pipe removed from the actuator, this will prevent the turbo from boosting, if you do so don't give the engine full load, this is just until you can get the remap sorted out. If you drive with the vacuum pipe connected to the turbo actuator without a remap it will over speed the turbo and cause turbo failure.



Parts required:

1. **GT1544V Turbo** from the 1.6 110 model.

Important: Cheap after market turbos do not do the job properly as the VNT mechanism must be set up very precisely on a flow bench. Don't waste your money on a sub £250 rebuilt turbo, and also don't try to change the cartridge yourself as you'll run in to lots of problems. Either buy a good low mileage unit, or a brand new turbo from Garrett Honeywell.

2. **Turbo oil feed pipe** from the 110 model. Buy a new one and make sure you buy it with the banjo bolts and copper washers. The newer pipe is a different thickness and it will leak (a lot of oil) if you use your old banjo bolts, unless you already have the updated banjo bolt. Part number **037946**

3. **Turbo to manifold gasket.**

4. If you have injectors with the code **0445 110 239** the you must upgrade the injectors to those from a 1.6 110 engine. Don't buy refurbished injectors as these are never set up properly, instead get a nice set of low mileage injectors. Part number is **0445 110 259**.

If you have one of the later 1.6 90 BHP models fitted with the **0445 110 311** injectors there is no need to upgrade as they flow enough for 145 BHP. If you do want to upgrade anyway you must use **0445 110 297** instead (this is not required).

5. **Injector sealing washers.** Part number same as existing parts.

6. Either buy or make a **de-cat pipe**.

[Fiesta Down pipe](#)

[1.6 HDI Downpipe](#)

Specialist Tools required:

1. Exhaust clamp opener.
2. Injector reseating tool.
3. Small impact wrench to speed things up.

Other tools required:

1. Small 1/4 drive ratchet and extensions.
2. 7, 8 10, 11 mm 1/4 drive sockets.
3. 8, 10, 11, 13, 16 mm ratchet spanners.
4. Various TorX bits.
5. Various Hex bits.

Removal of TD025 and fitment of GT1544V

1. First remove the intake pipes and the engine cover.
2. Remove the 8mm (Ford (F)) or 10mm (Peugeot/Citroen (P/C)) bolt from the turbo outlet pipe and rotate it upwards to pull out.



Remove engine cover and pipes.



Remove heat shields.

3. Remove 8mm (F) or 10mm (P/C) bolts from turbo heat shield. Remove both parts.
4. Remove 16mm exhaust clamp with a deep reach socket. Rotate it round and remove the bolt and key. Use the exhaust clamp tool to open the clamp and remove it. Slide the exhaust out of the way.
5. Remove the oil feed banjos top and bottom. Re-insert the banjo to prevent dirt from entering the turbo.
6. Remove the 4 11mm nuts on the exhaust manifold.



Remove exhaust, oil feed pipe, 11mm manifold nuts.

7. Slide turbo towards you and rotate until you can access the 7mm jubilee clamp on the oil drain.

8. Fit new GT1544V turbo use a new gasket. Reverse above steps to fit new turbo.



New oil feed pipe.



GT1544V fitted.

9. Do not remove the mesh filter from the lower banjo bolt this acts as protection to the turbo and also an oil pressure restrictor. Use new copper washers to seal the oil pipe.

Injector upgrade

For vehicles fitted with 0445110311 there is no need to upgrade, but you may fit 0445110297 if you have them as these flow more fuel, but it is not essential for the 145 BHP remap.

For vehicles fitted with 0445110239 you must upgrade to 0445110259. 0445110188 have the same calibration as the 259, however they are older and presumably superseded by 259 for a reason, so we advise to use 259.

1. Remove engine cover and intake pipes.
2. Remove injector wiring loom bolts, disconnect plugs from injectors. Fold wiring loom backwards to give you space to work.



Disconnect wiring loom.



Remove leak off pipes. Loosen 14mm on pipes.

3. Remove the clips from the leak off pipes and then gently twist the pipes upwards and out. Keep them all in one chain.
4. Loosen the 14mm fuel pipes. Also remove the wedge-clip holding the pipes in place. This will allow you to move the pipes enough without needing to disconnect the other end.
5. Remove two hex bolts from the injector clamp. Wiggle and slide the injector until it pops out. Make sure you don't lever against the plastic manifold cover as it's easily damaged.



Remove 2x bolts, slide injector up.



Make sure the copper washer comes out.

6. Make sure you get the washer out if it doesn't come with the injector. Tip: an M8 threaded bar is perfect to catch the copper washer with a gentle turn without any risk of damaging the head as it can't fit through.

7. Clean the injector seat. This needs to be spotless. I use an injector reseating tool but only with enough light pressure to make the seat flat and shiny (four full turns). The aim is to try not to remove any metal, a few filings are ok. Tip: Put lots of grease on the head of the tool and then it will catch all filings. Clean several times with a solvent and blow the holes out to get it absolutely spotless.



Before cleaning



Injector reseating tool

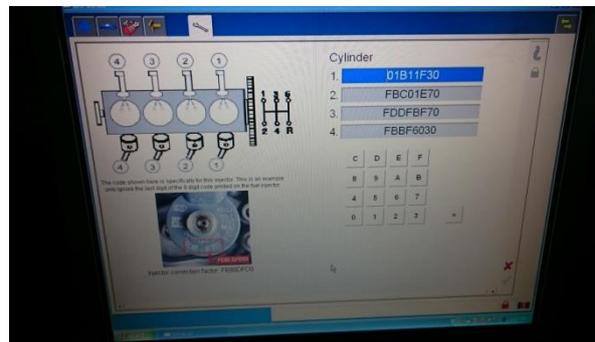
8. Write down the codes from each injector and remember which hole it went in. 1 is the gearbox end. Reverse the steps and fit the new injectors.

9. Enter the ECU configuration using Ford IDS or Peugeot Planet or Lexia. Update the injector calibration references to match your new injectors.

IMPORTANT: The injector code is only a calibration reference for the ECU. This lets the ECU know how far off tolerance the injector was when manufactured. It is very important that the new injectors are also added in to the **ECU software via a remap**, otherwise they will inject too much fuel and cause damage. Coding the injectors DOES NOT tell the ECU that they are different.



Shiny injector seat after cleaning



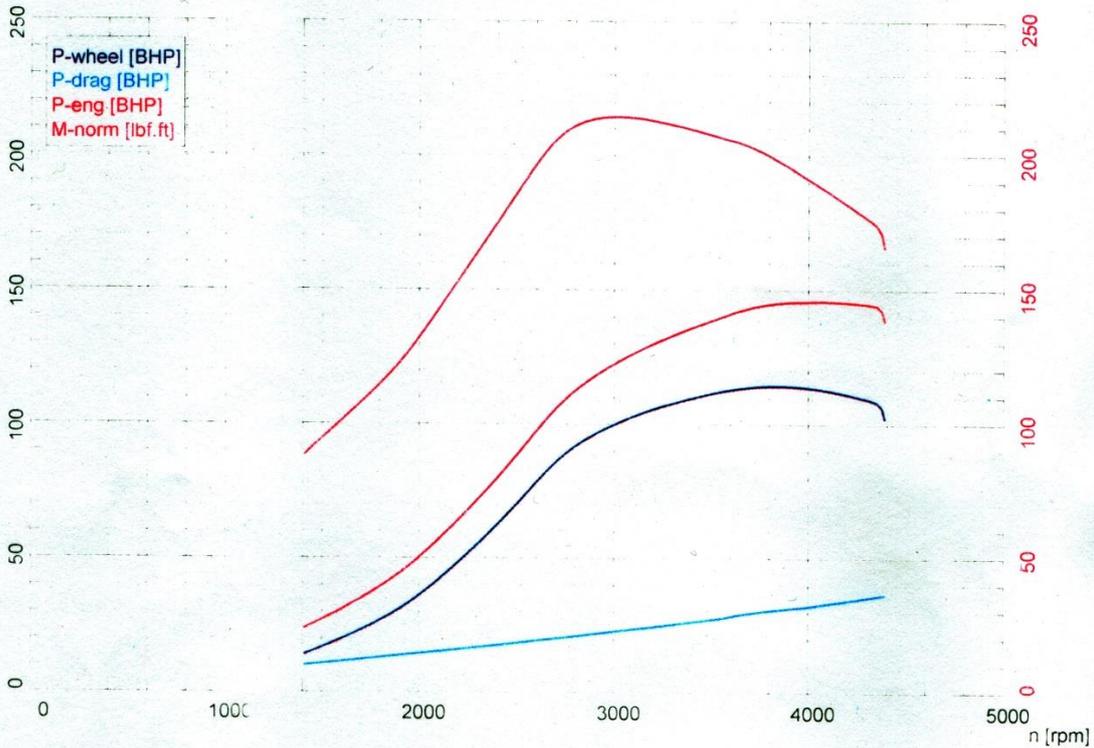
Update injector codes.

10. Prime the fuel system by squeezing the primer bulb, or by switching the ignition on and off if you have an electronic pump.

11. Start the engine to make sure all is working. Don't drive the car at anything more than idle until both the turbo and the injectors have been set up in the ECU software via a remap.



The finished product.



Power data

Corrected power 1)	P_{Norm}	----- BHP / ----- kW
Engine power	P_{Eng}	145.9 BHP / 108.8 kW
Wheel power	P_{Wheel}	113.1 BHP / 84.3 kW
Drag power	P_{Drag}	32.8 BHP / 24.4 kW
Max. power at		4065 rpm / 83.9 mph
Torque 1)	M_{Eng}	214.3 lb.ft
Max. Torque at		3030 rpm / 62.5 mph
Max. attained RPM		4390 rpm / 90.6 mph

1) No power correction
Correction factors: $Q_v = 0.00\%$

Ambient data

Ambient temperature	$T_{Ambient}$	14.7 °C
Intake air temperature	$T_{Intake\ air}$	12.5 °C
Relative humidity	H_{Air}	83.5 %
Air pressure	P_{Air}	989.2 hPa
Steam pressure	P_{Steam}	14.0 hPa
Oil temperature	T_{Oil}	13.0 °C
Fuel temperature	T_{Fuel}	----- °C

Slip

Speed no load	$V_{no\ load}$	----- mph
RPM no load	$n_{no\ load}$	----- rpm
Speed full load	$V_{full\ load}$	----- mph
RPM full load	$n_{full\ load}$	----- rpm
Slip		----- %

Rotating mass

Average delay run down 1	a_1	----- m/s ²
Average Brake force run down 1	F_1	----- lbf
Average delay run down 2	a_2	----- m/s ²
Average brake force run down 2	F_2	----- lbf
Force of the rotating mass	$F_{rot-total}$	----- lbf
Rotating total mass	$m_{rot-total}$	310.0 kg
Rotating test stand mass	$m_{rot-dyno}$	250.0 kg
Rotating vehicle mass	$m_{rot-vehicle}$	60.0 kg

Final results were 145.9 BHP and 290 Nm. Quite similar to the stage 1 remap on the 1.6 110 model.

For Fiesta Mk6 TDCI Tuning: <https://hdi-tuning.co.uk/ecu-remapping/custom-remaps/ford-tuning/fiesta-mk6-1600-TDCI/fiesta-tuning-1-6-90-TDCI.html>

For Peugeot and Citroen models: <https://hdi-tuning.co.uk/ecu-remapping/choose-brand-1.html>