Basic

Boost Adviser | Turbo Tech Basic | Turbo Tech Advanced | Turbo Tech Expert


Basic


Blow-off Valves


Wastegates


Oil & Water Plumbing


Journal Bearings
vs. Ball Bearings

Search by Product

or Search By
MODEL

GT12 GT25 GT32 GT40 GT60

HORSEPOWER

50 450 850 1250 2000

COMPRESSOR INDUCER DIA (mm)

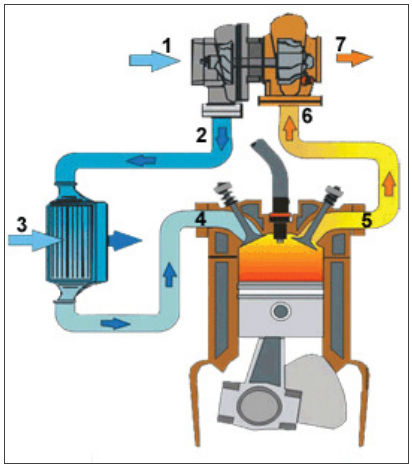
25 43 61 79 110

Advanced Search Search

How a Turbo System Works

Engine power is proportional to the amount of air and fuel that can get into the cylinders. All things being equal, larger engines flow more air and as such will produce more power. If we want our small engine to perform like a big engine, or simply make our bigger engine produce more power, our ultimate objective is to draw more air into the cylinder. By installing a Garrett turbocharger, the power and performance of an engine can be dramatically increased.

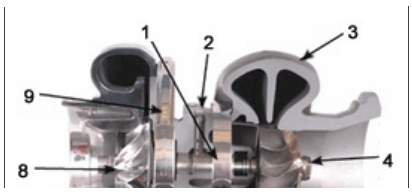
So how does a turbocharger get more air into the engine? Let us first look at the schematic below:



1 Compressor Inlet
2 Compressor Discharge
3 Charge air cooler (CAC)
4 Intake Valve
5 Exhaust Valve
6 Turbine Inlet
7 Turbine Discharge

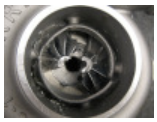
The components that make up a typical turbocharger system are:

- The air filter (not shown) through which ambient air passes before entering the compressor (1)
- The air is then compressed which raises the air's density (mass / unit volume) (2)
- Many turbocharged engines have a charge air cooler (aka intercooler) (3) that cools the compressed air to further increase its density and to increase resistance to detonation
- After passing through the intake manifold (4), the air enters the engine's cylinders, which contain a fixed volume. Since the air is at elevated density, each cylinder can draw in an increased mass flow rate of air. Higher air mass flow rate allows a higher fuel flow rate (with similar air/fuel ratio). Combusting more fuel results in more power being produced for a given size or displacement
- After the fuel is burned in the cylinder it is exhausted during the cylinder's exhaust stroke in to the exhaust manifold (5)
- The high temperature gas then continues on to the turbine (6). The turbine creates backpressure on the engine which means engine exhaust pressure is higher than atmospheric pressure
- A pressure and temperature drop occurs (expansion) across the turbine (7), which harnesses the exhaust gas' energy to provide the power necessary to drive the compressor



1 Ball Bearings (support and control the rotating group)
2 Oil Inlet
3 Turbine Housing (collects exhaust gases from the engine and directs it to the turbine wheel
4Turbine Wheel (converts exhaust energy into shaft power to drive the compressor)
5 Center Housing (supports the rotating group)
6 Oil Outlet
7 Compressor Housing (collects compressed air and directs it to the engine)
8 Compressor Wheel (pumps air into the engine)

Turbo Tech Download


Garrett White Paper 2 – Burst & Containment


Garrett White Paper 1 - Water Cooling

FAQ's

Frequently Asked Questions
Turbo | Intercooler | Other

9 Backplate (supports the compressor housing provides aero surface)

Next >>

SITE MAP