



UL520T



UL520T

A complete new engine ?

Not exactly, the UL520T is based on the well proven UL520 but now with a turbo charger / normalizer

Turbo, so a big increase in power ?

Yes and no.

The power at sea level (ISA) is 220 hp @ 2700 RPM, so that's a **+22 %** power increase over the UL520iS.

But the main goal is to maintain this power at higher altitude (up to 15.000 ft). So at 15.000 ft you have a power increase of **+190 %** compared with the UL520iS !

**+ 22% more Power at sea level
(compared with UL520iS)**

**+ 190% more Power at 15.000
ft (compared with UL520iS)**



UL520T

Can the turbo be retrofitted on existing UL520 engines ?

No, unfortunately this is not possible. It's not that simple, the turbo engine has different fuel injectors, a different manifold, different oil pump, a modified crankcase, a different ECU with other hardware and software,

What is the weight of this engine ?

The installed weight is 122 kg (269 lbs).

The UL520T has the best power-to-weight ratio in its class !

Power to weight ratio : 1.8 hp/kg (0.85hp/lb)



ULS20T

Can we add some more boost to get even more power ?

The turbo pressure is constant (up to 15.000 ft) 130 kPa (or 38.39 InHg). The engine is constructed (strength crankshaft, conrods, pistons,...) for this specific pressure. Higher pressure can lead to engine failure. Furthermore, the wastegate, ECU (fuel map, sensors,...) are optimized for this specific pressure.

The overboost controller will not allow extra pressure and will make sure that fiddling with the turbo will cause strange engine behavior

Intercooler available?

ULPower will offer 2 types of intercoolers (top mounting and side mounting).

Other models can be installed as long as the intercooler meets the requirements that are mentioned in the installation manual.



ULS20T

Type of fuel ?

Mogas with minimum RON97 (AKI93) or Avgas UL91 is recommended .
Avgas 100LL can also be used but in that case more frequent maintenance is required
(Avgas can be mixed with mogas if RON97 is not available).

What about the fuel consumption ?

The specific fuel consumption is 0.3l/h/HP (0.08USgal/h/HP).
Depending on the type of aircraft, personal style of flying,...., the average fuel consumption during cruise is 33-41 l/hour 8,7 -10,83 USgal/hour).



UL520T

What about ASTM ?

The UL520T is available as non certified version or as ASTM version. The ASTM version comes with a dual ECU, extended test procedure, and more paperwork.

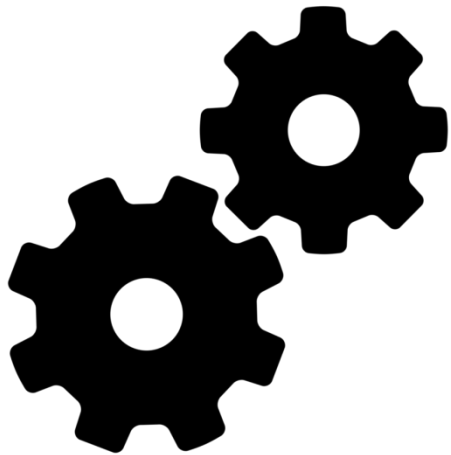
The engine is designed , tested and produced in accordance with the ASTM F2339-19 standard. This standard is merely a quality standard similar to ISO9001 but ASTM covers more technical criteria Following tests have been carried out (and passed) to meet the standard:

Calibration, vibration, detonation, accelerated overhaul (an endurance test that simulates TBO), ultimate load test, single fault tolerance , ECUOn top of all the tests, we also need a purchase , production and sales policy that ensures that every single engine that is sold, meets the same quality requirements as the one that passed the original ASTM tests.

The ASTM tests/ requirements are similar to the EASA(CS-E) standard. The main difference between ASTM and EASA is that the testruns are not supervised by an EASA official.

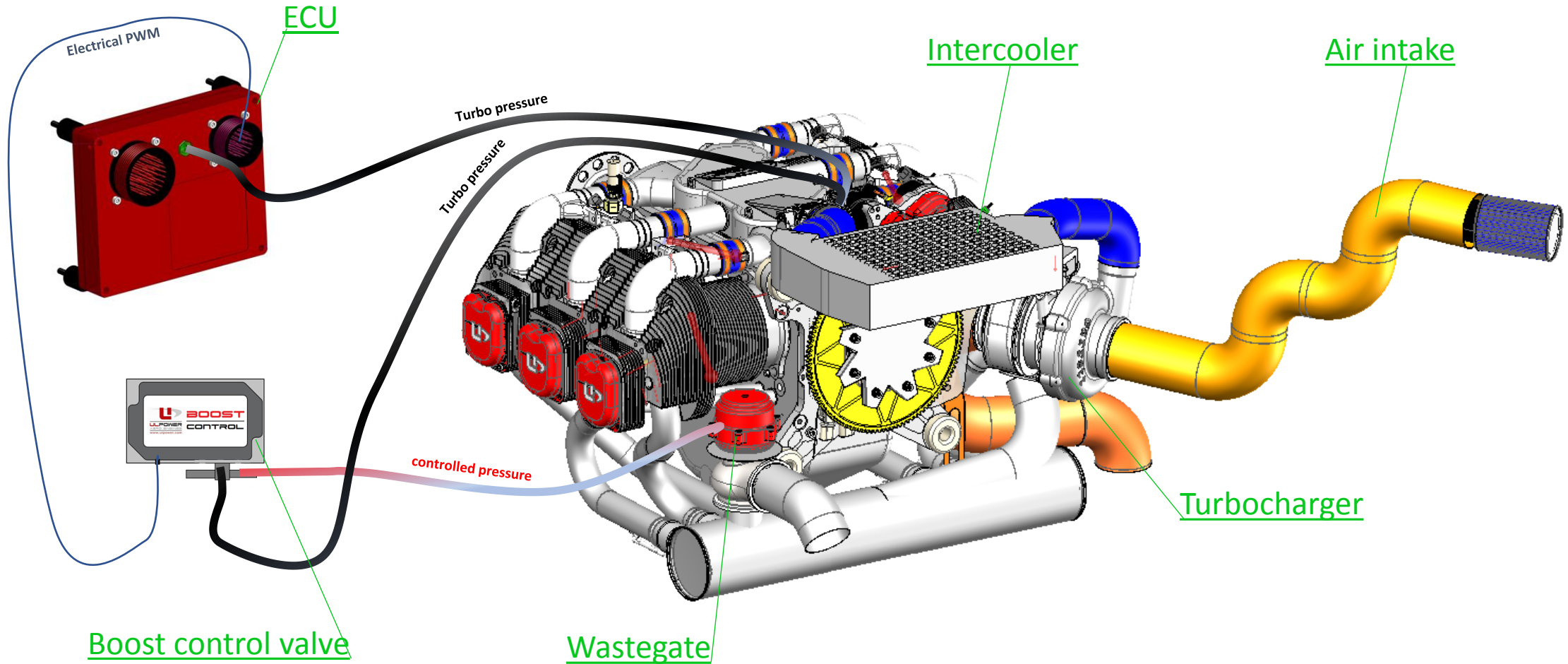


HOW DOES THE ULP TURBO SYSTEM WORK ?





EXAMPLE OF STANDARD INSTALLATION



ECU

Intercooler

Air intake

Turbocharger

Boost control valve

Wastegate

Electrical PWM

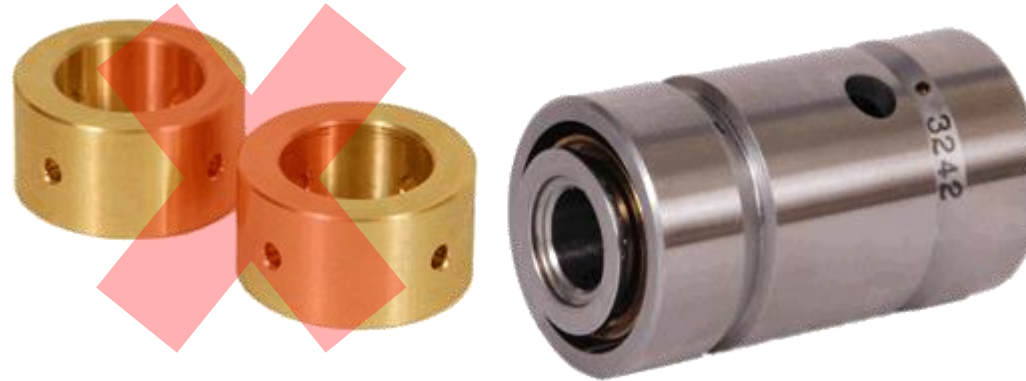
Turbo pressure

Turbo pressure

controlled pressure



BASIC PRINCIPLE TURBOCHARGER



LEFT = journal bearings , RIGHT = ball bearings

ULPower uses a turbocharger with ceramic ball bearings instead of traditional journal bearings

Advantages :

- Faster response (15% faster spooled up than journal bearings)
- Reduced oil flow to provide adequate lubrication (less possibility of turbocharger failure on engine shut down)
 - **An oil restrictor is installed**
- Better damping and control over shaft motion.
- The opposed angular contact bearing cartridge eliminates the need for the thrust bearing commonly a weak link in the turbo bearing system.

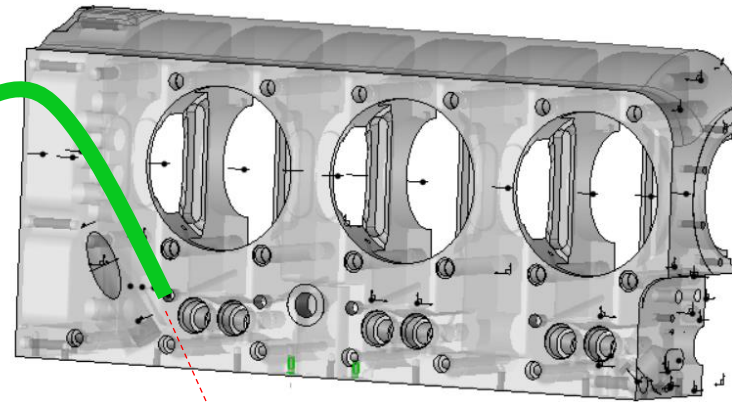


BASIC PRINCIPLE TURBOCHARGER

Turbo oil supply



Oil restrictor



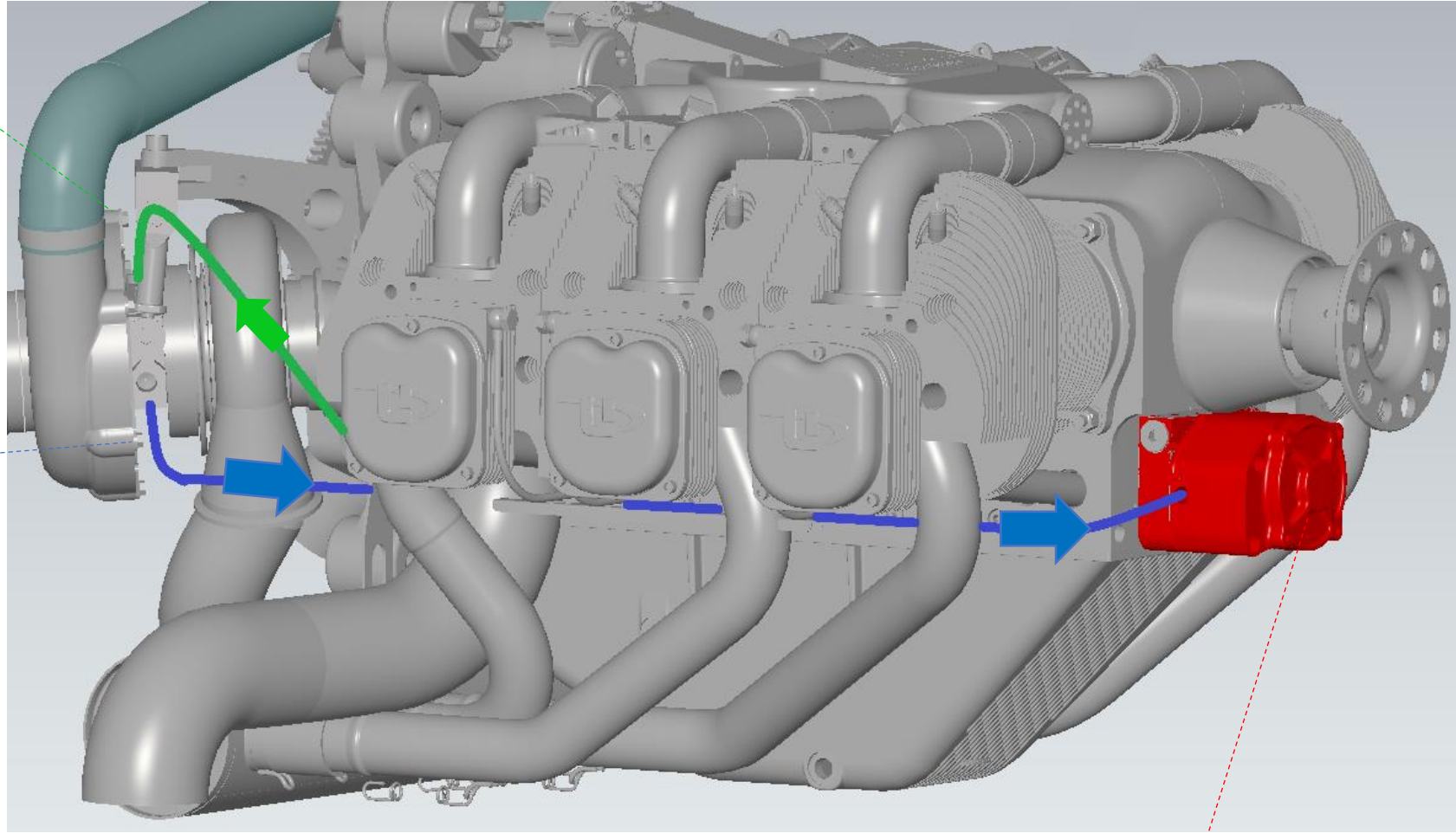
Oil supply (braided hose) from right crankcase



BASIC PRINCIPLE TURBOCHARGER

Turbo oil supply

Turbo oil return



Scavenge pump ensures that oil flows freely away from the center housing



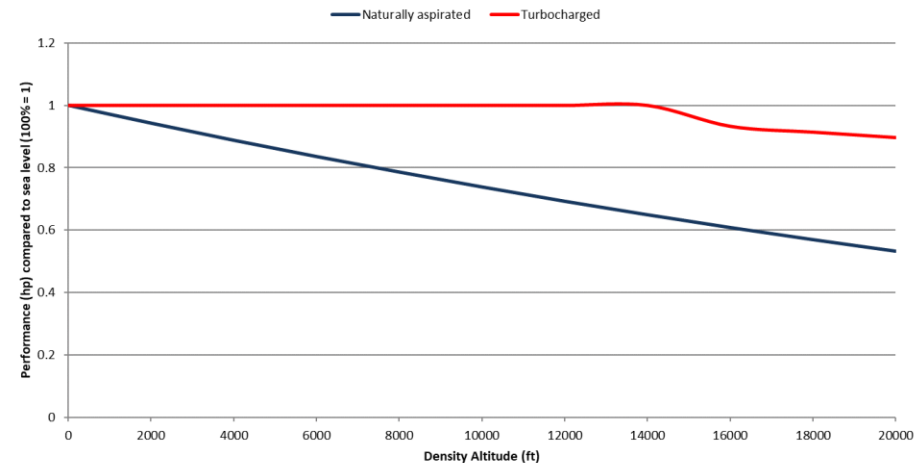
ULS20T



Advantages turbocharged engine

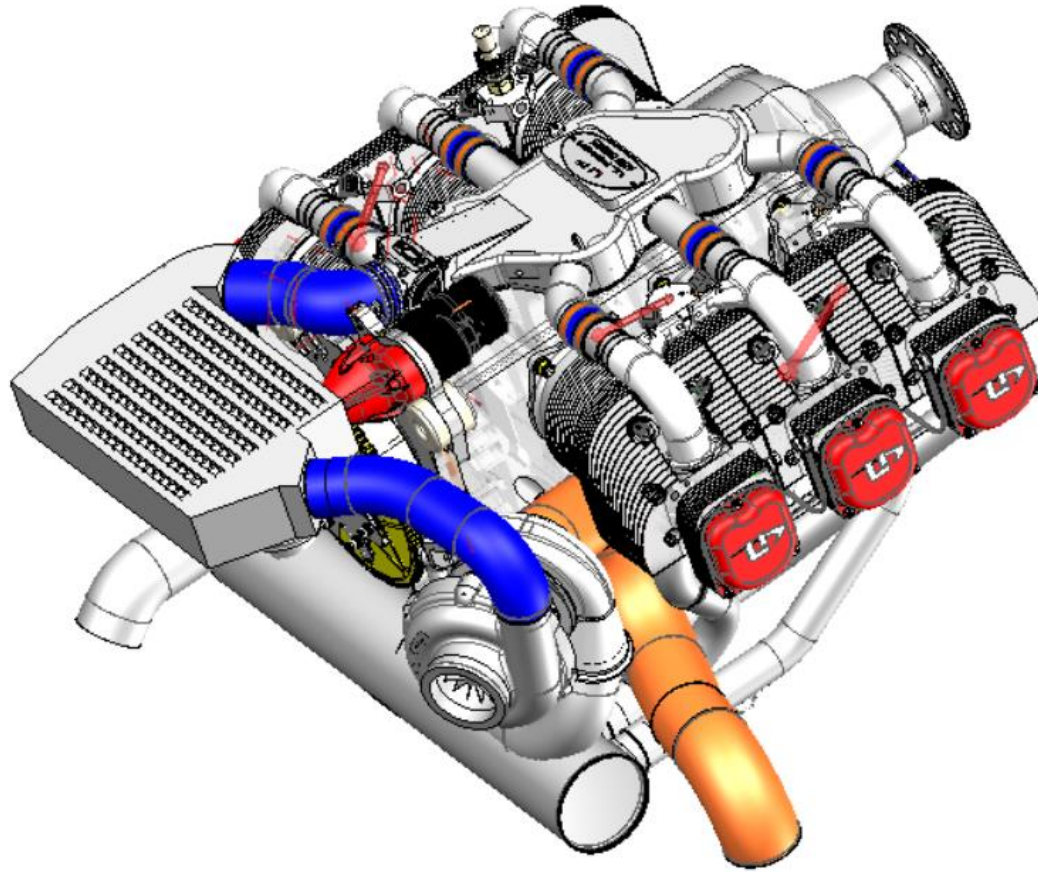
The objective of a **turbocharger** is to improve an **engine's** volumetric efficiency by increasing density of the intake usually air allowing more power per **engine** cycle. The **turbocharger's** compressor draws in ambient air and compresses it before it enters into the intake manifold at increased pressure.

An engine fitted with a turbo is much smaller and lighter compared to an engine producing the same **power** without a turbocharger + this power can be maintained at higher altitudes when using a correct regulation.





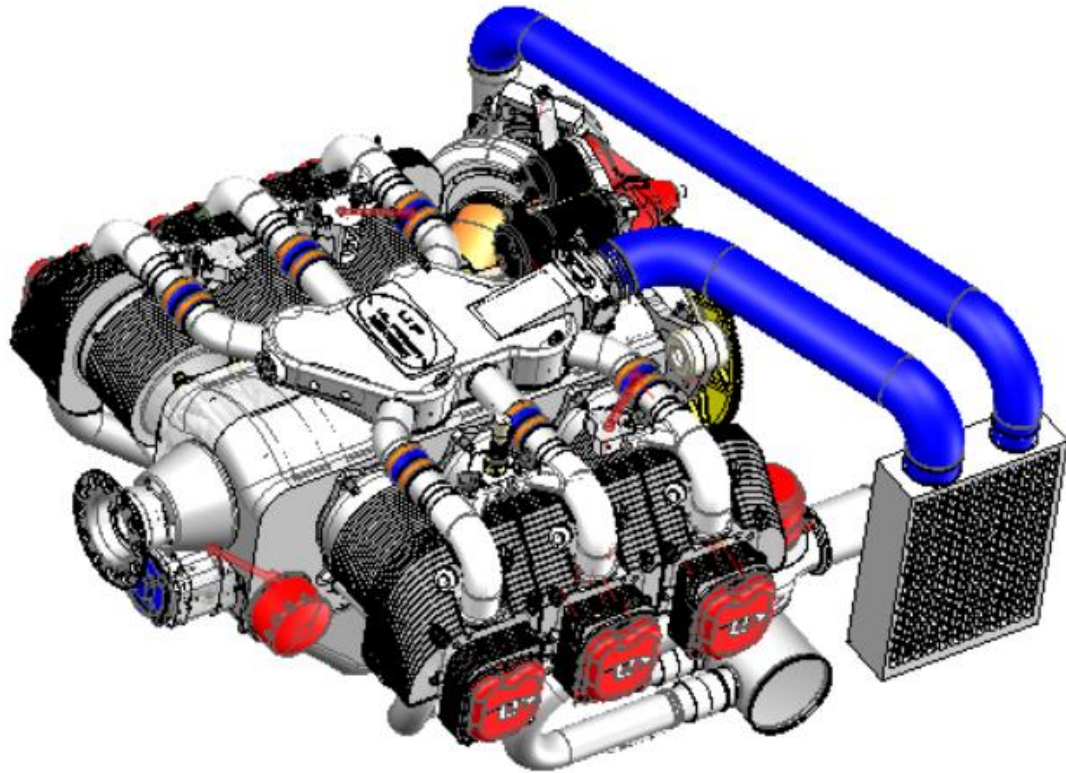
2 TYPES OF ULPOWER INTERCOOLERS



Top mounted intercooler



2 TYPES OF ULPOWER INTERCOOLERS



Side mounted intercooler



CUSTOM MADE INTERCOOLER

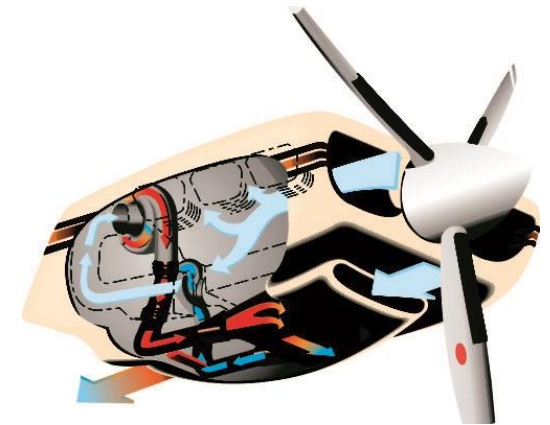
When installing a non-ULPower intercooler, be aware that :

Pressure loss over intercooler may not exceed ULPower requirements

Inlet/outlet must be minimum \varnothing 50 mm (2 inch)

Intercooler must be of sufficient size to provide enough cooling

These requirements can be found in the installation manual



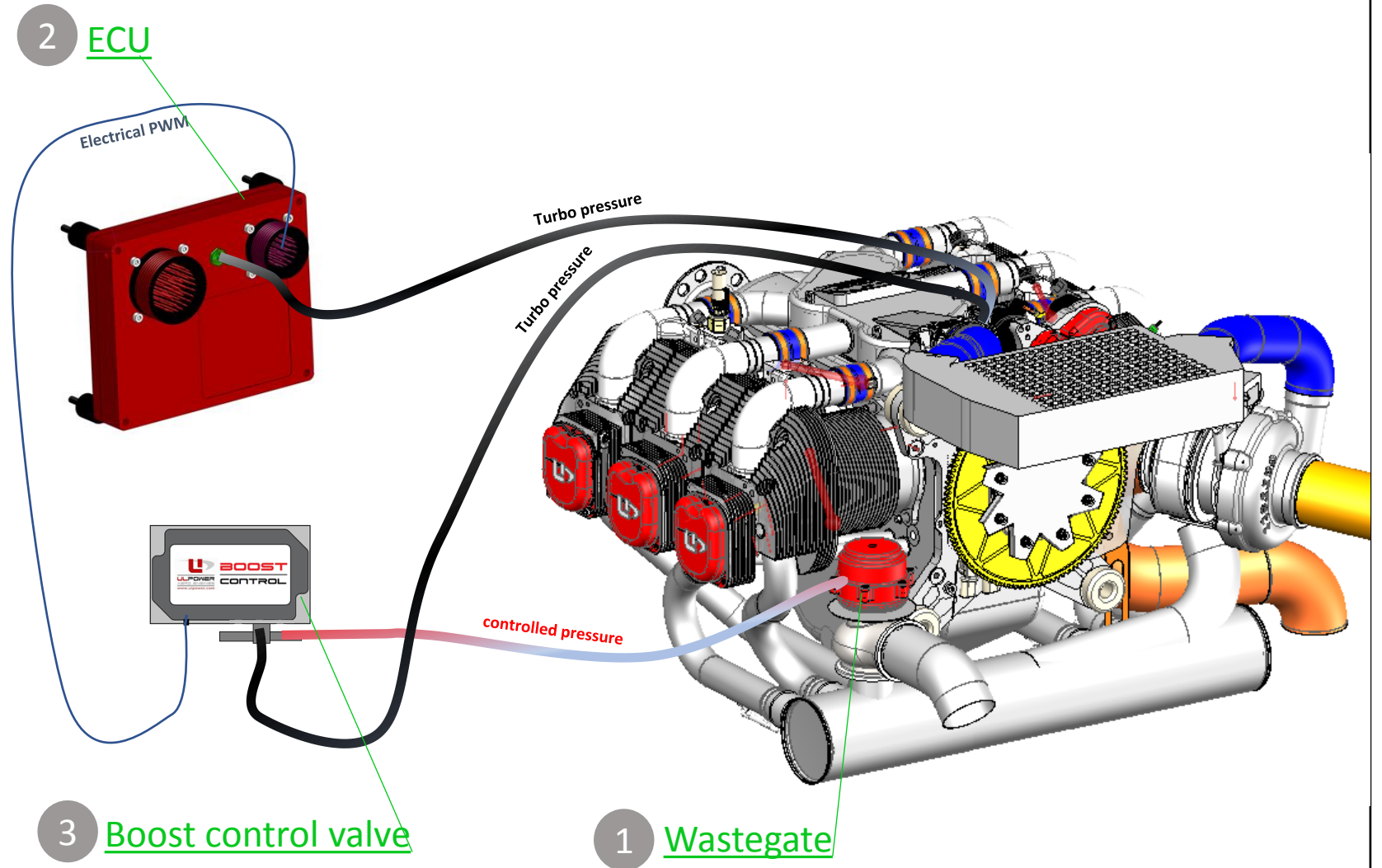


TURBO PRESSURE REGULATION

Parts :

To have a constant turbo pressure from sea level up to 15.000 ft, we need three important things :

1. Wastegate to divert exhaust gases
2. ECU that measures the turbo pressure
3. Boost control valve (controlled by ECU)



TURBO PRESSURE REGULATION

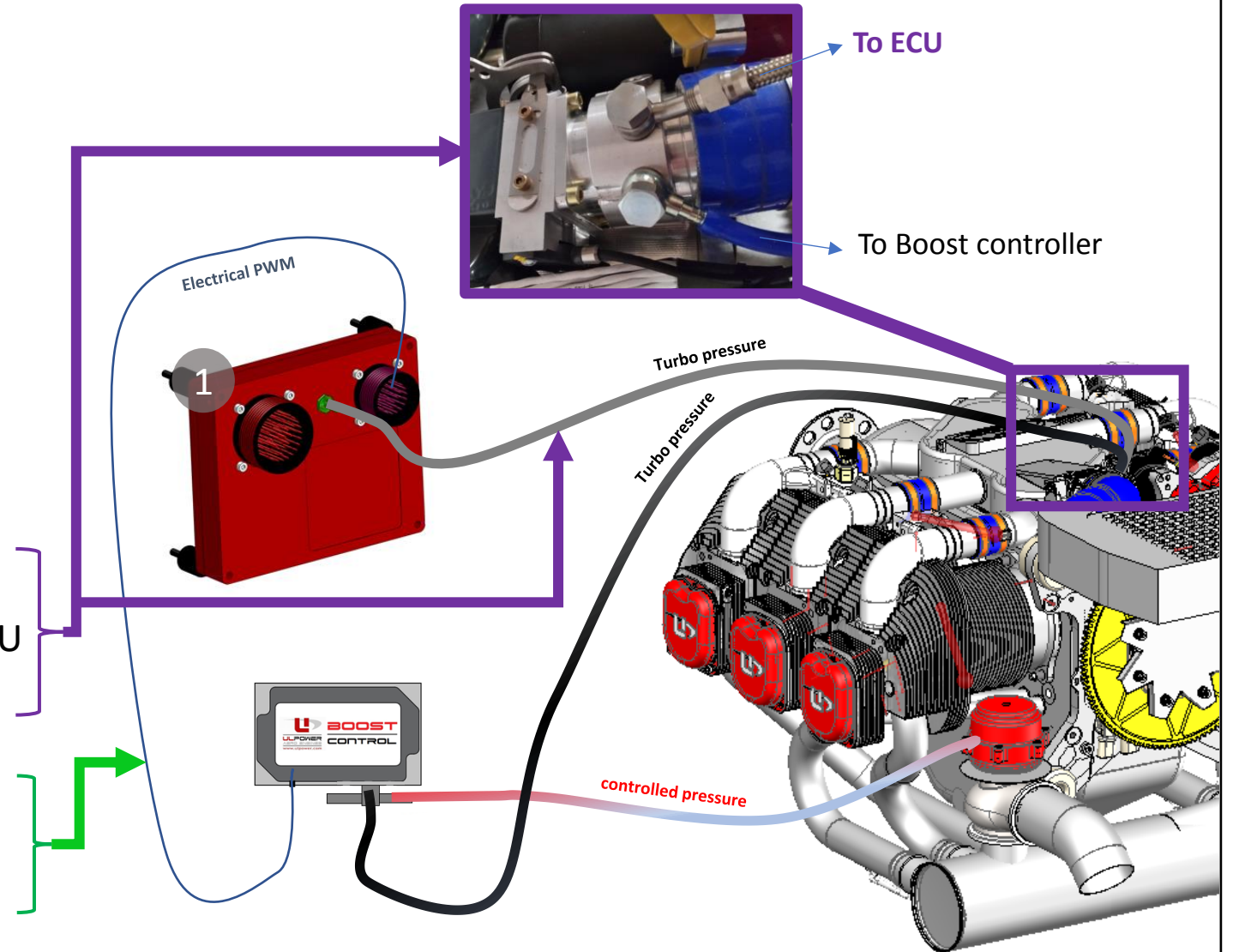
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ECU

The ECU looks familiar, but has a different pressure sensor, internal wiring, software, ... compared to the ECU of naturally aspirated engines.

The ECU measures the turbo pressure.
A braided hose is connected between the ECU (pressure sensor) and inlet (turbo pressure).

The ECU controls the boost control valve via the cockpit wiring loom





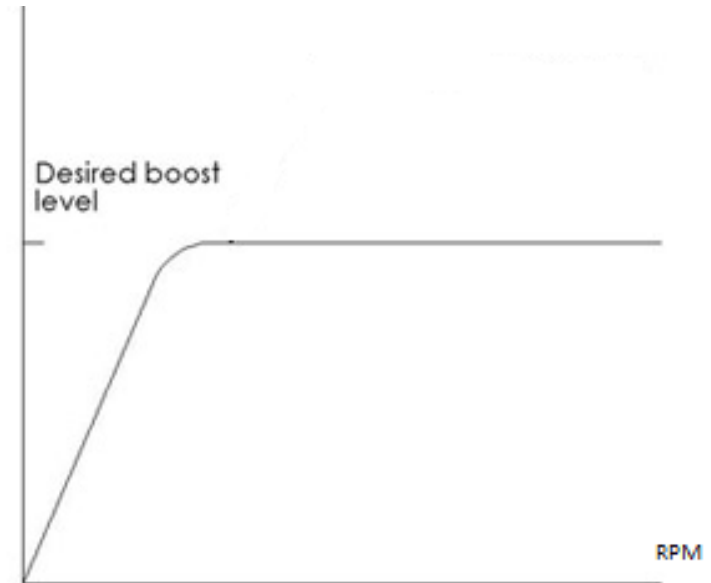
TURBO PRESSURE REGULATION

WORKING PRINCIPLE

FAST regulation

The ECU regulates the Boost control valve very quickly (so a constant switch between *turbo pressure too high* and *turbo pressure too low* like explained).

This ensures that the turbo pressure is kept constant within the normal engine operating range and at altitude.





UL520T

What has changed compared to the UL520 ? (2/2)

- Same fuel pumps as all other ULPower engines. We recommend using the ULPower fuel pump.
Always install 2 pumps !
- When using a fuel pump that is too light (< 120 liter/hour) insufficient fuel is available at full throttle (fuel pressure drops) and detonation occurs.
- If the pump is too strong (for example, a pump with a flow rate of 200 liter/hour (52.8 Us gal/hour)) the fuel pressure regulator will have trouble returning all of the fuel to the tank. The fuel pressure will rise and the engine will use more fuel than it needs to (running rich).
- Fuel system is critical (especially at WOT). It is important that the filters are kept clean. The prefilters for the UL520T are not the same as for the other engines. Use the recommended – washable – prefilters. The fine filter is the same as all other ULPower engines.
- Fuel pumps and filters are mounted on 3 separate brackets. The prefilters are easy to remove and replace.
- AUX-BOX is required (to measure the ambient air pressure). **We highly recommend to install EGT/CHT sensors.**