1982 Turbocharging Systems

AUDI 4000 DIESEL

DESCRIPTION

The Audi 4000 Turbo-Diesel uses a Garrett Air Research turbocharger, mounted directly to the exhaust manifold. A wastegate is a press fit into the housing of the turbocharger.

Other system components include, an additional safety device to prevent excessive boost, a boost pressure fuel enrichment device, and an oil cooler. Engine modifications to ensure reliability incude a piston cooling system (oil jet spray), and increased oil capacity.

OPERATION

At idle and light throttle, the Turbo engine operates like any other diesel engine. When more power is required, the usually wasted exhaust gases from the exhaust manifold enter the turbocharger's turbine housing and flow through the turbine blades.

Exhaust flow and turbine speed increase, as engine RPM increases. The impeller turns with the turbine and forces air into the compressor housing and intake manifold. The faster the impeller and turbine spin, the more pressurized air is provided for the engine.

If boost pressure went too high, engine damage would result. The wastegate opens when exhaust pressure exceeds a predetermined limit and allows exhaust gases to by-pass the compressor. A drain pipe is connected from the wastegate diaphragm housing to the impeller housing. This is to prevent a build up of oil or blowby from the crankcase ventilation system.

A boost pressure safety valve (blow-off valve) is used for protection in case the wastegate fails. The blow-off valve is connected to the intake manifold, and opens whenever boost pressure exceeds the safe limit. The excess boost pressure is vented to the intake pipe after the air cleaner. Some vehicals are equipped with a warning lamp which is connected to the blow-off valve. The warning lamp will light, whenever the blow-off valve operates.

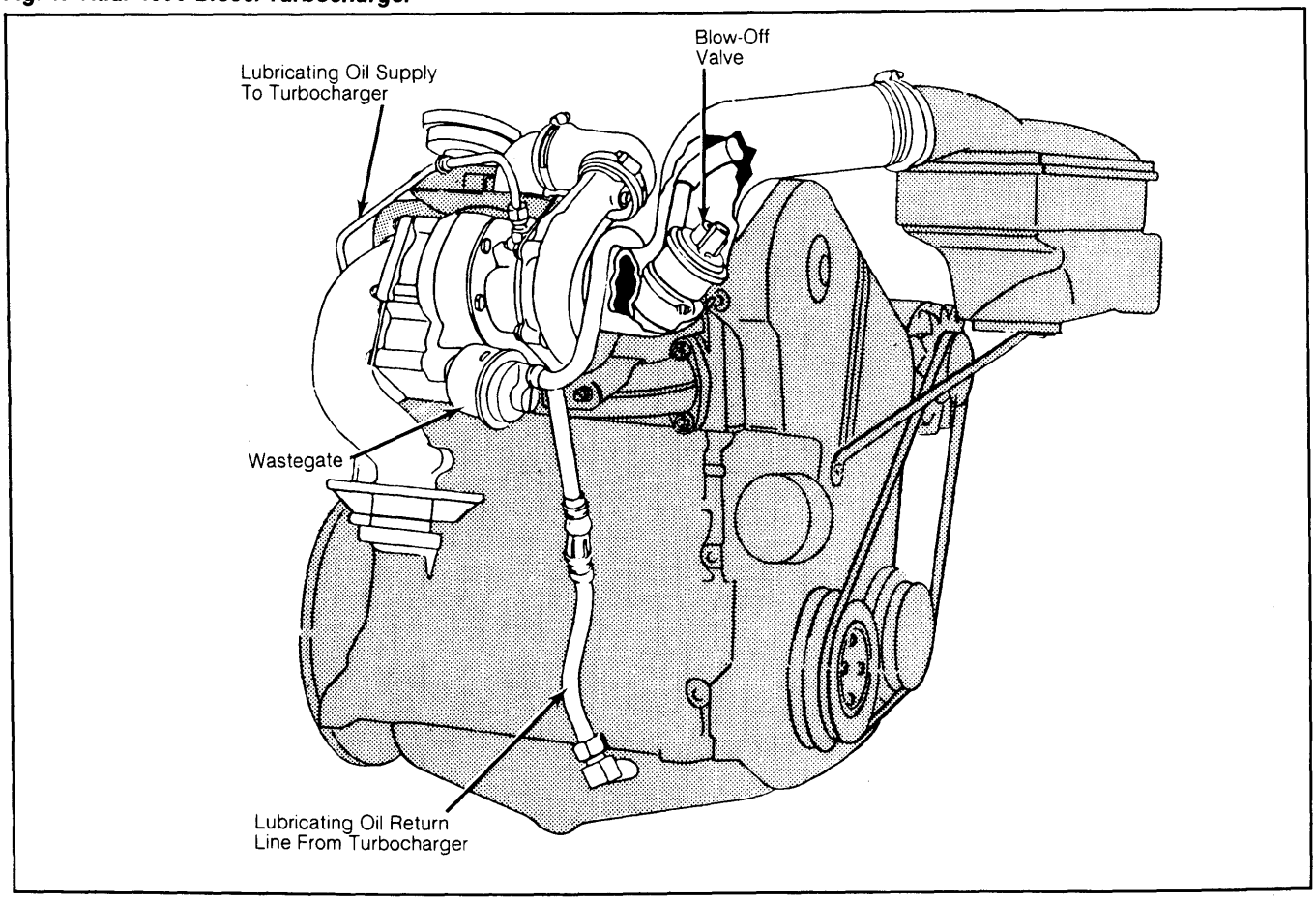
Since the turbocharger supplies more air to the engine, a boost pressure enrichment device is needed to increase the amount of fuel delivered to the engine. At part throttle when boost pressure is low, no enrichment is necessary. As boost pressure increases the engines fuel requirements also increase. The boost pressure enrichment device ensures the engines additional fuel enrichment requirement is met.

TESTING

1) To test the turbocharging system, use a pressure gauge (VW 1397) calibrated in both psi and bar. The gauge is equipped with a valve which locks pressure measurement when closed.

2) Attach gauge to the boost pressure line at fuel injection pump, using "T" fitting supplied with gauge. Use hose clamps at all connections to avoid low readings.

Fig. 1: Audi 4000 Diesel Turbocharger



AUDI 4000 DIESEL (Cont.)

3) Boost pressure can only be tested on a chassis dynamometer or through road testing. Carry the gauge inside car by routing the hose out right rear corner of hood and into passenger side vent wing window.

4) Accelerate engine to full throttle in drive position "2". Hold vehicle speed constant with foot brake, until engine speed reaches 3000-4500 RPM. Wait 2 seconds and close gauge valve by pulling sleeve away from dial.

5) Boost pressure at 3000-4500 RPM should be 9.4-10.5 psi (.67-.74 kg/cm²).

BOOST PRESSURE TOO HIGH

Possible causes of high boost pressure are as follows: Defective wastegate, and/or boost pressure control line to wastegate leaking.

BOOST PRESSURE TOO LOW

Possible causes of low boost pressure are as follows: Defective blow-off valve, wastegate or turbocharger defective, dirty air filter, and/or air leaks in turbo system.