1982 Turbocharging Systems

AUDI 5000

DESCRIPTION

The Audi 5000 Turbo uses a KKK (Kuhnle, Kopp, Kausch) turbocharger, mounted directly to the front of the exhaust manifold. A wastegate is attached to the back of the manifold. Other system components include an additional safety switch to prevent excessive boost, an oil cooler mounted behind the front spoiler, injector cooling fan, dual oil filters and an oil thermostat.

Engine modifications to ensure reliability incude a piston cooling system (oil jet spray), low compression pistons, larger piston pins, sodium filled exhaust valves, and increased oil capacity. Automatic transmission, brakes, tires and suspension have also been modified.

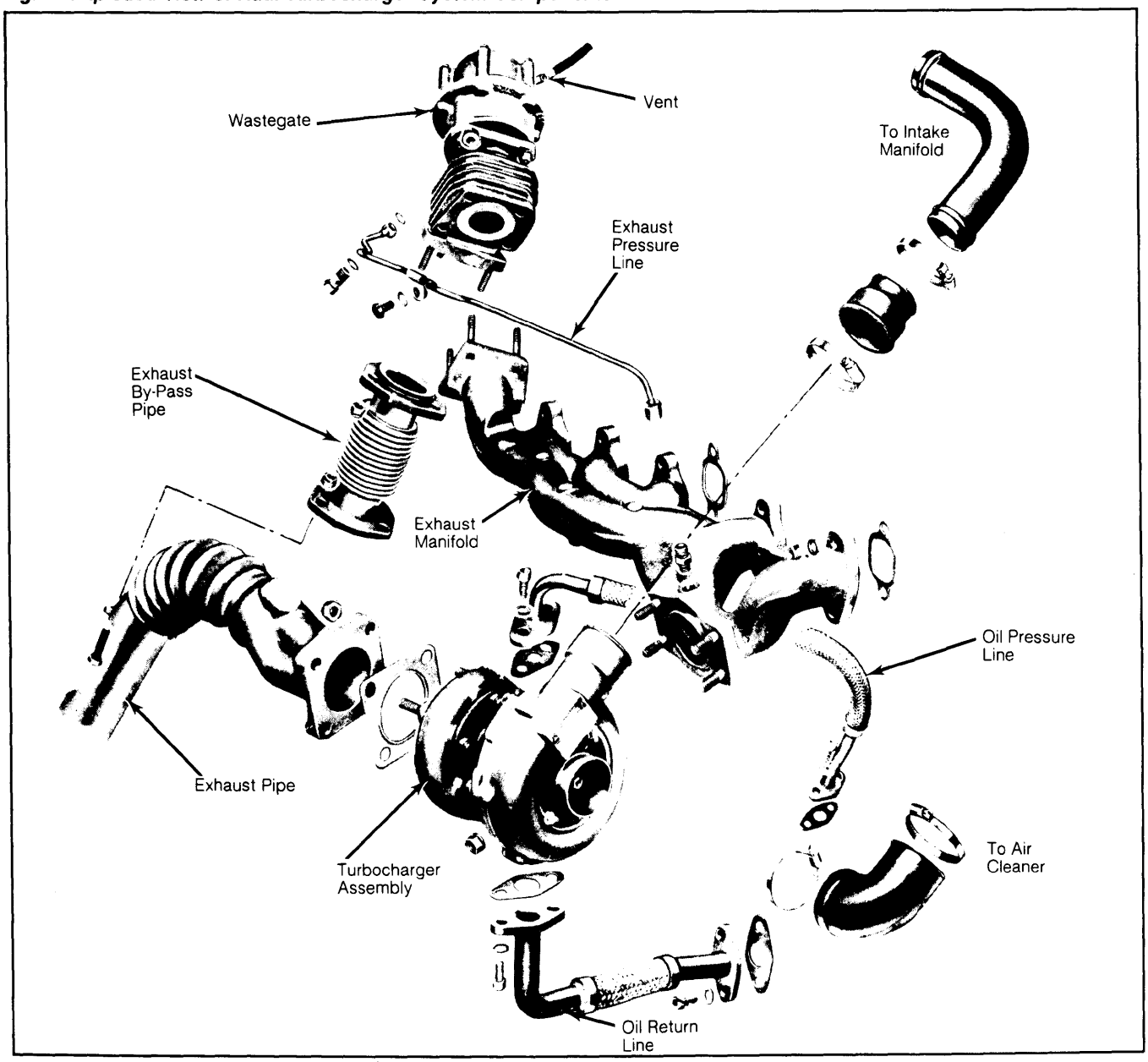
OPERATION

At idle and light throttle, the Turbo engine operates like any other 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 throttle opens and RPM increase. 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

Fig. 1: Exploded View of Audi Turbocharger System Components



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AUDI 5000 (Cont.)

exhaust gases to by-pass the compressor. A boost pressure safety switch is used for protection in case the wastegate fails. This switch is connected to the intake manifold and serves as the ground for the electric fuel pump. When pressure is higher than 11.6 psi (.82 kg/cm²), the switch opens and the fuel pump stops, slowing the engine.

An electric blower fan is used to cool the injectors and intake manifold and prevent vapor lock. A thermal switch controls fan operation and turns the fan on whenever manifold temperatures exceed 212°F (100°C).

Turbocharger operation requires a large quantity of clean oil to prevent bearing failure. Turbo models have increased oil capacity, an oil cooler, oil thermostat, and special filter. Both the turbocharger filter and the regular engine filter should be changed at regular intervals.

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 vacuum advance at distributor, using "T" fitting supplied with gauge. Be sure vacuum advance unit and charcoal canister purge valve are free of leaks. Use hose clamps at all connections to avoid low readings.

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 "1". Hold vehicle speed constant with foot brake, when engine speed reaches 5500 RPM. Wait 2 seconds and close gauge valve by pulling sleeve away from dial.

NOTE: Testing should not exceed 10 seconds at full boost.

5) Boost pressure readings will vary with atmospheric pressure, temperature and altitude, but will fall between ranges listed in Boost Pressure Specifications Table if turbocharger operation is correct.

BOOST PRESSURE SPECIFICATIONS

Ambient Temperature	psi (kg/cm²)
50°F (19°C)	7.0-7.6 (.49-.53)
68°F (20°C)	6.7-7.4 (.47-.52)
77°F (25°C)	6.6-7.3 (.46-.51)
86°F (30°C)	6.4-7.0 (.45-.49)

6) If boost pressure is too high, wastegate is defective. If boost pressure is too low, replace defective turbocharger.

NOTE: The boost pressure gauge in the instrument cluster is calibrated to read absolute pressure. When the engine is not running and gauge reads "1", this is normal atmospheric pressure. A reading of over "1" indicates boost pressure in the intake manifold; a reading less than "1" indicates presence of vacuum.