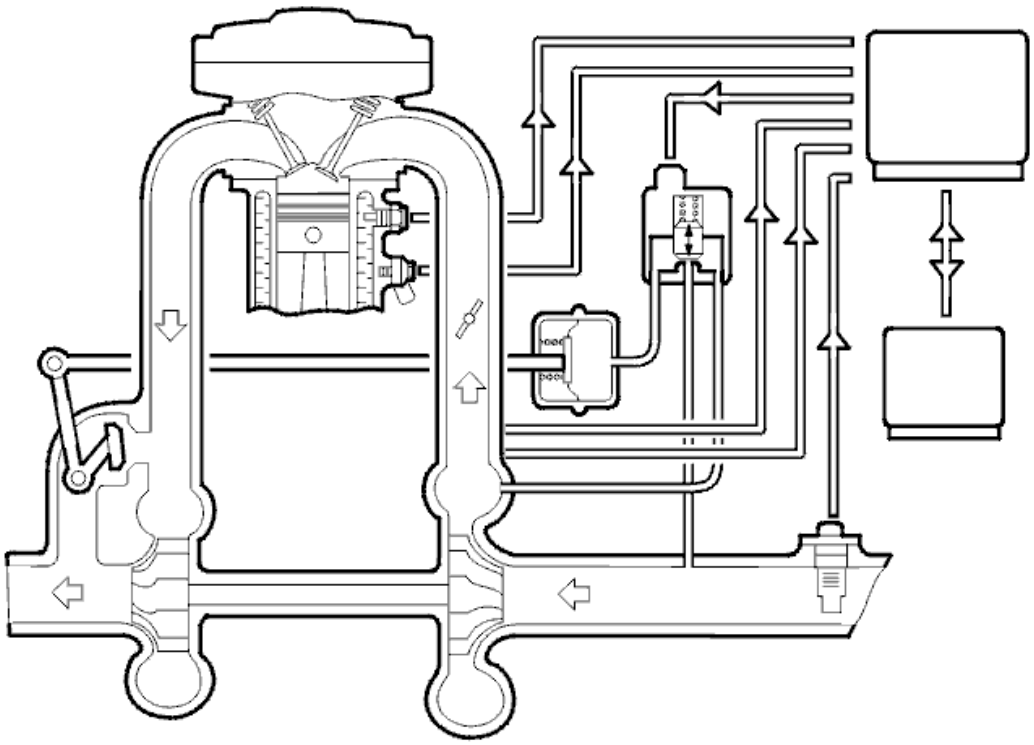
Turbocharger (TC) control system B52X4T



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Turbocharger (TC) boost pressure is controlled by the boost pressure control (BPC) valve whose pressure regulator is affected by the pressure from the turbocharger (TC).
The engine control module (ECM) determines current throttle angle and boost pressure to achieve the calculated torque.
The Engine Control Module (ECM) affects the controlling pressure using the turbocharger (TC) control valve.
When the pressure increases the boost pressure control (BPC) valve pressure regulator is affected. When boost pressure has increased to the maximum permissible value the boost pressure control (BPC) valve opens and part of the exhaust gases bypass the turbocharger (TC) turbine which limits the boost pressure. Turbocharger (TC) control takes place constantly by measuring the current boost pressure and comparing it to the requested boost pressure.

Controlling turbocharger (TC) boost pressure

When the engine control module (ECM) determines that a higher boost pressure is permissible, the turbocharger (TC) control valve opens further and a proportion of the

pressure acting on the boost pressure control (BPC) valve pressure servo is allowed through to the turbocharger (TC) inlet. In this way the control pressure is reduced, the boost pressure control (BPC) valve opens later and turbocharger (TC) pressure can increase.

The engine control module (ECM) affects the turbocharger (TC) control valve by grounding one of the terminals with a fixed frequency where the signals duty cycle determines how much the valve should open and therefore how much the boost pressure can increase.

Boost pressure reduction

The charge pressure is reduced when driving in first gear and reverse with engine speed (RPM) below 3000 rpm to reduce the risk of wheel spin. If the engine has an automatic transmission the automatic transmission receives information from the TCM about when reduced charge pressure is required, for example when shifting.

If the car has a manual transmission the Engine Control Module (ECM) determines which gear is selected based on the transmission and final drive gear ratios, engine speed (RPM) and vehicle speed.

On cars with automatic transmission there is also boost pressure reduction in the winter mode.

Boost pressure can also be reduced to protect the engine from damage. If the knock sensors (KS) detect that the engine is knocking above a given threshold value, and ignition has been retarded and the air/fuel mixture has been enriched, the Engine Control Module (ECM) will reduce the boost pressure until knock ceases.

A reduction in boost pressure also takes place If There Is a risk of the engine overheating. If the Engine Coolant Temperature (ECT) sensor indicates that the temperature has exceeded 118°C (244°F), the Engine Control Module (ECM) lowers the boost pressure to reduce heat generation.

Automatic high altitude compensation

Because the Engine Control Module (ECM) determines boost pressure using the signal from the intake air pressure sensor, there is automatic boost pressure control

compensation when driving at altitude and in different temperatures. The engine power is not therefore noticeably affected by air density or temperature.

When altitude exceed 2000 meter above sea level the engine control module (ECM) cannot compensate boost pressure any further because the air is too thin.

Boost pressure monitoring

The Engine Control Module (ECM) constantly monitors boost pressure using the mass air flow (MAF) sensor and the intake air pressure sensor. If boost pressure exceeds permitted levels the Engine Control Module (ECM) shuts the turbocharger (TC) control valve so that the engine torque can only be controlled through limiting the throttle opening. A diagnostic trouble code (DTC) is stored at the same time.

If the calculations display too low boost pressure a diagnostic trouble code is stored.

If a fault occurs in a component that affects boost pressure calculation , the Engine Control Module (ECM) will always limit throttle opening.

If there is a fault in any of the sensors the boost pressure control goes over in an open loop. This means that it is controlled by fixed duty cycle which is a direct function of accelerator pedal (AP) position and engine speed (RPM).