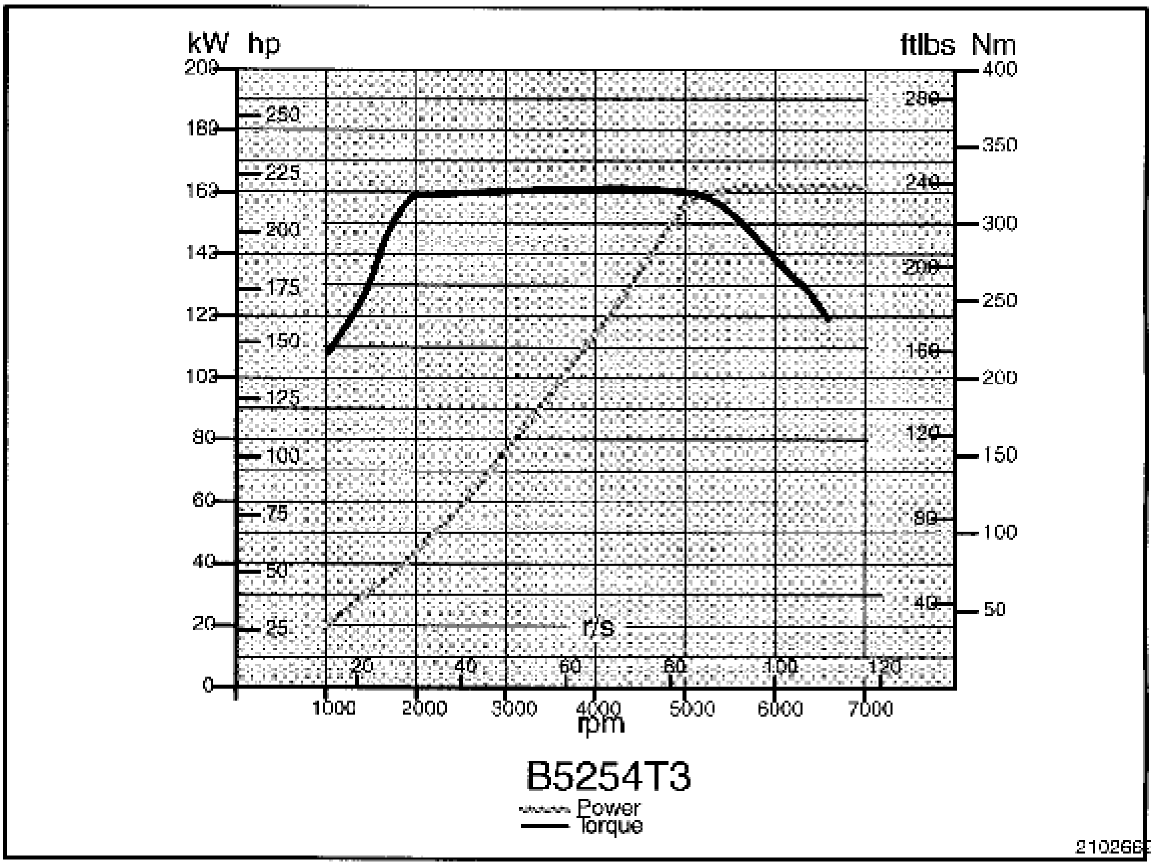


B5254T3

GENERAL

The B5254T3 is based on the B5254T2.

Uses Bosch ME 9.0 engine management system.

Meets U.S. ULEV emission standards.

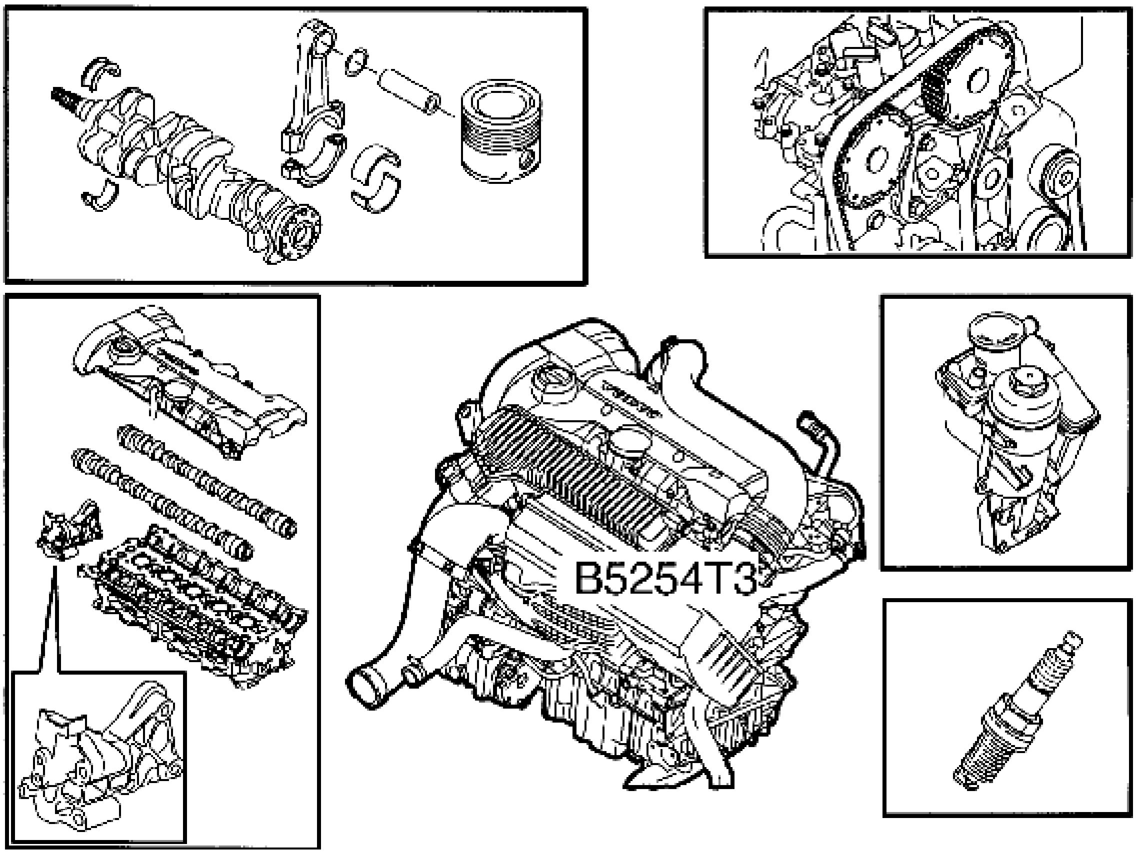
Uses M66W manual transmission.

Uses AW55-51 automatic transmission.

- When cold, the engine warm-up uses the 'Wide Range' concept.

Technical Data

	B5254T3
S40 Acceleration 0-100 km/h: Manual transmission Automatic transmission	 6.8 seconds 7.2 seconds
Maximum torque	320 N•m (236 ft•lb) from 1500- 4800rpm
Maximum output	162 kW (220 hp) at 5000 rpm
Final drive, manual transmission	3.77:1
Final drive, automatic transmission	2.27:1



OVERVIEW OF B5254T3

Crankshaft, Main Bearings

Stroke 93.2 mm; forged; weight 21606 grams; connecting rod pins: Ø50.00 mm; main bearing journals: Ø 65.00 mm.

- The crankshaft is somewhat heavier than on the 2.5 LT, B5254T2 (21559g) due to the different balancing for pendulum suspension motor mounts.

Both the upper and lower main bearings are aluminum.

Connecting Rods, Connecting Rod Bearings

Bigger connecting rods, forged using split caps. Center to center length 143 mm; weight 644 grams.

Both the upper and lower bearings are copper-lead alloy.

Pistons

Graphite-coated pistons

Wrist pin diameter/length = 21 mm/60 mm

Weight 412 grams with piston rings, snap rings and wrist pin

Piston weight alone 290 grams.

Graphite-coated pistons have a play of approximately 0.04 mm between the piston and cylinder before the graphite coating. The graphite coating is approximately 0.01 mm on either side of the piston. The graphite coating wears but never completely disappears as it penetrates the outer layer of the piston.

Cylinder head, camshafts

Cooling is more effective due to larger coolant ducts and a more directed flow between the exhaust ports and around the spark plug wells.

Multi Layer Steel (MLS) gasket for the cylinder head.

Cylinder head with CVVT on the intake and exhaust camshafts.

Change over angle CVVT:

- Intake = 50 crankshaft degrees
- Exhaust = 30 crankshaft degrees

The engine mounting bracket is located on the cylinder head and secured with 5 bolts that must be tightened in three stages. See VADIS.

Oil Filter / Oil Trap

The filter and trap are integrated into one unit.

The filter has been moved from the oil pan to the intake side of the engine. This causes less oil spillage when replacing the filter than on previous engines.

The filter and cover are the same as those used on Volvo's own diesel engine (D5244T/T2).

Oil flows from the outside in through the filter.

To ensure that oil flows even if the filter is clogged, there is an overflow valve in the cover that opens at 11kPa and when starting the vehicle from cold (-20°C to -25°C).

Oil Separation

The same as in B524454. In addition, in the turbocharged engines the gases go from the diaphragm to a T-coupling and from there, either to reed valves in the intake gasket or to the turbocharger, depending on engine load and engine speed.

Spark Plugs

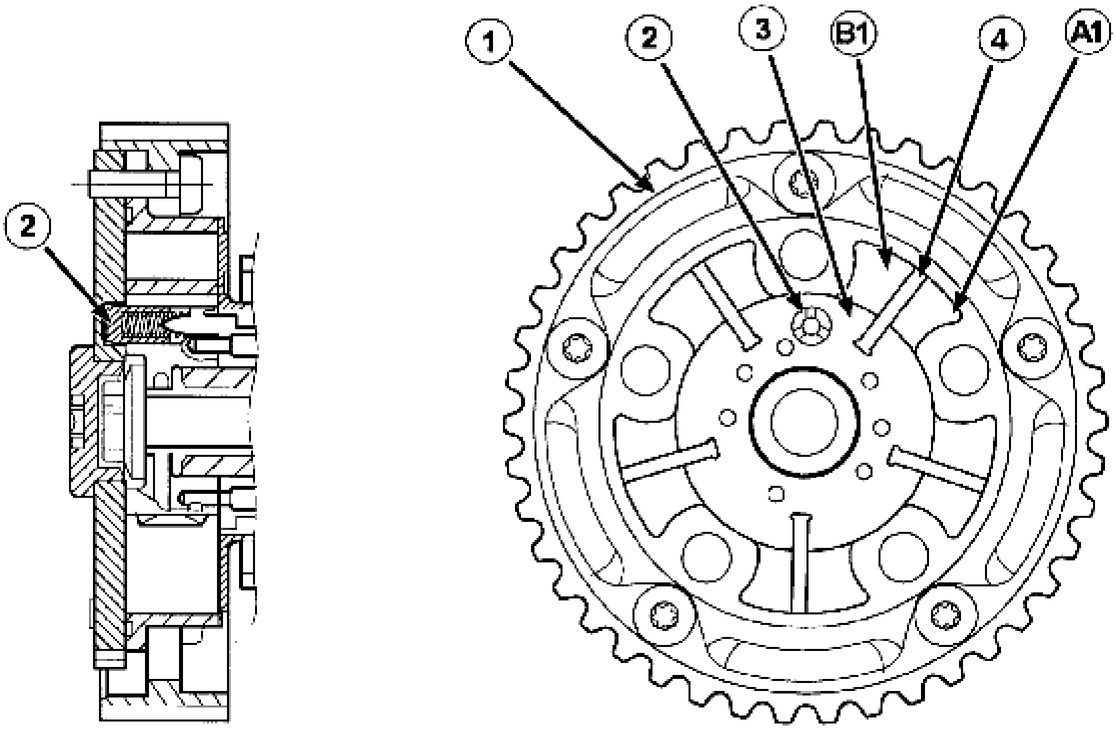
To reduce carbon deposits when starting the vehicle from cold, the ceramic is thinner at the tip of the spark plug. This is called Quick Heat.

The spark plugs have a longer thread = 26.5 mm (previously 19.0 mm).

The spark plug has one electrode.

The diameter of the center electrode is now 1.1 mm (previously 0.8 mm).

The tightening torque is 28 N•m (+ /- 3 N•m).



CVVT UNIT

The illustration shows the CVVT unit from the side and from behind.

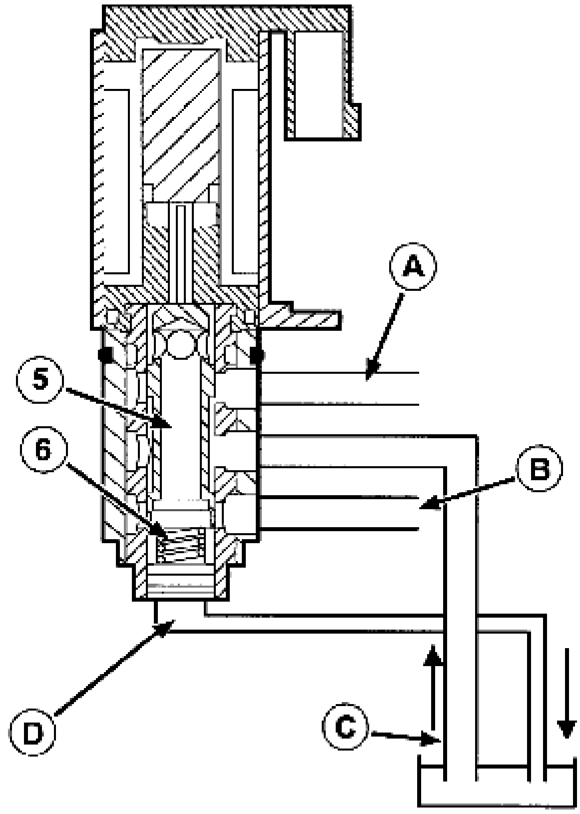
1	Timing belt pulley (hub)	3	Rotor	A1	Chamber A
2	Lock pin with spring	4	Rotor wings	B1	Chamber B

The design of the CVVT unit allows the position of the camshaft to be adjusted relative to the position of the crankshaft.

The camshaft is fixed in the rotor (3). The rotor (and with it the camshaft) can rotate in relation to the timing belt pulley (1) within a limited range.

When the unit is in the camshaft 0 position, the timing belt pulley (1) and rotor (3) are secured by the lock pin (2) which locks the timing belt pulley (1) to the rotor (3).

The lock mechanism works by pushing the spring-loaded lock pin into a hole milled into the cover.

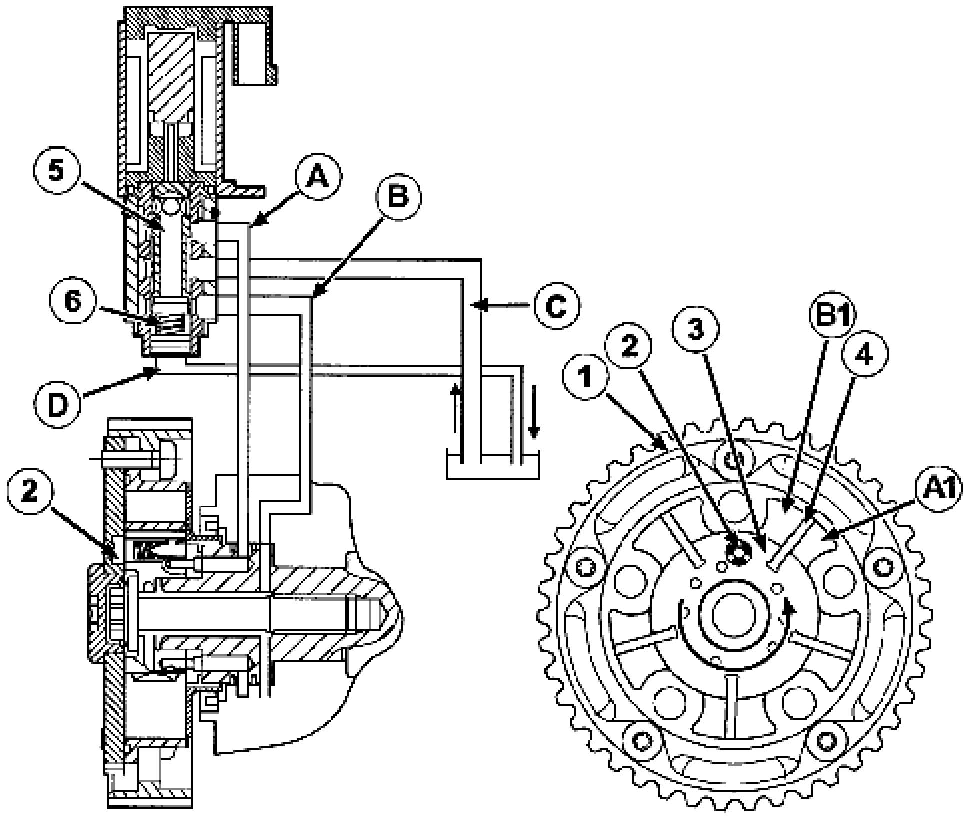


Camshaft Reset Valve

5	Piston with vents	A	Duct connected to the CVVT unit chamber A1	C	Oil duct (pressure)
6	Return spring	B	Duct connected to the CVVT unit chamber B1	D	Oil duct (return)

The camshaft reset valve controls the flow of oil to the CVVT unit.

The engine control module (ECM) controls the valve using a pulse width modulated (PWM) signal.



Camshaft Advance Control

1	Timing belt pulley (hub)		5	Piston with vents		A	Duct connected to the CVVT unit chamber A1
2	Lock pin with spring		6	Return spring		B	Duct connected to the CVVT unit chamber B1
3	Rotor		A1	Chamber A		C	Oil duct (pressure)
4	Rotor wings		B1	Chamber B		D	Oil duct (return)

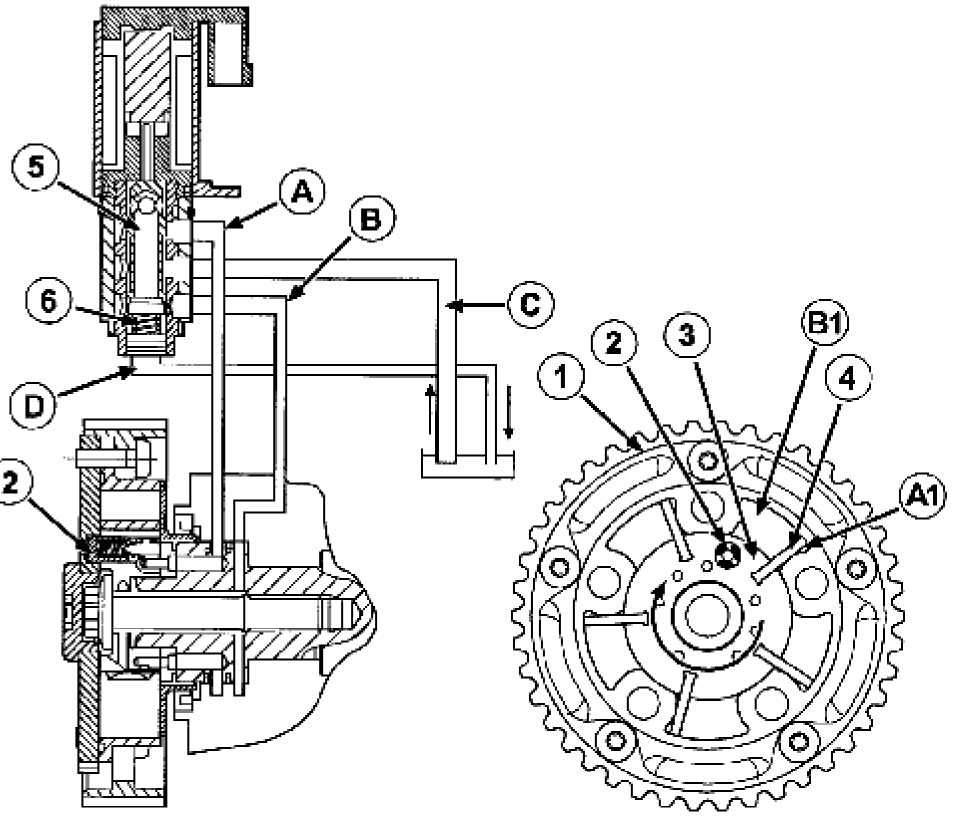
The oil is directed from the engine's lubricating system (C).

The position of the valve is controlled by the ECM and oil flows via the vents in the piston into the valve in the camshaft oil duct (A).

Oil flows via oil ducts in the camshaft to the top of lock pin (2). The lock pin is pressed in by the oil pressure and the CVVT unit is released.

Chamber (A1) fills with oil. Due to the oil pressure in the chamber, the rotor (3) rotates counterclockwise.

Return oil flows from chamber B1 via the camshaft duct (D) to the valve and back to the oil pan.



Camshaft Retard Control

The oil is forced from the engine's lubricating system (C).

The position of the valve is controlled by the ECM and oil flows via the vents in the piston into the valve in the camshaft oil duct (B).

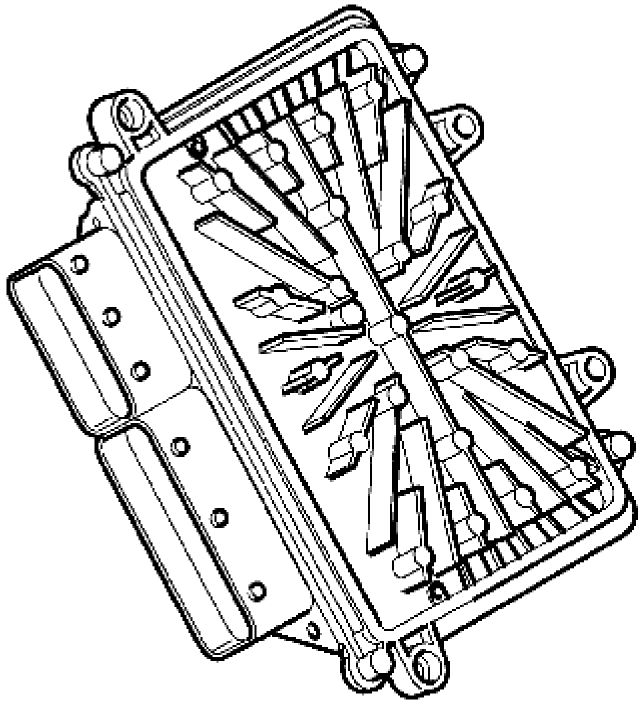
Chamber B1 fills with oil. Due to the oil pressure in the chamber, the rotor rotates clockwise.

The rotor wing (4) reaches its limit position and the lock pin is pushed out into a hole on the inside of the front of the timing belt pulley.

Return oil flows from chamber A1 via the camshaft valve and back to the oil pan.

This process takes place very rapidly. The reset valve is controlled by the ECM for advancing and retarding at a very high frequency which allows for quick and exact control.

The amount to which the camshaft can be advanced (change in the radial position of the camshaft) varies by engine variant.



M E 9.0

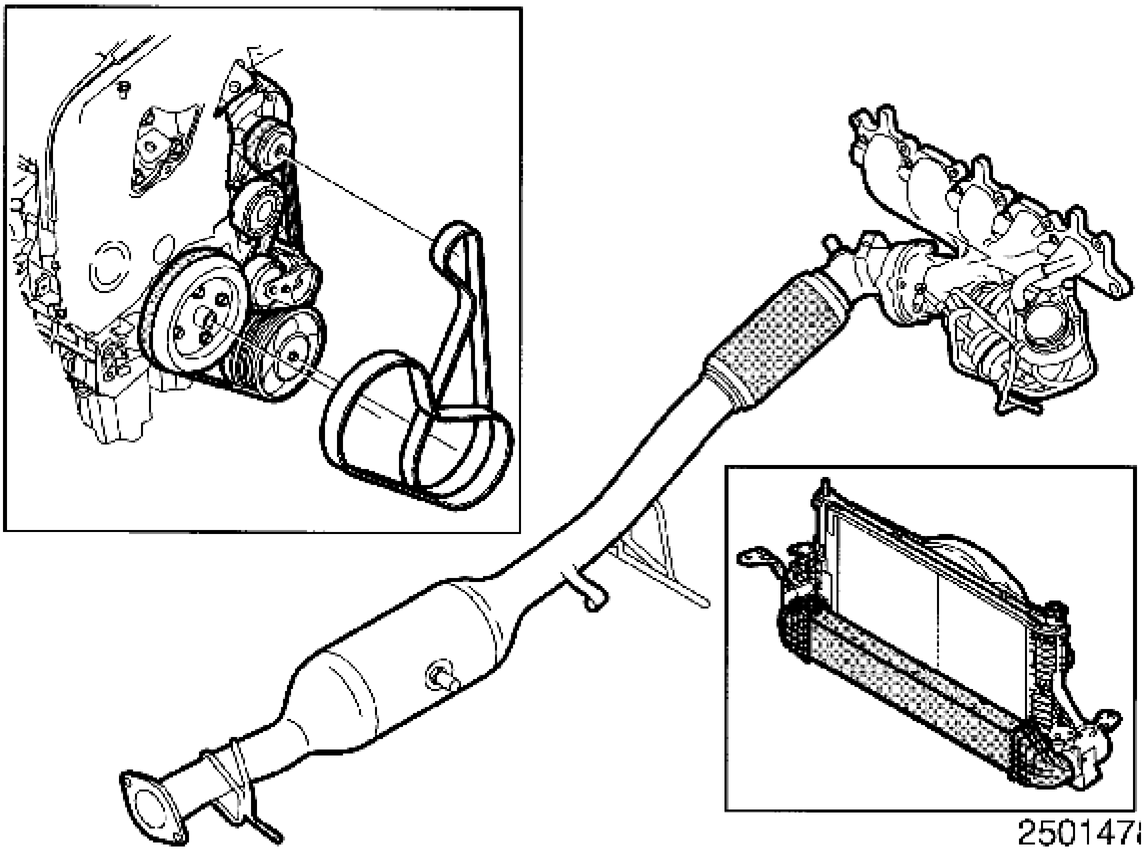
Bosch ME 9.0 Engine Management System

The engine now has a newly developed ME 9.0 engine management system from Bosch.

Bosch engine management system ME 7.01 had to be updated to the ME 9.0 for the S40/V50.
The control module has been moved from the control unit box to the intake manifold. This is mainly due to increased requirements for the control module's environment (temperature, vibration, water tightness etc.).

At the same time the processor has been replaced with a more powerful version with more memory.
The processor load for the ME 9.0 is approximately 80-85%, this figure would have been higher in the ME 7.01 and left too small a margin.

- The ME 9.0 also has 1.5 MB of flash memory (2MB available).
  The ME 7.01 only has 1 MB of memory.
- The ME 9.0 has a higher maximum temperature specification (105°C vs. 85°C).
- The ME 9.0 has more robust vibration specifications than the ME 7.0.1 due to its changed location.



TURBO

The exhaust manifold is integrated with the turbine housing.

Maximum charge pressure is 0.7 bar.

The oil pipe is routed differently and has a flat flanged connection to the turbocharger.

The Turbo Control Valve (TCV) is mounted in a bracket to the right of the turbocharger.

The exhaust manifold has a MLS (Multi Layer Steel) gasket. Two slits have been machined into the manifold to deal with heat expansion.

The turbocharger has been matched and designed by Volvo together with the sub-contractor 3k-Warner Turbo Systems from Germany.

The catalytic converter under the floor, UFC (Under Floor Catalyst), has double oval ceramic monoliths.

The flow through the catalytic converter is optimized to reduce resistance.

Exhaust Pipe

- The exhaust system has been developed to further reduce wind resistance under the car.

  The exhaust system consists of a single pipe (∅ 60 mm) and a tail pipe on each side of the muffler.

- The tail pipes ∅ 52 mm) have been designed to allow for effective gas flow and to be visible. A ∅ 65 mm end pipe gives the tail pipe a more visible impact.

Intercooler

- The Intercooler is rectangular and is located in front of the radiator assembly, just behind the air intake in the spoiler (similar to S60R second Intercooler).

Charge Air Pipe

The charge air pipe runs under the engine and is mounted on the turbocharger with a V-clamp.

Intake

- The intake has short pipes and a double gasket with built-in non-return valves (reed-type) for crankcase ventilation.

ETB

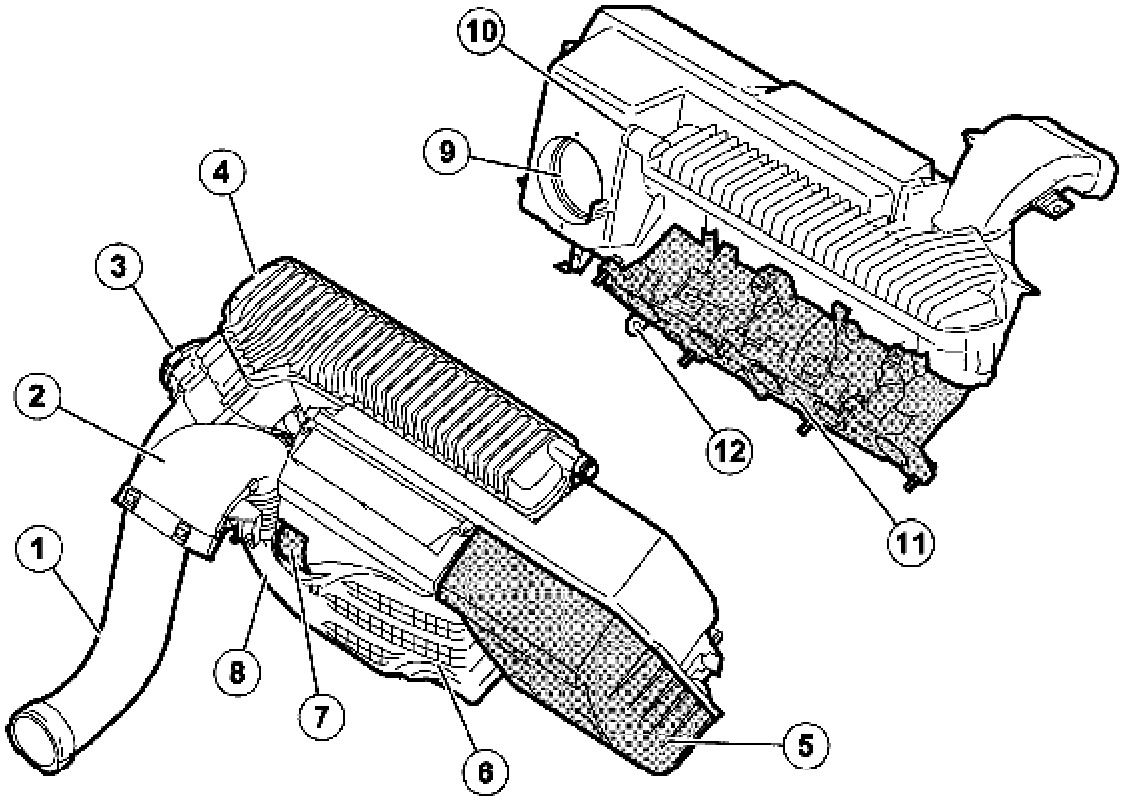
- The electronic throttle body is the same as the B5254T2, the only difference is, it has a shortened hose connector.

Auxiliary Equipment

- The design of the auxiliary equipment has been changed to make the engine shorter.
- The A/C compressor and alternator have their own drive belts. The alternator now rotates clockwise.
- The drive belts are in reinforced rubber (Poly-V), and are tensioned by their own mechanical tensioners.

Thermostat Housing

The thermostat housing has been moved to the block on the intake side of the engine.



1	Intake hose	5	ECM cover	9	Mass air flow (MAF) sensor mounting
2	Upper fresh air intake hose	6	Air cleaner	10	Vacuum output
3	Throttle body	7	Snow valve	11	Intake manifold lower section
4	Intake manifold upper section	8	Lower fresh air intake hose	12	Mounting bracket

TURBOCHARGER INTAKE SYSTEM

Intake Manifold Lower Section

The intake system is divided into upper and lower sections.

The injectors are located on the lower manifold to mix the fuel with the turbulent air as efficiently as possible.

The position of the injectors is optimized to minimize fuel film formation and improve emissions.

The lower intake manifold is aluminum to protect the fuel injection nozzles in the event of an accident.

There are individual ducts to each intake port to distribute the crankcase gases evenly between the cylinders.

The gasket between the lower intake manifold and the cylinder head is a double gasket with a non-return valve.

The gasket has a non-return valve (reed valve) beside each intake port to stop the crankcase gases from running back into the oil trap.

Intake Manifold Upper Section

The upper intake manifold is plastic.

Each cylinder has an intake pipe that comes off a plenum chamber.

Air Cleaner

The air cleaner and air cleaner housing are designed to minimize drops in pressure and to be as compact as possible.

- The air cleaner housing and control module box are integrated into one unit.

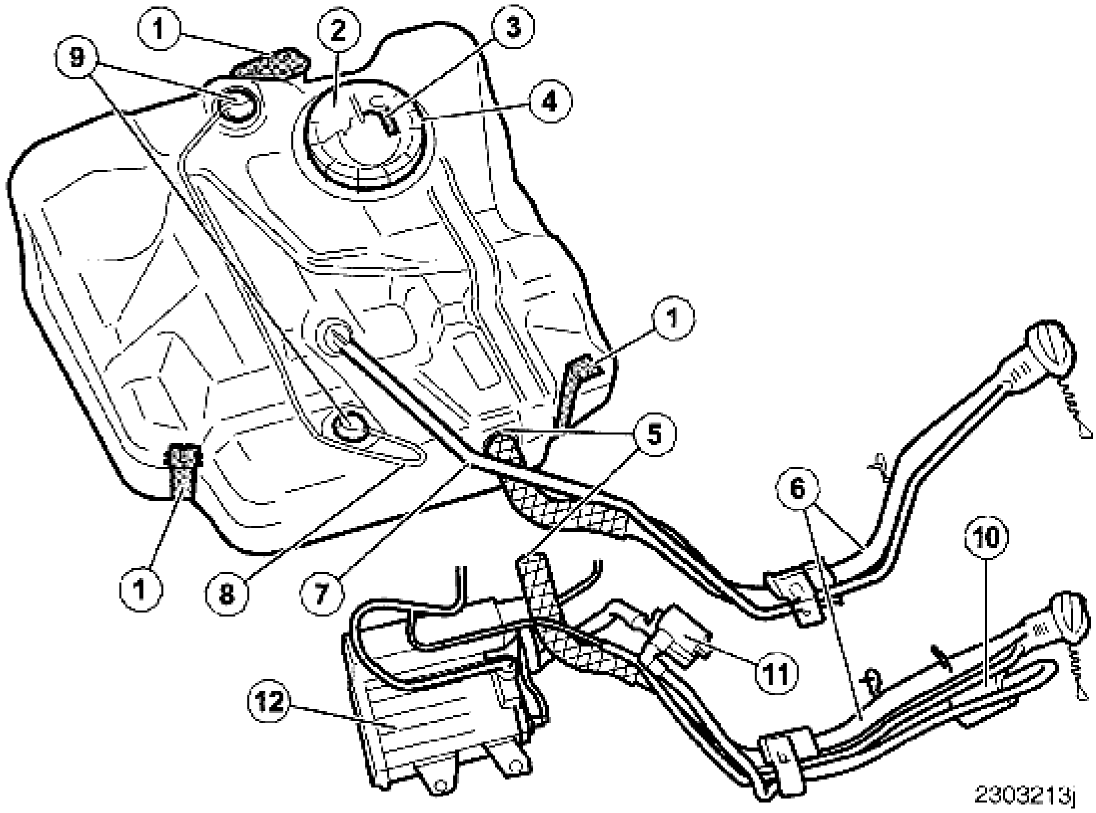
The air cleaner is a cassette that is inserted vertically and secured with 2 bolts.

- The air cleaner unit is mounted on three brackets.
- A spring-loaded valve is located beside the air cleaner and opens when the pressure drops below 6 kPa if the air intake pipe is restricted.

Engine Cooling Fan

6 fixed speeds

7 blades



1	Tank strap	5	Fuel filler pipe connector	9	Roll over valves
2	Fuel pump unit	6	Fuel filler pipe	10	Air cleaner
3	Fuel connector from fuel tank	7	Recirculation pipe	11	EVAP pump
4	Fuel pump unit nut	8	EVAP pipe	12	EVAP canister

FUEL TANK

PLASTIC TANK WITH ON-DEMAND FUEL PUMP

- For the U.S. (LEV II), the fuel tank is plastic and the fuel tank volume is 60 liters.
- The fuel pump unit in the fuel tank contains the following:
  - Fuel reservoir, on-demand fuel pump, ejector pump, level sensor and fuel filter.

There is a non-return valve with a plastic membrane in the bottom of the fuel filler pipe.

The fuel filler pipe is connected to the fuel tank by a piece of rubber hose.

The fuel filler pipe shut-off nipple is integrated into the fuel tank with a hose up to the fuel filler pipe.

The EVAP system has a round EVAP canister using one chamber filled with activated charcoal.

EVAP SYSTEM

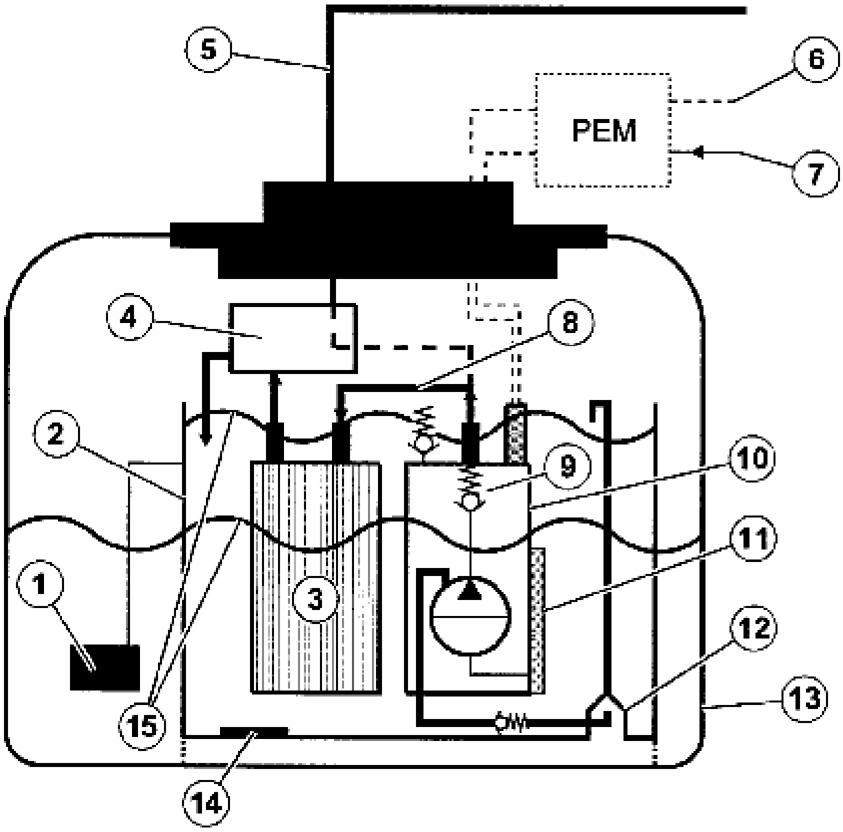
The EVAP system is connected to a recirculation pipe on the fuel filler pipe to reduce the volume of hydro-carbons in the EVAP canister when filling the fuel tank.

The EVAP system has a larger EVAP canister in which the EVAP canister and a Hydro Carbon Scrubber (HCS) are integrated.

PUMP ELECTRONIC MODULE (PEM)

An amplifier that converts the engine control signal to power for the on-demand fuel pump.

The PEM is mounted on a bracket secured to the bodywork to the right of the fuel tank.



1	Fuel level sensor	6	Control signal (PWM)	11	Fuel pre-filter
2	Reservoir	7	Power supply	12	Ejector
3	Fuel filter	8	Fuel line to filter	13	Fuel tank
4	PVV (Pressure Ventilation Valve)	9	Check valve	14	FFV (First Filling check Valve)
5	Fuel line to engine	10	On-demand fuel pump	15	Level

ON-DEMAND FUEL PUMP

The pump unit supplies the engine with only the amount of fuel being consumed at the time.

The flow from the pump unit is the same as fuel consumption.

The pump unit flow is:

- approximately 90 l/h at 400 kPa (corresponds to 380 kPa at the fuel rail) for naturally aspirated engines and 115 l/h for turbocharged engines at full load.
- At idle speed flow is approximately 1.2 l/h to 2.0 l/h.

Power consumption varies from approximately 8 A at full capacity to approximately 2 A when the engine is idling.

Pressure Ventilation Valve (PVV)

The PVV works differently for naturally aspirated engines than turbocharged engines.

Naturally Aspirated Engine

On a naturally aspirated engine, pressure is limited to 400 kPa (corresponds to 380 kPa at the fuel rail).

The valve limits pressure surges occurring when the fuel injection is interrupted.

Pressure limitation is achieved by 'leaking' fuel through the valve. The fuel surplus runs into the reservoir at approximately 34 l/h (applies only to naturally aspirated engines). The leakage also helps to flush the valve free of particles.

When the engine is switched off, the valve maintains a residual pressure in the fuel injection system to help prevent restarting problems.

Turbocharged Engines

The PVV is closed under normal driving conditions and only opens when there is a pressure surge in the fuel rail (approximately 560 kPa). Examples of when pressure surges occur are when engine braking and when the engine is switched off due to power loss.

The ECM raises the pressure in the system so the PVV opens (approximately 600 kPa). This flushes the valve free of particles.

Pressure Relief Valve (PRV) Applies Only to B5244S4

The safety valve is integrated into the fuel pump. The valve opens in the range 550 kPa - 850 kPa.

First Filling Valve (FFV)

Allows fuel into the pump reservoir when the fuel tank is filled after it has been almost emptied.

The valve is closed when the car is tilted so that there is still fuel in the reservoir around the pump.

Check Valve

The valve closes when the pressure in the pump is lower than system pressure - when the engine and power to the pump is switched off. This is to prevent the fuel line to the engine being drained of fuel.

The valve is integrated into the fuel pump.

Ejector

Continuously fills the pump housing with fuel.

Approximately 10-15 l/h is always flowing from the fuel pump through the ejector and back to the reservoir.

Fuel Filter

The fuel filter is located in the reservoir and is integral with the pump/pickup assembly.