

VOLVO  
**NEW CAR FEATURES 0520**

**VOLVO**  
for life

TECHNICAL PRESENTATION

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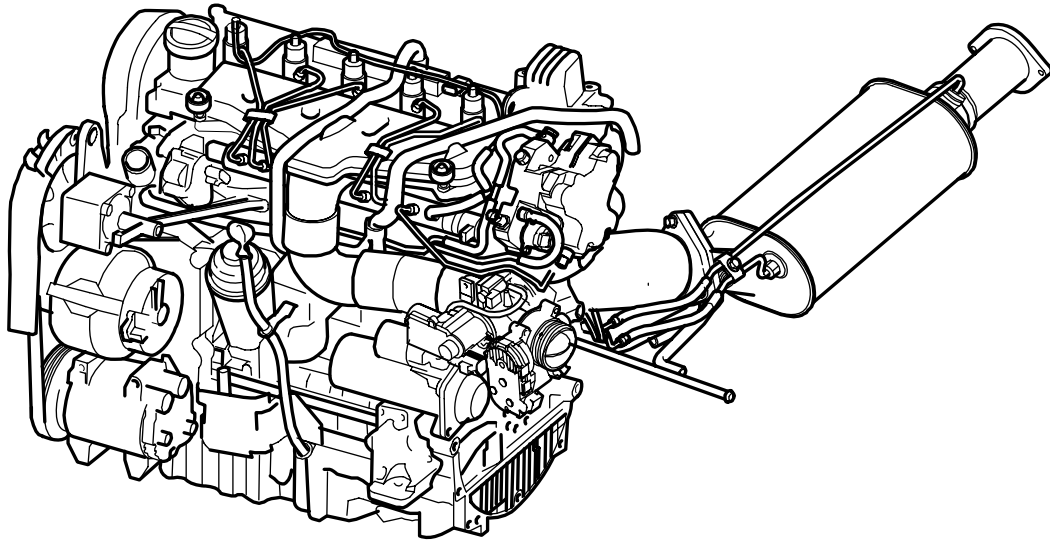
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## **S60, V70, XC70 and XC90**

### **General**

Engine variants D5244T4/T5/T6/T7 introduced from and including ÄT0520. The design is based on D5244T/T2.

- Engine variants D5244T4/T5/T6/T7 are identical apart from performance. The performance is determined by the software in the ECM.
- All engine variants comply with the emission requirements of EURO 4.
- The engines are only being introduced with manual gearboxes. Automatic gearbox is introduced from and including ÄT 0540.
- Engine management system Bosch EDC16.
- Particle filter cDPF (catalyst Diesel Particulate Filter). No additives necessary to achieve the necessary temperature for the regeneration process.
- Compression lowered from 18.0:1 to 17.3:1. Results in improved filling and consequently improved performance.
- Coolant heated crankcase ventilation. PTC element discontinued.
- Service interval 30,000 km or 1 year. NOTE: depending on market.
- Note that for the S80 the "old" D5244T/T2 remains.

**Notes**

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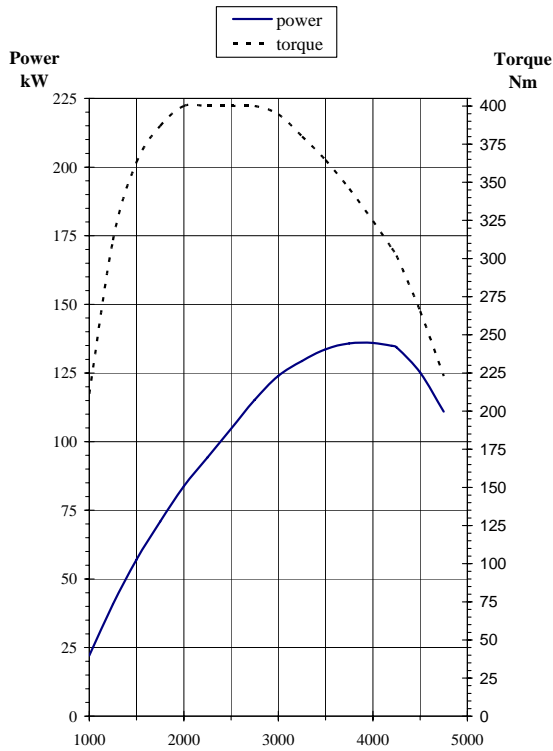
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Specifications

**D5244T4**



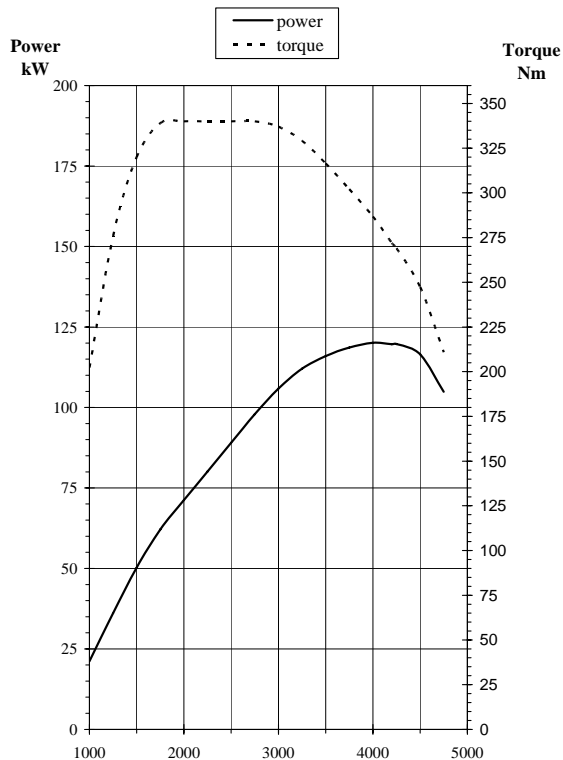
**Engine D5244T4**

Output @ 4000 rpm..... 136 kW, 185 hp

Torque ..... 400 Nm @ 2000 - 2750 rpm

The engine will be available in the XC90, S60 and V70

**D5244T5**



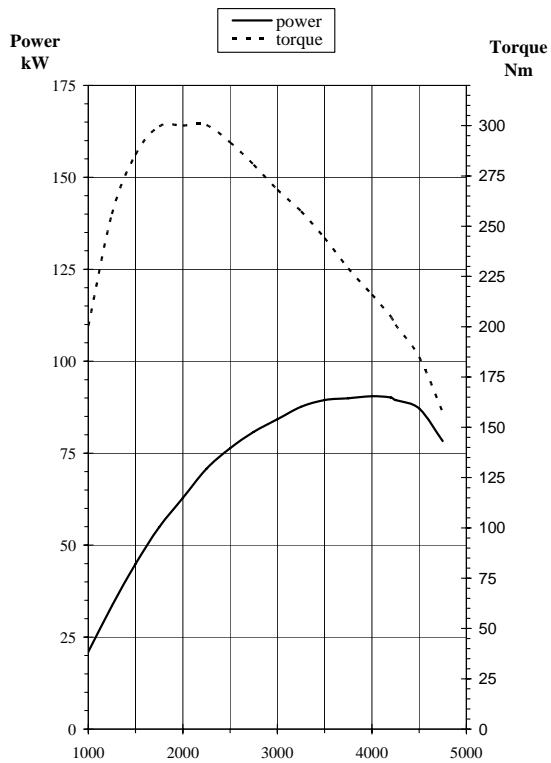
**Engine D5244T5**

Output @ 4000 rpm..... 120 kW, 163 hp

Torque ..... 340 Nm @ 1750 - 2750 rpm

The engine will be available in the S60 and V70

### D5244T6



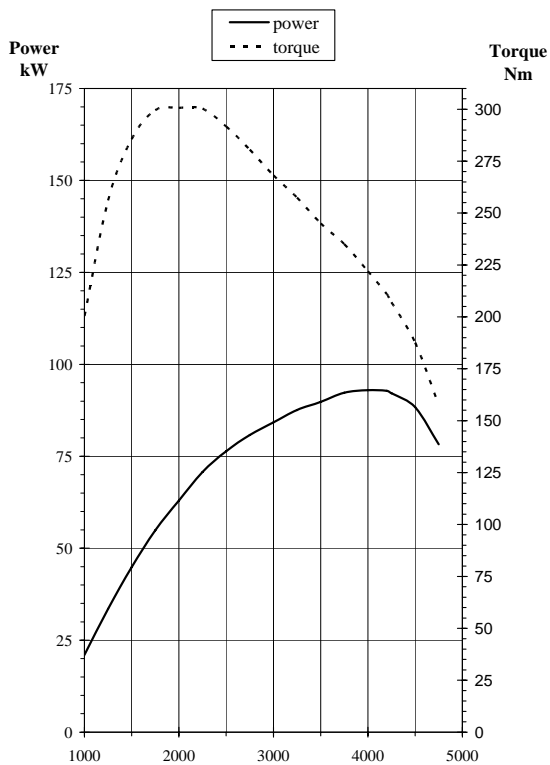
#### Engine D5244T6

Output @ 4000 rpm.....90 kW, 122 hp

Torque .....300 Nm @ 1750 - 2250 rpm

The engine will be available in the S60 and V70

### D5244T7

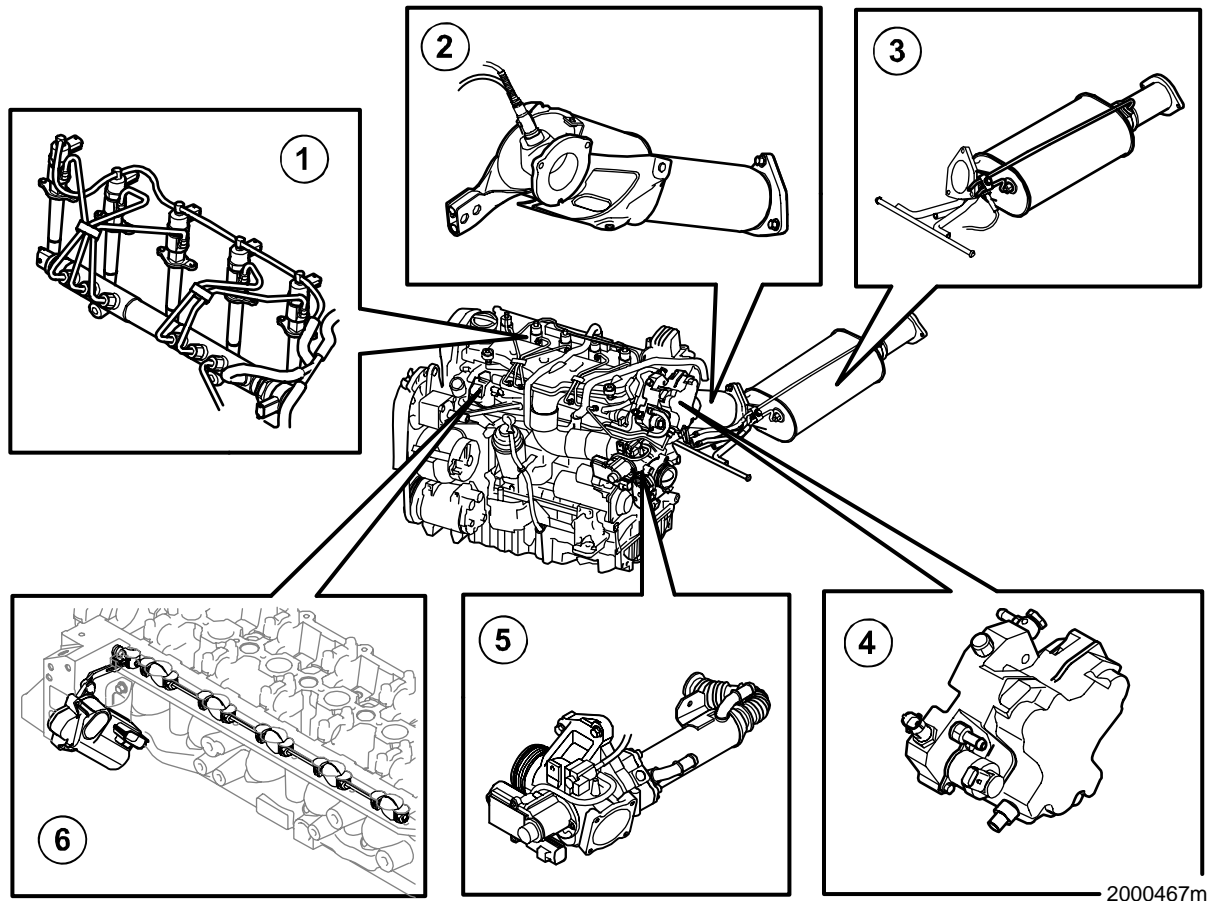


#### Engine D5244T7

Output @ 4000 rpm.....92 kW, 126 hp

Torque .....300 Nm @ 1750 - 2250 rpm

The engine will be available in the S60 and V70



### Modifications compared with the D5244T/T2

The following modifications have been made amongst others in order to comply with the emission requirements of EURO 4:

- The injectors (Pos 1) have 7 holes (previously 5 holes) which results in improved combustion and consequently reduced emissions.
- Catalytic converter (Pos 2) with greater capacity. Reduces HC and CO emissions.
- cDPF (catalyst Diesel Particulate Filter), (Pos 3) where particles are stored and combusted. The filter also works as an oxidation catalytic converter.
- High pressure pump (Pos 4). A higher injection pressure is used in general during the entire loading and engine speed range. Results in an improved fuel/air mixture which results in more efficient combustion.  
NOTE: Max. pressure of 1600 bar is unchanged.
- Exhaust gas recirculation (EGR) (Pos 5) is used to a greater extent. Reduces NOx emissions.
- Variable throttle, a so-called "swirl throttle" (Pos 6), located in the cylinder head's tangential ducts. Regulates the air distribution between the tangential and swirl ducts to the cylinders. Proportionately more air through the swirl ducts resulting in a more powerful swirl formation which improves the combustion process.



**Notes**

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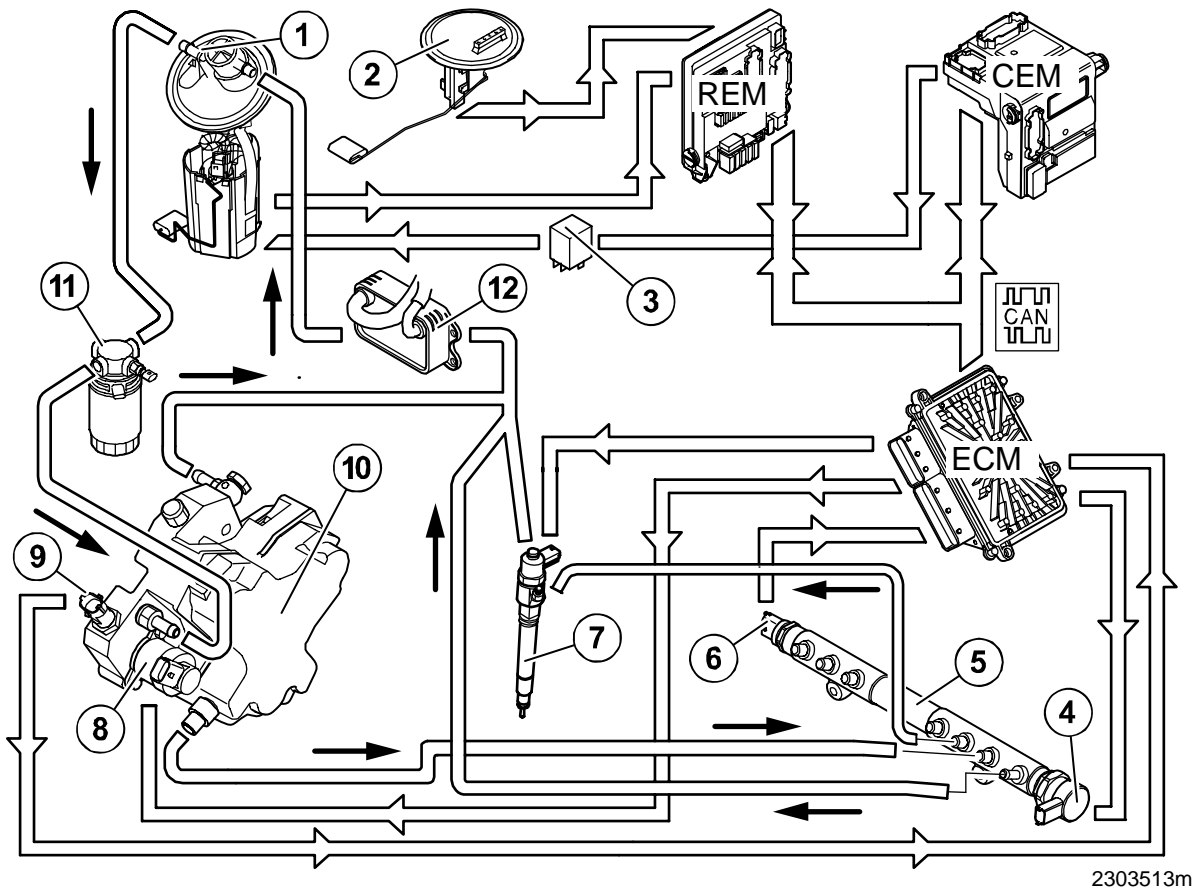
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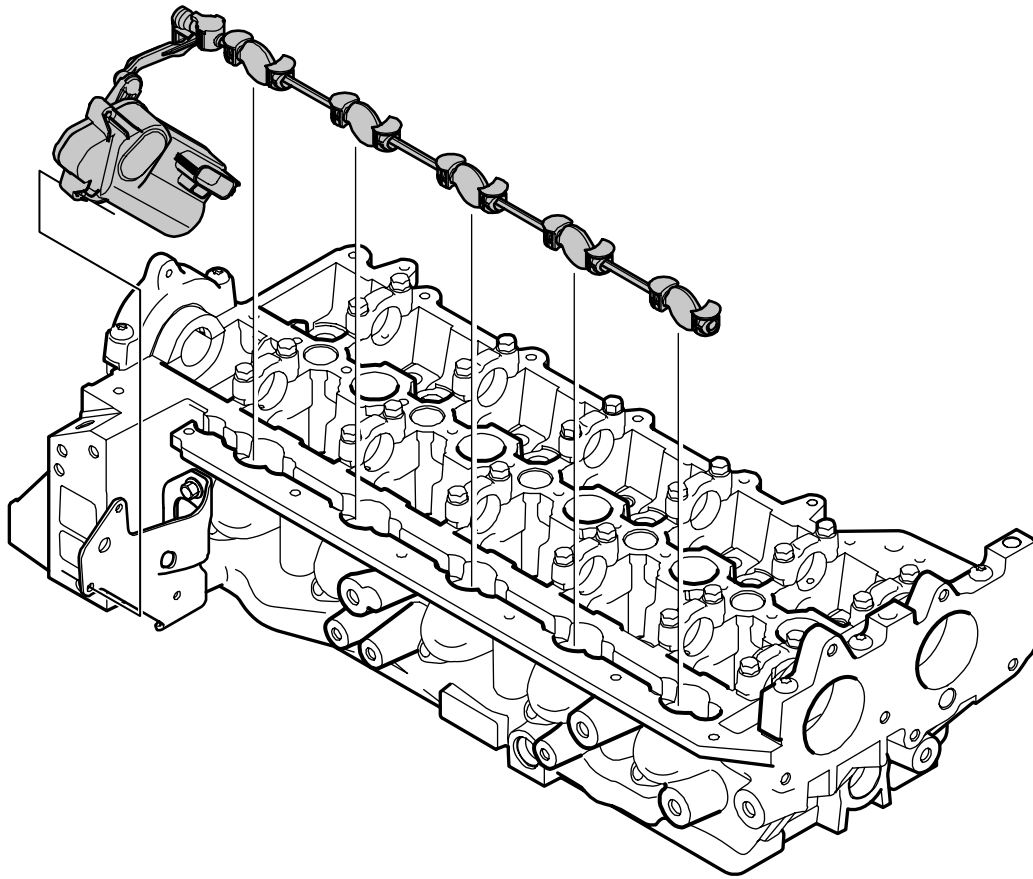
1	Electrical fuel pump with fuel level sensor	7	Injector
2	Fuel level sensor	8	Fuel flow control valve
3	Relay, fuel pump	9	Fuel temperature sensor
4	Fuel pressure control valve	10	High pressure pump
5	Fuel rail	11	Fuel filter with preheating
6	Fuel pressure sensor	12	Fuel cooler (AWD only)

## Fuel system

- The electrical fuel pump is located in the tank's right-hand saddle pocket and continuously supplies the high pressure pump with fuel.
- The non-return valve located on the injectors' common return line is removed. Required counterpressure is created "automatically" by existing components on the fuel return side such as hoses and ejector pumps for example.
- The injectors have 7 holes (previously 5). They have also undergone a number of inner modifications to improve sealing for example. The injectors can be replaced individually. The replacement method is equivalent to that for the D4164T engine.

- There is a fuel pressure control valve on the fuel rail in order to regulate the fuel pressure for the injectors more quickly.
- The principle for the functioning of the fuel pressure control valve is the same as the fuel pressure valve for the D4204T.

***NOTE: When replacing injector(s) the ECM and Volvo's database must be updated. This takes place by means of a function in VIDA. If this is not carried out, then performance, fuel consumption and emissions are affected amongst other things!***



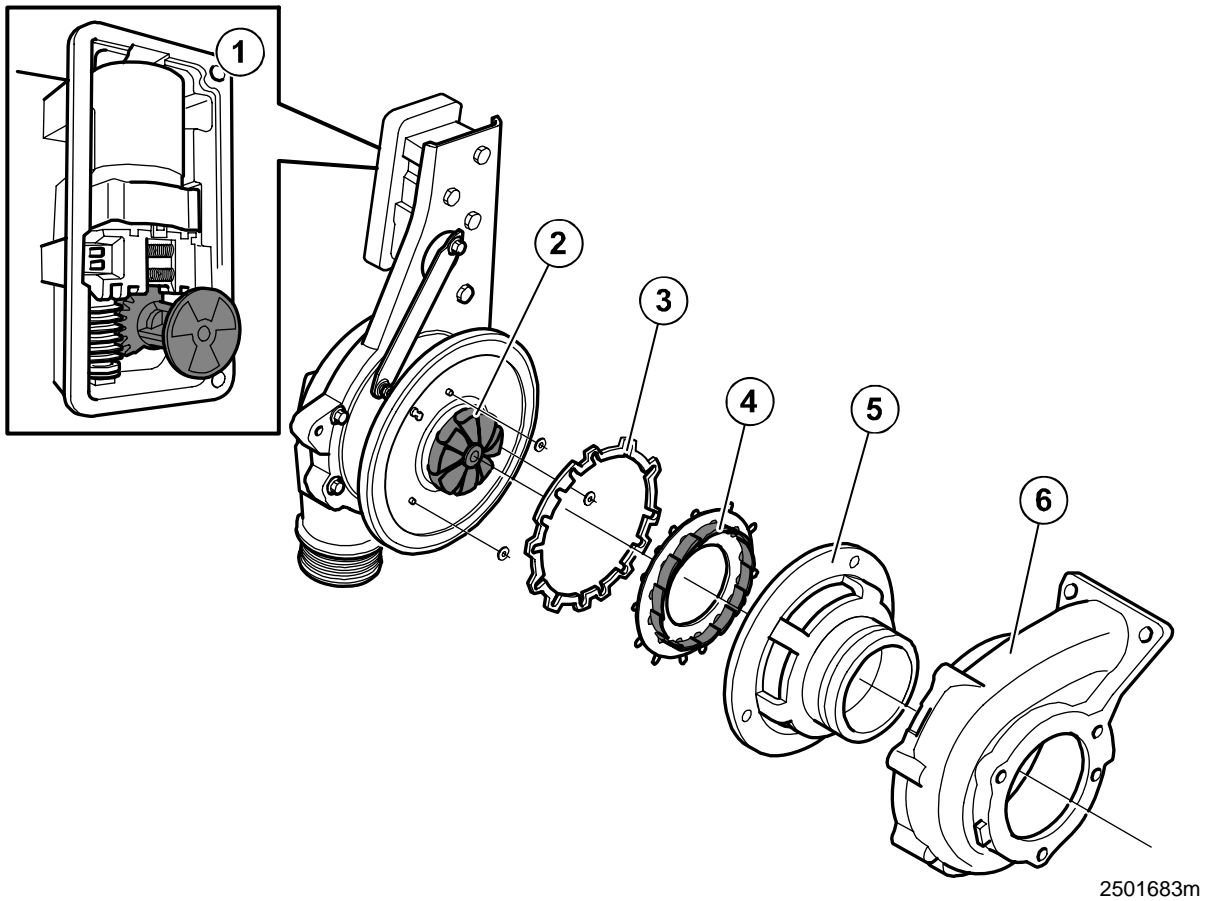
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## New components and functions

### Swirl throttle

- Exhaust gas recirculation (EGR) control is used to an even greater extent compared with previously in order to comply with the emission requirements of EURO 4 with regard to nitrogen oxide emissions, NO<sub>x</sub> etc.
- One set of the cylinder head's inlet ports, the tangential ducts, are equipped with a shutter, a so-called "swirl throttle", in order to improve the combustion process during exhaust gas recirculation (EGR) control.
- By closing the throttle the flow of air through the swirl ducts increases, which increases the swirl formation in the cylinder. This improves the mixture of air and fuel. In this way the emissions from the cylinder are reduced.
- The throttles are closed during idling and then open steplessly up to an engine speed of approx. 3000 rpm. At an engine speed above 3000 rpm the throttles are open.
- The position of the throttles is regulated by a direct current motor. The motor is controlled by the ECM by means of a PWM signal.

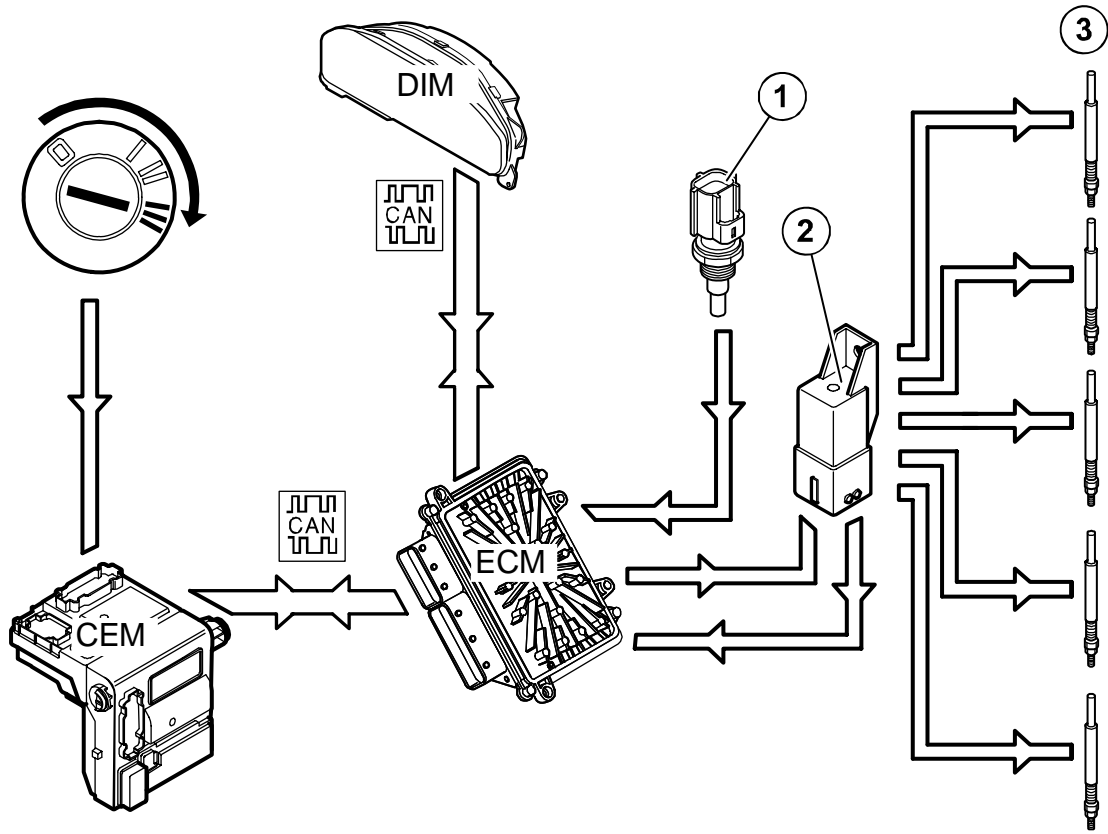
In order that the ECM shall know the position of the throttles and to be able to compensate for any wear in the internal components the throttle motor is run to its mechanical stops (open/closed position) at each 5th ignition switch-off. (The function is in the ECM and may be modified for start of production).



1	Turbocharger control motor, REA (Rotor Electric Actuator)	4	Guide rails
2	Turbine	5	Housing for guide rails
3	Ring	6	Turbine housing

#### **Turbocharger with REA (Rotor Electric Actuator) and VNT (Variable Nozzle Turbine)**

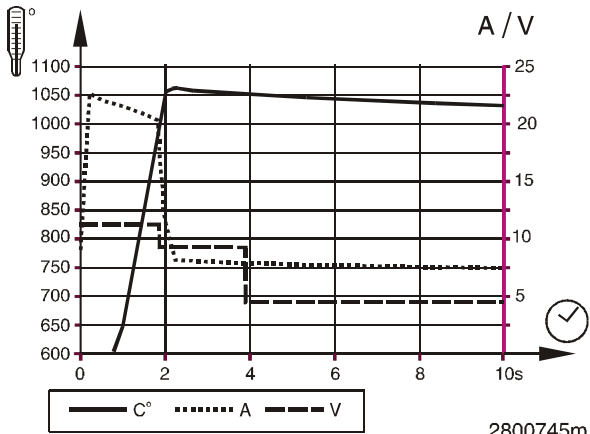
- New version of turbocharger.
- The position of the guide rails is regulated by the REA (Rotor Electric Actuator). The REA is an electric direct current motor which is controlled by means of a PWM signal from the ECM. This provides faster and more precise control compared with a vacuum controlled system.
- The turbocharger is cooled by coolant which results in efficient heat conductivity.



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1	Coolant temperature sensor.	2	Glow plug relay	3	Glow plug
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**Glow system**



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The glow plugs have a low inner resistance in order to obtain faster heating and consequently a rapid start of the engine.

The glow plugs are designed for a continuous voltage of 4.4 volts.

Rapid heating is obtained by supplying the glow plugs with an "overvoltage" of 12 volts.

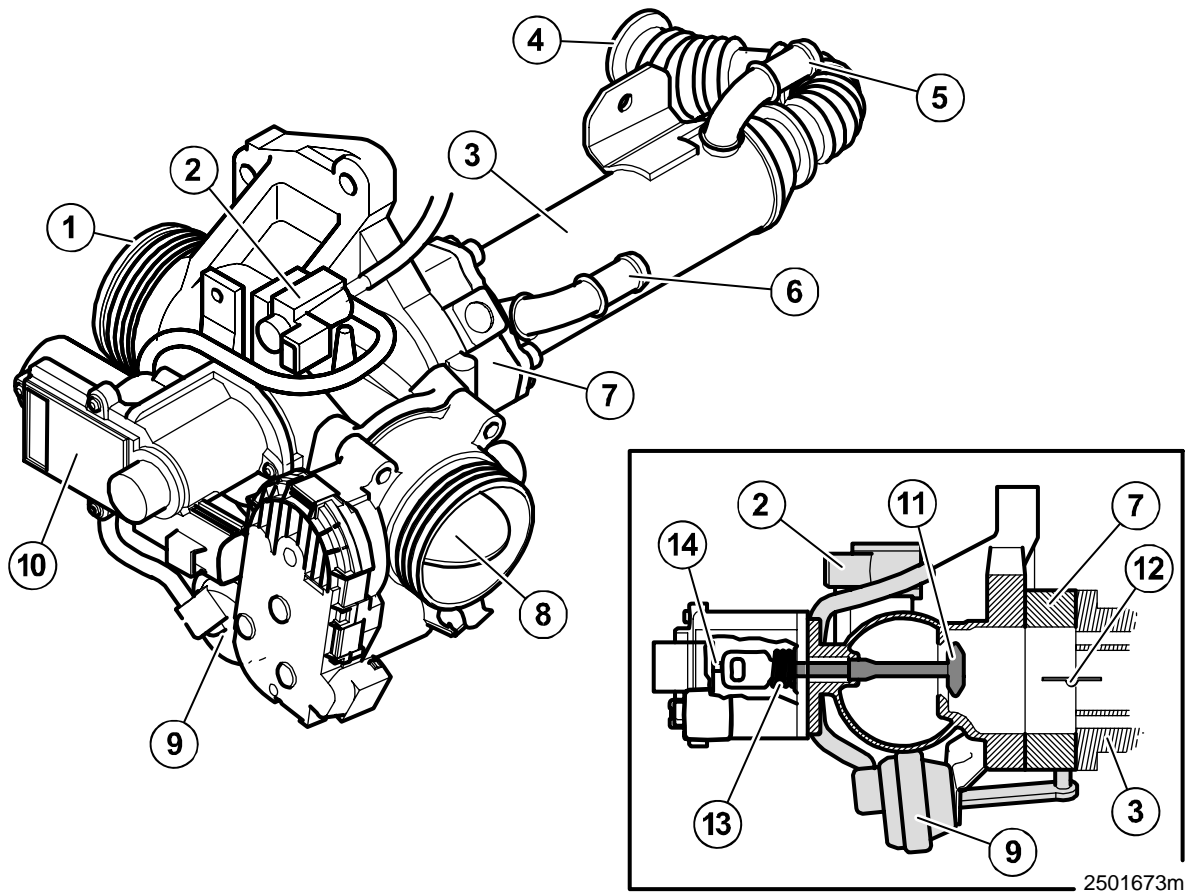
A temperature of approx. 1000°C is obtained after a second.

After the glow plugs have initially been supplied with power of 12 volts the voltage is reduced after a couple of seconds to approx. 9 volts. After a further few seconds the voltage is reduced further to 4.4 volts.

The ECM calculates when/how the glow plugs should be supplied with power. The voltage level is sent as a PWM signal to the glow plugs' relay. In turn the relay controls the glow plugs using a PWM signal.

The ECM calculates how the glow plugs should be controlled based primarily on engine speed, engine temperature, quantity of injected fuel (mass) and time.

***NOTE: The glow plugs must be connected to a maximum 4.4 volts. If the plugs are connected to a higher voltage then they could be destroyed.***



1	To intake manifold	8	Throttle body ETA
2	Vacuum valve/solenoid (only certain variants)	9	Vacuum box (located under the unit, only certain variants)
3	Exhaust gas recirculation (EGR) cooler	10	Control motor unit
4	Exhaust gas inlet to exhaust gas recirculation (EGR) cooler	11	Exhaust gas recirculation (EGR) valve
5	Coolant outlet	12	By-pass throttle
6	Coolant inlet	13	Return spring
7	Housing with throttle (throttle only certain variants)	14	Position sensor (hall sensor)

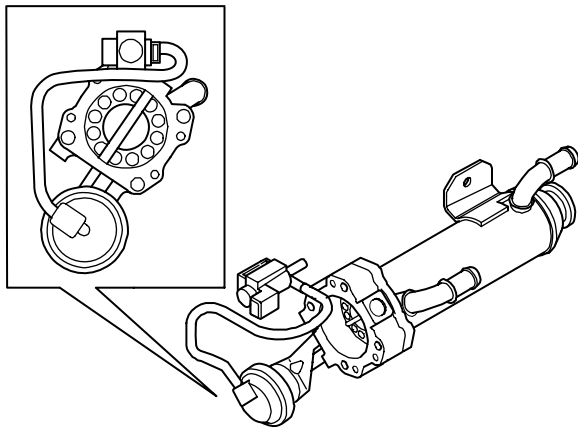
### Exhaust gas recirculation (EGR) system

Modifications compared with the D5244T/T2 are:

- The control motor unit with exhaust gas recirculation (EGR) valve is located on the engine's cold side i.e. in direct connection to the intake manifold. Provides a higher EGR flow with better cooling. A temperature reduction of up to 200°C can be achieved. In this way NOx emissions are reduced considerably
- The valve regulating the exhaust gas recirculation (EGR) flow only has one valve disc.
- The position of the valve is controlled by a direct current motor (previously solenoid).

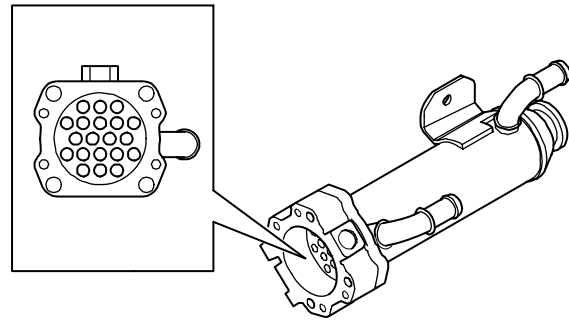


- The coolant flows against the exhaust gases (previously with the exhaust gases) for more efficient cooling.  
The pipes through which the exhaust gases pass are a modified design, round with spiral shape, for improved cooling capacity.
- Some variants have a by-pass throttle (12) located at the exhaust gas recirculation (EGR) cooler outlet for exhaust gases. During the engine's warm-up phase the throttle is open and the majority of the exhaust gases are directed to the intake manifold without being cooled. This raises the combustion temperature, which reduces the emissions.  
The throttle is closed at normal operating temperature and all exhaust gases pass through the cooler.



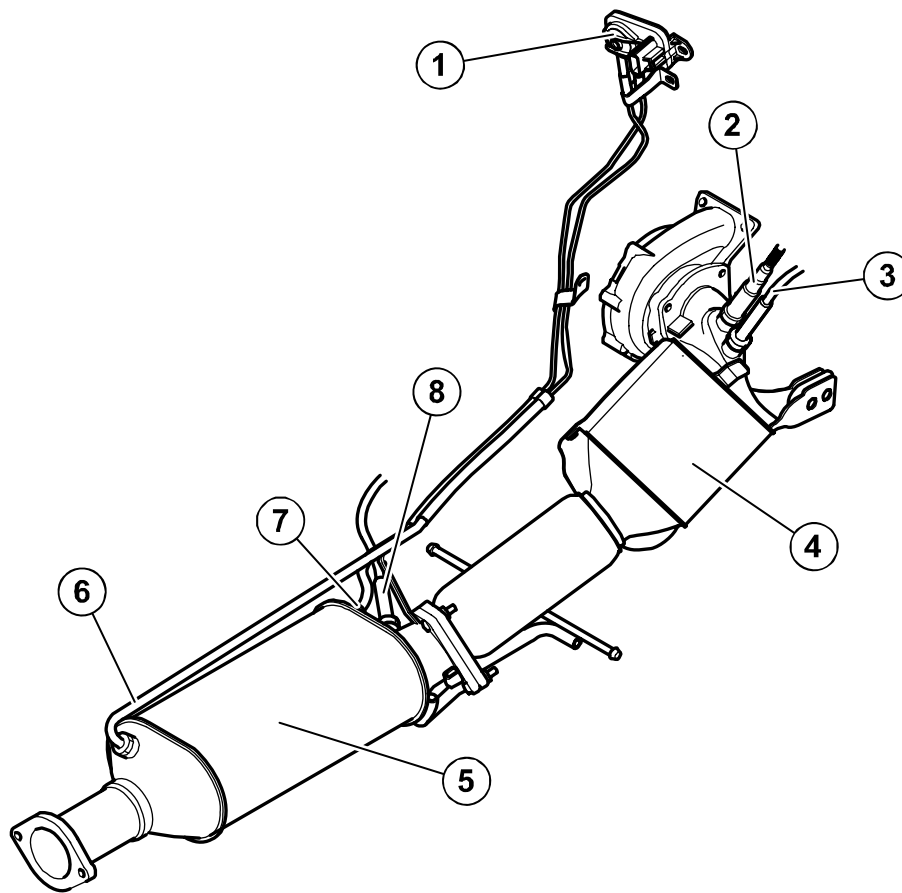
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*Exhaust gas recirculation (EGR) cooler with by-pass throttle. Here the throttle is closed and the exhaust gases pass the cooler through the outer pipes.*



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*Exhaust gas recirculation (EGR) cooler without by-pass throttle. The "whole" cooler is used for cooling.*



2501684m

1	Differential pressure sensor	5	Particle filter
2	Lambda-sond	5	Pipe
3	Temperature sensor, catalytic converter	6	Pipe
4	Catalytic converter	8	Temperature sensor, particle filter

### Particle filter

The engines are equipped with a system called cDPF (catalyst Diesel Particulate Filter).

The unit works partly as a particle filter and partly as an oxidation catalytic converter. This means that the emissions of particles as well as HC and CO are reduced.

The particle filter is made of porous silicon carbide coated with a washcoat (surface enlarger). The washcoat in turn is coated with a layer of precious metal. The precious metal works as a catalyst and oxidises CO and HC to CO<sub>2</sub> and water.

The particle filter section works for example as D4204T. I.e. the exhaust gases are forced through the filter's porous walls at which the particles attach to the walls.

A new filter traps approx. 70% of the particles, and a "slightly" used one more than 95% of the particles.

Burning clean the filter takes place without any additives.

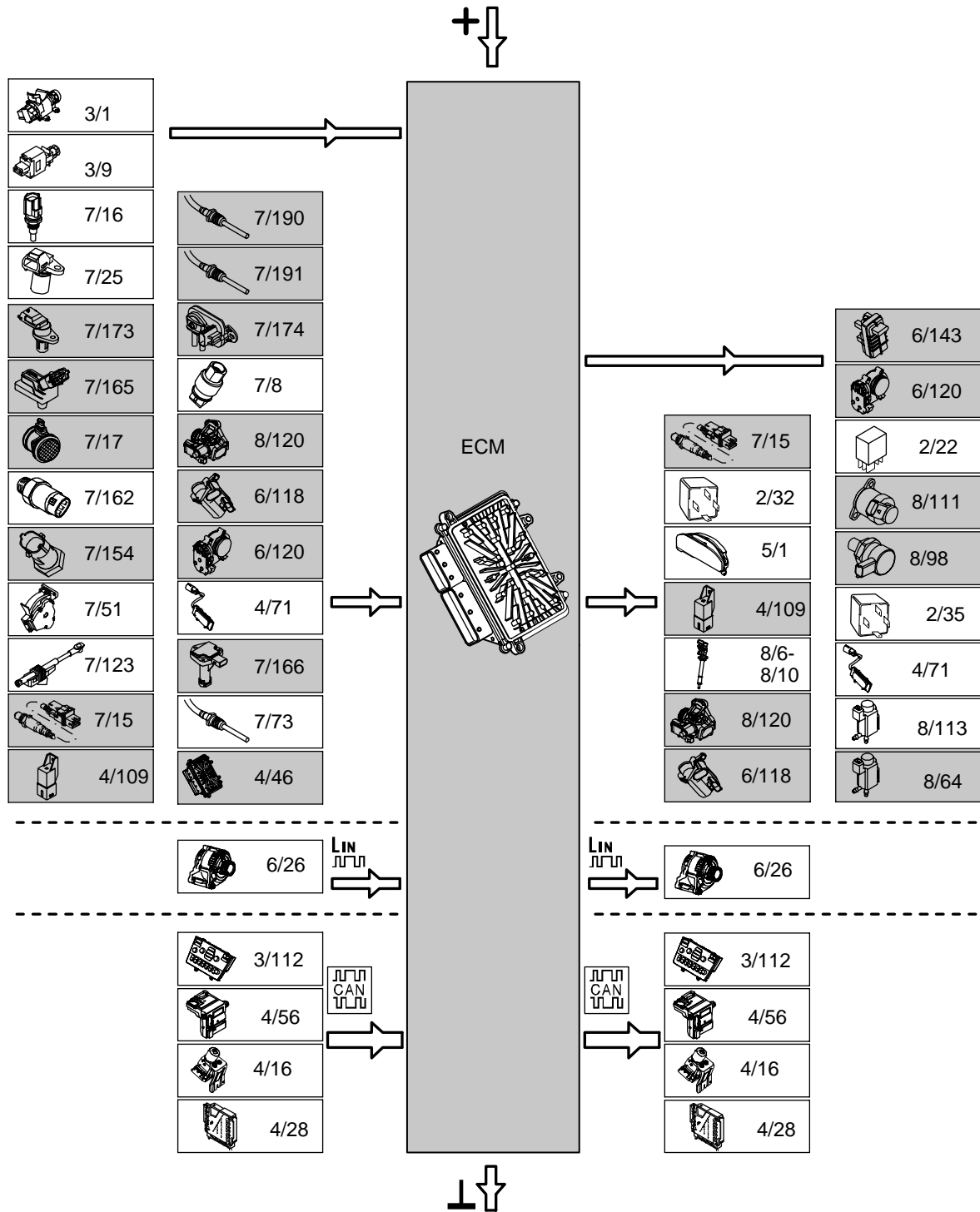
The particle filter has no replacement interval.

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**Notes**

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Signal description



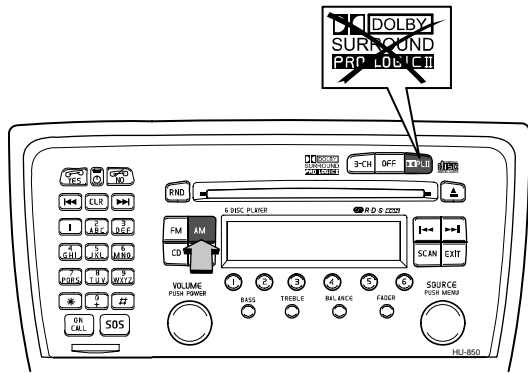
**Directly connected input signals**

<b>New / modified component / sensor compared with D5244T/T2</b>	
Camshaft position (CMP) sensor (7/173), (changed).	Modified signal characteristics. The ratio between high and low signal is changed.
Air temperature and pressure sensor inlet (boost pressure sensor) (7/165), (changed).	Change of location. Now on the charge air cooler (CAC).
Mass air flow (MAF) sensor with integrated air temperature sensor (7/17), (changed).	Changed signal characteristics. The values for mass and temperature are sent as two separate digital signals.
Fuel temperature sensor (7/154), (new).	The signal allows the ECM to compensate for the density of the fuel.
Lambda-sond (7/15), (new).	Used for more precise exhaust gas recirculation (EGR) control. The signal is linear.
Glow plug relay (4/109), (new).	The signal is used to diagnose the glow plugs.
Temperature sensor, catalytic converter (7/190), (new).	The signal is used to control regeneration.
Temperature sensor, particle filter (7/191), (new).	The signal is used to control regeneration.
Differential pressure sensor, particle filter (7/174), (new).	The signal is used to control regeneration.
EGR with position sensor (8/120), (new).	Provides information on the position of the exhaust gas recirculation (EGR) valve.
Control motor, swirl duct throttle (6/118), (new).	Provides information on the position of the throttles.
Throttle unit, inlet (6/120), (new).	Provides information on the position of the throttle (ETA). Only one feedback signal is used.
Oil level sensor (7/166), (new).	Used for the first time on a diesel engine. Both temperature and level signal are used.
Glow plug relay (4/109), (new).	Diagnostics signal.

**Directly connected output signals**

<b>New / modified component / sensor compared with D5244T/T2</b>	
Lambda-sond (7/15), (new).	Heating the sond.
Glow plug relay (4/109), (new).	Controlling the temperature of the glow plugs via the relay.
Injectors (8/6-8/10), (changed)	Injection takes place in the pre, main and post injection phases.
Exhaust gas recirculation (EGR) valve with position sensor (8/120), (new).	An electric motor controls the position of the exhaust gas recirculation (EGR) valve.
Control motor, swirl duct throttle (6/118), (new).	An electric motor controls the position of the throttles.
Turbocharger control motor (6/143), (new).	An electric motor controls the position of the guide rails. Provides more precise and rapid control of the turbocharger's guide rails.
Throttle unit, inlet (6/120), (new).	An electric motor controls the position of the throttle.
Fuel pressure control valve (8/98), (new).	The valve controls (lowers) the pressure in the fuel rail.
By-pass valve, exhaust gas recirculation (EGR) cooling (8/113), (new).	A vacuum valve controls the pressure in a vacuum box. The pressure in the box determines the position of the throttle.

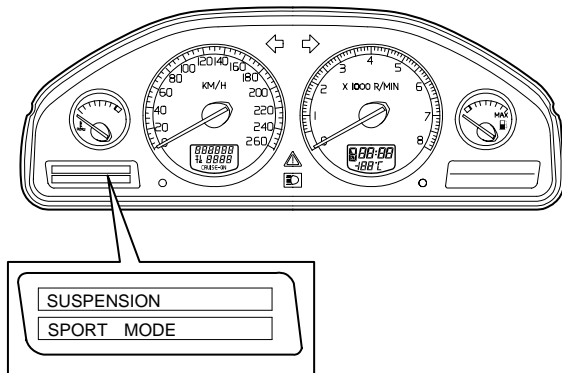
### Section 3, Electricity



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#### Audio

The Dolby Surround function is no longer available with AM reception.



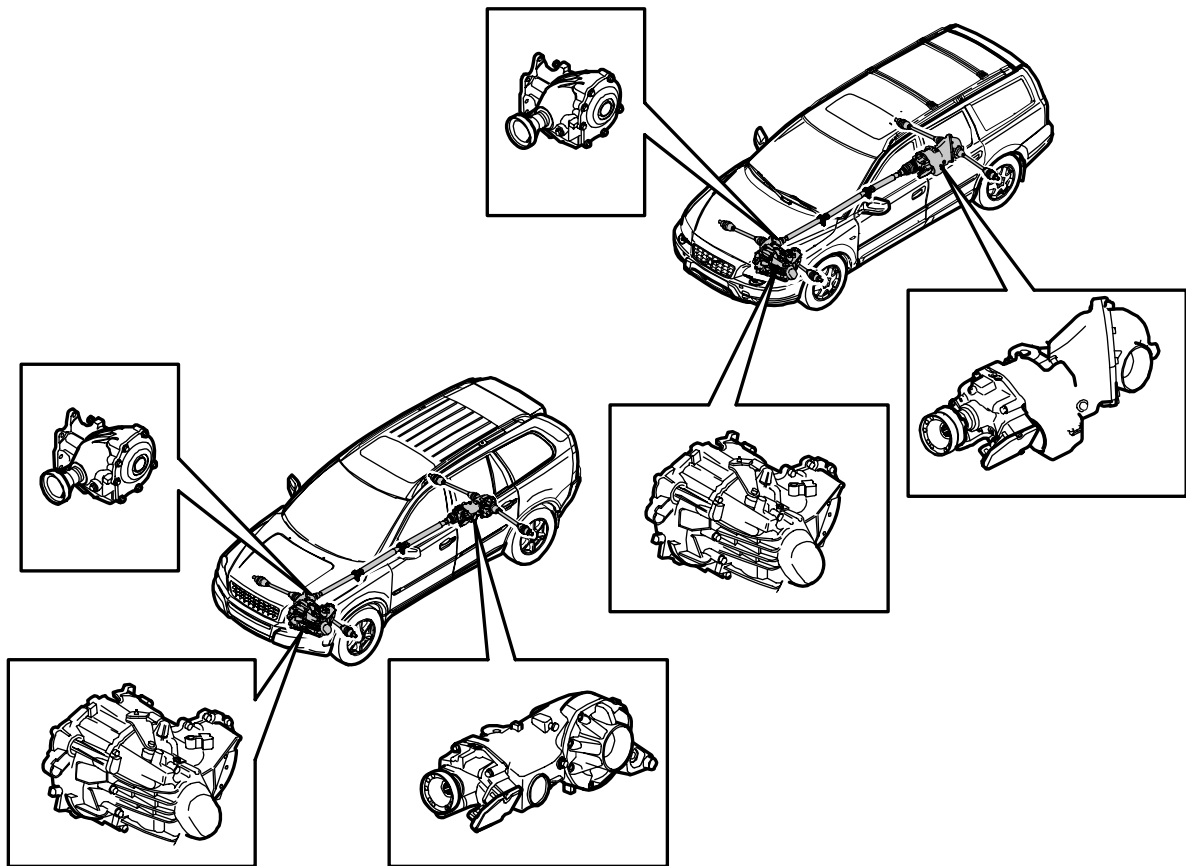
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#### Driver information module (DIM)

The 4-C system chassis setting is shown via a text message in the driver information module (DIM). Does not apply to R-cars.

**Notes**

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## Power transmission

### AWD XC90, V70, XC70

Power transmission components differ on AWD models with D5244T4/T5/T6/7 engine depending on car model.

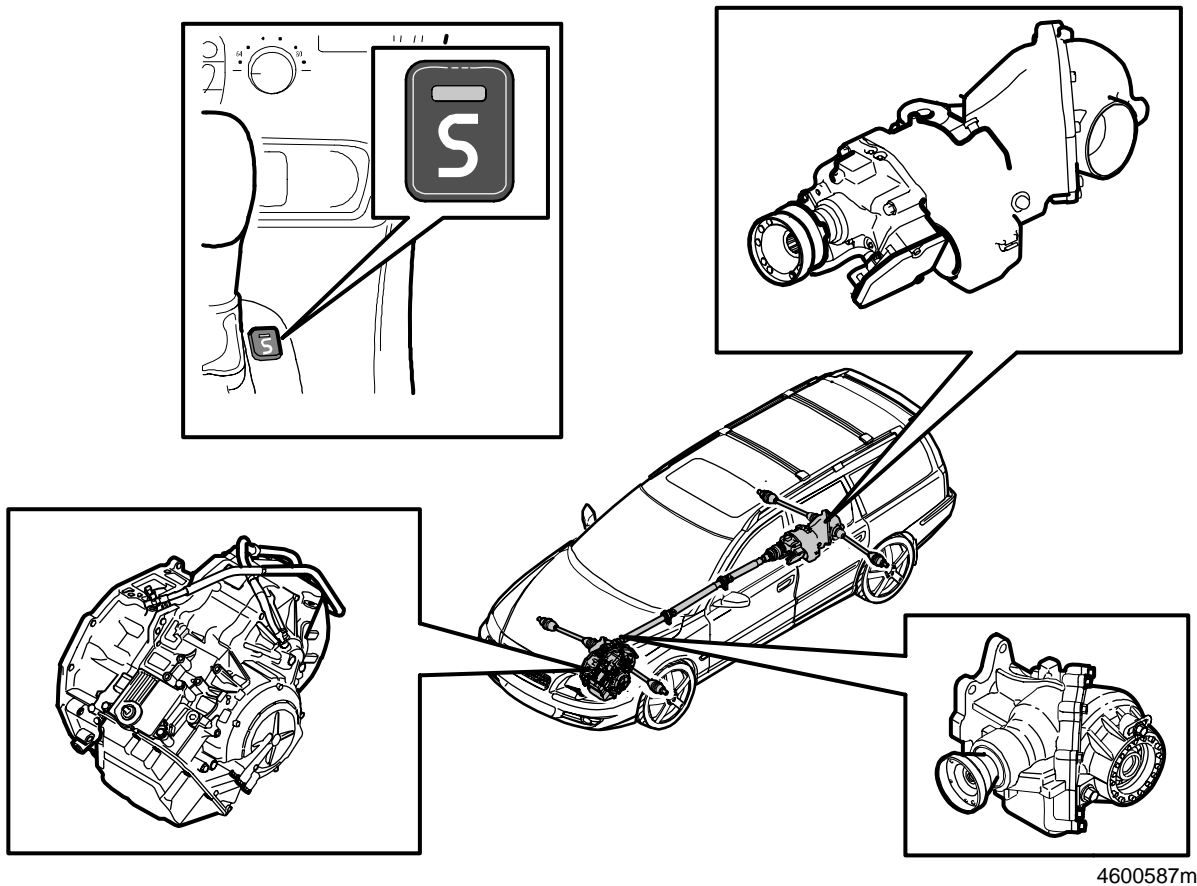
### XC90

- Torque transfer to the rear axle is limited to 1500 Nm.
- Bevel gear, propeller shaft and final drive/housing are the same type for B8444S.
- The gear ratio for the bevel gear is 1:2.58 and for the final drive 2.58:1.
- Different diagnostic systems for B8444S and D5244T4 mean that the DEM (differential electronic module) has different part numbers.



### **V70AWD and XC70**

- Torque transfer to the rear axle is limited to 1000 Nm.
- Bevel gear same as for the XC90. Gear ratio 1:2.58.
- Final drive housing unchanged as the XC90 housing is not accommodated in the subframe. The gear ratio is changed to 2.57:1. (gear set 2.58:1 not accommodated in the housing).
- The propeller shaft is adapted for modified bevel gear.
- The connecting sleeve between gearbox and bevel gear is changed from 45 splines to 47 splines.



## R-models

### *Gearbox TF-80SC*

The gearbox is different with regard to the following points compared with the version for B8444S:

- K-value 204 for the torque converter.
- The converter cover is adapted to suit the engine.
- The starter motor is located on the side of the engine.
- Sport mode is selected with a button.

In Sport mode the gear-changes are "sportier" i.e. gear-changing is harder and takes place later compared with "normal mode".

***Power transmission(in combination with gearbox TF-80SC)***

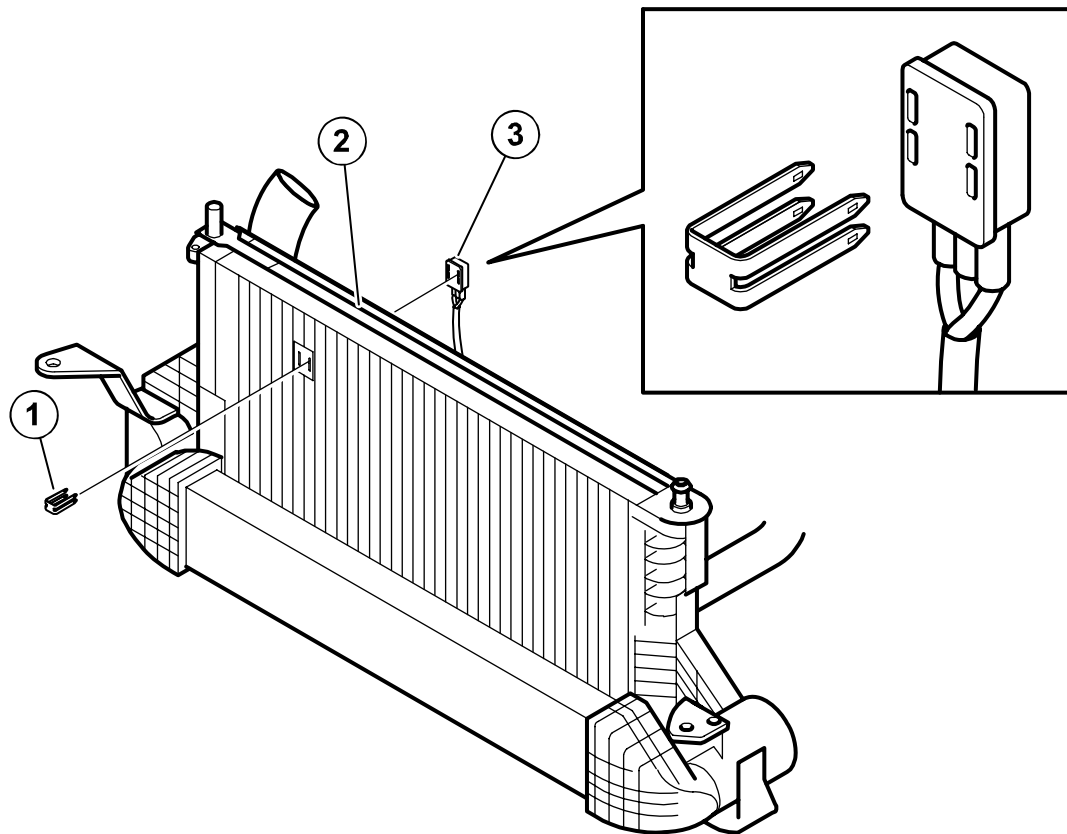
- Torque transfer to the rear axle is limited to 1000 Nm.
- Bevel gear housing and gear ratio (1:2.56) are unchanged.  
The connecting sleeve between gearbox and bevel gear is changed from 45 splines to 47 splines.
- Final drive housing unchanged i.e. the gear ratio is 2.56:1.

**All models with AWD**

Instant Traction is introduced on all models with AWD

(Note: S40, V50 remain with AWD systems without Instant Traction).

For further information see NCF 0446, Theoretical session AWD XC90 V8.



2600515m

1	Clamp for RATD unit	2	PremAir® radiator	3	RATD unit
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## S40/V50

### Diagnostic system for PremAir® radiator, B5244S7 engine (only California)

#### Background

A diagnostic system has been introduced on the PremAir® radiator in order to comply with legal requirements in the Californian market

The local authority CARB (California Air Resource Board) requires that the radiators fitted must be PremAir®-treated (DOR = Direct Ozone Reducing). For this reason cars with PremAir®-radiators have a diagnostic system that identifies that the correct type of radiator is installed. A warning decal is fitted by the radiator which advises of this.

**RATD (Radiator Anti Tampering Device)**

The RATD system is a diagnostic system designed to identify that a PremAir® treated radiator is installed in the car.

If the system is tampered with such as by means of removing the sensor from the radiator or replacing the radiator with another radiator then a diagnostic trouble code (DTC) is generated

To ensure that the correct radiator is installed during replacement, radiators with fitted RATD unit are only available as a complete spare part.

The RATD system communicates with the ECM via LIN.

*For fault tracing and handling diagnostic trouble codes (DTC), see VIDA*

**Autostart (USA only)**

Only with S40/V50 with B5254T3 engine and automatic transmission

**General**

- When the ignition key is turned to position III the ECM activates the starter motor via the starter motor relay.
- If the ignition key returns to ignition position II before the engine has started then the starter motor will continue to operate. The starter motor continues to operate until the engine starts or until a certain time has elapsed.
- How long the starter motor is allowed to operate is dependent on engine temperature:
  - Approx. -40 °C (-40 °F) up to 18 seconds.
  - Approx. -10 °C (14.36 °F) up to 8 seconds.
  - 0 °C (32 °F) up to 6 seconds.
  - 15 °C (59 °F) up to 4 seconds.
  - 90 °C (194 °F) up to 4 seconds.
- If the engine does not turn or if engine speed is low when the starter motor relay is activated, then the ECM will stop the activation of the starter motor relay.
- Starter motor activation is only allowed if:
  - the engine is not running (engine speed under a certain value).
  - the function for electronic immobiliser allows starting.
  - the gear selector lever is in the "P" or "N" position.
- The ECM receives a signal regarding the position of the gear selector lever from the TCM, both via the CAN network, and via a directly connected cable between the TCM and ECM.
- No function exists for activating the starter motor without time limitation.

## **Miscellaneous changes**

### **Engine B5254T3**

The catalytic converter has been modified to comply with the emission requirements of EURO 5. The cell density has been changed from 400 CPSI (cells per square inch) to 600 CPSI. The catalytic converter has ceramic monoliths. The size and counterpressure of the catalytic converter are the same as before.

### **Engine D4164T**

Following delays, the particle filter which was presented with NCF0446 (see NCF0446, Theoretical sessions, Motor D4164T) is being introduced.

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**Notes**

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## Accessories

### **S60, V70, XC70, 90**

#### **Protective cover for towbar**

##### **S60, V70 05- (excl. XC70 01-)**

- An attractively designed protective cover for concealing the mounting of the detachable tow ball

#### **Foot step, towbar US, CA**

##### **S60, V70 00-, XC70 01-, XC90**

- A useful accessory for reaching up to load a space box.
- Equipped with reflector.
- Anti-slip surface
- Acts as design element when ball is not mounted.
- Secured with lock pin.
- Made of aluminium, painted black.

#### **Cargo compartment wall, longitudinal XC90**

- A steel cargo compartment wall enables you to separate the cargo compartment longitudinally.
- Useful for dog owners.
- Wall is installed together with the protective grille.
- Same design as protective grille.
- Collapsible function in order to prevent injuries in the event of an impact.
- Grey colour

#### **Volvo Turn by Turn**

##### **S60, S80, V70, XC70**

- Different arrows are used to show the direction of the road and the next exit or junction. The status field may show the distance remaining and the estimated time of arrival.
- The information on the screen is complemented by various voice messages, such as *Turn right ahead* and *Turn right after 200 metres*.



**Aluminium wheel, Oreander 7 x 17'****XC70 06-**

- Rec. tyre size 215/60 R17

**Aluminium wheel, Nereus 7 x 18' Split****XC90**

- Rec. tyre size 235/60 R18

**Aluminium wheel, Echo 6.5 X 16'****S60, V70 00- , excl. XC70**

- Rec. tyre size 235/60 R18

**Aluminium wheel, Echo 6.5 X 16'****S60, V70 00- , excl. XC70**

- Rec. tyre size 205/55 R16

**Aluminium wheel, Phoenix Black Chrome 7 x 16'****S60, S80, V70 00-**

- Rec. tyre size
  - S80 215/55 R16 or 225/55 R16.
  - S60, V70 205/55 R16 or 215/55 R16

**Aluminium wheel, Cassiopeia 7.5 x 17'****S80, S60, V70 00-**

- Rec. tyre size
  - S80 225/50 R17
  - S60, V70 225/45 R17

**Aluminium wheel, Capella black chrome 8 x 18'****S80, S60, V70 00-**

- Rec. tyre size 235/40 R18

## **S40 and V50**

### **Cargo compartment wall, longitudinal V50**

- A steel cargo compartment wall enables you to separate the cargo compartment longitudinally.
- Useful for dog owners.
- Wall is installed together with the protective grille.
- Same design as protective grille.
- Collapsible function in order to prevent injuries in the event of an impact.
- Grey colour

### **Coin holder**

#### **S40, V50 06-**

- Practical storage of small change for parking machines.
- Detachable
- Covered with rubber on inside
- Located in the front cup holder in centre console

### **Cup holder, air intake**

#### **S40 04-, V50**

- An attractive and practical mug/cup holder
- Located outside the air blower
- Designed for aluminium cans or McDonalds cups & 0.5 litre PET bottles
- Easy to fit and remove

### **Cup holder**

#### **S40 04-, V50**

- Cup holder insert for two cups of different sizes.
- Ashtray or coin holder can be installed if required.

**Volvo Turn by Turn****S40, V50**

- Different arrows are used to show the direction of the road and the next exit or junction. The status field may show the distance remaining and the estimated time of arrival.
- The information on the screen is complemented by various voice messages, such as *Turn right ahead* and *Turn right after 200 metres*.

**Aluminium wheel, Crius 6.5 x 16'****S40 04-, V50**

- Rec. tyre size 205/55 R16

**Aluminium wheel, Cursa 6.5 x 16'****S40 04-, V50**

- Rec. tyre size 205/55 R16

**Aluminium wheel, Rana 6.5 x 16'****S40 04-, V50**

- Rec. tyre size 205/55 R16

**Aluminium wheel, Polished Scotia 7 x 17'****S40 04-, V50**

- Rec. tyre size 205/50 R17

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