



Audi TT RS with the 2.5L TFSI Engine



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Always check Technical Bulletins and the latest electronic service repair literature for information that may supersede any information included in this booklet.

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The Self-Study Program provides introductory information regarding the design and function of new models, automotive components, or technologies.

The Self-Study Program is not a Repair Manual!
All values given are intended as a guideline only.

For maintenance and repair work, always refer to current technical literature.

Reference



Note



Introduction

The original Audi TT, named after the legendary “Tourist Trophy” race in the United Kingdom, was a milestone in automotive design. The design followed pure geometry, with the central theme being a circle reflected in the wheel arches, roofline arches, and both the front and rear fascias of the vehicle.



TT_BodyShop_1

The production of the Audi TT RS involves the use of two factories. The Audi Space Frame (ASF) body is constructed in Ingolstadt, Germany, while final assembly is completed in Győr, Hungary.



TT_BodyShop_2



TT_BodyShop_3

The TT RS is clearly the flagship of the TT model series. The muscular sheet metal body, tautly curved surfaces, and sharp lines give an impression of sculpture in motion.

From the side, the 18-inch wheels, large brakes, and flared wheel openings of the TT RS instantly catch the eye. Matte aluminum door mirror covers are standard.



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The front of the TT RS features the Audi marque single frame grille. The insert is shiny black bounded with a matte aluminum finish. Large side air intakes with flared edges draw air into the engine compartment.

The left intake routes air to the transmission, while the right intake routes air to an auxiliary radiator. The turbocharger draws in air through the upper section of the grille while the intercooler sits behind the lower segment of the grille.

The front valance has been designed as a splitter, and when coupled with the rear spoiler, provides perfect aerodynamic balance.



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The headlight design is a distinguishing Audi characteristic. Xenon plus headlights, standard on the TT RS, are accentuated by daytime running lights comprised of 12 LEDs arranged in a straight line.



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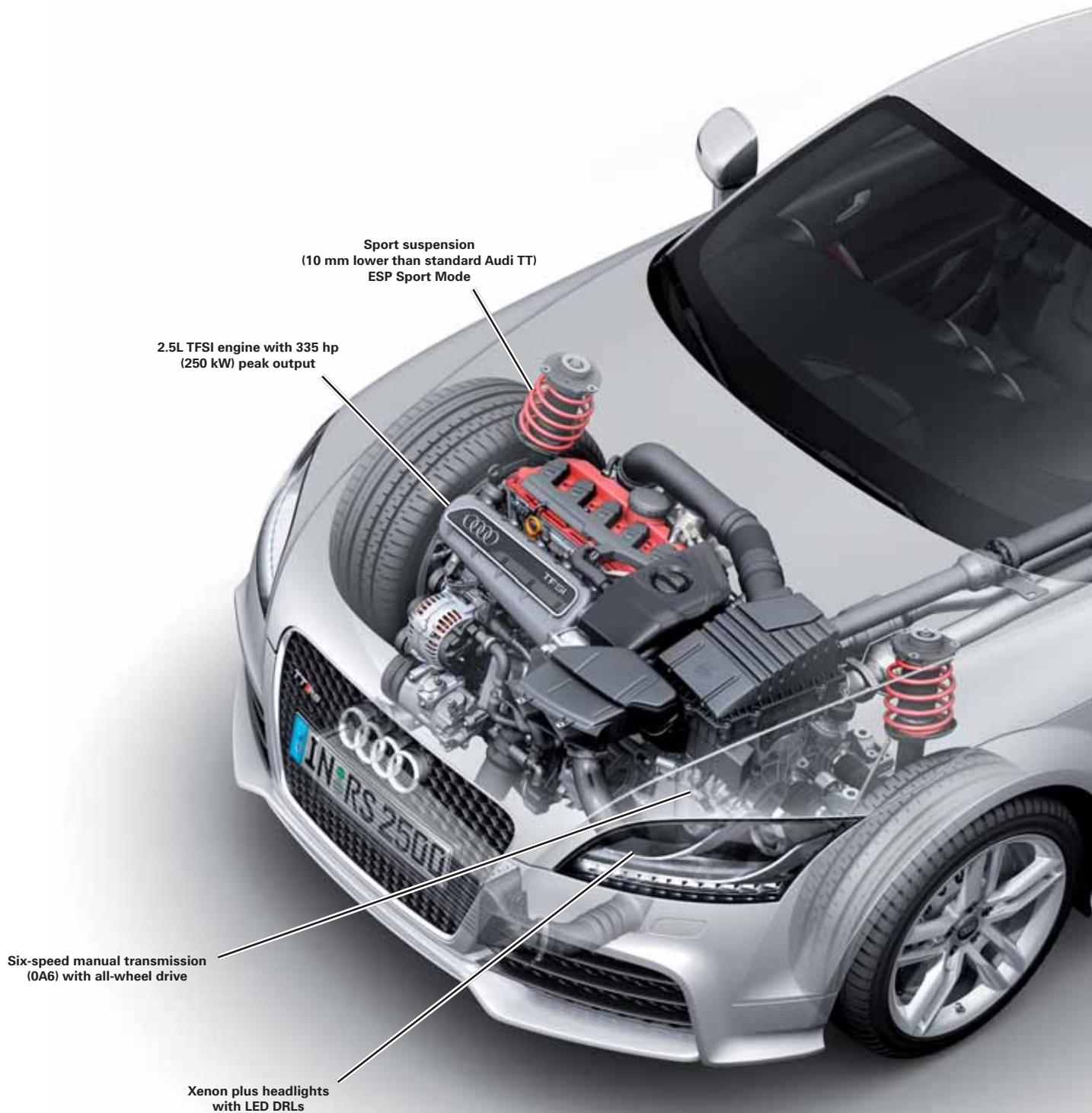
Rear View

The rear bumper includes an integrated diffuser insert that surrounds two large, oval tailpipes.

A wide, stationary spoiler increases downforce on the rear axle, improving stability at high speeds. The automatic spoiler featured on the standard production TT is available on the TT RS as an option.



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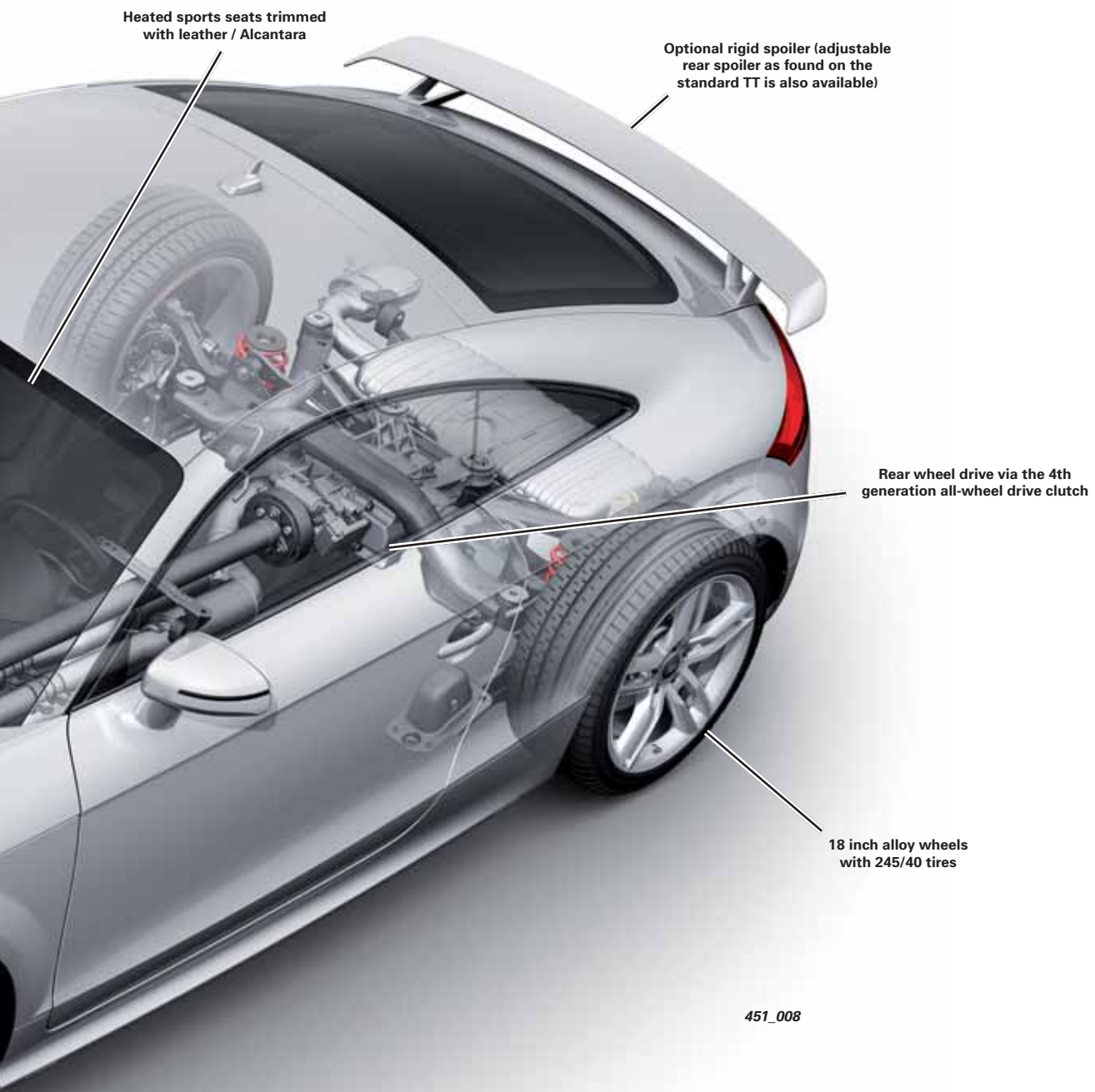


Sport suspension
(10 mm lower than standard Audi TT)
ESP Sport Mode

2.5L TFSI engine with 335 hp
(250 kW) peak output

Six-speed manual transmission
(0A6) with all-wheel drive

Xenon plus headlights
with LED DRLs



Heated sports seats trimmed with leather / Alcantara

Optional rigid spoiler (adjustable rear spoiler as found on the standard TT is also available)

Rear wheel drive via the 4th generation all-wheel drive clutch

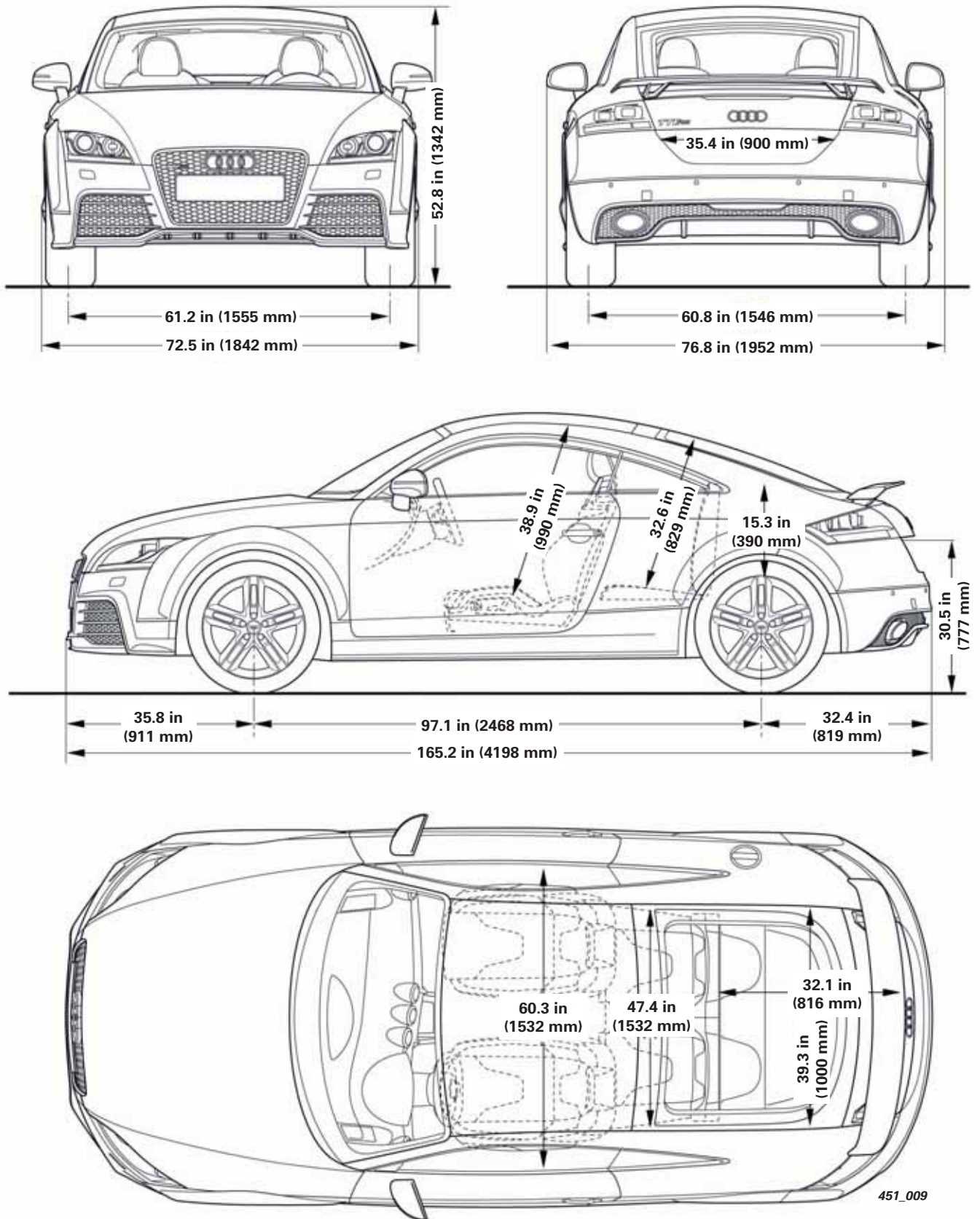
18 inch alloy wheels with 245/40 tires

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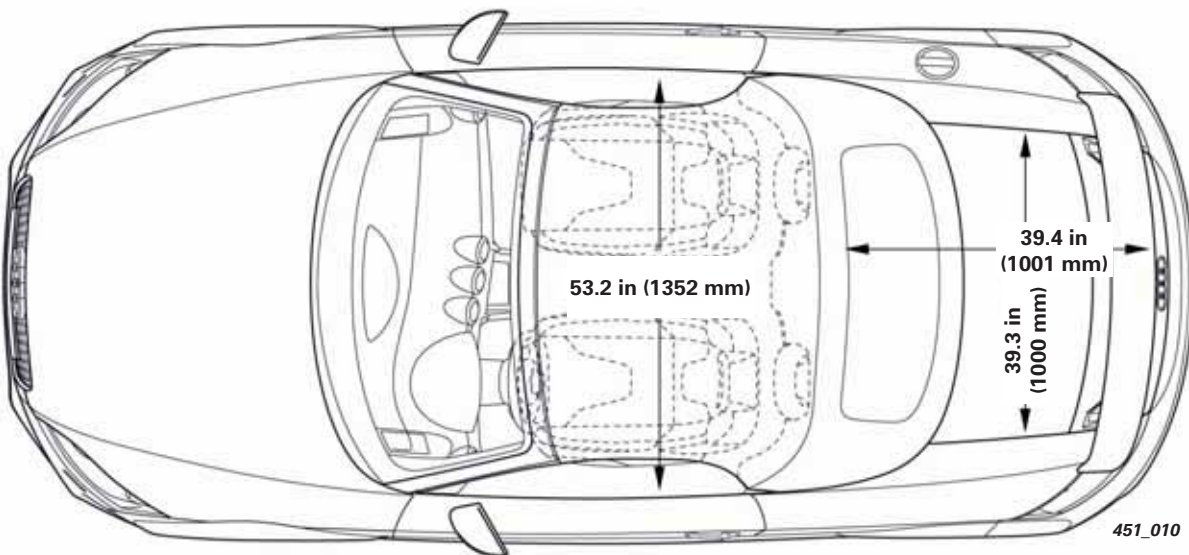
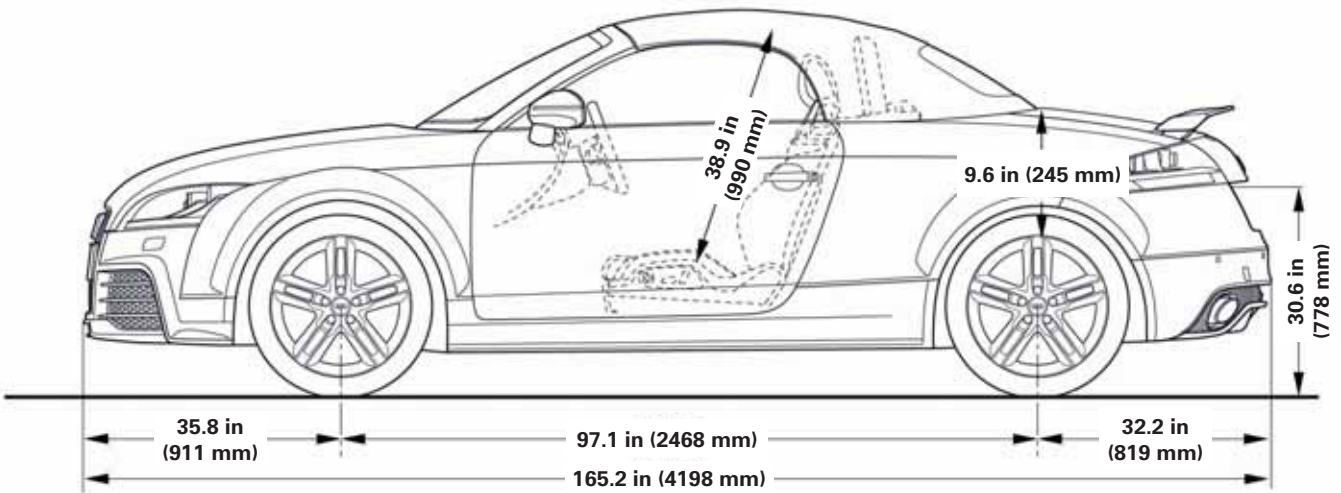
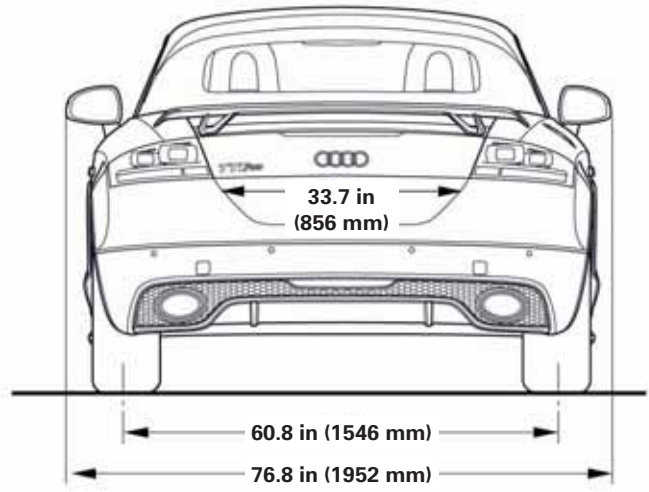
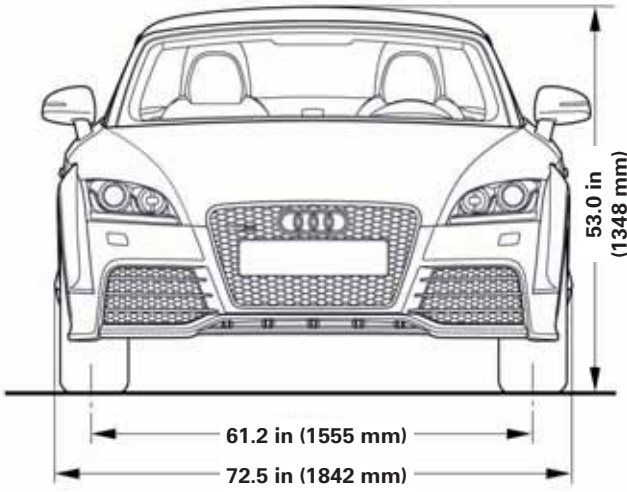
Body

Dimensions

Audi TT RS Coupe

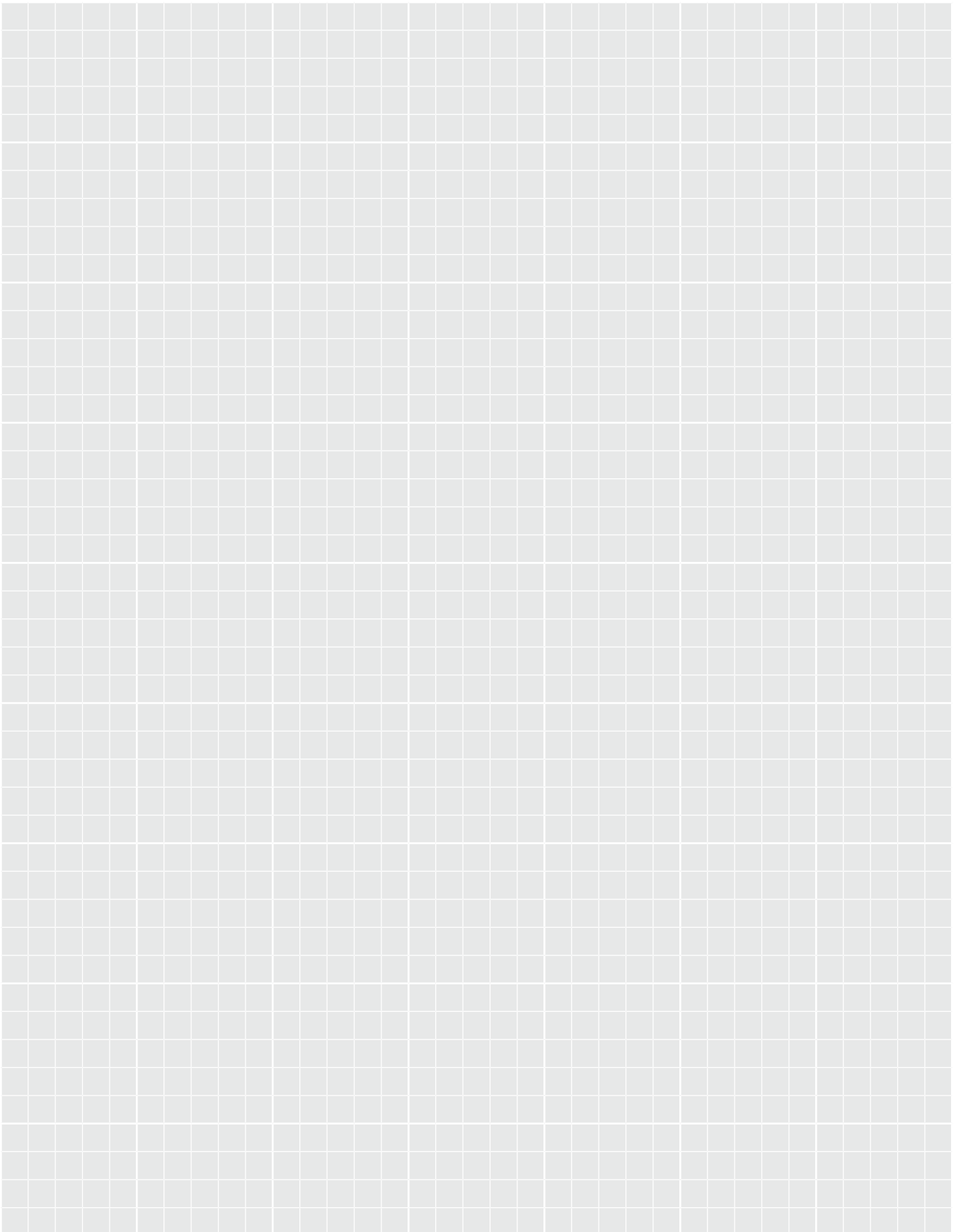


Audi TT RS Roadster



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	Coupe	Roadster
Curb weight	3196.6 lb (1450 kg)	3328.9 lb (1510 kg)
Maximum gross weight	4034.4 lb (1830 kg)	4034.4 lb (1830 kg)
Luggage capacity (seats folded down)	10.2 cu ft / 24.7 cu ft (290 liter / 700 liter)	8.8 cu ft (250 liter)
Fuel tank capacity	15.8 gal (60 liter)	15.8 gal (60 liter)
Drag coefficient	0.32	0.34



Audi Space Frame

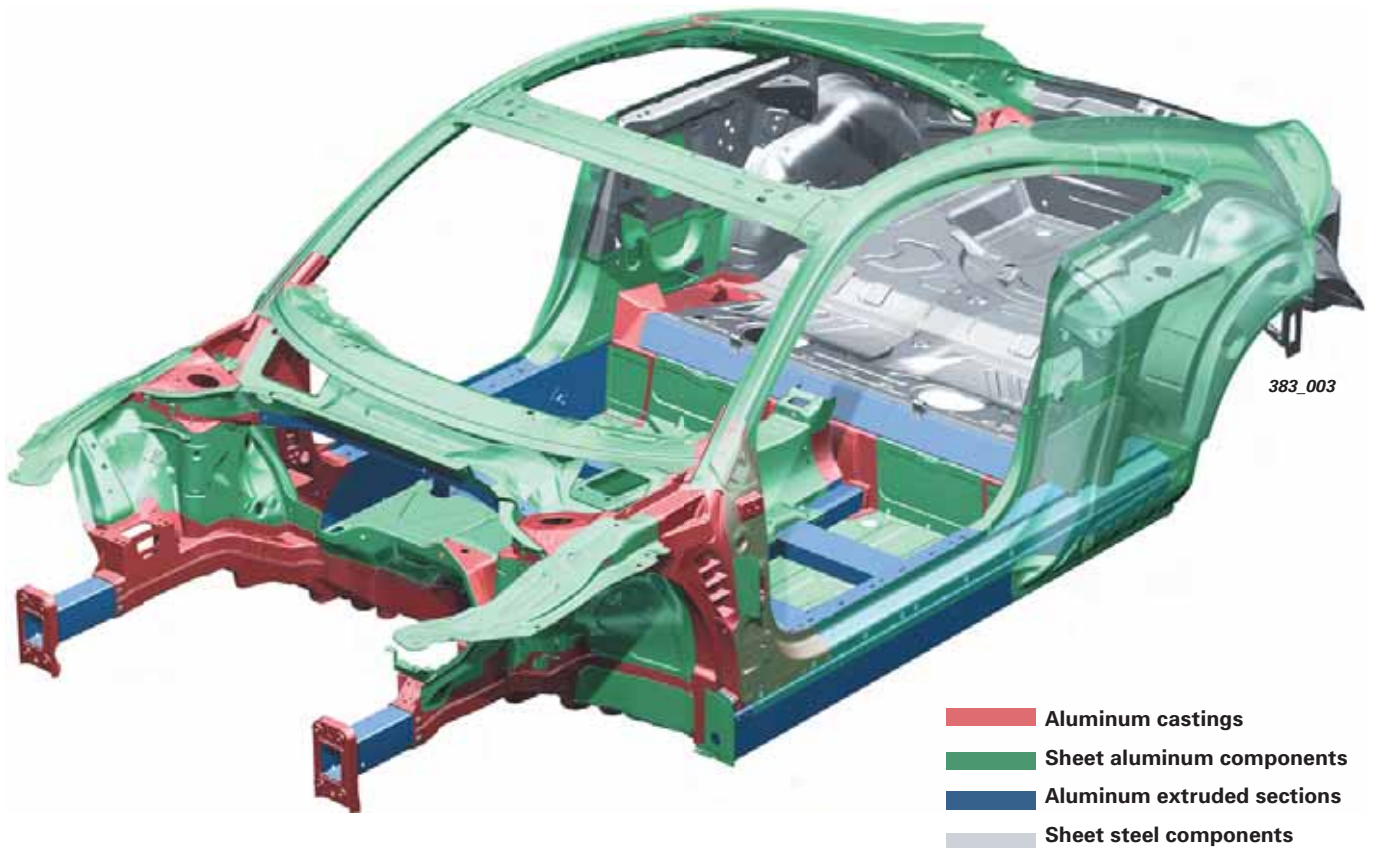
Technical Design

The hybrid Audi Space Frame (ASF) first used in the 2008 TT is also used in the TT RS Coupe and TT RS Roadster.

Sheet steel and aluminum sheet metal components, aluminum castings, and aluminum extruded sections form the TT RS body structure.

Vehicle weight distribution is optimized by using sheet steel components in the rear fascia, improving driving dynamics and acceleration.

TT RS Coupe



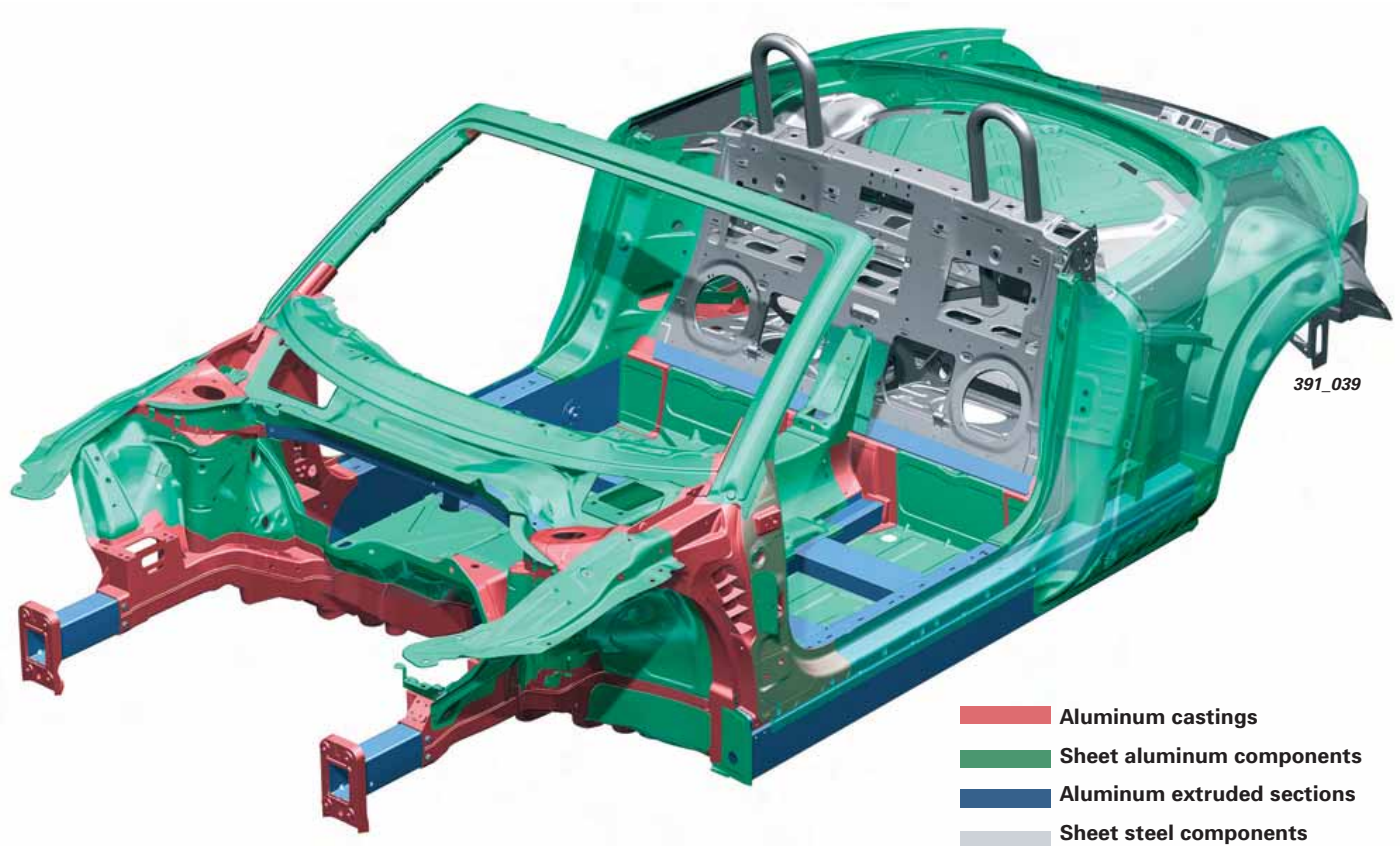
Reference

For more information about the Audi Space Frame used in the Audi TT Coupe, refer to Self-Study Program 994703, *The 2008 Audi TT Body*.

This ASF hybrid design guarantees maximum rigidity and a balanced distribution of axle loads.

The body shell of the Coupe weighs 454.1 lb (206 kg), while the body of the Roadster weighs in at 553.3 lb (251 kg). Roadster weight is slightly higher due to extra reinforcement.

TT RS Roadster



Reference

For more information about the Audi Space Frame used in the Audi TT Roadster, refer to Self-Study Program 995703, *The 2008 Audi TT Roadster*.

2.5L TFSI Engine

Introduction

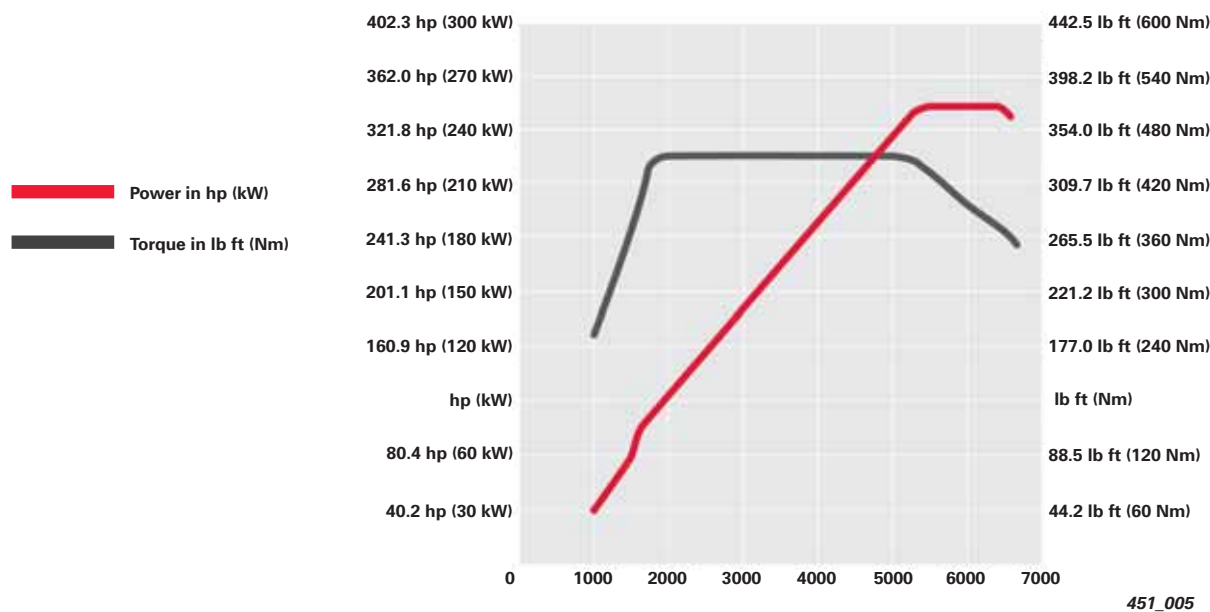
Audi's five-cylinder engines of the 1980s were powerful, sporty engines that reinforced the brand's "Vorsprung durch Technik" commitment.

These five-cylinder engines combined the efficiency of a four-cylinder with the power of a six-cylinder, resulting in lighter and more compact engine packages. A turbocharged version was a sensation.



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Specifications



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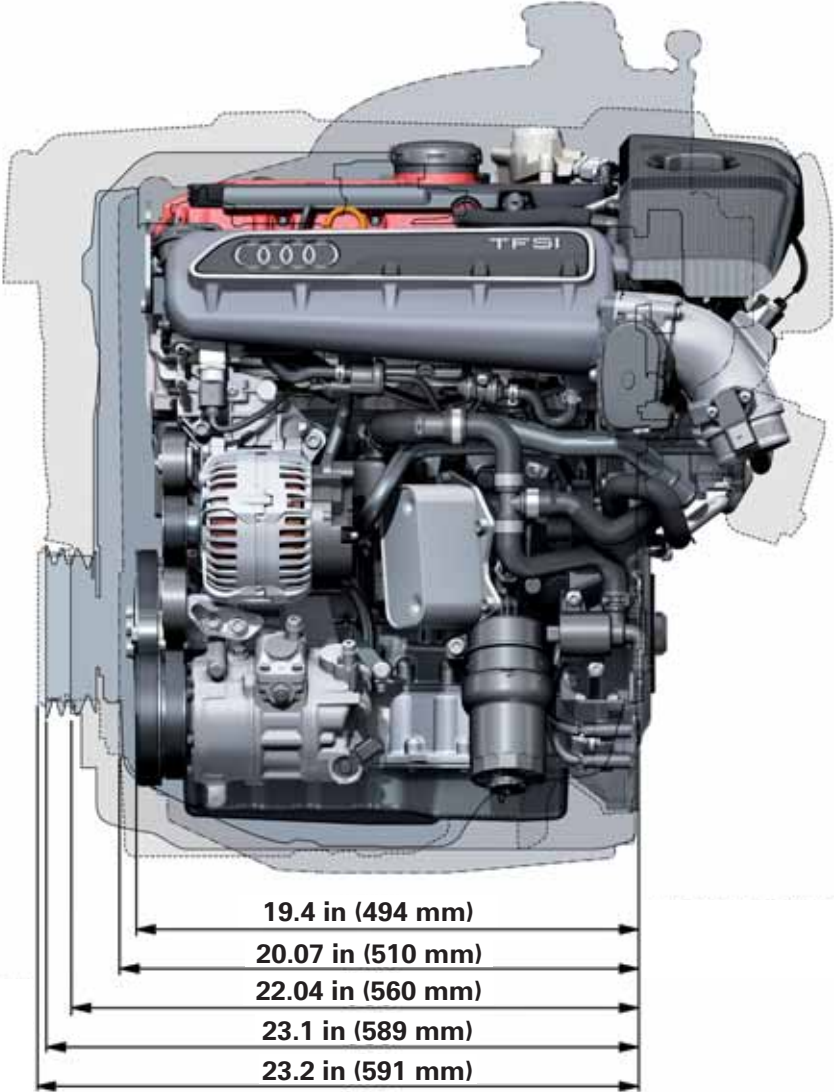
Engine Code	CEPA
Engine type	Five-cylinder inline engine
Displacement	151.3 cu in (2480 cc)
Maximum power	335.2 hp (250 kW) @ 5400–6500 rpm
Maximum torque	331.9 lb ft (450 Nm) @ 1600–5300 rpm
Valves per cylinder	4
Bore	3.24 in (82.5 mm)
Stroke	3.65 in (92.8 mm)
Compression ratio	10 : 1
Firing order	1-2-4-5-3
Fuel system	FSI (homogeneous) direct injection with demand-based high and low fuel pressure regulation Engine management without an air mass meter
Fuel grade	91 AKI
Engine weight	403.4 lb (183 kg)
Engine management	Bosch MED 9.1.2
Exhaust emission standard	LEV II
Emissions control	Sensors upstream and downstream of the catalytic converter

Cylinder Block

Because of its very short overall length, this engine lends itself very well to transverse mounting.



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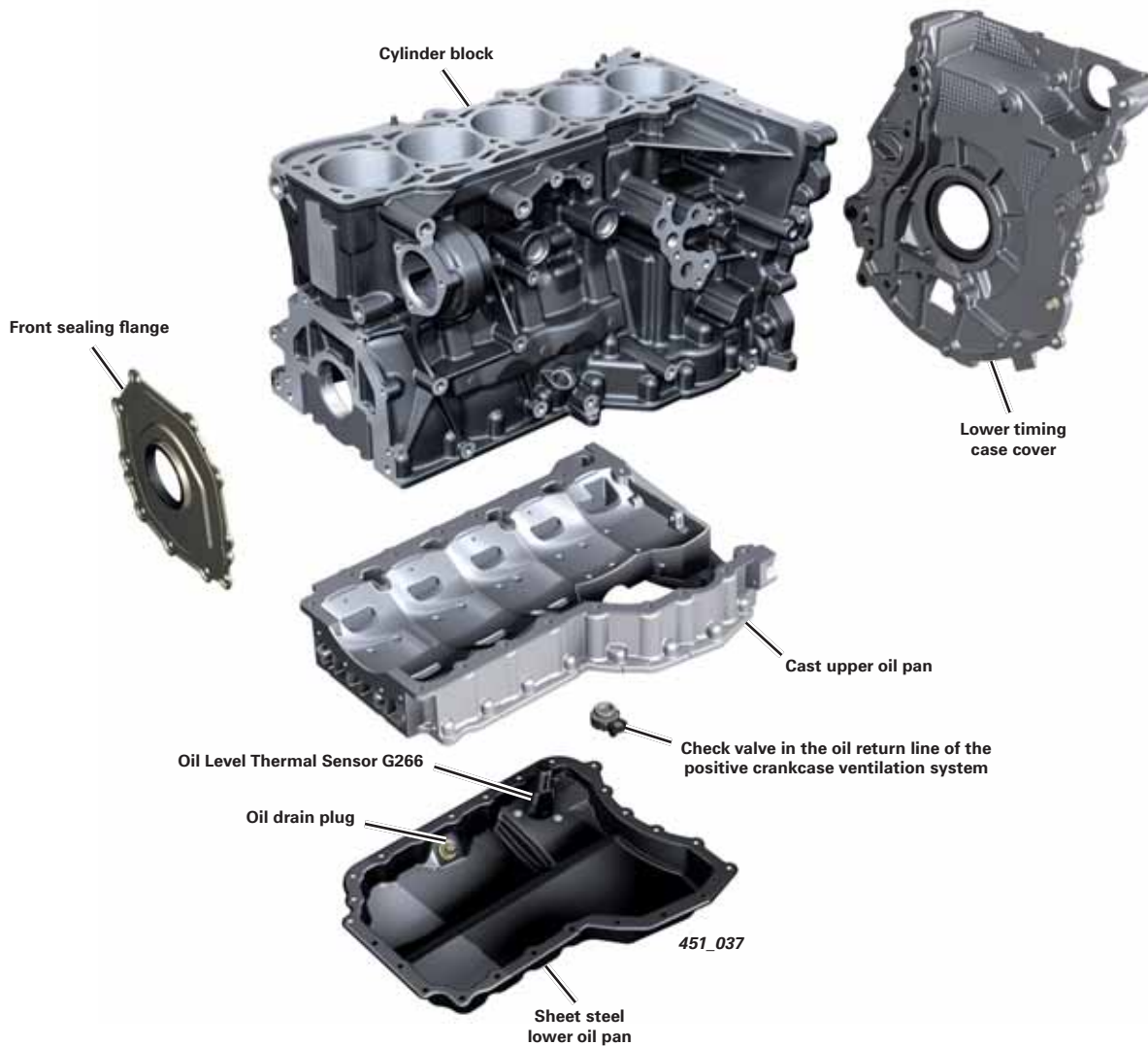


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Material Selection

The cylinder block is made from high tensile strength cast iron. The strength of this material is needed because the connecting rod bearings and main bearings have relatively small widths.

Piston cooling jets are mounted in the cylinder block.



Oil Pan

The oil pan is constructed from two parts. The cast upper part acts as a baffle plate and is bolted to the crankcase. This upper part supports the oil pump, which is bolted to the cylinder block.

The lower part of the oil pan is made from sheet steel. It houses Oil Level Thermal Sensor G266 and the drain plug.

Both the front sealing flange and lower timing case cover are sealed against the cylinder block by a liquid sealant.



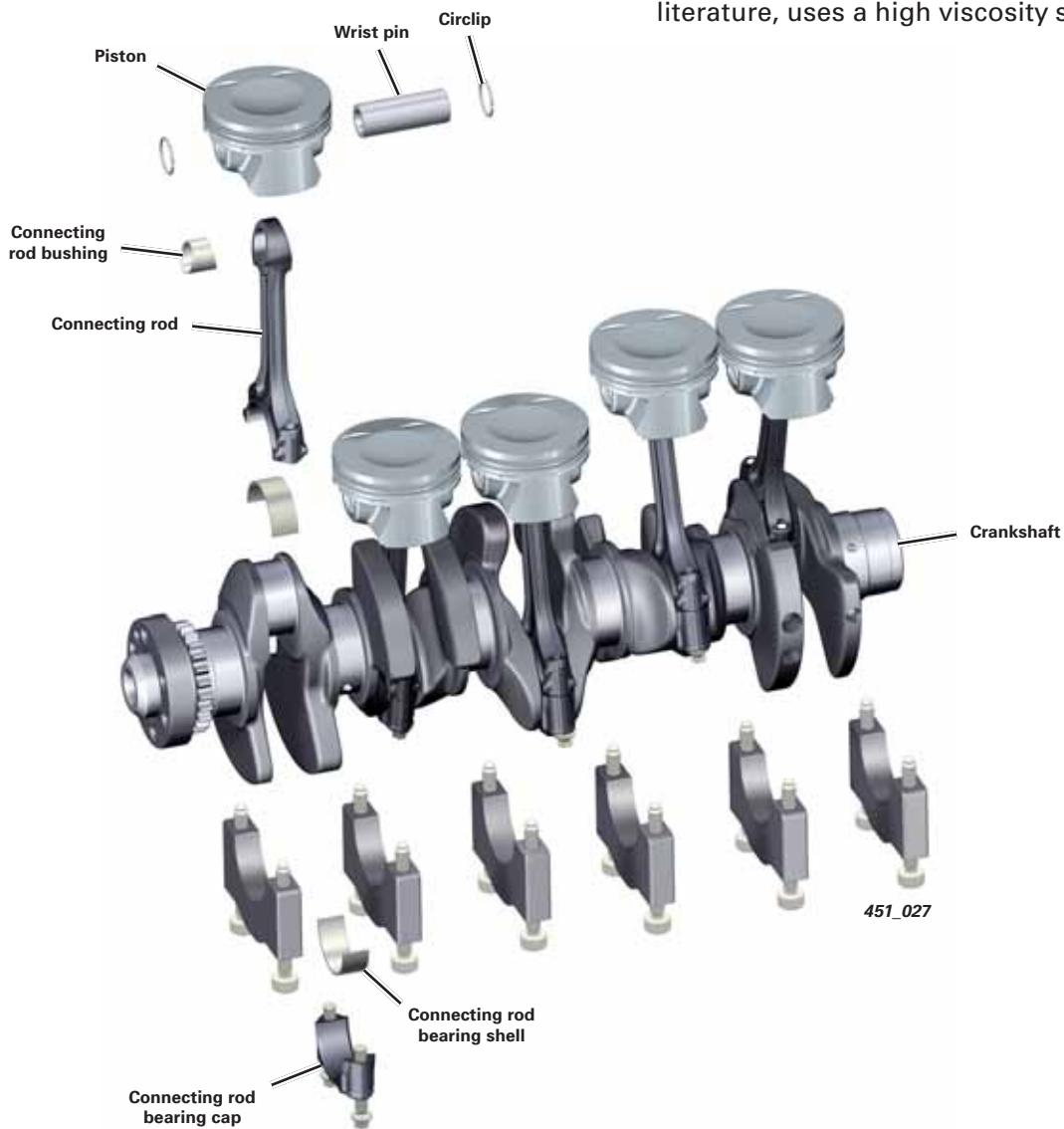
Note

The liquid sealants using during engine assembly and repair are specifically designated for various components. Always check the latest technical literature and ETKA for correct application and part numbers.

Crankshaft Drive

The forged steel crankshaft is supported by six main bearings.

A torsional vibration damper reduces radial vibration by the pistons and crankshaft. The damper, referred to as a viscodamper in repair literature, uses a high viscosity silicone.



Specifications

Center-to-center distance between cylinders	3.46 in (88 mm)
Block height	8.66 in (220 mm)
Connecting rod length	5.66 in (144 mm)
Crankshaft main bearings	6
Main bearing diameter	2.28 in (58 mm)
Connecting rod bearing diameter	1.88 in (47.8 mm)

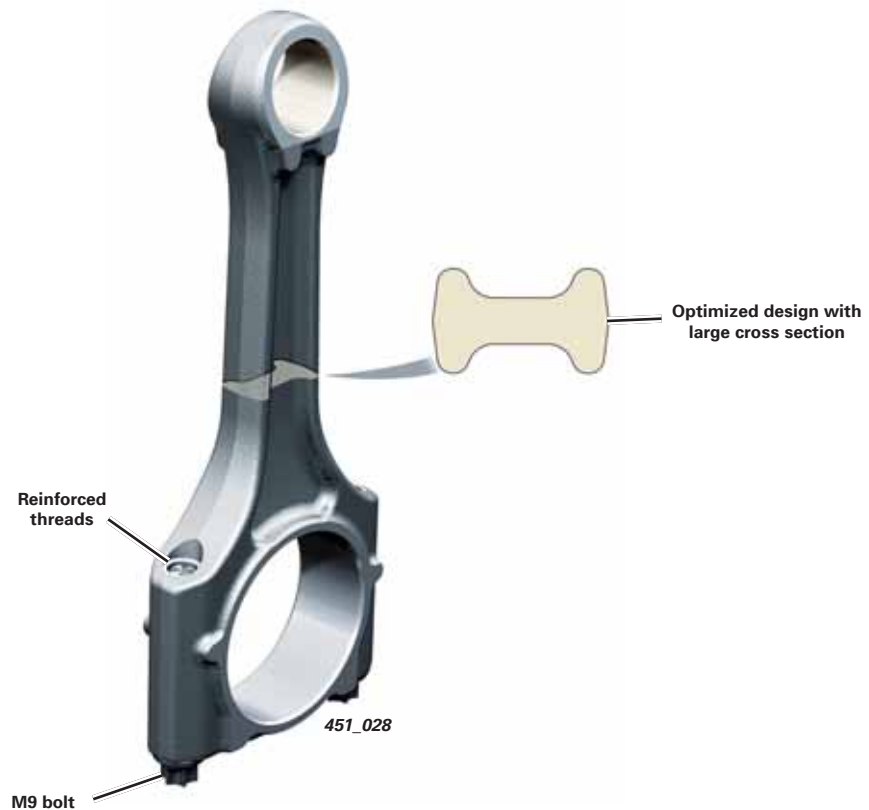
Pistons and Connecting Rods

To better respond to high loads, the pistons are a "boxed" design. They have an asymmetrical skirt with beveled box walls on the thrust and counter-thrust sides. They are manufactured from a high heat resistant alloy and have cast-in ring lands for the upper piston ring. Lower weight and low oil consumption characteristics were designed into these pistons.



*PVD = Physical Vapor Deposition is a coating process in which the coating material is physically vapor-deposited (by kinetic or impact energy) on a material in a vacuum environment.

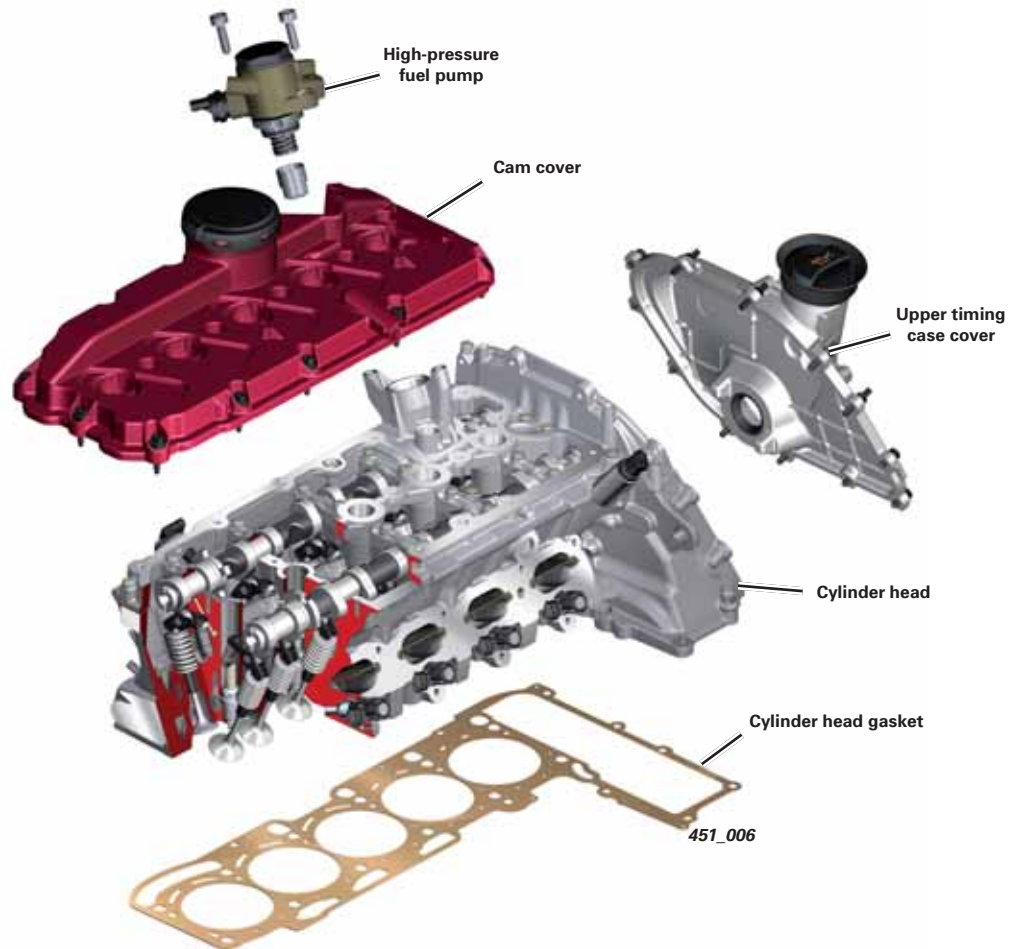
**Top-beveled oil control ring with coil expander



Cylinder Head

The cylinder head is from the 2.5L 5-cylinder VW engine, but to withstand the higher stresses of a turbocharged engine, it was necessary to make the following modifications:

- Different aluminum casting alloy
- Lower-set water jacket around the spark plug
- Tempered exhaust valve seats
- Attachment of a high-pressure pump to the ladder frame
- Optimized exhaust cam contour
- Addition of an exhaust cam adjuster
- Sodium-filled exhaust valves for cooling
- Turbo-specific intake port (to produce the required tumble air flow in the combustion chamber)



Specifications

Intake valve diameter	1.33 in (33.85 mm)
Exhaust valve diameter	1.10 in (28 mm)
Intake valve lift	0.42 in (10.7 mm)
Exhaust valve lift	0.39 in (10 mm)
Intake camshaft adjustment range crank angle	42°
Exhaust camshaft adjustment range crank angle	42°

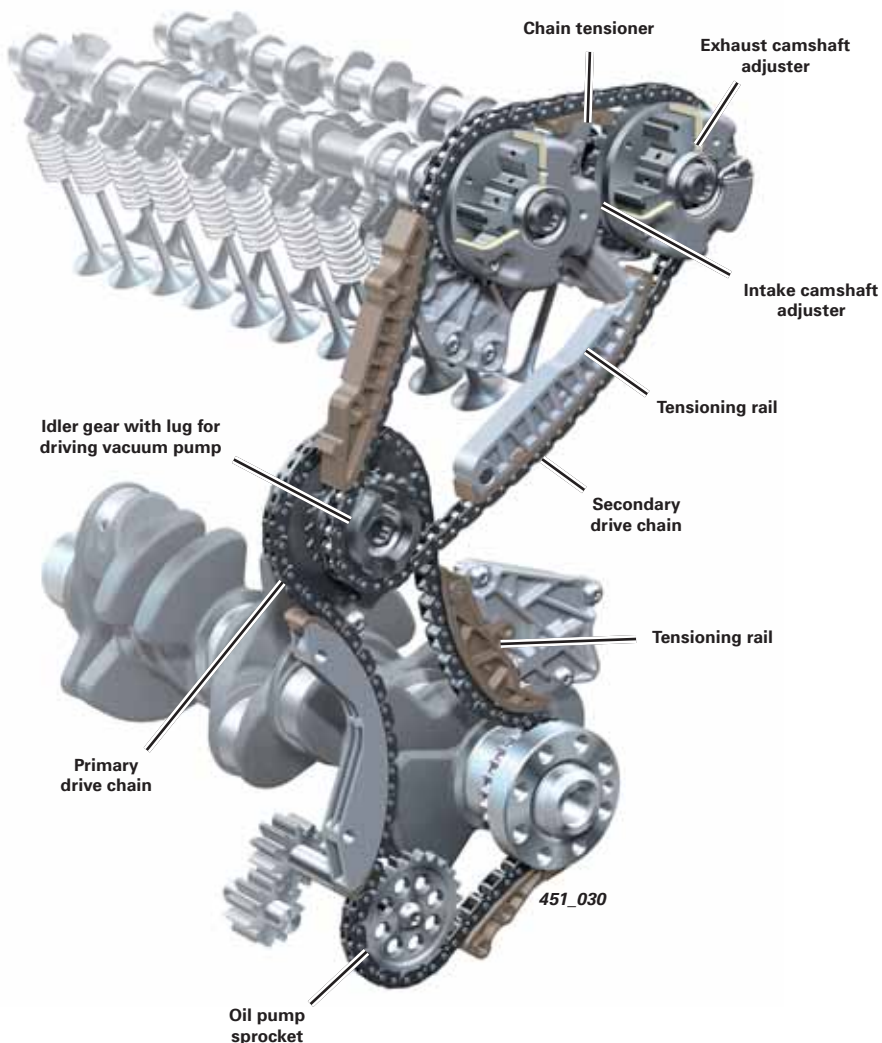
Chain Drive

The camshaft gears are located on the transmission side of the engine. The drive system is a two-stage arrangement using two different chain types.

In the first stage of the chain drive, the oil pump and primary drive gear are driven by the crankshaft. Attached to the primary drive gear is the idler gear, which serves two purposes. It drives both camshafts via the second chain, and also provides a drive lug for operation of the external vacuum pump.

A 3/8" gear chain is used in the primary drive train to drive the oil pump and idler gear. It is similar in design to the chain in the 2.0L R4 TFSI engine and offers acoustic advantages over a roller chain. A 3/8" roller chain is used in the secondary drive.

The entire chain drive is lubricated by the oil returning from both camshaft adjusters and by a bore in the high pressure chamber of the chain tensioner in the secondary drive. There is no replacement interval for the chain drive.



Note

Always replace timing case cover seals after performing work on the chain drive. Refer to current technical literature for specifications.

Oil Supply

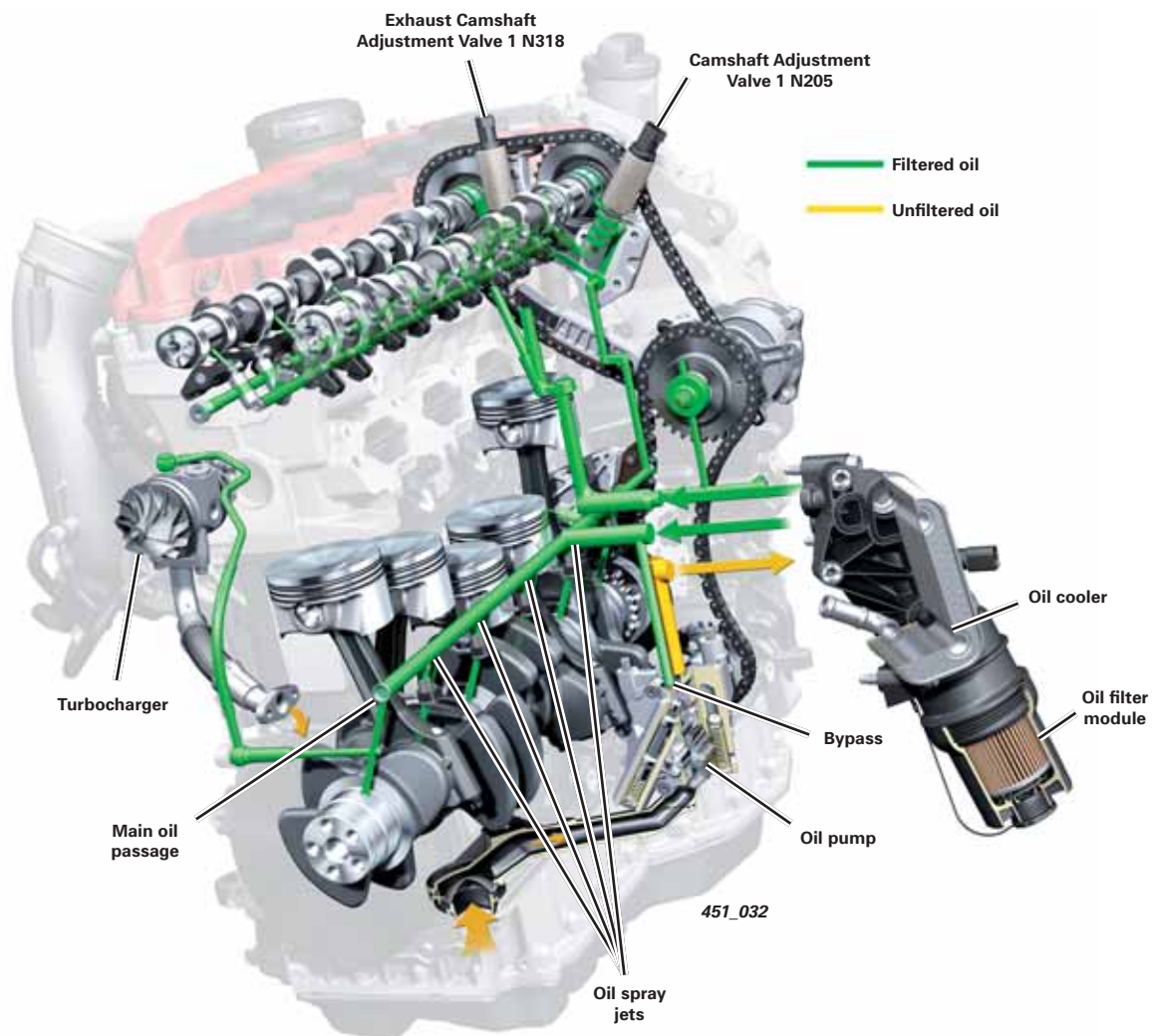
High longitudinal and transverse acceleration forces are to be expected when driving a sport vehicle of this type. Because of this, the engine lubrication system has been designed to function reliably even in extreme driving conditions.

The initial oil fill capacity of approximately 7.3 qt (7.0 liter) is relatively high. In addition, the oil pump intake is designed and installed to protect against air induction under high longitudinal and transverse acceleration forces.

Oil Circulation System

A self-regulating oil pump circulates unfiltered oil from the oil pan through the oil filter module and then through the oil cooler. The filtered oil flows through passages to the lubrication points.

The oil cooler and filter are housed in a single module mounted to the cylinder block. Oil check valves for the cylinder block and cylinder head, as well as an oil cooler bypass valve, are also integrated into the module.



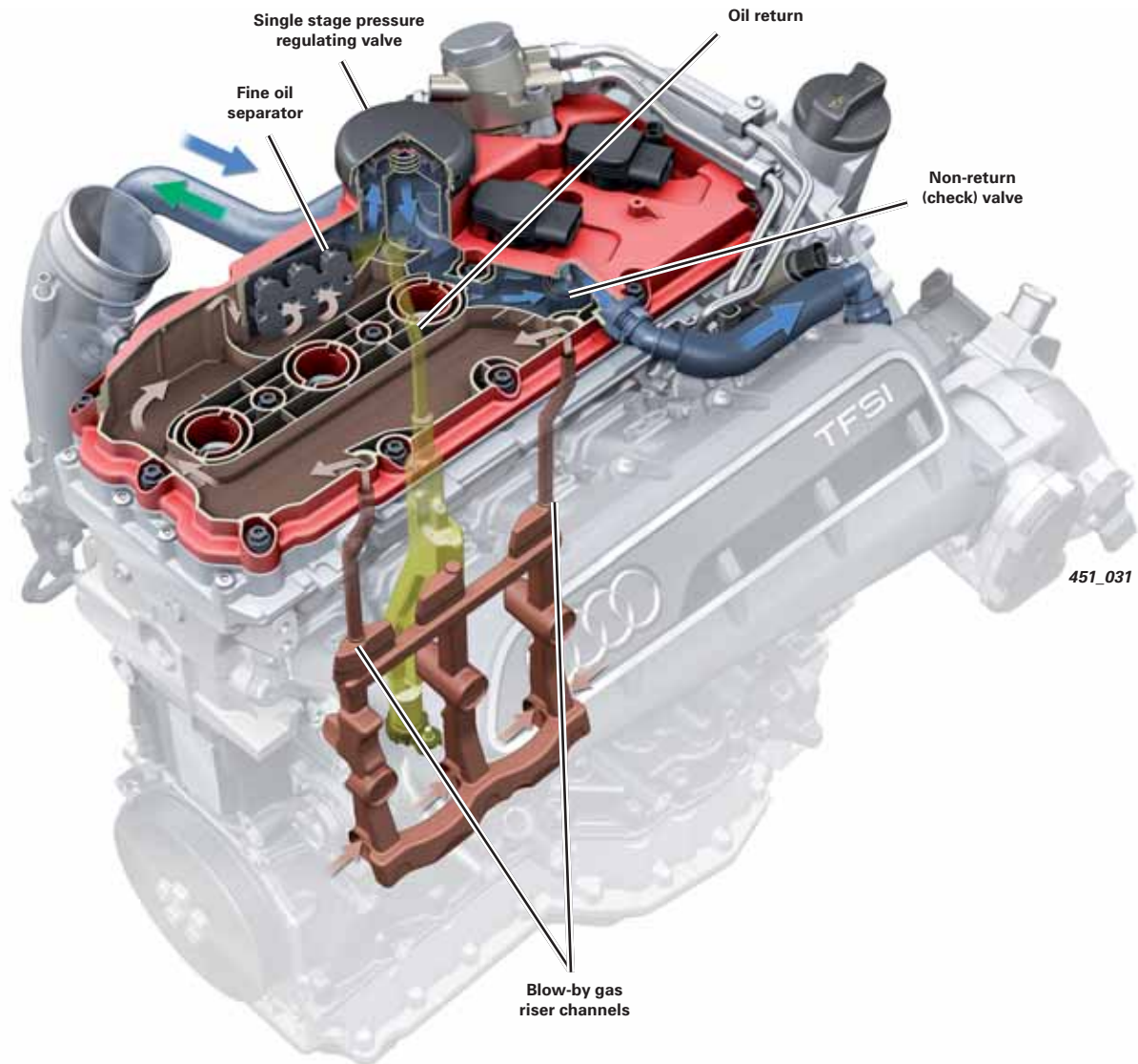
Reference

For more details about the self-regulating engine pump, refer to Self-Study Program 922903, *The 2.0L 4V TFSI Engine with AVS*.

Crankcase Ventilation

The crankcase ventilation system of the 2.5L TFSI engine is referred to as a "head ventilation" system.

Blow-by gases from the crankcase are directed through riser channels integrated into the cylinder block. The riser channels are protectively located in the bearing saddle of main bearings two, three, and four. The blow-by gases are drawn into the camshaft cover through the cylinder head, and are pre-cleaned as they pass through the riser channels.



Note

This sectional view does not show the positive crankcase ventilation (PCV) valve or the second non-return (check) valve.

The gas and oil spray mixture (blow-by) entering the camshaft cover, first flows into a relatively large hollow chamber where oil droplets deposit on the walls. The gas then flows to the fine oil separator.

The fine oil separator consists of four permanently open cyclone chambers and six packets of up to nine cyclone chambers each that can be activated or deactivated depending on the blow-by gas flow rate.

Flow rate is dependent on engine speed, with the cyclone chambers activated and deactivated by locking springs with different spring characteristics.

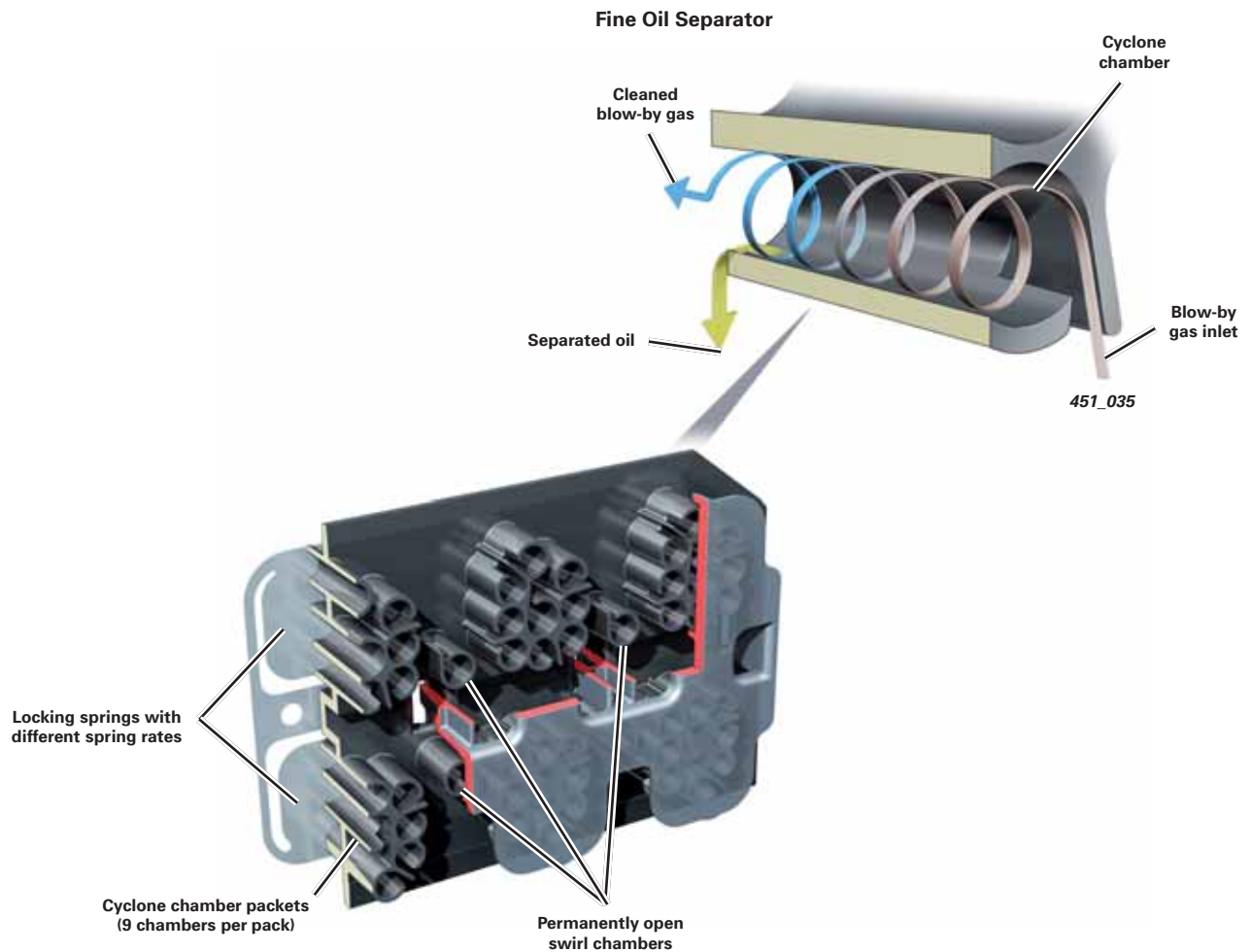
The separated oil from the camshaft cover and fine oil separator is continuously recirculated to the oil pan via return passages in the cylinder head and cylinder block. Returned oil enters the oil pan below the engine oil level.

In the extreme event of icing or malfunction, the positive crankcase ventilation (PCV) valve in the camshaft cover prevents high pressure from damaging the engine. To avoid drawing oil from the oil pan into the air intake system, a second non-return (check) valve installed in the upper part of the oil pan closes.

Cleaned blow-by gases are directed through a single stage pressure regulating valve.

Depending on pressure in the intake manifold, the gases flow through a non-return (check) valve into the intake manifold downstream of the throttle valve or upstream of the turbocharger turbine.

A single stage pressure regulating valve is integrated into the camshaft cover. The non-return (check) valves to the intake manifold or turbocharger side are optimized for pressure differential. Together with the pressure regulating valve, they produce the partial vacuum in the crankcase.



The positive crankcase ventilation (PCV) system is used to purge the crankcase with fresh air at part throttle. The system helps to separate fuel and water that collects in the engine oil during the combustion process.

If fuel and water are allowed to remain in the oil pan, they can ice up at low ambient temperatures, damaging the crankcase ventilation system and engine. By admitting air gathered downstream of the air filter, the fuel and water are channeled out through the camshaft cover.

Dry fresh air flows through the chain shaft and into the crankcase, absorbing moisture and fuel along the way. This helps prolong the useful life of the lubricating oil.

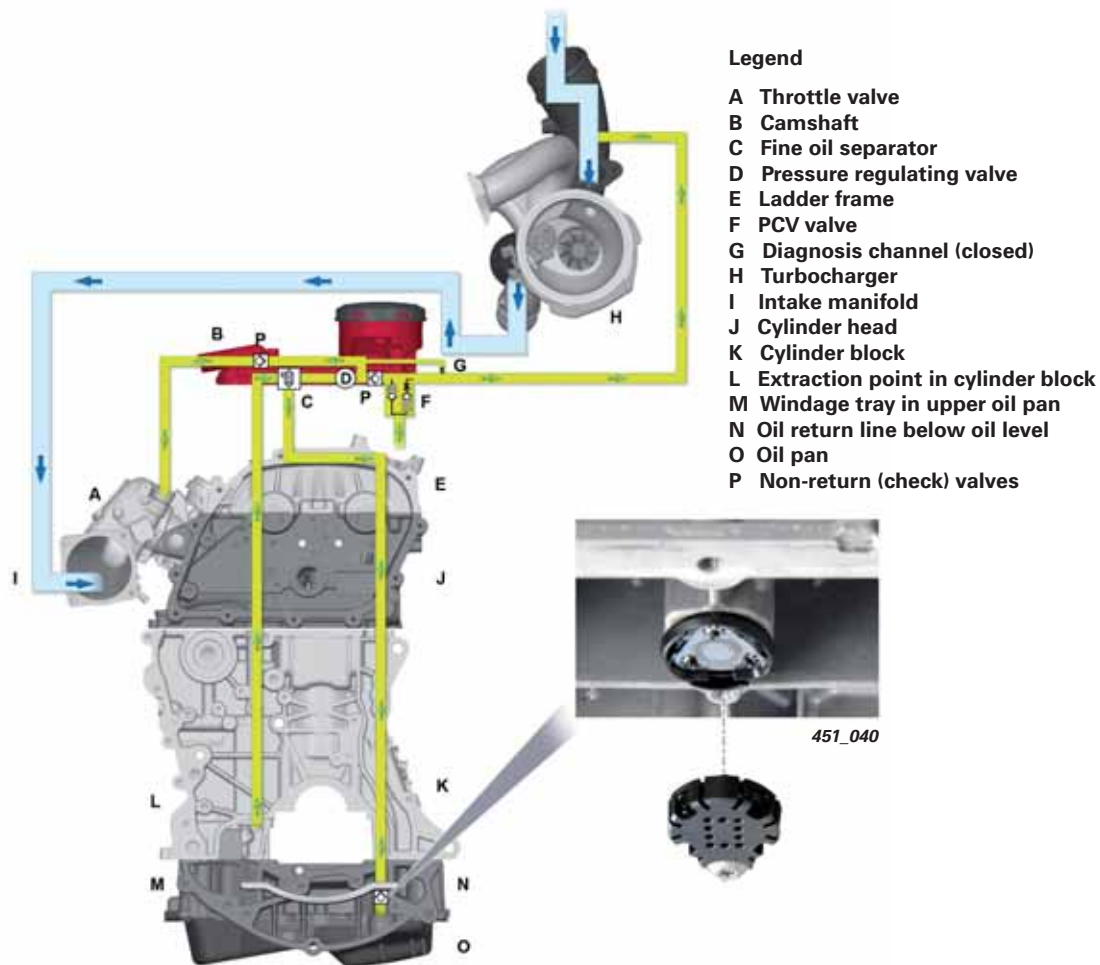
The fresh air for crankcase ventilation is extracted from the positive crankcase ventilation line running to the exhaust turbocharger.

The PCV valve, which is integrated in the camshaft cover, has the following tasks:

If a slight partial vacuum is present in the crankcase during normal operation, it opens to vent the crankcase. Fresh air flows from the line downstream of the air filter and into the engine.

If a pressure of over 1.45 psi (100 mbar) develops in the engine, excess pressure is relieved into the line. This protects the crankcase seals.

A fault in the system or improper installation of components are diagnosed by the ECM. This is indicated to the driver via the MIL in the instrument cluster.



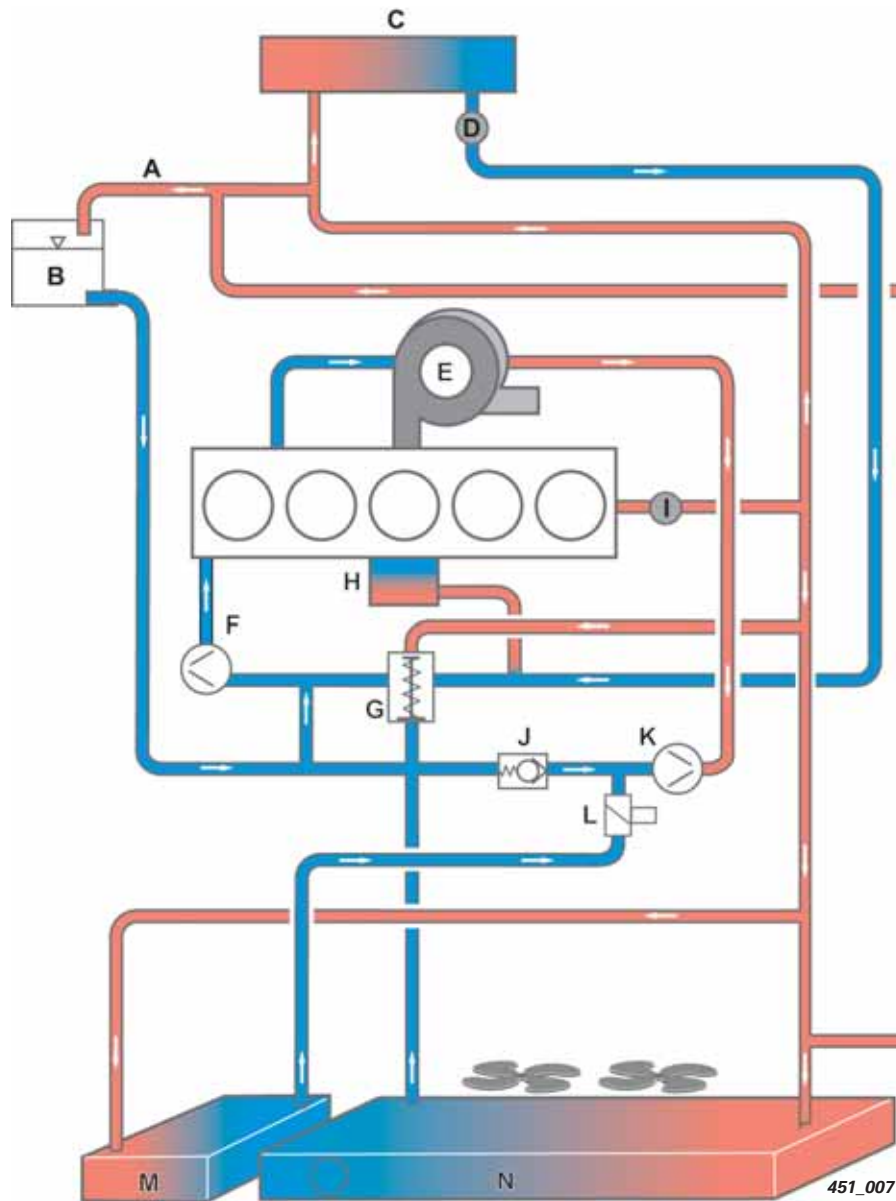
Note

All components required for cleaning and ventilation are integrated in the cam cover. If one of these components fails, the complete cam cover must be replaced.

Cooling System

The cooling design is based on longitudinal flow through cylinders 1 to 5. The coolant pump is driven by a poly-vee belt and is designed to control high thermal load, on the turbo engine.

To prevent the turbocharger from overheating when the engine stops, the cooling system is equipped with After-Run Coolant Pump V51. When required, it is activated by ECM via Auxiliary Engine Coolant Pump Relay J496.



Legend

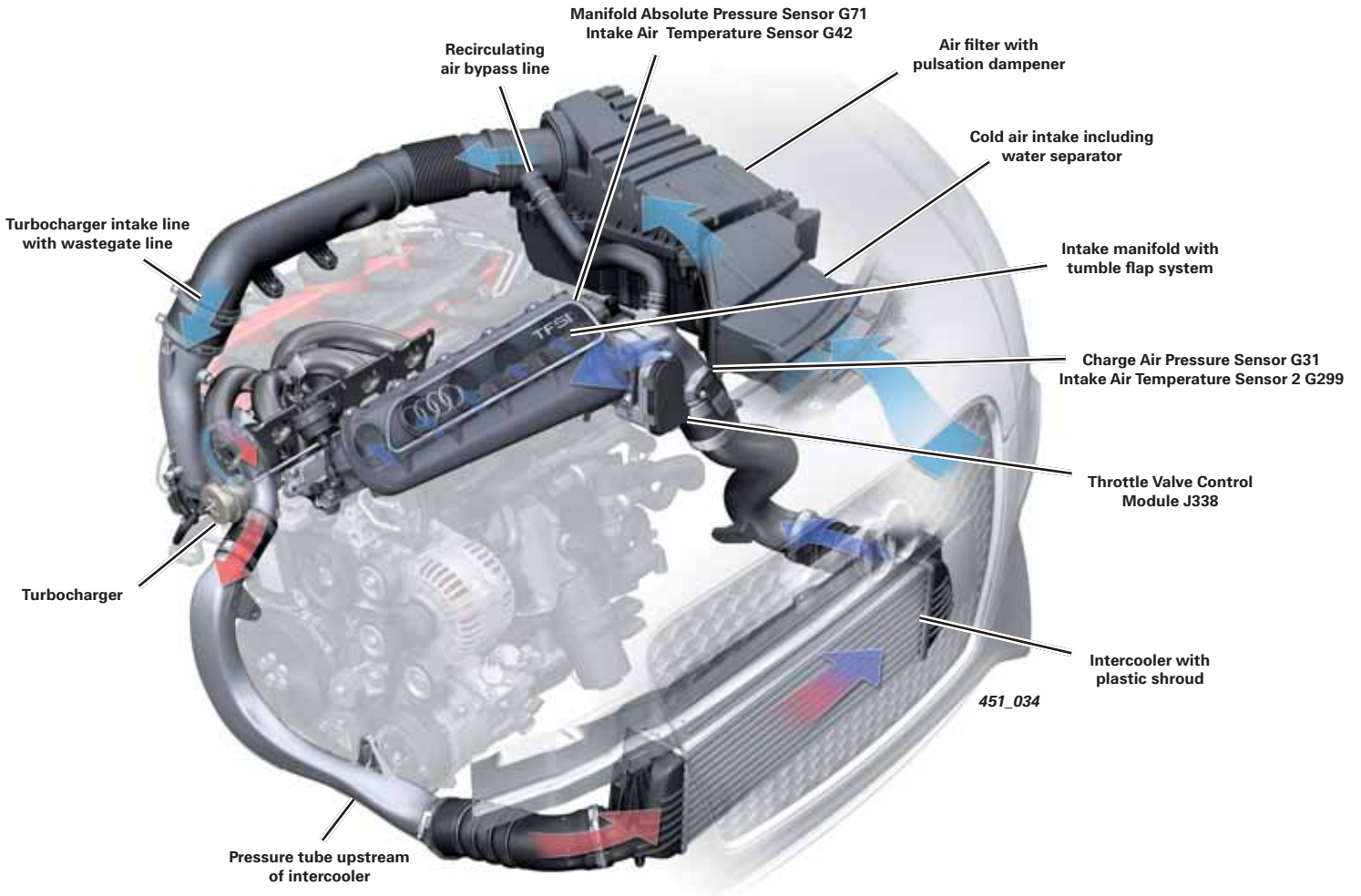
A Breather pipe	H Engine oil cooler
B Expansion tank	I Engine Coolant Temperature Sensor G62
C Heater heat exchanger	J Non-return (check) valve
D Bleeder	K After-Run Coolant Pump V51
E Exhaust turbocharger	L Cooling Circuit Solenoid Valve N492
F Coolant pump	M Auxiliary cooler
G Coolant thermostat	N Cooler

Air Supply

Fresh Air Intake

When designing the intake path, the primary focus was on creating high efficiency and capacity.

The cross sections were optimally adapted to available space, with air flow configured to be as direct as possible.



Intercooler

The greatest pressure losses in a turbocharger system occur at the intercooler.

The position of the intercooler at the lower front of the vehicle allows maximum exposure to the cooling air mass flow. This allows the fins of the intercooler to be configured so that pressure loss is reduced.

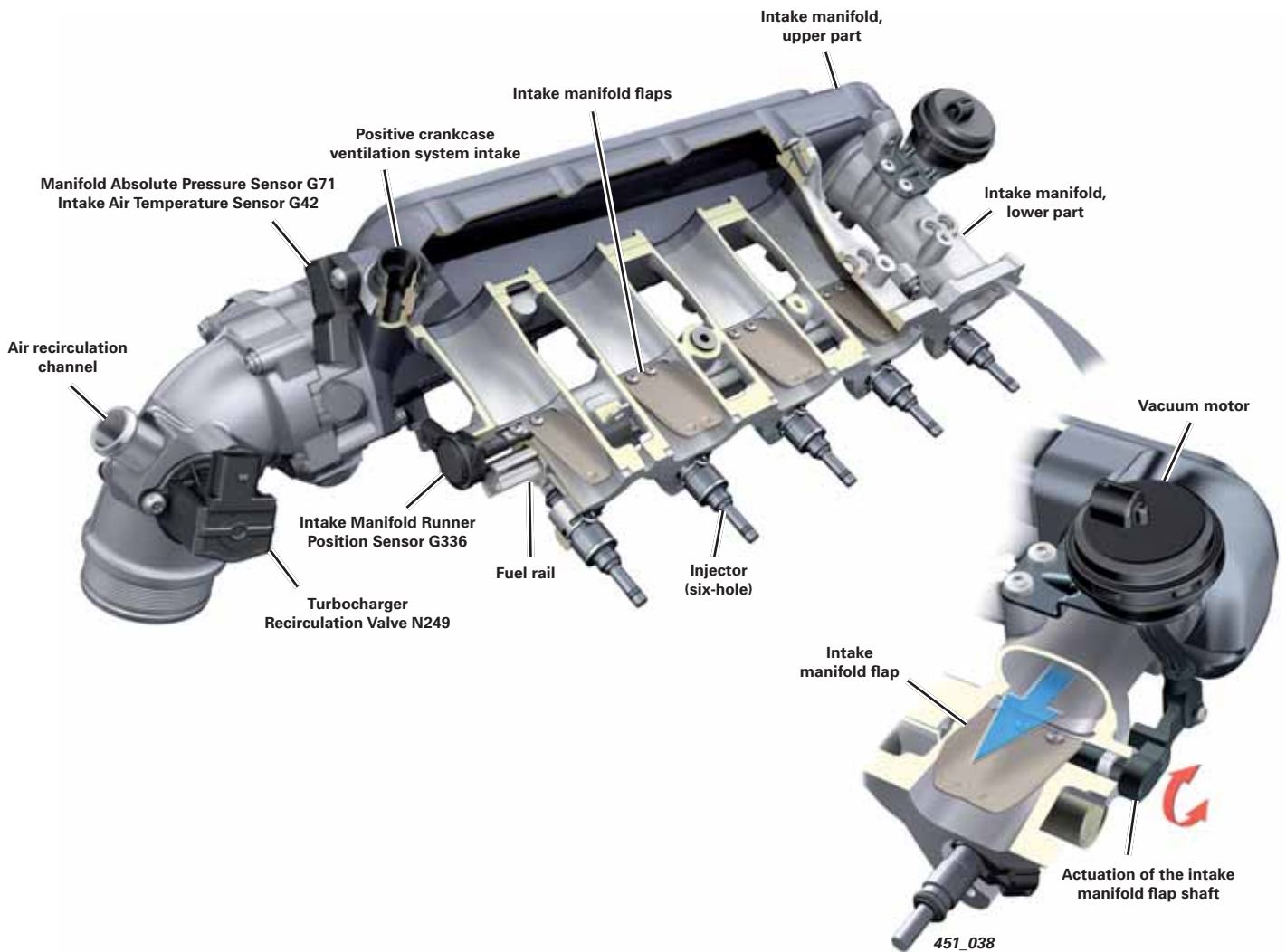
The total pressure loss along the air flow path from the turbocharger outlet is only 1.9 psi (135 mbar) at maximum flow.



Intake Manifold with Flaps

The intake manifold is a two-part sand casting comprised of the intake plenum and intake arm gallery. A pneumatically actuated system of flaps is integrated in the intake gallery. Together with the tumble intake port, this system produces the turbulence necessary for optimum mixture formation.

The flap position requested by the ECM is measured by Intake Manifold Runner Position Sensor G336. The ECM monitors this position. When Intake Manifold Runner Control Valve N316 is not activated, the intake manifold flaps are completely closed.

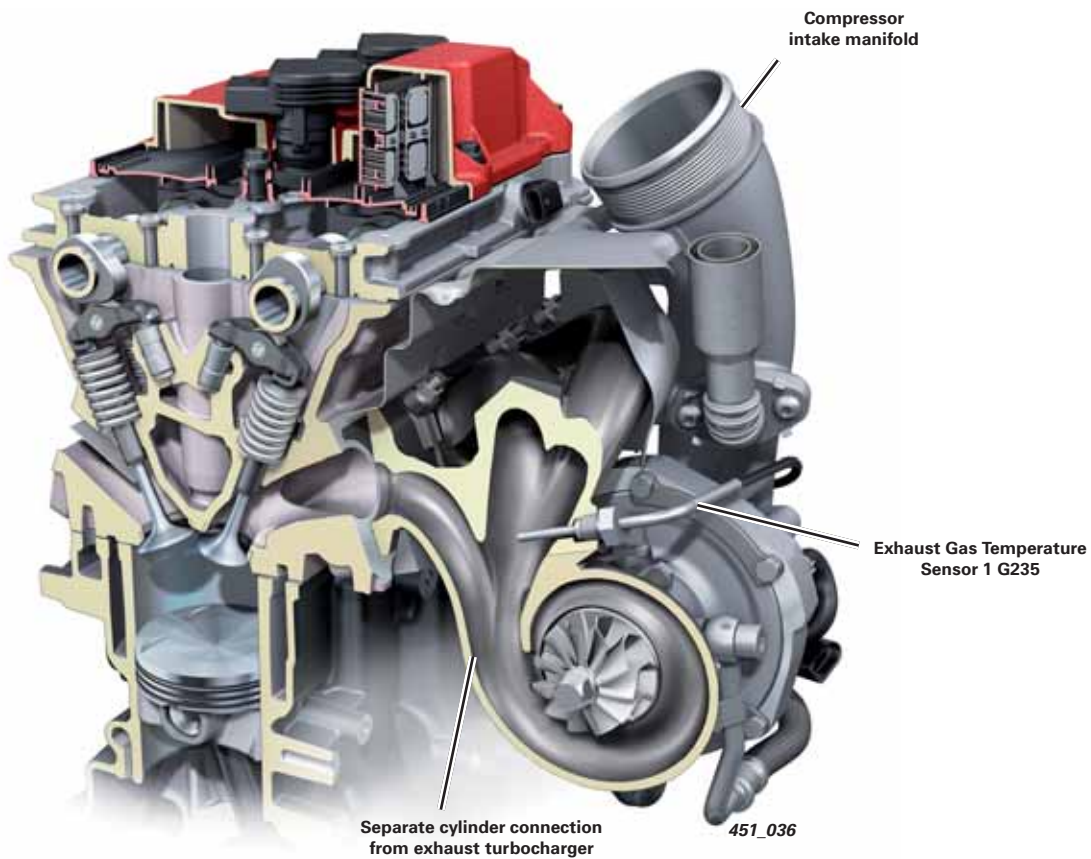


Exhaust System Overview

The exhaust system has the following components:

- Turbocharger module
- Close-coupled pre-catalytic converter
- Twin-flow down pipes with isolating elements
- Two catalytic converters
- Two center mufflers
- One rear muffler with twin tailpipes

The exhaust turbocharger module is a derivative of the four-cylinder TFSI engine. The illustration below shows the separate connection between the exhaust turbocharger and cylinder no. 3.



Note

For the latest turbocharger mounting system, please refer to current technical literature.

Turbocharger

The exhaust turbocharger, a type K16 turbocharger by Borg Warner Turbo Systems, is notable for its high efficiency over a wide operating range.

It is large, with a compressor wheel that is 2.51 in (64 mm) in diameter at the outlet end. At full throttle it can compress 10.24 cu ft (7.0 liters) of air per second, producing relative charge pressures of up to 17.4 psi (1.2 bar).

The exhaust turbocharger housing has a separate oil supply, and is integrated with the engine cooling circuit. When the engine is switched OFF, After-Run Coolant Pump V51 dissipates the accumulated heat.

A sensor assisted exhaust gas temperature regulation system ensures that a maximum permissible exhaust gas temperature of 1796°F (980°C) is not exceeded during operation.

To accomplish this, Exhaust Gas Temperature Sensor G235 measures exhaust gas temperature just before the turbine wheel.



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Turbocharger Recirculation Valve N249

N249 is not located directly at the turbocharger outlet. It is attached to the throttle valve body upstream of the throttle valve.

The advantage of this design is that airflow is not disturbed along the relatively long path to the intake manifold via the intercooler. Turbine speed losses are therefore minimized, which results in the turbocharger therefore responding very quickly after N249 is closed.

When N249 is opened, air is admitted into the intake side of the turbocharger downstream from the air filter via the air bypass.

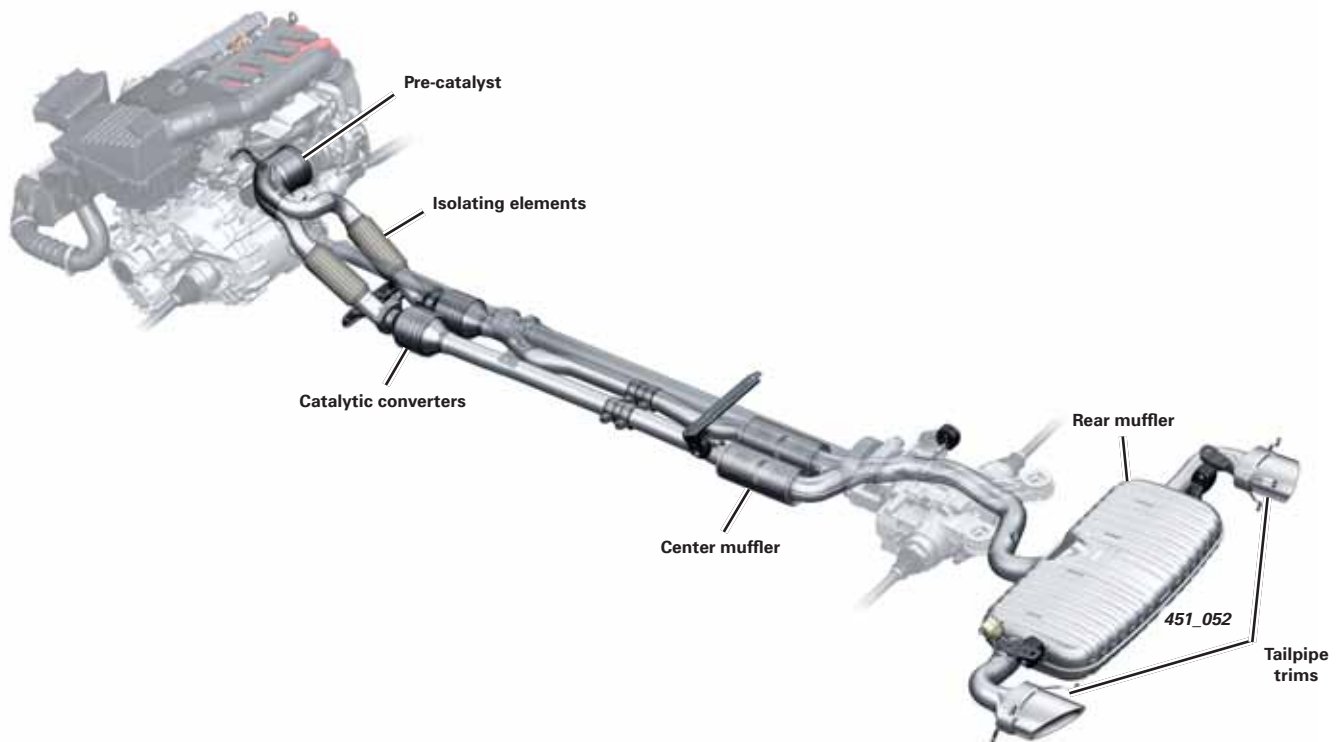
Exhaust System Components

To ensure compliance with LEV II exhaust emission standards, it was necessary to position the pre-catalytic converter as close as possible to the turbocharger outlet, which is made of ceramic material.

An oxygen sensor is integrated directly into the turbocharger module at the outlet. Another oxygen sensor is located directly downstream of the pre-catalytic converter, and is non-linear.

Two additional catalytic converters are mounted further downstream of the exhaust system.

A developmental goal for the dual flow exhaust system was to minimize exhaust gas backpressure, which resulted in large diameter pipes being used.



Exhaust Flap

The left tailpipe has an exhaust flap. When this flap is opened, the engine note becomes more sporty. The flap is opened and closed by Exhaust Door Valve 1 N321, which is characteristic map-controlled by the ECM.

If N321 fails, or there is a leak in the vacuum line to the valve, the exhaust flap will stay open.



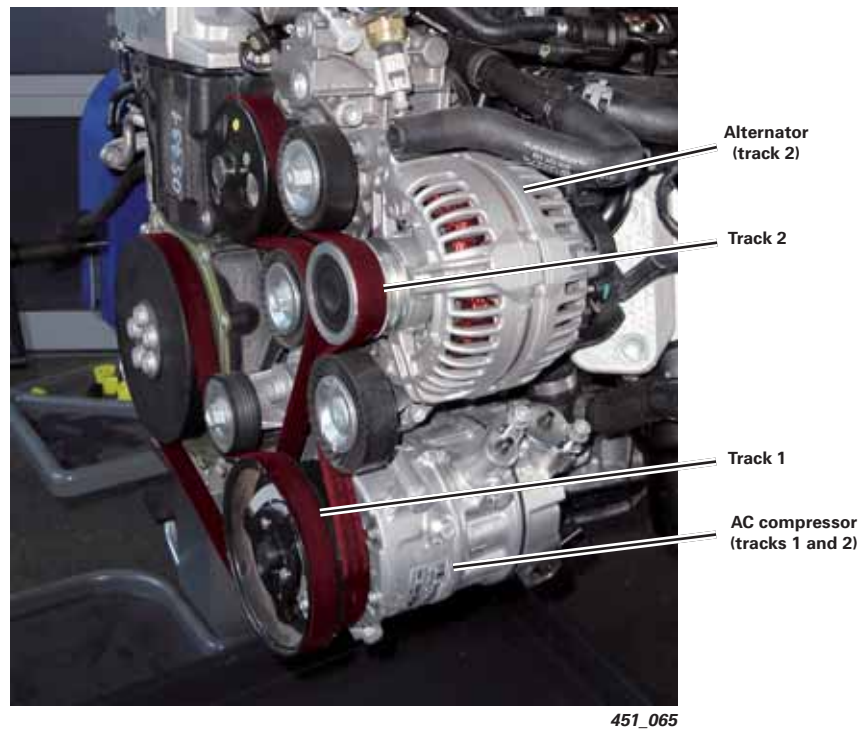
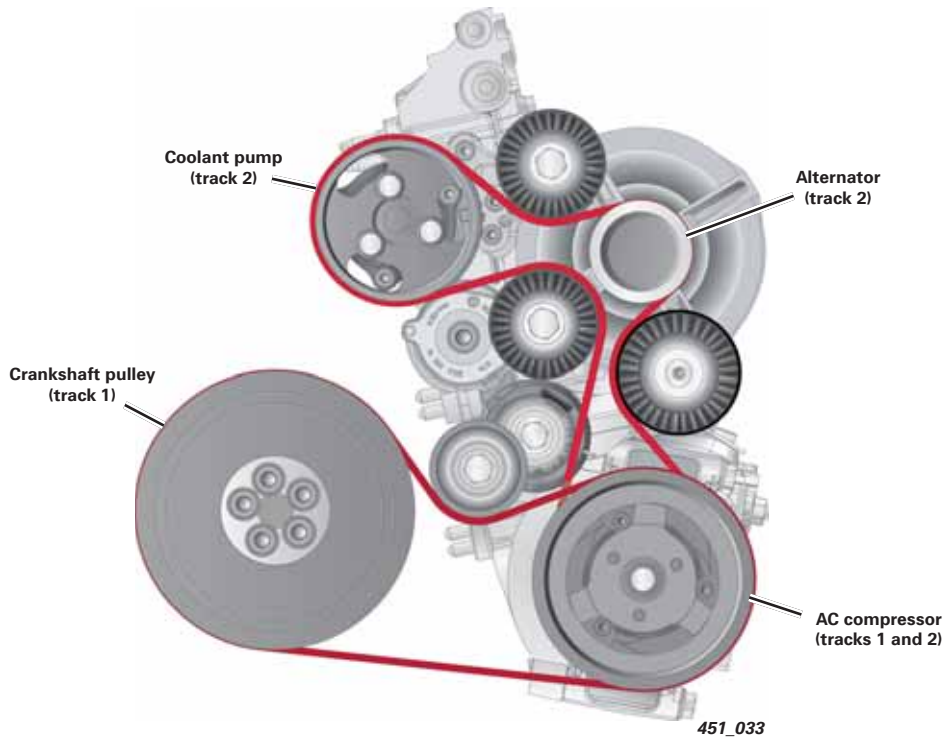
Belt Drive

Due to space limitations, the drive system for the A/C compressor, alternator, and engine coolant pump is a two-stage design.

A belt from the torsional vibration damper on the crankshaft drives the A/C compressor, which has twin belt pulleys.

A second belt, driven by the A/C compressor, drives the alternator, tensioner, and the engine coolant pump.

Both belt tensioners are friction-damped. The complete belt drive is designed for lifetime operation.



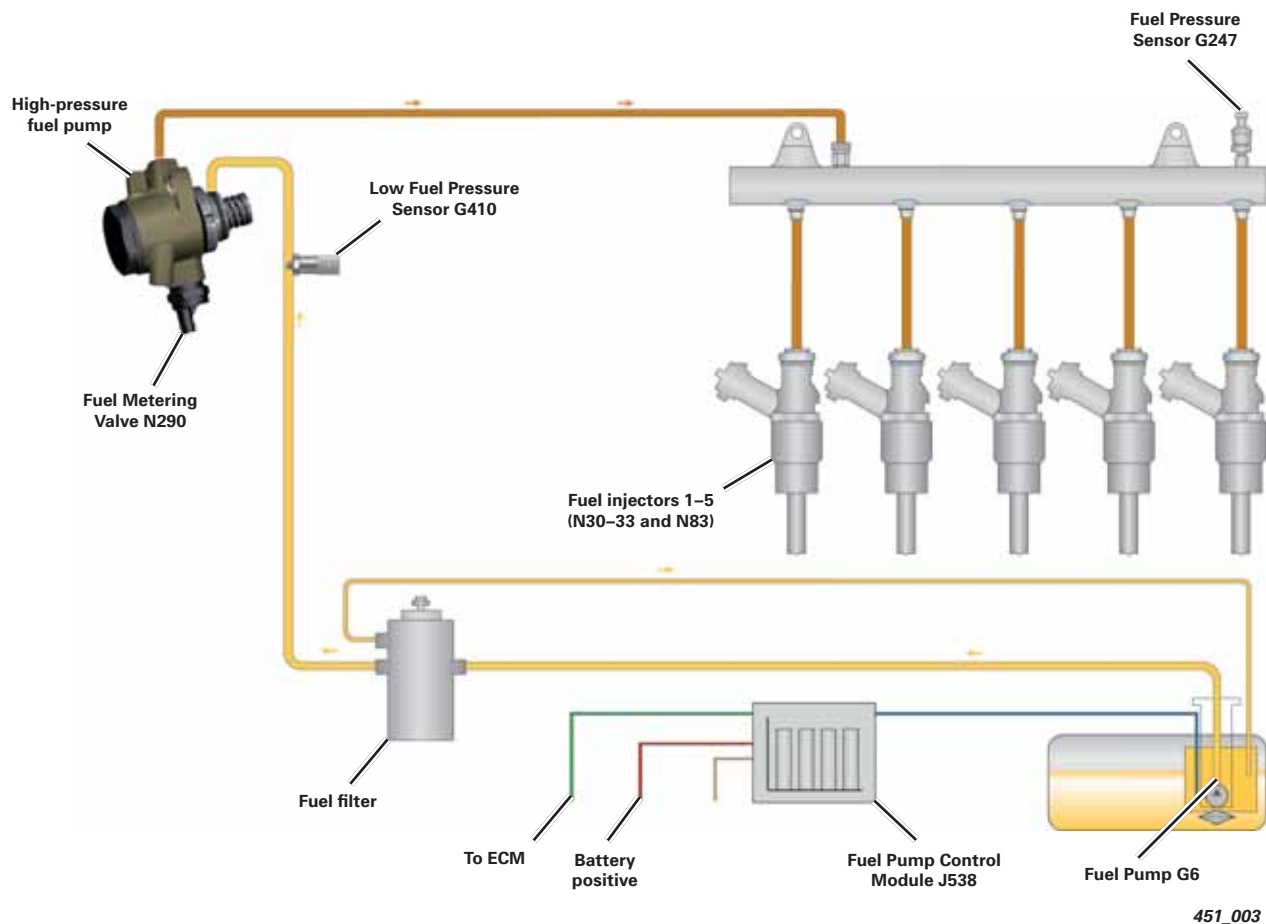
Fuel System

The TT RS fuel system is demand-controlled on the high and low pressure sides. On the low pressure side, the ECM regulates Fuel Pump Control Module J538 and the delivery rate of the fuel pump in the tank.

On the high pressure side, the ECM regulates Fuel Metering Valve 290 directly at the high-pressure pump. To monitor pressure levels in the system, two fuel pressure sensors send their respective signals to the ECM.

The central element of the fuel system is a demand-controlled single-piston high-pressure pump. This Generation III fuel pump by Hitachi is driven by a three-lobe cam seated on the exhaust camshaft.

The system operates at a maximum pressure of 1740.4 psi (120 bar). A pressure limiting valve in the pump opens at a pressure of approximately 2103.0 psi (145 bar).



Warning

Be very careful when working on the fuel system. It operates at extremely high pressures. To open the high pressure side, always follow the instructions given in current technical literature.

System Overview

Sensors

Charge Air Pressure Sensor G31
Intake Air Temperature Sensor 2 G299



Manifold Absolute Pressure Sensor G71
Intake Air Temperature Sensor G42



Engine Speed Sensor G28



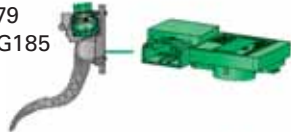
Throttle Valve Control Module J338
EPC Throttle Drive Angle Sensor 1 G187
EPC Throttle Drive Angle Sensor 2 G188



Camshaft Position Sensor G40 (Intake)
Camshaft Position Sensor 3 (Exhaust)



Accelerator Pedal Position Sensor G79
Accelerator Pedal Position Sensor 2 G185
Clutch Position Sensor G476



Brake Light Switch F
Brake Pedal Switch F47



Sport Program Button E541



Fuel Pressure Sensor G247
Low Fuel Pressure Sensor G410



Knock Sensor 1 G61
Knock Sensor 2 G66



Oil Pressure Switch F22



Engine Coolant Temperature Sensor G62



Intake Manifold Runner Position
Sensor G336



Heated Oxygen Sensor G39
Oxygen Sensor After Three Way
Catalytic Converter G130

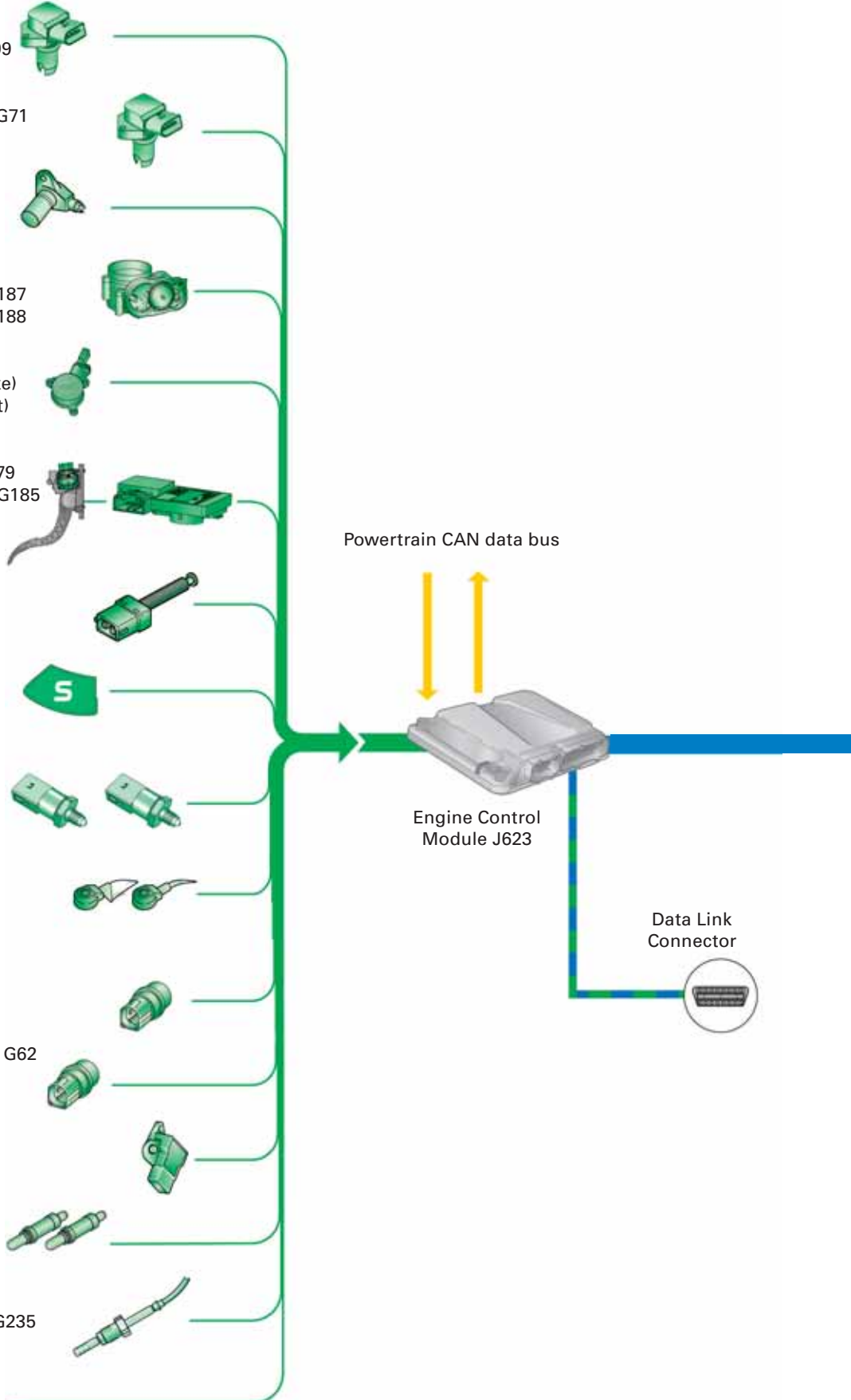


Exhaust Gas Temperature Sensor 1 G235



Auxiliary signals:

- J393 Door Contact Signal
- E45 Cruise Control System (ON/OFF)

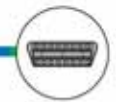


Powertrain CAN data bus



Engine Control
Module J623

Data Link
Connector



Actuators

Fuel Pump Control Module J538
Transfer Fuel Pump G6

Injectors for Cylinders 1–5
(N30–33 and N83)

Ignition Coils for Cylinders 1–5
(N70, N127, N291, N292, N323)

Throttle Valve Control Module J338
EPC Throttle Drive G186

Intake Manifold Runner Control
Valve N316

Engine Component Power Supply
Relay J757

Motronic Engine Control Module
Power Supply Relay J271

Wastegate Bypass Regulator Valve N75

EVAP Canister Purge Regulator Valve 1

Turbocharger Recirculation Valve N249

Fuel Metering Valve N290

Exhaust Door Valve 1 N321

Camshaft Adjustment Valve 1 N205
Exhaust Camshaft Adjustment Valve
1 N318

Coolant Circuit Solenoid Valve N492

Coolant Fan Control Module J293
Coolant Fan V7
Coolant Fan 2 V177

Oxygen Sensor Heaters Z19, Z29

Auxiliary Engine Coolant Pump
Relay J496
After-Run Coolant Pump Relay V51

451_004

Engine Management

The Bosch MED 9.1.2 engine management system calculates engine load from the values of Manifold Absolute Pressure Sensor G71 and Engine Speed Sensor G28. To meet LEV II emission standards, the following subassemblies, in combination with special injection and catalytic converter heating strategies, are used:

- Intake manifold with intake manifold flaps
- Multi-port fuel injection and flat pistons
- Close-coupled pre-catalytic converter

A secondary air injection system was not needed.

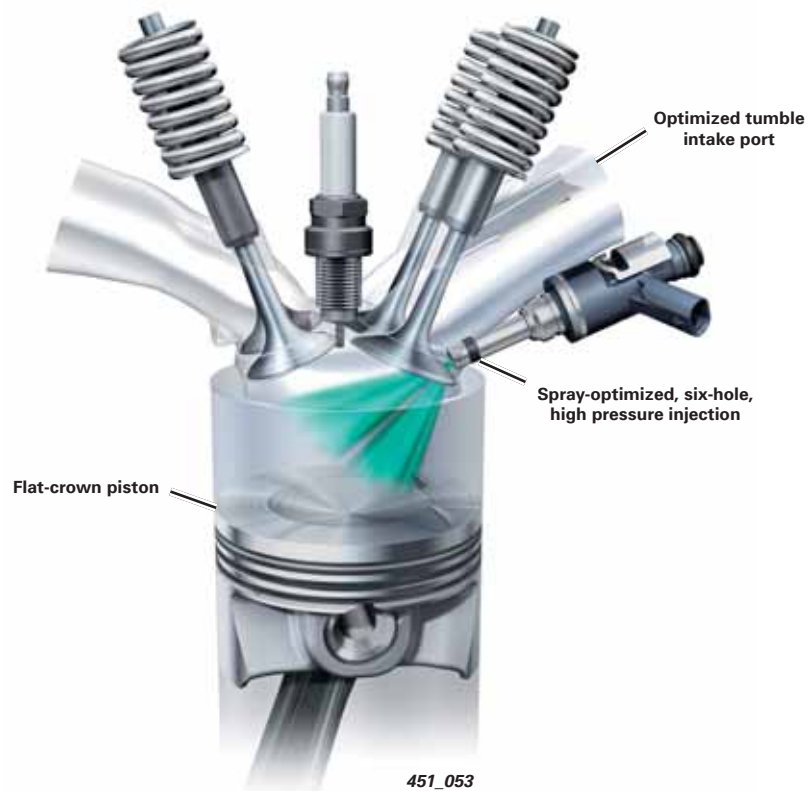
Combustion Process

By optimizing spray parameters in combination with a flat piston crown shape, it was possible to improve mixture formation compared to the 2.0L TFSI engine, despite the approximate 25% increase in flow rate of the high-pressure injectors.

Operating Modes

The following operating modes are possible:

- High pressure stratified charging starting at an ambient temperature of -14.8°F (-14.8°C)
- Catalytic converter heating and quicker engine warm-up through double injection
- Camshaft timing and exhaust camshaft duration adaptation to create high cylinder scavenging rates, minimizing the amount of residual gas in the cylinders when the engine is warm and running at low rpm
- Matching of intake and exhaust pressures in the upper rpm band to optimize flow rates and minimize pressure losses



Engine Load Sensing

Engine load is calculated from engine speed and air mass values. Because no mass airflow sensor is used, two identical combined temperature/pressure sensors are used:

- Charge Air Pressure Sensor G31, Intake Air Temperature Sensor 2 G299
- Manifold Absolute Pressure Sensor G71, Intake Air Temperature Sensor G42

Two sensors are used because very different pressures can exist simultaneously on either side of the throttle valve assembly.

Also, the cast aluminum intake accumulates heat and could potentially falsify the temperature signal by temperature sensors G71/G42. The temperature signal generated by G31/G299 upstream of the throttle valve is the most reliable measurement.

First Sensor

Designation: Charge Pressure Sensor G31/Intake Air Temperature Sensor G299

Task: Measurement of pressure and temperature upstream of the throttle valve

This sensor is the boost pressure sensor and is used to control boost pressure. Its signal is not actually required at full open throttle because boost pressure will be the same as pressure in the intake manifold. However, in order to achieve a better response, boost control (measured by this sensor) becomes active even before the throttle valve fully opens.

If the sensor fails, the charge pressure control system will go into limp-home mode. This means the engine will run as a normally aspirated engine, with the MIL lighting up, and a DTC stored in the ECM.



Second Sensor

Designation: Manifold Absolute Pressure Sensor G71, Intake Air Temperature Sensor G42

Task: Measurement of pressure and temperature in the intake manifold

This is referred to as the main charge sensor and replaces the hot-film air mass sensor. The air mass flowing through the engine is calculated at all operating points of the engine from signals generated by this sensor. The requisite amount of fuel is then injected.

If this sensor fails, the engine will go into limp-home mode, with engine power output reduced. Air mass is then calculated in "alpha n mode," which is based on the throttle valve angle and engine speed only. The MIL will light up and a DTC will be stored in the ECM.

Intake Air Temperature Sensor G42



Sport Mode

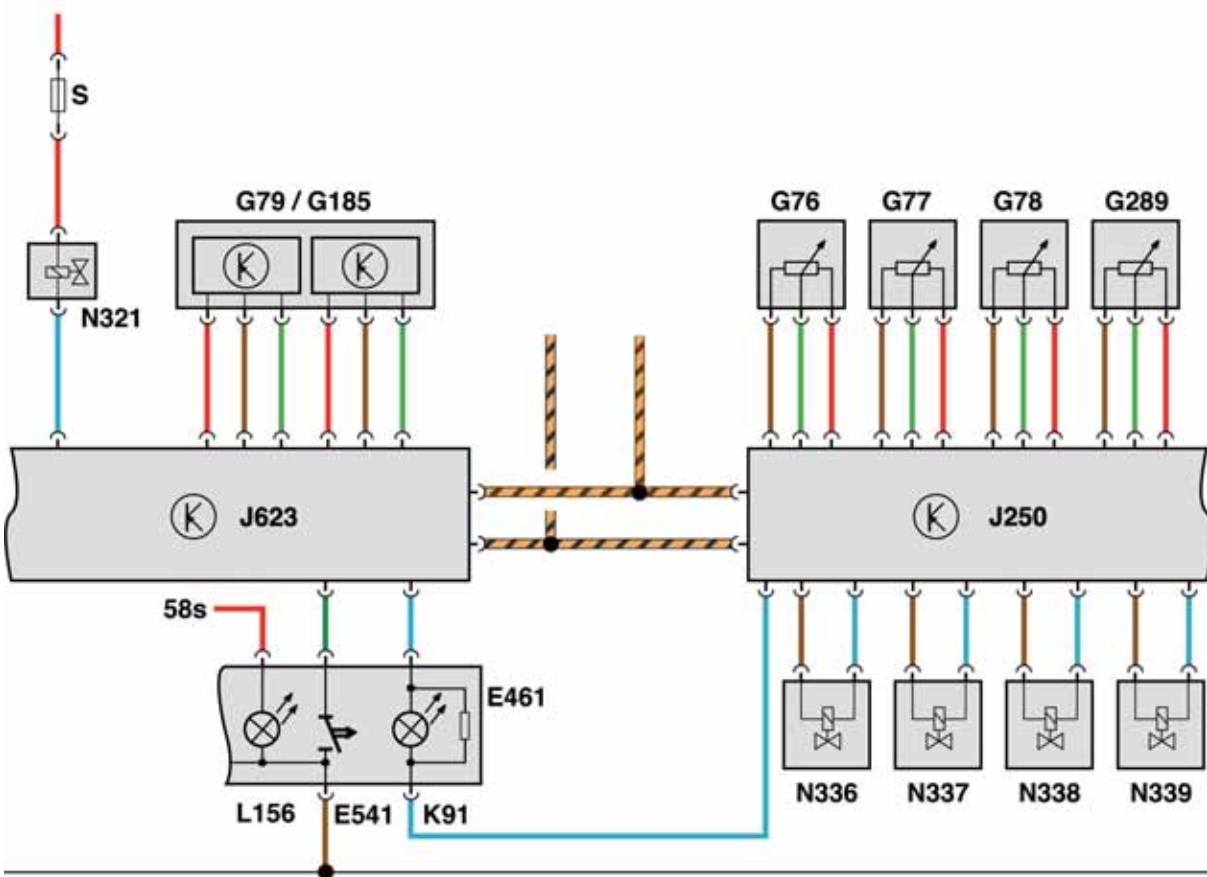
The following functions can be activated with the Sport button:

- Direct accelerator response. A different characteristic curve is selected by the engine control module
- Modification of exhaust system characteristics. Vacuum motor for the exhaust flap door is actuated by Exhaust Door Valve 1
- Sport driving mode of Audi magnetic ride is activated
- Sport program indicator lamp K91 illuminates



451_045

Automatic Transmission Sport Mode Indicator Lamp K91



31

Legend

E461	Front Center Console Control Head	J623	Electronic Control Module
E541	Sport Program Button	K91	Automatic transmission Sport Mode Indicator Lamp
G76	Left Rear Level Control System Sensor	L156	Switch Illumination Bulb
G77	Right Rear Level Control System Sensor	N321	Exhaust Door Valve 1
G78	Left Front Level Control System Sensor	N336	Left Front Damping Adjustment Valve
G79	Accelerator Pedal Position Sensor	N337	Right Front Damping Adjustment Valve
G185	Accelerator Pedal Position Sensor 2	N338	Left Rear Damping Adjustment Valve
G289	Right Front Level Control System Sensor	N339	Right Rear Damping Adjustment Valve
J250	Electronic Damping Control Module	S	Fuses

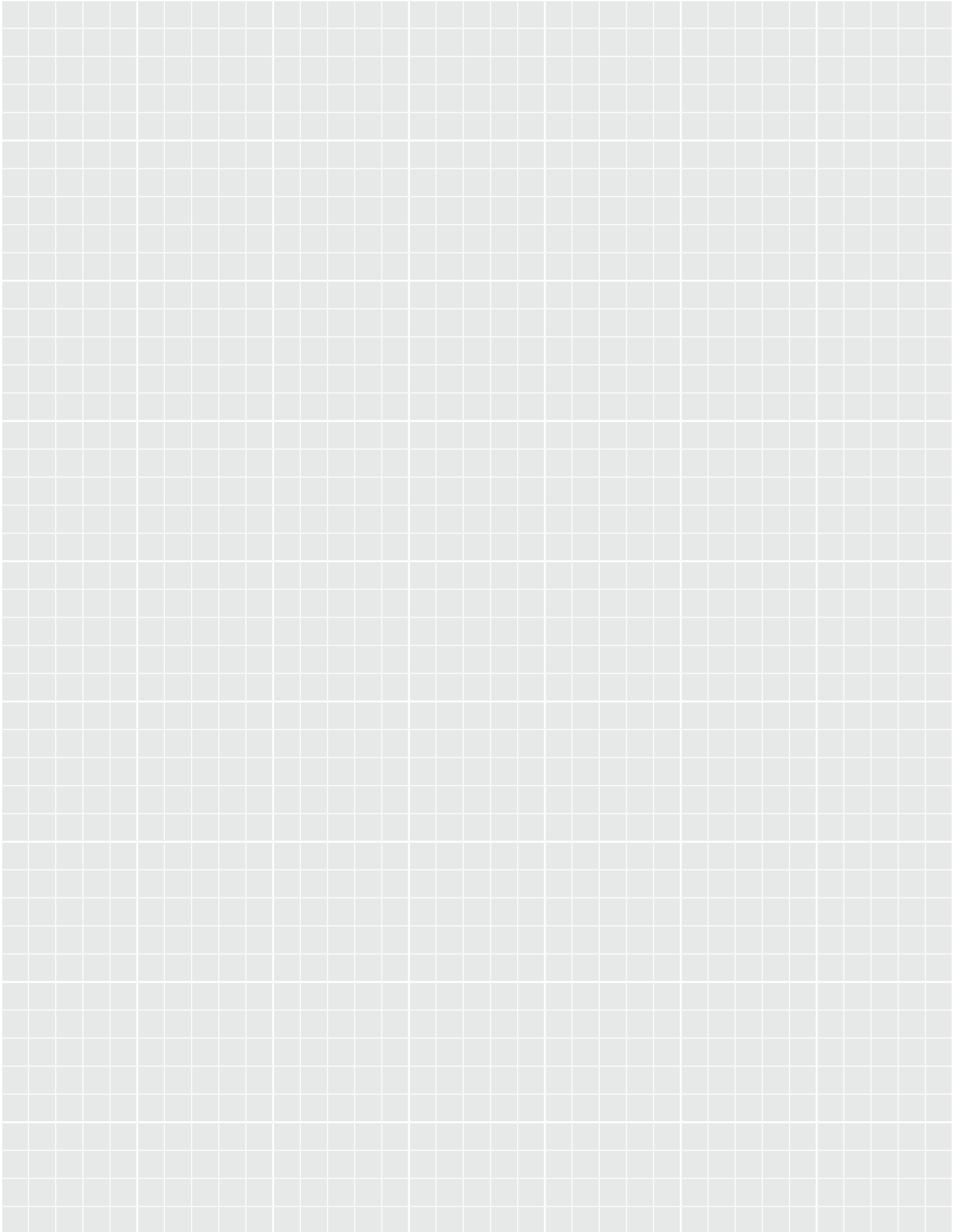
Manual Transmission 0A6



Manual Transmission	0A6 with all-wheel drive	
Ratio including front axle drive i_{total}		
	1st gear	13.45
	2nd gear	8.12
	3rd gear	5.51
	4th gear	4.16
	5th gear	3.36
	6th gear	2.83
	Reverse gear	14.41
Ratio spread	1st – 6th gear	4.75
Front axle drive ratio	Output shaft – 1st/2nd gear	64 : 17 = 3.765
	Output shaft – 3rd – 6th gear	64 : 22 = 2.09
	Output shaft – reverse gear	64 : 20 = 3.200
Weight with oil fill		187.3 lb (85 kg)

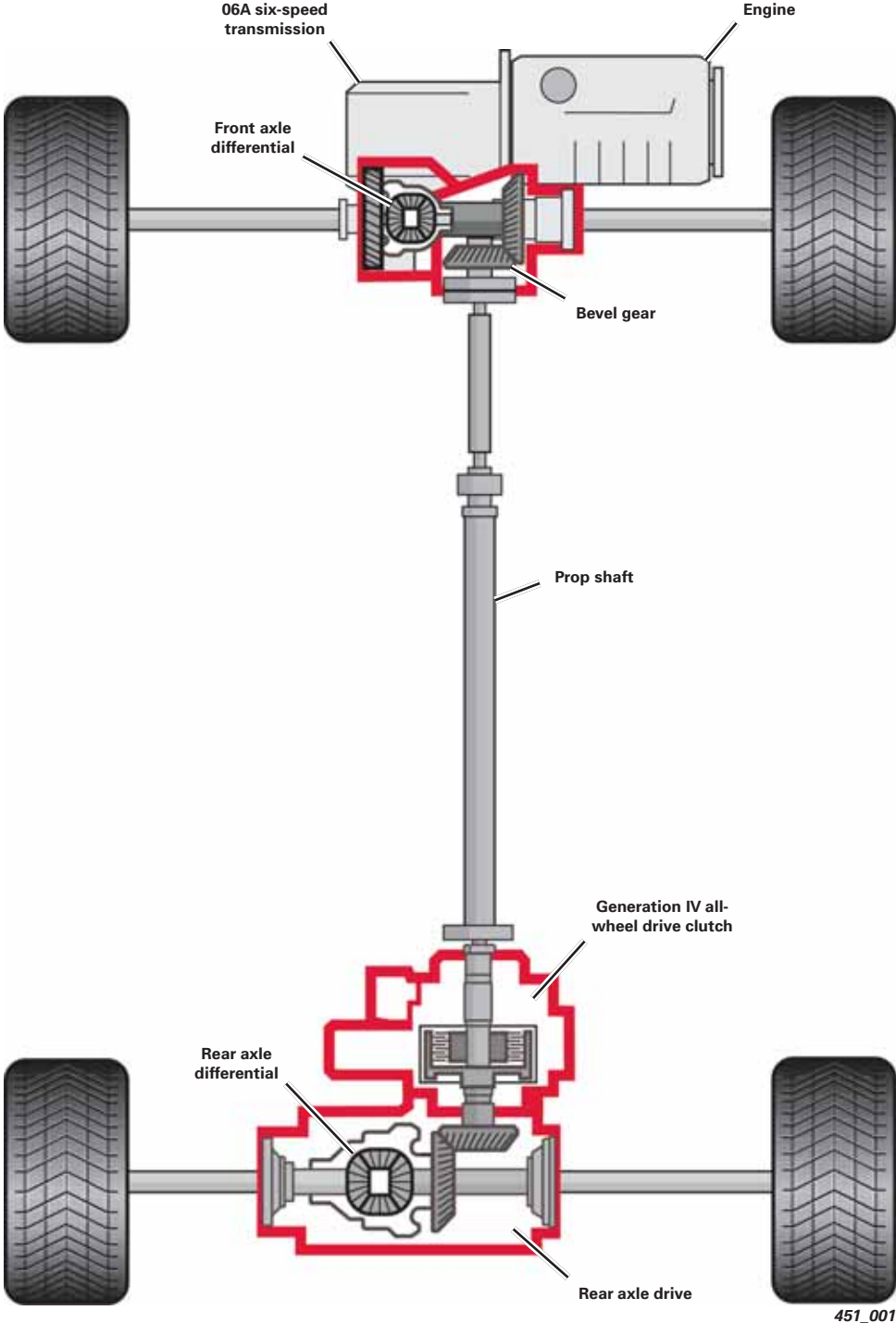
Six-speed manual transmission 06A can handle up to 368.7 lb ft (500 Nm) of torque.

Notes



Drive Concept

The TT RS has the quattro permanent all-wheel drive system as standard equipment. No front-wheel drive version is offered.



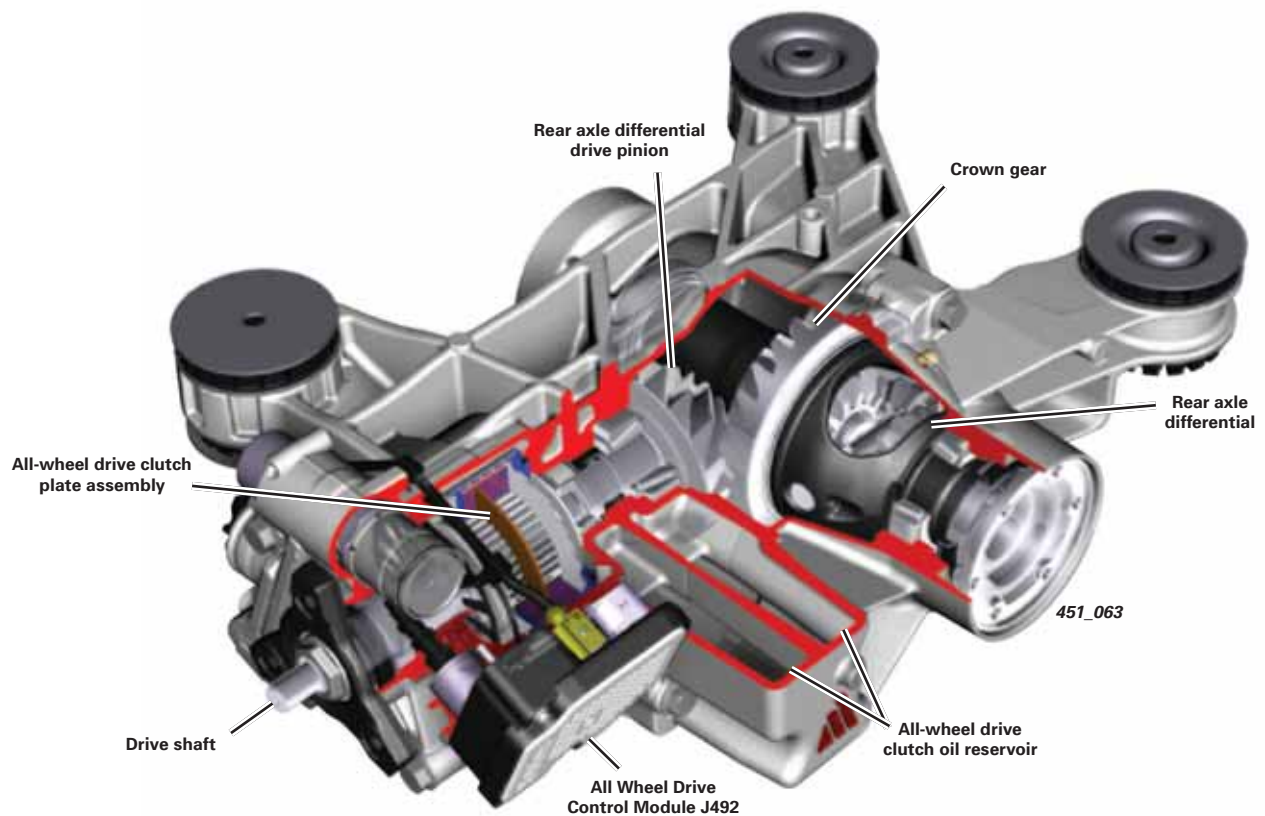
Generation IV All-Wheel Drive Clutch

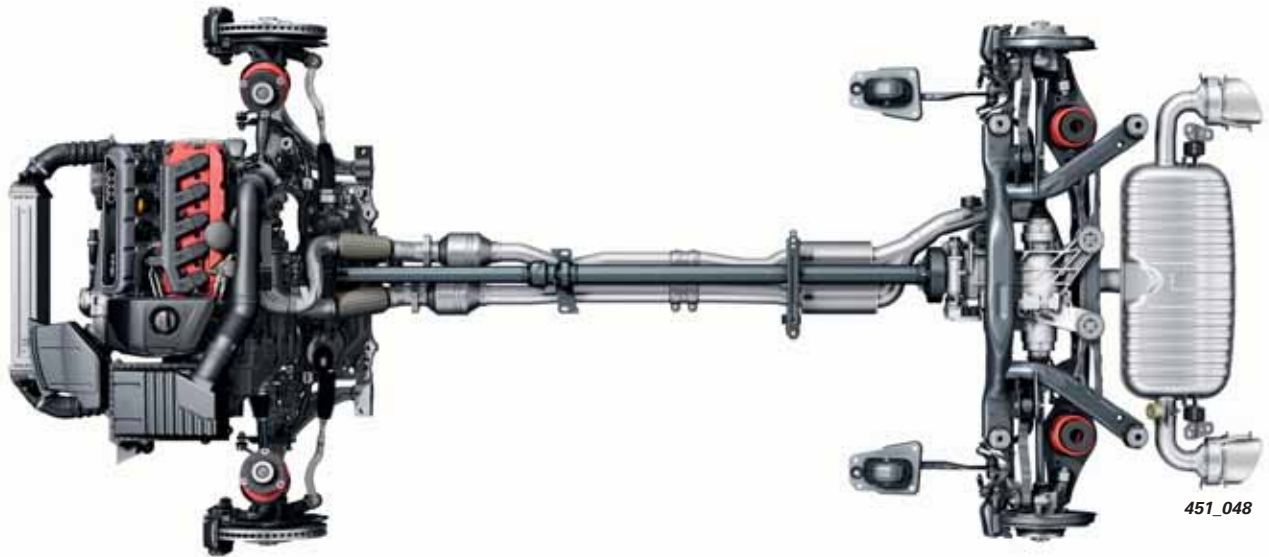
The TT RS powertrain uses the Generation IV all-wheel drive clutch. Power is transmitted via the clutch plate set in the same way as the previous Haldex generations. The major difference is that clutch hydraulic pressure build-up is performed by an electric pump on the Generation IV system.

All Wheel Drive Control Module J492 determines torque to be transferred by controlling Haldex Clutch Control Valve N373. Speed differences between the front and rear axle are no longer required to activate the all-wheel drive coupling.

Thanks to a high performance pressure reservoir, all of this happens within a matter of milliseconds.

To optimize TT RS axle load distribution, the Generation IV clutch is mounted in front of the rear axle differential.





Front Axle

The front suspension system, with a track width of 61.06 in (1551 mm) is a MacPherson-type design with triangular lower wishbones. The pivot bearings, subframe, and wishbones are made from aluminum. To increase rigidity, the subframe is bolted to the body at six points.

Steering

The electromechanical power rack-and-pinion steering system comes with variable servo assistance. Its characteristics have been adapted to the dynamic qualities of the TT RS.

Rear Axle

The four-link rear axle, with a track width of 60.8 in (1546 mm), is capable of absorbing longitudinal and lateral forces separately thanks to its sophisticated design.

The longitudinal links absorb the driveline and braking forces, while the relatively soft mounts permit excellent ride comfort.

The three links per wheel — the spring link, the upper wishbone, and tie rod — are attached rigidly to the subframe to enhance handling dynamics.

The elastokinematic behavior of the high strength steel control arms has been modified compared to non-RS TT models. Separate coil springs and newly developed dampers provide vertical support.

The body of the TT RS has also been lowered 0.39 in (10 mm) compared to non-RS TT models.

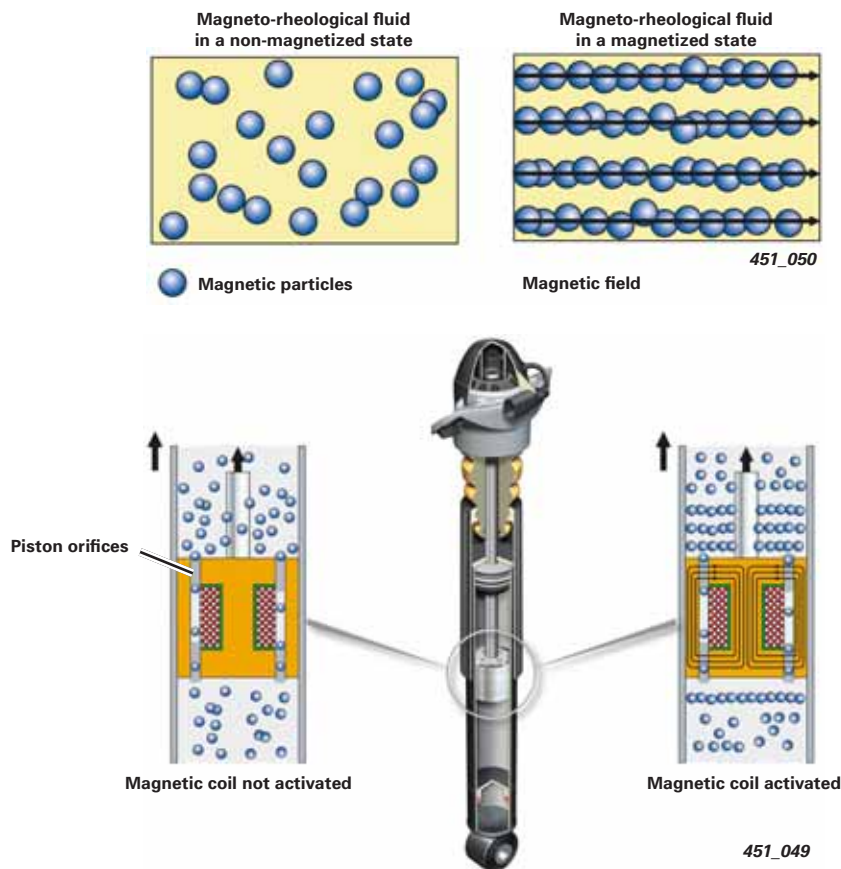
Audi Magnetic Ride

Audi magnetic ride is offered as standard equipment on the 2012 TT RS.

Function

Circulating inside its damper pistons is a synthetic hydrocarbon fluid containing minute magnetic particles between three and 10 micrometers in size. When voltage is applied to a coil, a magnetic field is created in which the orientation of particles changes.

These magnetic particles cluster transversely to the direction of flow of fluid, thus inhibiting flow through the piston channels. This alters the damping characteristic within a matter of milliseconds.



Operation

The system's control module constantly monitors the driver's style and condition of the road, adjusting its response accordingly. The driver can change between Normal and Sport modes at the touch of a button. In Normal mode, when the fluid has high viscosity, the suspension of the Audi TT RS offers a well-balanced, comfortable ride.

In Sport mode, when flow is inhibited, the suspension is uncompromisingly firm, so the car hugs the road with minimal body roll. The specific stabilization of each wheel offers more neutral self-steering behavior, resulting in a more precise steering response.



Reference

For further information about the Audi Magnetic Ride system, refer to Self-Study Program 993703, *The 2008 Audi TT Running Gear*.

Brake System

All four wheels feature ventilated disc brakes. The front brake discs are 14.5 in (370 mm) while the rear discs are 12.2 in (310 mm). The front disc friction surfaces are cross-drilled to promote maximum heat dissipation.

All four calipers are manufactured from aluminum to reduce unsprung weight. The front calipers are painted black and sport the RS logo.



Electronic Stabilization Program (ESP)

The Electronic Stabilization Program is optimized for dynamic driving but can be deactivated in two stages using ASR/ESP Button E256 in the center console.

First Stage (Sport Mode)

In the first stage (Sport mode), traction control is disabled and the brakes intervene somewhat later than in normal operation. To select, push the ESP OFF button briefly. The ESP warning light in the instrument cluster comes ON and ESP Sport is displayed in the Driver Information System. Driving stability is limited in Sport mode.



TCS/ESP button

Second Stage (complete shut down)

In the second stage, ESP is completely deactivated. To select, push the ESP OFF button for longer than three seconds. The ESP warning lamp comes ON and ESP OFF is displayed in the Driver Information System. When ESP is deactivated, traction control is also deactivated.



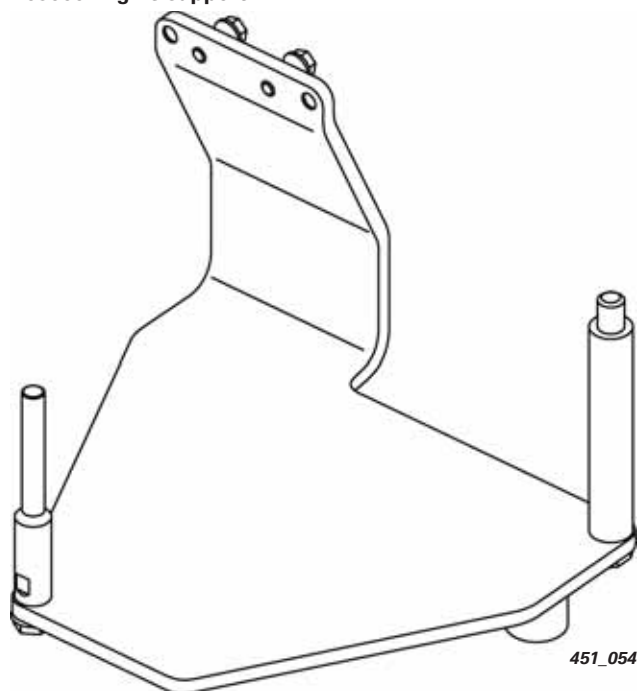
Note

ESP Sport mode should only be activated for agile handling and sporty driving if road, weather, visibility, and traffic conditions permit.

Service

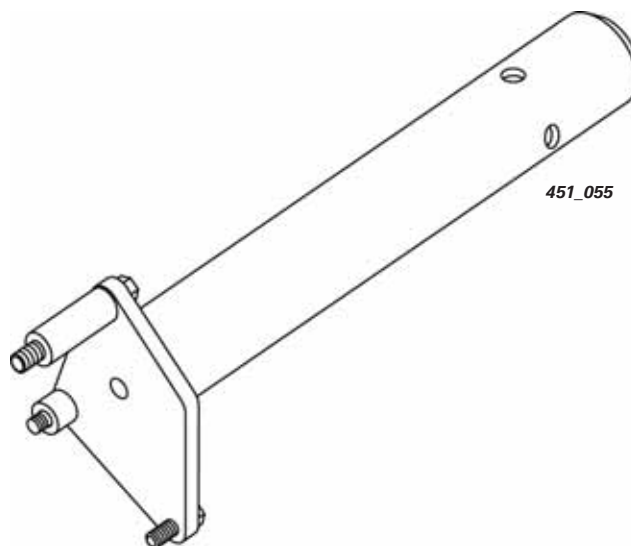
New Special Tools for the TT RS

T03000 Engine support



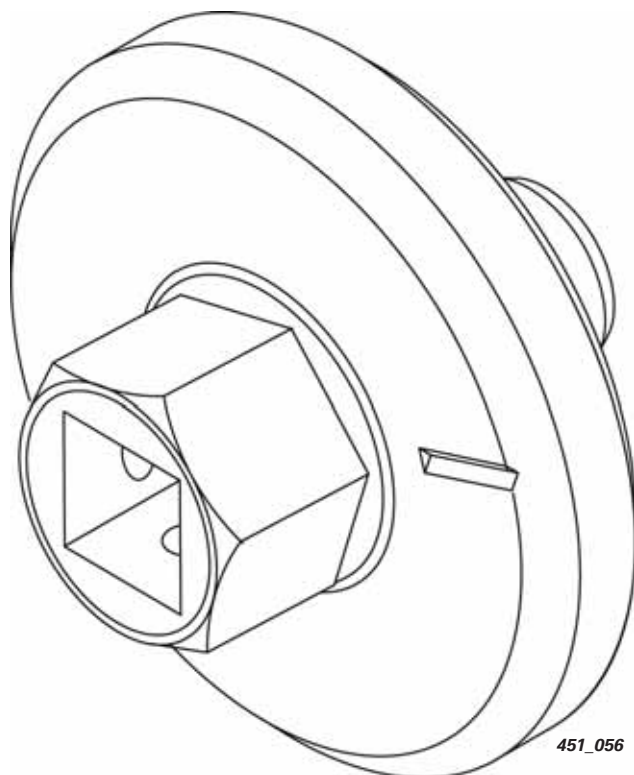
For removing and installing the engine in combination with the engine and transmission support V.A.G. 1383 A

T03001 Engine support



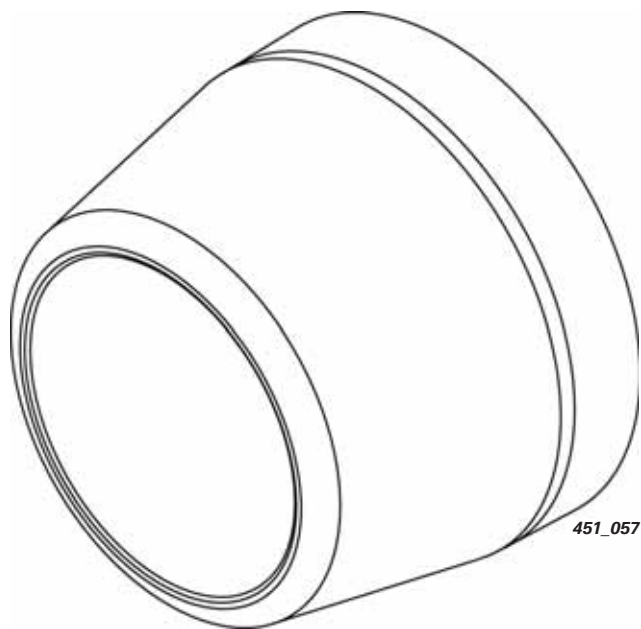
For mounting the engine on the engine and transmission support VAS 6095 or support clamp VW313

T03003 Wrench



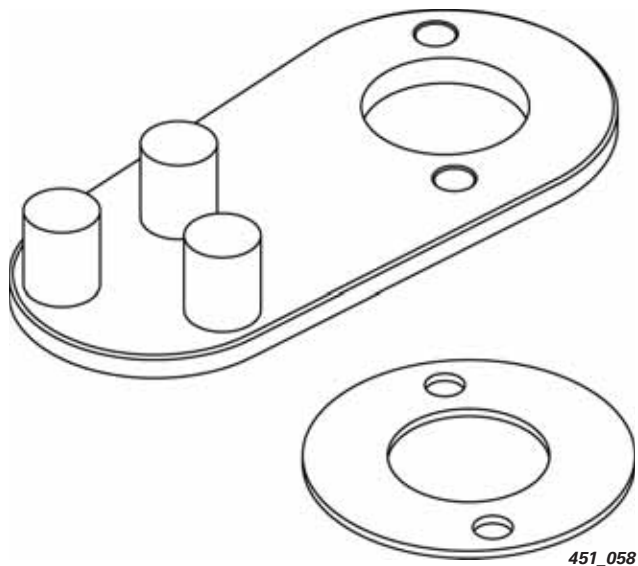
For setting the crankshaft to TDC

T03004 Assembly sleeve



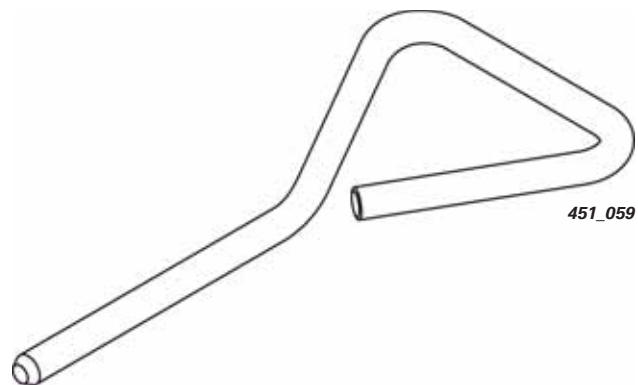
For replacing the crankshaft sealing flange on the belt pulley side

T03005 A Oil pump clamp



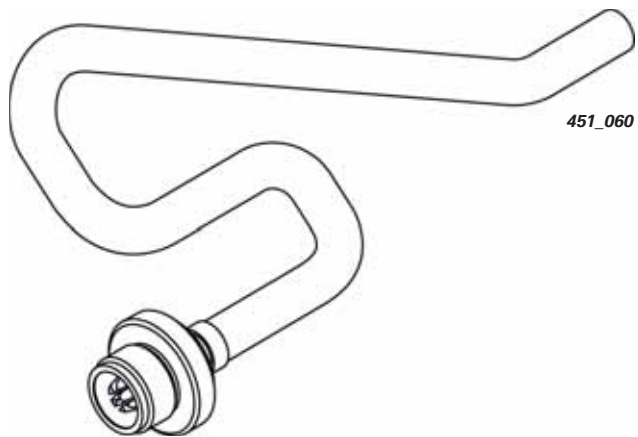
Oil pump clamp

T03006 Locking pin



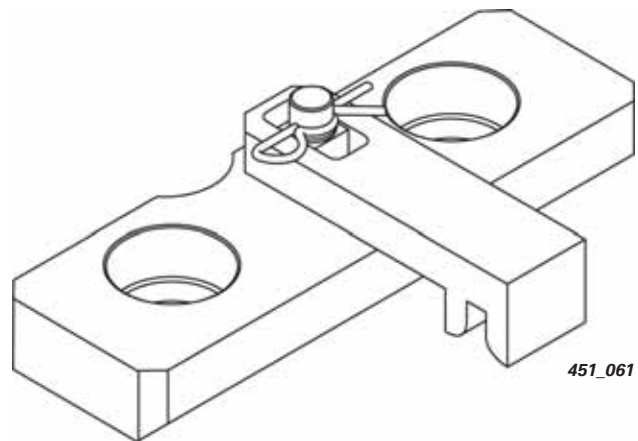
Chain tensioner clamp

T40057 Oil drain adapter



For draining engine oil out of the oil filter module

T40226 Gauge

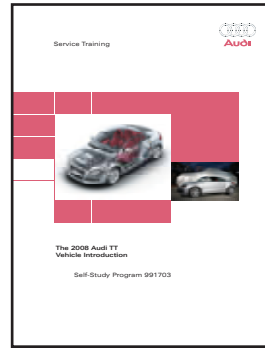


For transmission mounting

Self-Study Programs for the Audi TT

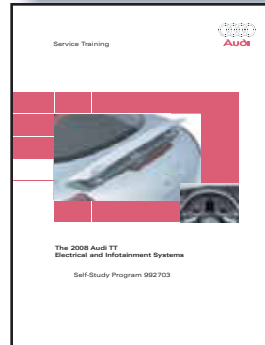
SSP 991703 The 2008 Audi TT Introduction

- Body
- Occupant Protection
- Engine
- Suspension System
- Electrical System
- Climate Control
- Infotainment



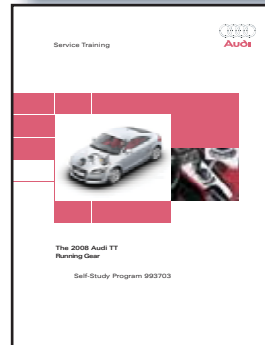
SSP 992703 The 2008 Audi TT Electrical and Infotainment Systems

- Control Module Locations
- Topology and Networking
- Electrical and Comfort System Electronics



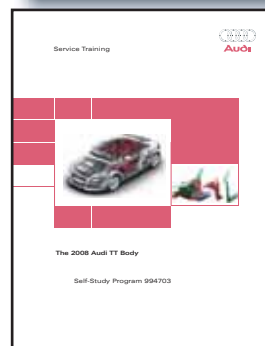
SSP 993703 The 2008 Audi TT Running Gear

- Axles
- Brake System
- Steering System
- Audi Magnetic Ride
- Other Features



SSP 994703 The 2008 Audi TT Body

- Audi Space Frame (ASF)
- Joining Techniques and Production Processes
- Vehicle Safety Concept
- Dimensions



Knowledge Assessment

An on-line Knowledge Assessment (exam) is available for this Self-Study Program.

The Knowledge Assessment is required for Certification.

You can find this Knowledge Assessment at:

www.accessaudi.com

From the accessaudi.com Homepage:

- Click on the "ACADEMY" tab
- Click on the "Academy Site" link
- Click on the "CRC/Certification" link
- Click on Course Catalog and select "990713 — Audi TT RS with the 2.5l TFSI Engine"

For assistance please call:

Audi Academy
Certification Resource Center (CRC)
1-877-283-4562
(8:00 a.m. to 8:00 p.m. EST)

Or you may send an email to:

audicrhelpdesk@touchstone-group.com

Thank you for reading this Self-Study Program and taking the assessment.

Audi
Truth in Engineering



990713

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