MASERATI
ACADEMY

# Introduction to Maserati

## Volume 1

**2009 Edition**

**English version**

**Training Documentation for Maserati Service Network**

# EXCELLENCE THROUGH PASSION

Welcome to Maserati!
You are about to be part of one of the most glorious and renowned names in motoring history. Maserati stands for more than 90 years of motoring heritage.
Technical innovation, craftsmanship, refined design and countless victories in motor sport have continuously characterised the long Maserati history. Maserati vehicles express the maximum Italian style and passion for automobiles.
Let the Maserati passion come to you and be prepared to make an important step in your professional life.

This manual will introduce you to Maserati and its products. It will take you briefly through the history of the company and give an overview of its road cars; you will get familiar with the technical aspects of the most recent Maserati models and its mechanical and electrical systems and components; it will introduce you to vehicle diagnostics and will take you through a number of aspects of the Maserati service organisation. During this journey you will meet some of the most interesting technical constructions in automotive history.

And this is just the first step. If you successfully walk through the simple steps of the Maserati Academy training program, you will be able to improve your skills and acquire an in-depth technical knowledge of Maserati vehicles. This will allow you to improve on servicing Maserati cars on behalf of the customer, the dealer and Maserati – therefore on behalf of you!
To succeed it is also important for you to be always sensitive for the real needs of the customers and the people around you in the workshop. Real customer service starts with your willingness to offer help!
Confident that you will easily grow accustomed to the Maserati service organisation, we wish you a good and successful start!

# Index

## Volume 1



## Volume 2

# 1

# Introduction to Maserati

# Hystoric Overview of Maserati


## The Maserati Brothers

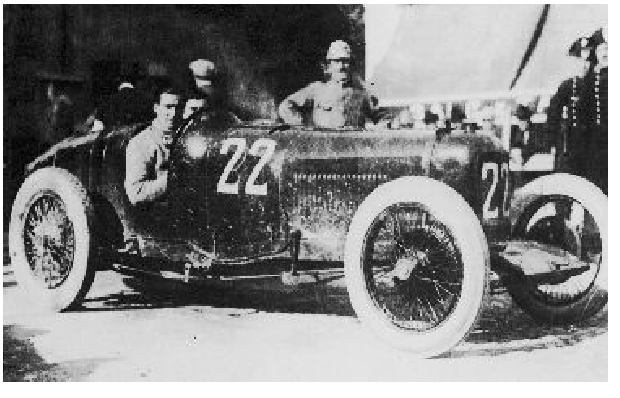
The Maserati brothers, seven male sons, were all born in a small house on the outskirts of Voghera, in the province of Pavia, where their father, Rodolfo, a railway engine driver, had moved from Piacenza after marrying Carolina Losi. Carlo, the eldest son, was born in 1881, Bindo in 1883, Alfieri in 1885: the latter died after only a few months and his name was given to the next son, born in 1887. Then Mario (1890), Ettore (1894) and Ernesto (1898) were born.

With the exception of Mario, who turned his creative vocation towards painting, they all became involved in engineering, in modification and later in design and construction of automobiles and engines.

The initial experiences were gained by Carlo Maserati.

Carlo the oldest son, who as a very young apprentice in a bicycle factory at Affori, near Milan, designed a monocylindrical engine in 1898 to power a velocipede. He even found a patron, the Marquis Michele Carcano di Anzano del Parco who, together with his son Cesare, started a factory for the production of bicycle engines in the same year.

Carcano took part in motor cycle competitions for a few seasons and with Carlo Maserati riding, some successes were gained such as the Padova-Bovolenta, the 5 km record and the Brescia-Mantova-Verona-Brescia race, all in 1900. The following year (1901) the Carcano firm ceased its activity and Carlo Maserati went to work first for Fiat (the current owners of Maserati) and then, in 1903, for Isotta Fraschini, as technical adviser and test-driver. He quickly made a career for himself: in 1907 he was with Bianchi, in 1908 with Junior as General Manager, but in 1919 his young life was cut short with an illness.



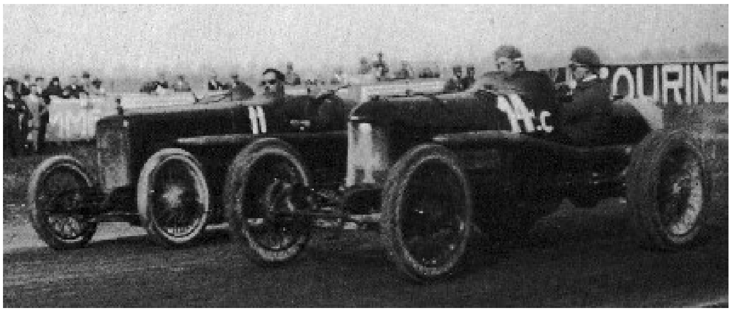

In 1903, when Carlo joined Isotta Fraschini, he also persuaded them to hire his brother Alfieri, who was only sixteen, but with a passion at least equal to his refined mechanical sensitivity. These two qualities were destined to become related in Alfieri with the progressive expression of his uncommon creative talent.
Alfieri Maserati soon made a name for himself at Isotta Fraschini (where his brother Bindo and Ettore later followed) both as a technician and as a driver and later the Milanese firm sent him and his brother Ettore to Argentina, then to London and finally, in 1912 to Bologna with the task of organising customer service. Two years later Alfieri Maserati set out on his own.

## 1914-1937: The first Maserati

The 14th of December, 1914, was a normal Monday just like any other. Italy, the only "great power" of Europe not to have been overwhelmed by what was to pass into history as the First World War, was half way through the ten illusory months which separated its short-lived proclamation of neutrality (August 2nd , 1914) from its fatal entry into the conflict on May 24th of the following year.


These were certainly not propitious times for any sort of business initiative, except perhaps for arms and munitions factories. Nevertheless, on that cold winter's day towards the end of the year, the "Societa Anonima Officine Alfieri Maserati" was born in Bologna at a ground floor office rented in Via de' Pepoli. A "trademark" was about to be added to the list of those which "had made" the history of the automobile.

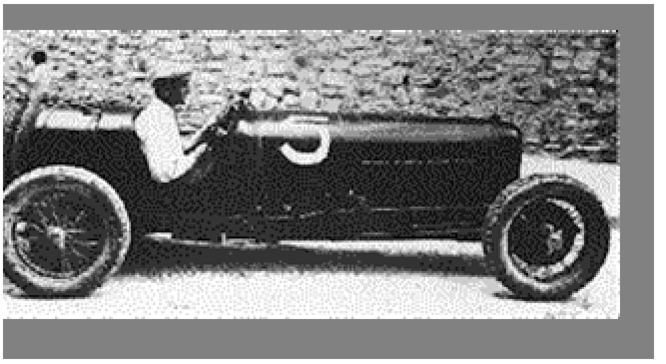
Starting business with a workshop specialising in race preparation for Isotta Fraschini engines, Alfieri was joined by Ettore and Ernesto Maserati (20 years and 16 years old respectively) and five mechanics. It was the beginning of a legend!
At the outbreak of war, Alfieri and Ettore were called up for action and the workshop was entrusted to young Ernesto. When Alfieri completed his military service, he set up a spark plug factory in Milan while hostilities continued and in 1919 moved it to Bologna and returned with his brothers Ettore and Ernesto. A new site was acquired for the workshop on the eastern outskirts of the city in an area known as the Alemanni quarter but which was better known as the Ponte Vecchio. These years were agitated not only by deep social unrest and upheavals but also by a great fervor of activity in industrial reconversion, reconstruction initiatives and growth in every sector of the economy. Even at Maserati activity resumed intensely.



Race modifications were based on Isotta Fraschini mechanics but every now and then other marques were used especially for Alfieri Maserati's race appearances, which were becoming more and more frequent as well as promising. The Isotta Fraschini Tipo Speciale was built in 1920 and this coupled a series-built chassis to a four-cylinder engine of 6330cc . Alfieri drove this car brilliantly in 1921 races winning the Susa-Moncenisio and coming fourth at the Mugello Circuit and the Gentleman GP in the Settimana di Brescia. In 1922, Alfieri, together with his brother Ernesto, used an improved version of this car to win the Mugello Circuit in record time, the Susa Moncenisio again and the Aosta-Gran San Bernadino.

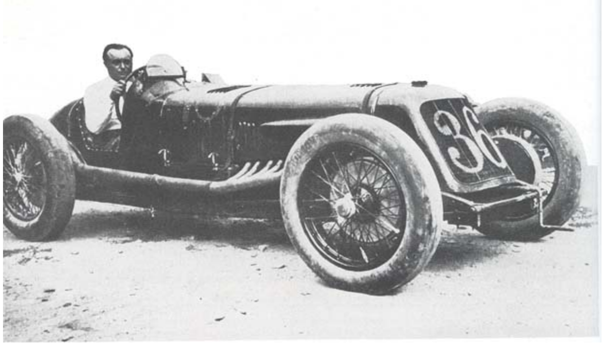
These victories impressed the directors of Diatto who offered Alfieri Maserati a car for the remaining races of the season together with a technical consultancy contract for preparation of their competition models. The Monza victory in the GP d'Autunno (3000cc class), gave rise to big expectations, but was not to be followed up in 1923. In spite of numerous retirements and the not too healthy state of the company, that same year Diatto helped Maserati to build a unique racing car powered by a 5000 cc Hispano Suiza V-8 cylinder engine which had been radically modified. This car enabled Alfieri to win the Coppa Principe Amedeo and gave him his third consecutive victory in the Susa Moncenisio, followed by his second in the Aosta-Gran San Bernadino.
1924 was less successful and the year in which Ernesto Maserati made his racing debut with some good results, while Alfieri, after having dominated the San Sebastian GP was unable to finish because of engine failure. Then he was unceremoniously disqualified (for five years, but condoned a few months later), for having replaced the two litre engine of Diatto with a three litre for the Rabassada Hill climb, not too far from Barcelona.


Forced to give up racing, Alfieri dedicated more of his time to work in the factory and this enabled him to build a Grand Prix Diatto for the 1925 season powered by an eight cylinder, two litre engine designed to be fed with a supercharger. However, the unhealthy economic situation at Diatto brought a definite end to the Maserati brothers' collaboration and so, in the winter between 1925 and 1926, they committed themselves to construction of an entire car, which would be the first to carry their name ... the Maserati Tipo 26.



The first car they were wholly responsible for was the Tipo 26, built in 1926. The engine was an 8-cylinder in line with a 1.5 litre supercharged displacement that developed 120 bhp at 5300 rpm. Above the radiator a then unknown badge presented a trident that evoked Bologna's famous statue ofThe Tipo 26 made its debut with Alfieri Maserati at the wheel and Guerino Bertocchi as mechanic in the Targa Florio on April 25 1926. It came first in its class, ninth overall.

After that the wins came thick and fast. In 1929 Maserati won the Tripoli Grand Prix (Borzacchini-E. Maserati) and the Mille Miglia (overall winner). In the same year, Borzacchini set a new 3-5 litre world speed record in a Maserati Tipo V4, an extraordinary car with a V16 engine made by coupling together two Tipo 26 engine blocks. The Maserati's average speed of 246 km/h was achieved from a propelled start on a 10 km track near Cremona and was not beaten until eight years later.
It was a performance that did a lot for the Maserati image and sales figures.




In 1933, **Tazio Nuvolari** appeared on the scene, driving the 8C to victory in the Belgian Grand Prix, the Coppa Ciano at Montenero and the Nice Grand Prix

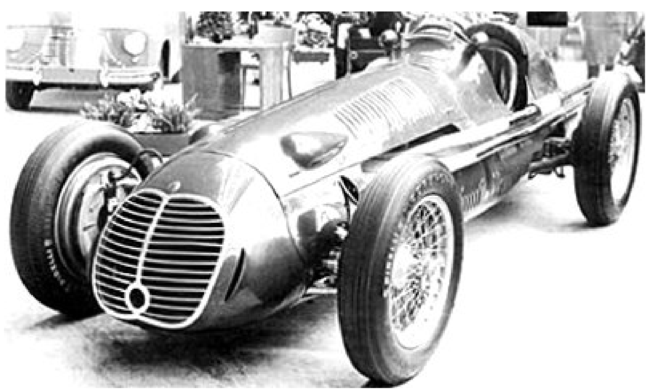
**The Maserati V4: the world's first supercar**

In 1929, a sensational new vehicle was presented by Maserati: the outrageous 16-cylinder V4 race car.
The engine of this car was created by coupling two Tipo 26B 8-cylinder compressor engines together in an angle of 25°. Both engines shared the same basement and the carburettors were designed especially for this car by Eduardo Weber.
Similar projects came also into existence by Fiat and Bugatti, and later also by Alfa Romeo, but Maserati's V4 project was courageous and innovative by every standard. With its more than 280 hp, power output was almost double compared the Tipo 26B. This car had excellent potential as a race car, but tyres and brakes of the time were not able to hold against the power.
In September 1929, The V4 won the world land speed record by achieving an average speed of 246,500 km/h over a 10 km straight (non-asphalted!) near Cremona. This record was beaten only 8 years later by Bernd Rosemeyer in an Auto Union.
Only two of these spectacular V4 cars were ever made. One of them received in 1931 an elegant new spider body from Zagato adapted for road use and was finished in a stylish two-tone green colour. By doing so the world's first supercar was born before the word was even invented.

## The Orsi years: 1937-1967

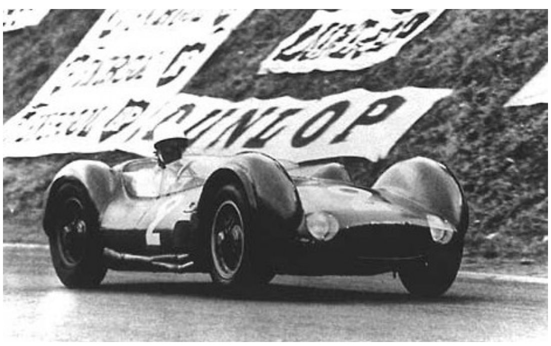

**Omar Orsi with chief engineer Giulio Alfieri and test driver Guerino Bertocchi**

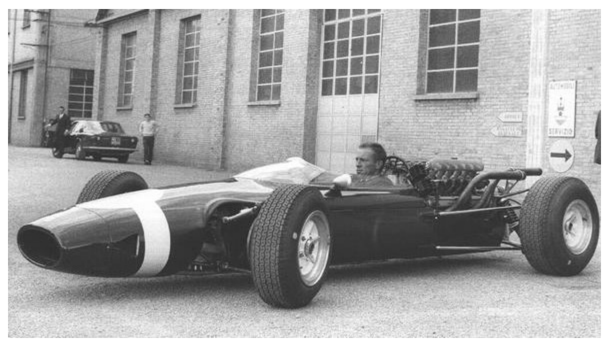
In 1937 the Maserati brothers handed over the financial management of their company to the Orsi family, while keeping their hands on the engineering side of the business. That opened the way to operations on a much broader scale, which bore fruit in two successive race wins on United States soil. In 1939 and 1940, Maserati won the Indianapolis 500 with Wilbur Shaw in an 8CTF. That made Maserati the first and the only Italian constructor to win the legendary American race.



Meanwhile in 1939, the firm moved to its now celebrated premises on Viale Ciro Menotti in Modena. It is here that its extraordinary creativity was deployed in the service of the Italian war effort as it converted to the production of machine tools, electrical components, spark plugs and even electric vehicles.

In 1957, Stirling Moss left Maserati after he had racked up numerous victories in the 250 F but had failed to win the F1 world championship. His place was taken by Fangio who made a triumphant debut in the Argentine Grand Prix where Maserati took all three places on the podium. (1st Fangio, 2nd Behra, 3rd Menditeguy). By the end of the season Fangio had won the world title in a Maserati 250 F. At the same time, Maserati was also excelling itself in the World Sports car Championship with the legendary 450S, a genuine powerhouse driven by a weighty 4.5 litre V8 engine that developed 400 bhp.





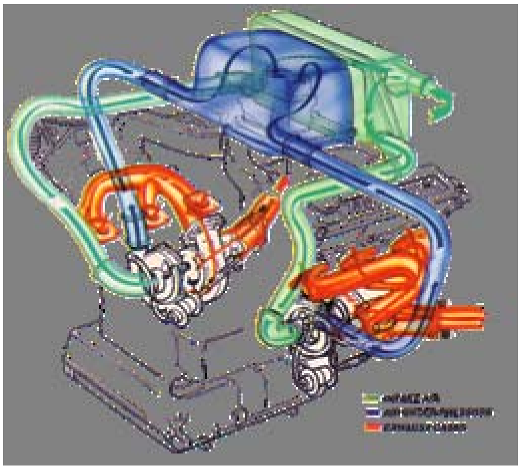
Then at the end of the year Maserati unexpectedly announced that it would no longer race, though it would go on designing racing cars. Indeed it went on to produce several masterpieces of the art including the Tipo 60 and the 61 "Birdcage" as well as the 3-litre V12 power unit used on the Cooper Maserati Formula 1 car in 1965-67.

## 1967-1975: The Citroën Area

In 1968, the Orsi family sold Maserati to Citroën which was primarily interested in acquiring its engine know-how. Indeed a 6-cylinder Maserati engine was used on the Citroën SM coupé. Under the new management and in total contrast with Maserati's traditional insistence on a front-mounted engine, the firm also produced two centre-engined models: the Bora (1971-79) with a 90° V8 engine and the Merak (1972-83) with a 90° V6 power unit, both of them with Italdesign bodies. Citroën also introduced a new version of the Quattroporte with SM mechanicals and front wheel drive! Very few were ever produced and the model was never homologated.
1973 saw the debut of the Khamsin, a sharply cut streamlined coupé with a Bertone body. In the same year, though, Maserati sales were badly hit by the oil crisis and Citroën pulled out.

## 1975-1993: the de Tomaso years

In 1975, the effects of the oil crisis forced Citroën to draw in its horns, which meant abandoning Maserati which was then sold to **Alejandro De Tomaso's** GEPI. Under its management, the firm produced a 2000 cc version of the Merak and in 1976 it launched a new version of the Quattroporte. This went on to become the best selling Maserati of all time. The Quattroporte was also famous for being the vehicle of choice for successive Italian presidents.



The eighties brought many changes, not least the creation of a model destined for mass production. That was the surprising Biturbo, a performance saloon with a 2000cc V6 engine that was launched in 1981. In 1984, an impressive 6,000 Biturbo’s were constructed. Further development of the turbocharged V6 engine led in 1989 to the launch of the Shamal that featured the first Maserati V8 adopting twin turbo's.

## 1993 onwards: under Fiat’s wings

In 1993, Fiat Auto acquired the entire share capital of Maserati, which was later put under the full control of Ferrari in July of 1997. Work began on the new Maserati factory on 1st October, 1997 and the Quattroporte Evoluzione came out in 1998. That same year the 3200GT coupé was launched at the Paris Motorshow. It was both the first Maserati of the new era and a revival of a 4-seater Grand Tourer tradition that began forty years earlier with the 3500GT. The 3200GT was first shown to the Australian public at the 1999 Melbourne Motorshow. The 3200GT instantly captured the attention of automotive aficionados all over the world.

## Maserati milestones:

- **The first Maserati, Tipo 26, made its debut by winning its class at the Targa Florio of 1926. Alfieri Maserati was at the wheel.**
- **Maserati breaks the world land speed record in 1929 with the mighty V4.**
- **Maserati engine powers the world water speed record in 1931.**
- **Maserati introduces the world's first hydraulic brake system on the 8CM racing car in 1933.**
- **The Maserati breaks the world speed record again in 1934 with the 4CM (1100cc class).**
- **Maserati fills the complete podium (victory, 2nd and 3rd place) of the famous Targa Florio road race for four consecutive years: 1937, 1938, 1939 & 1940.**
- **Maserati wins the Indianapolis 500 miles race for two consecutive years (1939 and 1940) with Wilbur Shaw at the wheel of the 8CTF.**
- **Maserati won the Formula 1 world championship in 1957 with Juan Manuel Fangio at the wheel of the 250F**
- **The 3500 GTI introduced in 1957 important innovations such as twin-plug ignition system, fuel injection and disc brakes.**
- **The Quattroporte of 1963 was named the fastest saloon car in the world.**
- **Maserati introduced the world's first twin-turbo engine on the Biturbo in 1981.**
- **The same Biturbo model introduced the Torsen limited slip differential for the first time on a road car.**
- **During the early 1990's the Maserati Racing, and little later also the Ghibli and Ghibli Cup, were the world's most powerful 2-litre road cars.**
- **Maserati stunned the world in 1998 with the gorgeous 3200GT, which introduced the world's first tail lights using led technology.**
- **The mighty MC12 has proven to be the world's most successful GT race car in the 2004-2008 area with several world championship titles over these years and three important victories in the Spa 24 hours race (2005, 2006 & 2008).**

# The Maserati Company Today

Maserati today is a modern and fast growing specialist car manufacturer with representations worldwide. In 2005 the Maserati ownership has been transferred from Ferrari S.p.A. to Fiat Partecipazioni S.p.A.

2008 has been a year of absolute record numbers for Maserati. Vehicle sales have grown to 8759 units, up 17% with respect to 2007. The GranTurismo has established itself as the most successful model, representing 63% of the Maserati sales. Also the economic results have been constantly improving. The Maserati trading profit has reached in 2008 72 millions of Euros, or three times the value of 2007.

In 2008, Maserati continued its strategy of broadening its model range with the aim to match the different costumer needs. An important fact in 2008 was the introduction of the GranTurismo S model, which is the embodiment of Maserati's true sports DNA.

Maserati's successful saloon, the Quattroporte, underwent after five years an important upgrade and is now offering a wider choice of variants to maintain its leading position in the sports luxury sedan segment under the challenging 2009 market conditions.

For a better commercial focalise on its most important markets, Maserati has now subsidiaries in the United States, the United Kingdom, France, Germany and Switzerland, and a new sales structure for the fast growing Chinese market.

In the sporty sphere, 2008 was again a highly successful year for the Maserati MC12 racing cars: the consolidation of both team's and driver's world championship titles for the fourth consecutive year, and the third victory in four years in the illustrious Spa-Francorchamps 24 hours race, all in GT racing.

Other important facts in 2008 were the appointment of Engineer Harald J. Wester as the new Maserati CEO on August 1, and the presentation of the GranTurismo MC Concept, a prelude to Maserati's future on the race track.

**Maserati facts and figures:**

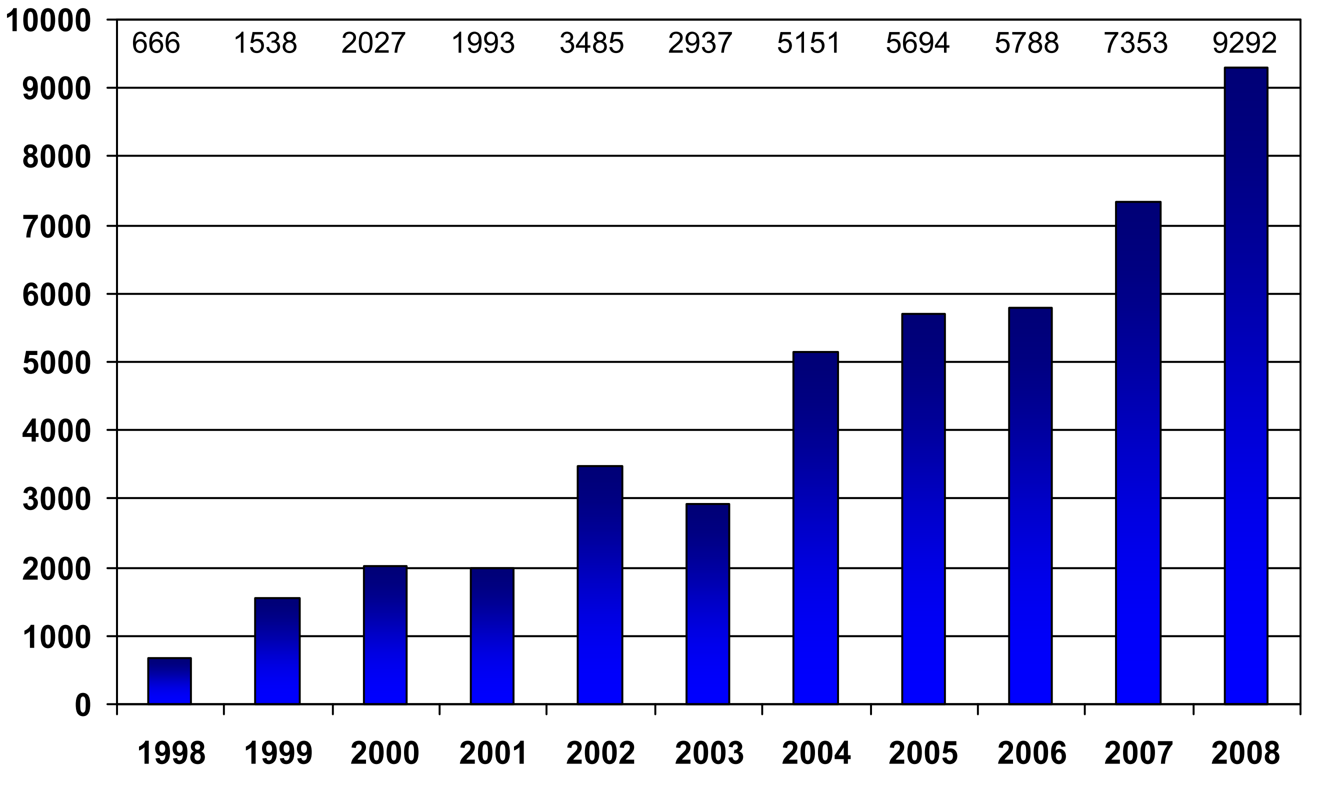
President: Sergio MARCHIONE

Chief Executive Officer: Harald J. WESTER

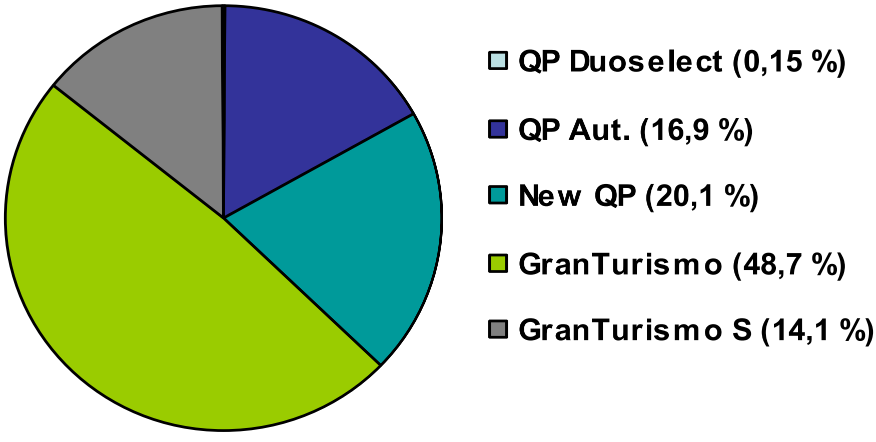
| | 2007 | 2008 | Difference |
|---|---|---|---|
| **Total revenues (in millions of Euros)** | **694** | **825** | **+18,9 %** |
| **Total trading profit (in millions of Euros)** | **24** | **72** | **+ 200 %** |
| **Number of employees (at the end of the year)** | **± 950** | **± 780** | **-** |
| **Number of vehicles produced** | **7.353** | **9.292*** | **+26,4 %** |
| **Number of vehicles sold** | **7.496** | **8.759** | **+16,8 %** |

(*): 431 produced Alfa 8C vehicles not included

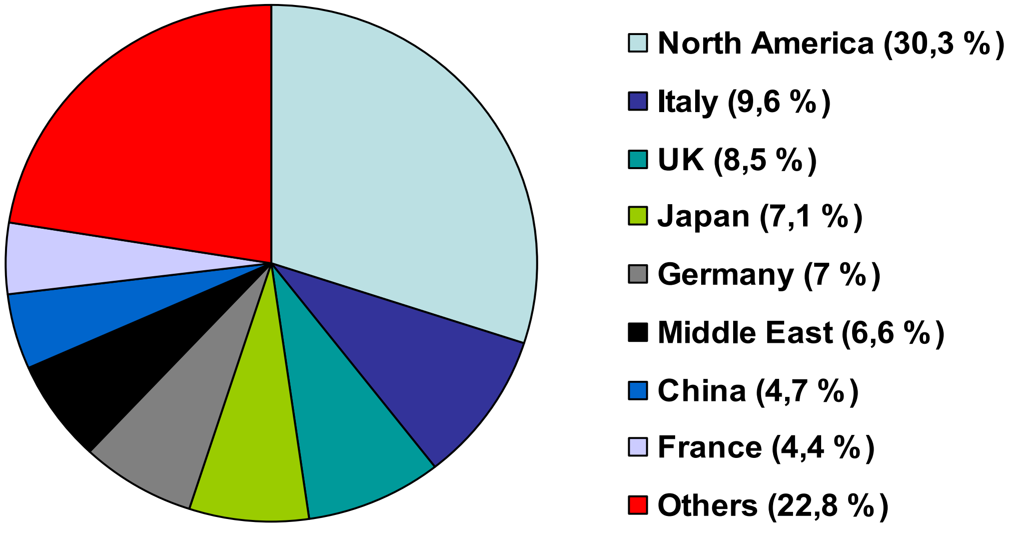
**Maserati vehicle production growth 1998-2008:**



**Maserati 2008 global vehicle sales divided by model:**




**Maserati 2008 global vehicle sales divided by market:**



**Maserati 2008 overview:**

- **January 12:** presentation of the new Quattroporte “Collezione Cento” at the Detroit Motor Show
- **February 12:** first images GranTurismo S released
- **March 4:** launch of the GranTurismo S at the Geneva Motor Show
- **May 15:** start of production of the GranTurismo S
- **June 23:** first images released of the new Quattroporte S
- **July 10:** start of production of the new Quattroporte and Quattroporte S
- **August 1**: Harald J. Wester becomes the new CEO of Maserati
- **August 3:** Vitaphone Racing Team wins with Maserati the Spa-Francorchamps 24-hour race (Belgium) for the third time in four years
- **September 24:** presentation of the GranTurismo MC Concept at the Monza race track
- **October 2:** presentation of the new Quattroporte range at the Paris Motor Show
- **October 5:** Second victory of the season by Vitaphone Racing Team with Maserati (Nogaro, France)
- **October 19:** Bertolini-Bartels win with their Vitaphone Racing Team Maserati at the Zolder race track (Belgium) and secure by doing so the 2008 FIA-GT world drivers championship title
- **October:** record number of vehicles produced by Maserati in 1 month: 1130
- **October:** launch of the new website Maserati.com
- **November 3:** first prototype built of the Alfa Romeo 8C Spider
- **November 17:** start of production of the new Quattroporte Sport GT S
- **November 23:** Vitaphone Racing Team wins with Maserati the 2008 FIA-GT world team championship title (San Luis, Argentina)
- **December 3:** presentation of the MC Sport line at the Bologna Motor Show
- **December 19:** record number of Maserati cars produced in 1 year: 9292

**Maserati Today:**













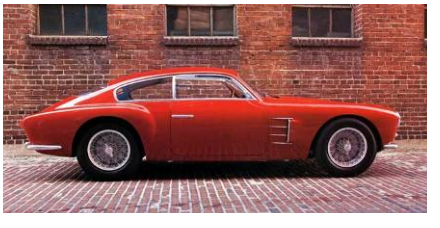
# Maserati Road Cars

## 1500 Gran Turismo (A6)

**Years of production: 1946-1950**
**Numbers produced: 61**
**Engine: 6 cylinder, 1500cc, 65 hp**

It was already in 1941 that the decision was made for the development of a GT car, but the first examples of Maserati's first ever road car were not built until 1946. However this car was officially called "1500 Gran Turismo", it is better known under its project name A6 (*Alfieri, 6-cylinder*). The over head cam engine had a sophisticated valve command system and the tubular chassis was innovating for its time with round section steel tubes.
Except for one experimental prototype built by Zagato, all bodies were built by Pinin Farina. First examples had covered head lights and a different rear section. The car received its final body style in 1948 (see picture).

## 2000 Gran Turismo (A6G)



**Years of production: 1950-1951**
**Numbers produced: 16**
**Engine: 6 cylinder, 2000cc, 100 hp**

The A6G or 2000 Gran Turismo had a new two-litre engine based on the power unit of the A6GCS racing cars. Compression ratio and thus power was reduced to allow the engine to run on commercial fuel, of which excellent quality was not always guaranteed. Coupé bodies ware built by Frua, Vignale and Pinin Farina and an elegant spyder version was created by Frua. All bodies were of great luxury, refined and cured in every detail. However a high list price and performances not matching the quickly changing standard in the luxury car segment didn't favour its sales. Only 16 pieces were produced.

## A6GCS Berlinetta Pinin Farina

**Years of production: 1953-1954**
**Numbers produced: 4**
**Engine: 6 cylinder, 2000cc, 170 hp**

A very special car was presented at the Turin motor show of 1954. It concerned a 2000 Sport fitted with an elegant closed “berlinetta” body from Pinin Farina. The 2000 Sport (project name A6GCS) was a higly successful open 2-seater race car designed for road races and was much beloved by the racing drivers of the area for its excellent driving qualities. An elegant berlinetta body from Pinin Farina on this basis was the right recipe for one of the most beautiful creations in automotive history. Only four of them were built (chassis 2056, 2057, 2059 and 2060), but chassis 2060 had a short life as it was re-bodied as an open race car in 1955 and received a new identification number (2086). This car is one of the most sought-after historic Maseratis. One of them is on display at the Panini-collection.

## 2000 Gran Turismo (A6G54)

**Years of production: 1954-1957**
**Numbers produced: 60**
**Engine: 6 cylinder, 2000cc, 150 hp**

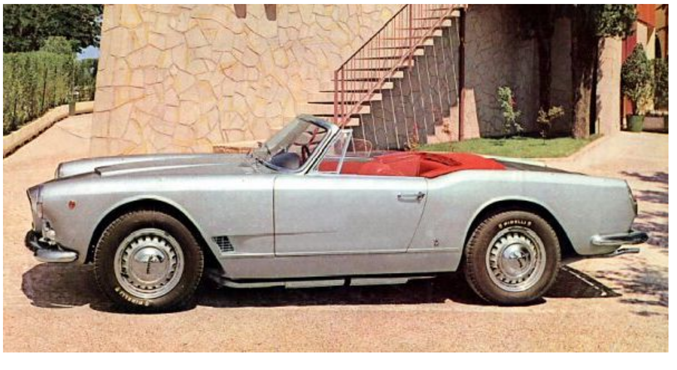
The experience gained with the successful 2000 Sport was used for a small series GT cars with elevated performances and reserved to a limited number of elite customers. The A6G54 twin cam engine of the 2000 Sport was detuned and had now a classic oil sump instead of a dry sump lubrication system. Its 150 horse power gave the 2000 Gran Turismo of 1954 the true GT performance its predecessor lacked and this car was highly appreciated by the public. Coupé and spyder bodies were made by Frua, Zagato and Allemano.

## 3500 GT & GTI

**Years of production: 1957-1964**
**Numbers produced: 1983 (all versions)**
**Engine: 6 cylinder, 3.5L, 220 & 235 hp**

The 3500 GT was an important car for Maserati as it was the first production car to be built in large numbers. In 1957 Maserati had officially withdrawn from motor racing and full attention was now on the production of Gran Turismo road cars. The elegantly shaped body of the 3500 GT was a creation from Carrozzeria Touring and was made from aluminium which was attached to a tubular steel frame (Superleggera patent). The 6-cylinder engine came from the 350S racing car of 1956 and was characterised by excellent torque values at low engine speed. In 1961, the triple Weber carburettors were replaced by a mechanical fuel injection system from Lucas, boosting the power to 235 hp. Injection equipped vehicles were referred to as 3500 GTI. This car became a big commercial success and contributed importantly in resolving the economical difficulties of Maserati at the time.

## 3500 GT & GTI Spyder



**Years of production: 1958-1964**
**Numbers produced: 242**
**Engine: 6 cylinder, 3.5L, 220 & 235 hp**

Almost simultaneously with the coupé, an open version of the 3500 GT was under development. Early prototypes of the Spyder were made by Touring and Frua, but the final design was a masterpiece of designer Giovanni Michelotti when he was working for Vignale. The body was now made from steel instead of aluminium and was fitted on a 10 cm shortened chassis. Also the Spyder adopted the Lucas fuel injection system and its drum brakes were replaced by more modern disc brakes on later versions, although drum brakes remained available upon request.

## 5000 GT

**Years of production: 1959-1966**
**Numbers produced: 34**
**Engine: 90° V8, 5.0L, 325 & 340 hp**

The worldwide success of the 3500 GT has drawn much attention to the Maserati brand. Some however desired from Maserati a Gran Turismo that was even more exclusive. On specific request of the Shah of Persia the 5000 GT was born. Chief engineer Giulio Alfieri used only the very best components available to built this extraordinary car. Its powerful V8 engine originated from the 450S racing car by which Juan Manuel Fangio and Jean Behra won the 1957 Sebring 12 hours race and the vehicle used a reinforced 3500 GT chassis. The brake system was servo-assisted with discs on the front wheels and drums on the rear. Performances were unprecedented for a road car at the time. Bodies for the 5000 GT were created by the worlds most famous coachbuilders: Touring, Pinin Farina, Monterosa, Allemano, Ghia, Bertone, Vignale and Frua.

## Sebring


**Years of production: 1962-1968**
**Numbers produced: 600**
**Engine: 6 cylinder; 3.5L, 3,7L & 4.0L; 220-265 hp**

Before the sales of the 3500 GT began to slow, Maserati presented its new Sebring coupe at the Geneva motorshow of 1962. The new car was named after the race track in Florida were the 450S racing cars obtained an important win a few years earlier. The Sebring was based on the short 3500 GT Spyder chassis and its 2+2 body was a design from Michelotti during his time at Vignale. The 6-cylinder engine had always fuel injection from Lucas and total displacements were 3.5L, 3.7L and also 4.0L from 1965, with power outputs varying from 220 to 265 hp. The Sebring showed a number of technical improvements over the 3500 GT. Automatic transmission, air conditioning and Borrani wire wheels were available on request.

## Quattroporte I


**Years of production: 1963-1969**
**Numbers produced: 776**
**Engine: 90° V8, 4.1L & 4.7L, 260 & 290 hp**

In the early 1960's, Giulio Alfieri started to work on a completely new project. Inspired by the success of its Gran Turismo cars, Maserati was now thinking about a saloon car. The new Quattroporte (Italian for "four doors") must of course have the same level of elegancy, refinement, power and performances as the other trident products. With a top speed of 230 km/h, it was the fastest saloon production car at the time. The design was from Pietro Frua and the car had a modern sheet metal monocoque structure instead of a tubular frame. The De Dion rear axle was replaced by a more traditional rigid axle and the option was offered for a more powerful 4.7 engine when a second series was presented in 1966. A curious detail: 5 Quattroportes were converted into pick-ups by coachbuilder Grazia of Bologna and were used as fire extinguisher cars on the Italian race tracks.

## Mistral & Mistral Spyder

**Years of production: 1964-1969**
**Numbers produced: 955**
**Engine: 6 cylinder; 3.5L, 3,7L & 4.0L; 220-265 hp**

With this car started Maserati's tradition to name its Gran Turismo cars after famous winds (the Ghibli, Bora, Merak, Khamsin, Karif and Shamal would follow). The Mistral shared its mechanical base with the Sebring but, thanks to its 2-seater fastback body from Pietro Frua, had a much more modern appearance compared to the more traditional styled 2+2 Sebring. A first prototype of the Mistral was presented at the Turin motorshow in the autumn of 1963 but production didn't start before 1964. The body was from steel but the doors, bonnet and rear window frame were made from aluminium to reduce the weight. An open Spyder version was presented at the Geneva motorshow in March 1964. The Spyder was produced in about 120 units.

## Mexico

**Years of production: 1966-1972**
**Numbers produced: 485**
**Engine: 90° V8, 4.1L & 4.7L, 290 & 300 hp**

After the 5000 GT and the Quattroporte, the Mexico is Maserati's third road car using a civilised version of the V8 race engine from the 450S sport prototype race car. A first prototype of the Mexico was shown in 1965, but the official presentation of the final version was at the Paris motorshow in 1966. The sober but balanced and elegant design from Vignale keeps the middle between a 4-seater coupe and a 2-door saloon car and the car offers comfortable interior space to four people thanks to its 2640 mm wheelbase. The Mexico shares its mechanical base with the Quattroporte and has a steel monocoque structure combined with a front auxiliary frame. The Mexico was available with both 4.1L and 4.7L engine and has a top speed between 250 and 260 km/h.

## Ghibli & Ghibli Spyder

**Years of production: 1967-1972**
**Numbers produced: 1280**
**Engine: 90° V8, 4.7L & 4.9L, 340 & 330 hp**

In 1966 a project was started for a new sporty Gran Turismo in the best tradition of the Maserati Brand. The new Ghibli, named after a desert breeze, was strictly a 2-seater and its beautiful design was a true masterpiece of the young designer Giorgetto Giugiaro during his period at Ghia. The body of the Ghibli was perfect in every detail and is still regarded as one of Giugiaro's most beautiful designs. The V8 engine from the Quattroporte/Mexico adopted a dry sump lubrication system in order to fit under the long and low Ghibli bonnet. From 1969 the Ghibli was also made available with a 4.9L engine, named Ghibli SS, and an open Spyder version was added, of which only 125 units were produced.

## Indy

**Years of production: 1969-1975**
**Numbers produced: 1104**
**Engine: 90° V8; 4.1L, 4.7L & 4.9L; 260, 290 & 300 hp**

The Maserati Indy, officially presented at the Geneva motorshow in 1969, was a tribute to the two consecutive victories of the Maserati 8CTF race cars in the famous 500 miles race at the Indianapolis speedway in 1939 and 1940. This new car was designed by Vignale and could be seen as a model in between the Ghibli and the Mexico. The roof line was higher compared to the Ghibli in order to offer space for the rear passengers. Mechanicals were borrowed from the Ghibli and traditional Maserati: 90° V8 engine with four overhead camshafts, semi-monocoque structure with front auxiliary frame, independent double wishbone front suspensions and a rigid rear axle with leaf springs. In 1973 the Indy adopted the brake system from Citroën, who was the new owner of Maserati.

## Bora

**Years of production: 1971-1978**
**Numbers produced: 530**
**Engine: 90° V8, 4.7L & 4.9L, 310 & 320 hp**

The Bora was a milestone in Maserati's history: It was the first Maserati road car with a central mounted engine - engineer Guilio Alfieri gained much experience with the central engined Birdcage Tipo 63-65 race cars - and it was the first car which has been developed under full Citroën ownership. The engine was the well-known V8, first in 4.7L and later also in 4.9L configuration, while its beautiful fastback body was another masterpiece from Giorgetto Giugiaro. The Bora was equipped with Citroën's complex hydraulic system, which was used for the brakes, the opening of the headlights, the adjustment for the driver's seat and the pedals. Sales of the Bora suffered from the oil-crisis in the mid-seventies, while racing plans were crossed due to homologation problems.

## Merak, Merak SS & Merak 2000


**Years of production: 1972-1983**
**Numbers produced: 1820**
**Engine: 90° V6; 3.0L & 2.0L; 190, 208 & 170 hp**

The Merak was Maserati's answer to the oil crisis, which strongly penalised the sales of big-engined cars. This small sister of the Bora used a modified version of the type C.114 engine, which Maserati had produced for Citroën. This smaller engine made it possible to equip the Merak with two small rear seats, while the Bora was a two seater. The Merak used even more Citroën components as its bigger sister, such as the single-spoke steering wheel; but much of these components disappeared again on later versions. In 1976, a lighter and more powerful version was presented, the Merak SS, while for the Italian market a two-litre version was offered. This latter version was recognisable by its black striping. The combination of its sensational Italdesign body and more economic engine choice made from the Merak a real best-seller.

## Khamsin

**Years of production: 1974-1982**
**Numbers produced: 430**
**Engine: 90° V8, 4.9L, 320 hp**

The Khamsin was a remarkable vehicle, it was not only the last work of Giulio Alfieri as head of Maserati's engineering department, it was also Maserati's first series-production car to be designed by Bertone. The result was a streamlined, wedge-shaped car with elegant proportions. The mechanical base was still borrowed from the Ghibli, but now with independent rear suspensions, while brake system was a legacy from Citroën and not by everyone equally appreciated.
The Kamshin's traditional GranTurismo configuration – a big sports car with front mounted engine and rear wheel drive – indicated the end of an area which would only return in the late 1990's.

## Quattroporte II


**Years of production: 1976-1978**
**Numbers produced: 12**
**Engine: 90° V6, 3.0L, 210 hp**

The second generation of the Quattroporte conceals one of the obscurest periods in Maserati's history. The car has been developed under Citroën's ownership and was technically identical to the Citroën SM, included its front wheel drive and hydro-pneumatic suspension. Performances were behind on the first generation Quattroporte and the car was unloved by Maserati purists, but nevertheless the Quattroporte II was very comfortable, well equipped and offered an excellent ride. Its Bertone-designed body was modern and the build quality very good. Unfortunately, the early end of the agreement with Citroën in 1975 and financial problems hampered the launch of the Quattroporte II. In fact, the model has never been homologated for the European market. Only 12 units were produced in its three years of production and they were all sold to the Middle East.

## Kyalami

**Years of production: 1976-1983**
**Numbers produced: 200**
**Engine: 90° V8, 4.1L & 4.9L, 255 & 280 hp**

The Kyalami indicated at the same time the end and the beginning of an area. It was the last Maserati coupe equipped with the illustrious V8 engine and it was the first that has been developed under the new ownership of Alejandro de Tomaso. The Kyalami was actually based on De Tomaso's own Longchamp model, but the Ford-Cleveland V8 has been removed in favour of Maserati's own four-cam V8, and the original design from Tom Tjaarda has been elegantly reworked by Frua. Only 200 units were produced of this car that was named after the South African race track where the Maserati-engined Cooper Formula 1 cars scored an important win almost ten years earlier.

## Quattroporte III

**Years of production: 1979-1990**
**Numbers produced: 2155**
**Engine: 90° V8; 4.1L & 4.9L; 255, 280 & 300 hp**

The third generation of the Maserati luxury saloon was meant to make up for the Quattroporte II fiasco. Alejandro de Tomaso, who disliked Citroën, discarded all Citroën technology used on the Quattroporte II. Mechanical parts came from the Kyalami and the Quattroporte had again a V8 engine and rear wheel drive. The impressive body of the Quattroporte III was designed by Giugiaro and the steel body shells were built at the Innocenti plant near Milan, prior to assembly in Modena. When the car went on sale in 1979, it was an instant commercial success. In 1987, a restyled version called Quattroporte Royale offered an upgraded interior and a 20 hp more powerful 4.9L engine. Production of the Quattroporte III continued until 1990.

## Biturbo

**Years of production: 1982-1989**
**Numbers produced: 11919**
**Engine: 90° V6 twin turbo 18v, 2.0L, 180-223 hp**

When the Biturbo was presented in December 1981, a new area started for Maserati. Alejandro de Tomaso's plan to resolve Maserati's financial problems was the introduction of a compact coupe with first level performances and an interesting price setting, and in this way attracting new customers to Maserati. Its engine was a modified version of the Merak V6 with the adoption of two small turbochargers, a world premiere. The Biturbo became a big commercial success thanks to its excellent performances and luxury interior, but first generation versions suffered from reliability problems. In 1983, the more powerful Biturbo S was presented with twin intercoolers and two Naca air ducts on the bonnet. In 1986 and 1987, both versions were upgraded with fuel injection (Biturbo i and Biturbo Si).

## Biturbo 2500

**Years of production: 1983-1991**
**Numbers produced: circa 6500**
**Engine: 90° V6 twin turbo 18v,**
**2.5L, 189-196 hp**

While the two-litre versions of the Biturbo were reserved for the Italian market, a 2.5 litre version destined for exportation was presented in 1983. The 90° V6 three-valve engine had an increased bore to expand its capacity to 2491 cc, but the cylinder liners were now from cast iron instead of aluminium and this engine didn’t have intercoolers for the two IHI turbochargers. The Biturbo 2500 maintained the Torsen limited slip differential from the two-litre versions (a world first on a production car). A slightly more powerful version was named Biturbo ES. In 1987 the Biturbo 2500 and Biturbo ES adopted fuel injection and the name was changed into Biturbo Si 2500.

## Biturbo 4-door models (all versions)

**Years of production: 1984-1994**
**Numbers produced: 9809 (all versions)**
**Engine: 90° V6 twin turbo 18v;**
**2.0L, 2.5L & 2.8L; 200-248 hp;**
**90° V6 twin turbo 24v, 2.0L & 2.8L, 245 & 279 hp**

With an 86 mm extended wheelbase and two added rear doors, the Biturbo was transformed into a compact and sporty saloon car. It was presented first in 1984 with the 2.5L engine destined for export (425), but little later also followed by a two-litre version meant for the Italian market (420, 420S, 420i, 420Si). A minor facelift in 1988 had these models replaced by the 422, in harmony with the two-door 222. This model was joined in 1990 by the 4.18v. and the four-valve 4.24v., both fitted with a two-litre engine. The export model received in 1987 the 2.8L engine in 3-valve and in 1991 also in 4-valve version (430 and 430 4v.). Other upgrades and aesthetical modifications were in-line with the coupe models. In spite of the fact that they had four doors, these models were never named Quattroporte.

## Biturbo Spyder (all versions)


**Years of production: 1985-1994**
**Numbers produced: 3076 (all versions)**
**Engine: 90° V6 twin turbo 18v; 2.0L, 2.5L & 2.8L; 180-224 hp; 90° V6 twin turbo 24v, 2.0L, 241 hp**

Top performances and open top driving fun were again combined in the Biturbo Spyder who was the first open Maserati since the Ghibli Spyder, more than 12 years earlier. Development for the body was done by Zagato near Milan while the bodies were assembled in Turin before transportation to Modena where the mechanical parts were added. The 2514 mm wheelbase from the Biturbo was reduced to 2400 mm for the Spyder models. The Biturbo Spyder existed in various versions and followed the same technical and aesthetical evolutions as the coupe, with exception of the 24-valve 2.8L engine. The various versions were: Biturbo Spyder, Biturbo Spyder 2500, Biturbo Spyder i, Biturbo Spyder i 2500, Biturbo Spyder 2.8i, Spyder 2.0 4v. and Spyder 2.8. In 1991 the Biturbo name was dropped for the open models.

## 228

**Years of production: 1987-1991**
**Numbers produced: 469**
**Engine: 90° V6 twin turbo 18v, 2.8L, 255 hp**

With the 228, of which production started in 1987, Maserati wanted to offer an alternative to the big luxury coupes from Mercedes-benz and BMW. The design of the 228 recalls much to the Biturbo, but its lines were softer and the 228 was built on the longer chassis taken from the 4-door Biturbo models. The engine capacity was increased to 2.8 litres. The 228 was a very luxurious coupe and standard equipment included power steering, alloy wheels, central locking, electric windows and hand-stitched leather seats. ABS was available on request. This model was in 1991 followed by the 222.4v.

## 222 & 2.24v


**Years of production: 1988-1992 and 1989-1992**
**Numbers produced: 1156 & 1147**
**Engine: 90° V6 twin turbo 18v, 2.0L, 223 hp;**
**90° V6 twin turbo 24v, 2.0L, 245 hp**

With its new name 222, the Biturbo received a small stylistic upgrade. The front grille was new and the Naca air ducts on the bonnet disappeared, while the two-litre engine still had twin intercoolers. Injection was now electronic from Weber-Marelli with integrated ignition. The 222 had electrically adjustable seats and electronic climate control.
In 1989, the twin-turbo V6 engine received a substantial technical upgrade. The cylinder heads were new with four valves per cylinder instead of three and two camshafts per cylinder bank. The light alloy cylinder liners were treated to reduce internal friction. Vehicles equipped with this more powerful version of the two-litre engine were named 2.24v.

## Karif



**Years of production: 1988-1991**
**Numbers produced: 221**
**Engine: 90° V6 twin turbo 18v, 2.8L, 248-224 hp**

The Maserati Karif, presented at the Geneva motorshow of 1988, was designed for pure driving fun. It had the same powerful 2.8L twin-turbo engine as used in the 228, but it was based on the shortened chassis from the Biturbo Spyder. The 114 mm shorter wheelbase and the increased torsional rigidity due to the reinforced sills from the spyder's floorplan had a positive effect on the Karif's handling. The rear seats from the Biturbo were sacrified for the Karif. Instead, extra lugguage space was available behind the front seats. This made the Karif ideal for long and joyful travelling for two persons.
Later versions of the Karif were equipped with a catalytic converter which reduced the engine power.

## Shamal


**Years of production: 1990-1996**
**Numbers produced: 369**
**Engine: 90° V8 twin turbo 32v, 3.2L, 322 & 326 hp**

Named after a Mesopotamian wind, the new Shamal was the most extreme derivate from the Biturbo model family. It was, just like the Karif, based on the shorter Biturbo Spyder floorplan, but offered also two small rear seats. The body of the Shamal was completely new, with exception of the doors. The Shamal’s muscular and aggressive design was the work of designer Marcello Gandini, which could be easily recognised by the shape of the rear wheel arches. The biggest news of the Shamal was however found under the bonnet. The V6 was replaced by a completely new twin-turbo V8 engine with four camshafts and 32 valves. This was coupled to a new 6-speed gearbox from Getrag. The design of the Shamal gave inspiration for the later Ghibli model. This is one of the most extreme production cars ever made.

## Racing


**Years of production: 1990-1992**
**Numbers produced: 230**
**Engine: 90° V6 twin turbo 24v, 2.0L, 283 hp**

The Maserati Racing was presented in December 1990, at Maserati’s usual press meeting before Christmas. This latest version of the Biturbo family received a restyling with a nose that was inspired by the Shamal, but he most important news came from under the bonnet. The Racing had the same 24-valve version of the two-litre engine as presented two years earlier for the 2.24v, but a number of modifications were made. The crankshaft was new, the connecting rods were lighter and the compression ratio has been increased. Together with modified turbochargers, made this from the Racing the most powerful two-litre production car in the world. Also the Getrag gearbox was new and the car was fitted with intelligent active shock absorbers from Koni. With a top speed of 256 km/h and an acceleration to 1000m in only 25,9 seconds, performances of the racing were excellent.

## 222 SR & 222.4v

**Years of production: 1991-1993**
**Numbers produced: 220 & 130**
**Engine: 90° V6 twin turbo 18v, 2.8L, 224 hp;**
**90° V6 twin turbo 24v, 2.8L, 279 hp**

While the 222 and 2.24v with their smaller two-litre engine were meant for the Italian market - Italian tax rules penalised strongly cars with an engine capacity of over two litres - the 222 SR and 222.4v with their 2.8L version of the twin-turbo V6 engine were destined for exportation. These cars received the same stylistic upgrade as the Racing a few months earlier. The 222SR, who replaced the Biturbo Si 2500, still had the engine with 3-valve cylinder heads and single over head camshafts, and was fitted with 15” wheels. The more powerful 222.4v had the 4-valve cylinder heads and received 16” wheels.

## Barchetta

**Years of production: 1992-1993**
**Numbers produced: 17**
**Engine: 90° V6 twin turbo 24v, 2.0L, 315 hp**

The Maserati Barchetta is a bit an outsider in the list of Maserati road cars as it was never really intended for road use. This car was developed for a single-make championship which was hold on various race tracks across Italy and Europe during 1993. The Barchetta had a single backbone chassis made from aluminium. This was a technology that has been developed for the Chubasco-prototype. The centrally mounted engine was the two-litre V6 in 24-valve configuration with power boosted to 315 hp, while its wheel geometry was Formula 1-style and the body was made from composite and carbon fibre. With a total weight of only 775 kg, performances were outstanding. A road-going version was considered but never commercialised due to homologation difficulties.

## Ghibli (2nd generation)

**Years of production: 1992-1998**
**Numbers produced: 2303 (all versions)**
**Engine: 90° V6 twin turbo 24v; 2.0L & 2.8L; 306, 281 & 330 hp**

For the latest descendant of the Biturbo family tree, the name of one of the greatest Maserati Gran Turismo cars of the 1960's was revived. The new Ghibli was still based on the Biturbo platform, but had a more modern body design and wider tracks. As usual, the two-litre version was destined for the Italian market, while the 2.8L was made for exportation. In 1995, the Ghibli was named Ghibli GT and underwent a number of technical modifications, included a new rear differential. A more potent version of the 2.0L, the Ghibli Cup, referred to the one-make racing series which was organised with the model. This was with its 330 hp the worlds most powerful two-litre production car.

## Quattroporte IV

**Years of production: 1994-1998**
**Numbers produced: 1670 (all versions)**
**Engine: 90° V6 twin turbo 24v, 2.0L & 2.8L, 287 & 284 hp; 90° V8 twin turbo 32v, 3.2L, 335 hp**

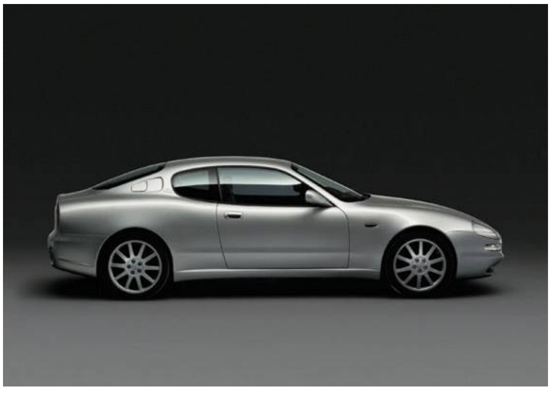
The fourth generation of the Maserati Quattroporte was presented at the Turin motorshow in April 1994. It was the first car to be presented under full Fiat ownership. The sober but elegant design was from Marcello Gandini, just like the spectacular Shamal five years earlier. With respect to the first generations of the Quattroporte, the Quattroporte IV is very compact but its performances are at true Gran Turismo level: a top speed of 260kmh and acceleration from 0 to 100 km/h in less than 6 seconds. From 1996, the Quattroporte was also made available with the 3.2L 32-valve V8 engine from the Shamal, which improved performances even further, and fitted with 17" wheels. Standard was a 6-speed gearbox from Getrag but an automatic 4-speed transmission from ZF (V6) or BTR (V8) was also available.

## Quattroporte Evoluzione

**Years of production: 1998-2001**
**Numbers produced: 730 (all versions)**
**Engine: 90° V6 twin turbo 24v, 2.0L & 2.8L, 287 & 284 hp; 90° V8 twin turbo 32v, 3.2L, 335 hp**

When in July 1997 Ferrari took over control of Maserati, one of the main objectives was to radically improve the quality of the vehicles. Notwithstanding it was widely renowned for its excellent driving qualities, the Quattroportre suffered since its introduction from reliability problems. Measurements taken were a complete revision of the production process and hundreds of the Quattroporte's components were redesigned in order to improve quality. The result was presented in 1998. These revised Quattroporte's can be recognised by the "Evoluzione" label on the front wings.

## 3200 GT



**Years of production: 1998-2002**
**Numbers produced: 4795**
**Engine: 90° V8 twin turbo 32v, 3.2L, 370hp**

With the introduction of the completely new 3200 GT, in Paris 1998, Maserati returned to its roots by building a true Gran Turismo in the great tradition of the brand and concluded in this way the Biturbo area. It still had a twin-turbo engine, but everything else on this vehicle was completely new. The V8 from the Shamal and Quattroporte IV underwent a number of substantial modifications and delivered now 370 hp. Choice was between a 6-speed manual transmission (ZF) or a 4-speed auto gearbox (BTR). The design from Giugiaro was, just like his creations for Maserati in the past, a true masterpiece and this model was mainly responsible for Maserati's sales revival which started in 1998. Its boomerang-shaped taillights were the first on a production car using led-technology. In 2001, a more edgy version was presented carrying the name "Assetto Corsa".

## Spyder GT & Spyder Cambiocorsa

**Years of production: 2001-2007**
**Numbers produced:**
**Engine: 90° V8 dry sump, 4.2L, 390 hp**

With the introduction of the Maserati Spyder, at the Frankfurt motor show of 2001, again a new area started for Maserati, this time an area of close technical collaboration with group partner Ferrari. Whilst the exterior of the new Spyder still reminds strongly to the 3200GT model, under the skin this car is completely new. Under the hood the twin-turbo unit has been dropped in favour of a completely new, normally-aspirated 4.2L V8 with a dry sump lubrication system. Also the transmission is totally new. The gearbox is moved to the rear end of the car where it forms a single unit with the differential (transaxle). The Spyder has a shortened wheelbase with respect to the Coupé and is strictly a two-seater only. The soft-top opens and closes fully automatically. This model initiated the return of the Maserati brand to the United States.

## Coupé GT & Coupé Cambiocorsa


**Years of production: 2002-2007**
**Numbers produced:**
**Engine: 90° V8 dry sump, 4.2L, 390 hp**

Shortly after the introduction of the new Spyder, it was time for the closed model to undergo the same technical transformation. The result was presented to the public at the Detroit motor show in January 2002. The Coupé adopted the elegant Giugiaro-designed body style from the 3200GT model it replaced, but under the skin almost everything is new. The typical boomerang-shaped taillights from the 3200GT were dropped to meet American homologation requirements. The new Coupé has the same all-new normally aspirated V8 engine and offers, just like the open Spyder variant, two gearbox options: a traditional manual transmission (GT) and a Formula 1-style electro-hydraulic operated gearbox with gearshift paddles at the steering wheel (Cambiocorsa), both located between the rear wheels (transaxle layout).

## Quattroporte V

**Years of production: 2003-2008**
**Engine: 90° V8 dry sump, 4.2L, 400 hp**

While the Quattroporte IV was a compact sports saloon, the fifth generation Quattroporte marked Maserati's return to the upper premium saloon segment, in the spirit of the first generation Quattroporte of 1963. The Quattroporte V combines royal interior space and the highest levels of comfort with a true sports heart. A powerful dry-sump V8 engine, mounted well back in the chassis, and a robotized transaxle transmission stand for a perfect weight distribution and excellent dynamic qualities. After its launch at the 2003 Frankfurt motor show, the Quattroporte became an instant commercial success for Maserati and has won numerous awards. This is partly thanks to its astonishing Pininfarina-designed bodywork.

## GranSport & GranSport Spyder

**Years of production: 2004-2007**
**Numbers produced:**
**Engine: 90° V8 dry sump, 4.2L, 400 hp**

With the GranSport, presented at the Geneva motor show of 2004, Maserati revives one of the great names of its own motoring heritage to indicate the most dynamic version of the M138 model range. The GranSport incorporates all necessary ingredients to convert the Coupé from a great performance GT car in a true driving machine. Various engine modifications brought the power up to 400 hp, while the control logic of the Cambiocorsa gearbox, standard for the GranSport, has been improved. Other modifications include new 19-inch alloy wheels, upgraded suspensions, a new front bumper with larger grille, aerodynamic side sills and a more sporty interior with new seats. The GranSport was joined later by an open GranSport Spyder version, presented at the Frankfurt motor show of 2005.

## MC12 Stradale

**Years of production: 2004-2007**
**Numbers produced: ± 50**
**Engine: 65° V12 dry sump, 6.0L, 630 hp**

The MC12 (*Maserati Corse, 12-cylinder*) represents Maserati in its most extreme and performant form. The 'Stradale', or road-going version, was created to be able to homologate the model for international GT-racing. With the MC12 Maserati returned to GT racing in a highly successful way and the GT1 version has proven itself as the car to beat on race tracks all over the world.
The MC12 is the fastest Maserati road car ever made; acceleration from standstill to 200 km/h takes less than 10 seconds and top speed exceeds 330 km/h. The technology of the MC12 is based on the Ferrari Enzo model, however substantial modifications were made to engine, chassis and aerodynamics. In late 2006, Maserati presented the MC12 Versione Corse, an even more extreme track-day variant of this all-conquering supercar.

## Quattroporte Automatic

**Years of production: 2007-2008**
**Engine: 90° V8 wet sump, 4.2L, 400 hp**

The most important technical evolution came with the introduction of the Quattroporte Automatic at the 2007 Detroit motor show. While the Quattroporte with Duoselect transmission has proven to be an ideal match for Maserati's sporty reputation, demand for a fully automatic version had always been present. The Quattroporte Automatic is much more then a Quattroporte simply fitted with a new gearbox. From the 16.500 components of which the Quattroporte is made, 4.800 are new. The powertrain is completely new with the adaption of a new wet sump engine (F136UC), 6-speed automatic gearbox from ZF, propellor shaft and limited slip differential. The Quattroporte Automatic is available in standard version as well as Sport GT and Executive GT.

## GranTurismo

**Years of production: from 2007, still in production**
**Engine: 90° V8 wet sump, 4.2L, 405 hp**

With the new GranTurismo, presented at the 2007 Geneva motor show, Maserati applies the experience gained in the luxury car segment with the Quattroporte to create a true luxury GT car. The GranTurismo is based on a modified Quattroporte floorplan. With an overall length of 488cm, the GranTurismo is significantly bigger than the Coupé/Gransport models it replaces, and offers comfortable interior space to four adults.
While the mechanical layout of the GranTurismo is identical to the Quattroporte Automatic – it uses the same 4.2L V8 wet sump engine and automatic 6-speed gearbox from ZF – various settings are specific to give the GranTurismo a more dynamic ride. Its pure and elegant body design is from the hand of Pininfarina and reflects perfectly Maserati's great tradition in the creation of elegant and sporty grand touring cars.

## GranTurismo S

**Years of production: from 2008, still in production**
**Engine: 90° V8 wet sump, 4.7L, 440 hp**

Exactly one year after the presentation of the original GranTurismo, Maserati unveiled a first derivate of this highly renowned GT car. The GranTurismo S was created to meet the demand of those who prefer a more dynamic version of the existing GranTurismo. Its more powerful 4.7L V8 engine and completely new, rear mounted robotized gearbox with super fast MC-shift strategy, in combination with an upgraded braking system and modified suspensions turn the GranTurismo S in a true performance car.
The more sporty nature of the GranTurismo S is perfectly reflected in its appearance with newly designed alloy wheels, dark headlights, new aerodynamic side sills, a boot lid spoiler, liberated exhaust system and modified interior trim. The character of the GranTurismo S is unmistakably aggressive, yet it keeps loyal to its GT background by offering the highest standards of comfort for all four occupants during long travelling.

## Quattroporte (MY09)

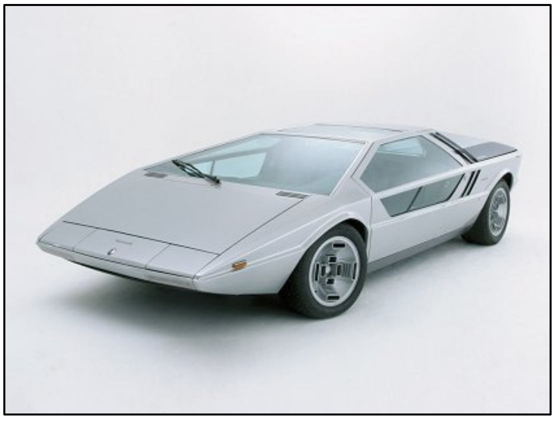
**Years of production: from 2008, still in production**
**Engine: 90° V8 wet sump, 4.2L & 4.7L, 400hp, 430hp & 440hp**

Five years after its launch and with more than 15.000 vehicles produced, Maserati's highly successful Quattroporte saloon underwent a discrete restyling. Pininfarina has reworked the Maserati flagship without affecting the purity and elegance of its original design. The new front and rear give the car a more fresh and modern appeal while at the same time enhancing the connection with its GranTurismo sister model.
Also the interior has been updated with a new and more user friendly entertainment and satellite navigation system, and new interior colours. Under the bonnet, the classic 4.2L V8 wet sump engine is now joined by a more powerful 4.7L version (Quattroporte S and Quattroporte Sport GT S). The restyled Quattroporte is available with an automatic six-speed transmission only.

# Prototypes and Concept Cars

During its history Maserati has inspired the worlds most important designers and coachbuilders to create some of their best designs. Some of the creations listed below were intended for production whilst others were meant as show cases strictly.

**Simun (1967)**
The Simun, named after a Sahara desert wind, was Giugiaro's last work as head of design at Ghia. It was built on the mechanical basis of the Mexico but had a reduced wheelbase. The Simun was meant to be Maserati's next four-seater GT car, with a less sporty nature than the current Ghibli. Yet its unremarkable design – it showed strong similarity with Giugiaro's Thor concept for Oldsmobile – led to the decision to choose the Michelotti-designed Indy for production instead. This car is currently part of the renowned Panini collection.



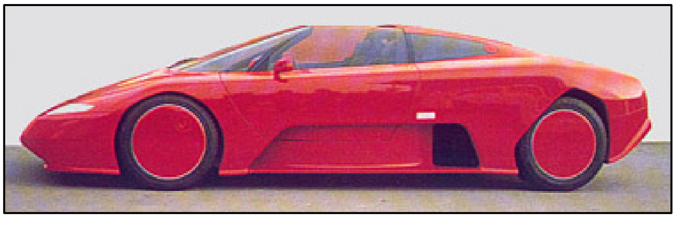
**Boomerang (1971-1973)**
Giorgetto Giugiaro stunned the world with the Maserati Boomerang concept of which a non-functional model was displayed first at the 1971 Turin motorshow. The fully functional Boomerang was launched at the 1973 Geneva motorshow and shared its mechanical parts with the Bora.
In 1966, Giugiaro entered the public eye with his designs for Ghia, such as the stunning Maserati Ghibli, which was most unconventional for the period in its use of straight lines and large, flat surfaces. When he created his own design company Italdesign in 1968, Giugiaro continued to explore this new design medium. The Boomerang is by many regarded as the ultimate embodiment of Giugiaro's design genius. It was without any doubt one of the most important concept cars of all time and its typical wedge shape influenced car design the next decades. The Boomerang has won numerous awards.

**124 GT (1974)**

Another prototype from Italdesign was presented at the 1974 Turin motorshow, the 124GT (based on a Maserati 124 type chassis, Giugiaro called it GT) was clearly inspired by the Boomerang concept car.
This four-seater GT car bas supposed to be an alternative to the Bertone-designed Khamsin, but its design was considered too avant-garde for its time by the Maserati management and the car never made it to production. Just like the Simun, this car is on display at the Panini collection.

**Medici I (1974) & Medici II (1976)**

Together with the 124GT, Giugiaro presented what was his interpretation of the Maserati Quattroporte. The Medici – named after the famous Renaissance family – was a futuristic six seater limousine which was again inspired by the Boomerang. A modified version was presented at the 1976 Paris motorshow, but none of both prototypes made it to production. Paradoxically, the third generation of the Quattroporte which has been commissioned to Italdesign had a very traditional styling.



**Chubasco (1991)**

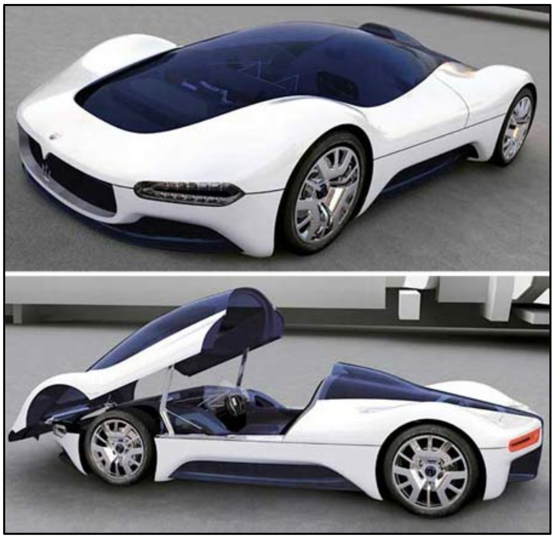
In December 1990, Maserati presented the Chubasco, a sensational mid-engined sports car. The work of designer Marcello Gandini can be easily recognised in the vehicle's dramatic exterior. Production was intended for 1992 but the project never got further than the construction of one static prototype. The experience gained with the vehicle's aluminium, single-tube chassis was crucial for the development of the later Barchetta model, which arrived in 1992. The only prototype is currently part of the famous Panini collection.

**320S (2001)**

The Maserati 320S concept car, unveiled at the 2001 Genève motor show, is a sporty racing “barchetta” based on 3200GT mechanicals but with a shortened wheelbase and a racing set-up. Styling was a development by Italdesign and racing supplier Sparco was involved in the project. This concept car expressed various themes of the Maserati brand. On one hand it was with its traditional Camoradi white and blue colour scheme a homage to the great Maserati sport prototype racing cars of the past; on the other hand it was a prelude to Maserati’s future racing activities, Maserati’s return to the US and to the new Spyder model which was to be unveiled later the same year.


**Kubang (2003)**

The Kubang concept car, presented in 2003 at the Detroit motor show, was meant to answer to the new needs of mobility of the 21st century. This new vehicle, defined as GT Wagon, was the result of a collaboration between Maserati and Italdesign and has been designed to combine true GT performance and driving pleasure with the versatility of a SUV. It has a 390 bhp V8 engine and all wheel drive, but the Kubang is not an off-road car, as such an interpretation would harm its Gran Turismo concept. In the end, series production of the Kubang was renounced.



**Birdcage 75$^{th}$ (2005)**

The Birdcage 75$^{th}$ by Pininfarina was presented in 2005 in celebration of the 75th anniversary of the famous Turin-based coachbuilder. The prototype directly recalls the legendary Tipo 63 racing car, nicknamed “birdcage” due to the radically triangulated tube construction of its chassis. This concept car, in homage to the spirit of the dream car era, is based on the road racing chassis of the Maserati MC12 and seeks to capture the ultimate expression of speed, sensuality and elegance – to create a functional and dynamic automotive sculpture. The contrast struck between its organic fluidity and the severe tension of its mechanicals, creates a dynamism seldom realized.

## GranTurismo MC Concept


The GranTurismo MC Concept was developed on the technical basis of the GranTurismo S road car. The technicians of the Maserati Corse racing department have improved the car's overall performance by drastically reducing its weight and improving the dynamic qualities of the standard car. The result is a high performance experimental racing car which contains innovative solutions for future production car applications. The GranTurismo MC Concept can also be seen as a prelude to a new Trofeo racing series of the Trident brand, which is planned to take of in 2010.

**Technical datasheet GranTurismo MC Concept:**

| | |
|---|---|
| Engine: | V8, 4.691cc |
| Max power : | 331Kw, 450 hp |
| Max torque: | 510Nm |
| Transmission: | Transaxle, robotized 6-speed gearbox, limited slip differential |
| Chassis/Body: | Steel monocoque with FIA-approved roll cage, composite body panels |
| Weight: | < 1400 Kg |

# The Maserati Connection




During the history of Maserati, a number of technical collaborations with other car manufacturers came into existence. Mostly it where other car constructors who benefited from Maserati's technical know how.

The best known example is probably the Citroën SM, who resulted from the ownership of Maserati by the French company. Its all-alloy, quad-cam V6 engine was made by Maserati (tipo C.114) and later in modified versions also used in Maserati's own Merak and Quattroporte II models. About 13.000 units were produced between 1970 and 1975. This car was for many years the world's fastest front wheel drive production car.

Maserati's Tipo C.114 engine was also used in the only sports berlinetta made by French car constructor Guy Ligier, the JS2 (named after racing driver Jo Schlesser, who was killed during the French Gran Prix of 1968). The engine was first used in 12-valve and later also in 24-valve configuration, boosting the power to 240 bhp. About 200 units were built between 1972 and 1977.

During the 1980's, the friendship between then Maserati owner Alejandro De Tomaso and Chrysler's boss Lee Iacocca led to the creation of the "Chrysler TC by Maserati", a convertible that was intended to become Chrysler's image-building flagship. Maserati delivered know-how and engineered certain components for this vehicle, but despite it had Maserati written on the valve cover, its engine was not a Maserati unit. 7300 vehicles were produced between 1989 and 1991, all designated for the American market.

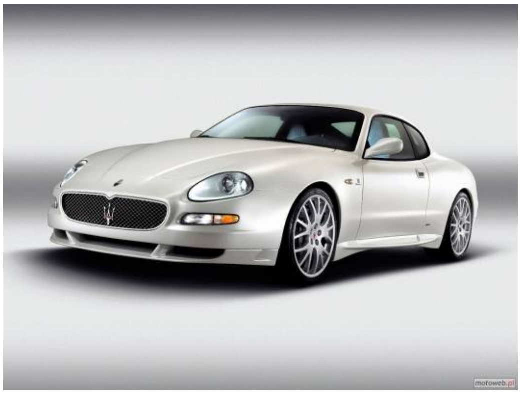
More recently, Maserati's expertise in the production of limited-series, high performance sports cars was used by group partner Alfa Romeo for its 8C Competizione sports car. A lot of its mechanical components, such as the V8 engine and robotized gearbox, origin from Maserati. Limited production of 500 units started in late 2007 at Maserati's Modena plant and will be followed by another 500 units of a spider version (planned for 2009).

# 2

# Maserati Models

## Technical Introductions

# Coupé, Spyder & GranSport (M138)



## Technical Introduction

## General Information

**Introduction**
This new generation of Maserati Grand Turismo vehicles was rung in by the presentation of the Spyder at the Frankfurt motor show in September 2001. This was followed little later by the presentation of the Coupé at the Detroit motor show in Januari 2002. Both vehicles present a completely new technical layout as the result of the close technical collaboration with Ferrari. With respect to the 3200GT model, the twin turbo engine was abandonned in favour of a completely new, normally-aspirated V8 engine with a total displacement of 4.2 litres.
Also the transmission was totally new. The gearbox was no longer fixed behind the engine but was now mounted at the rear of the vehicle where it forms a single unit with the limited slip differential (transaxle configuration). The possibility for a traditional automatic transmission (as for the 3200 GTa) was no longer offered. Instead, the Coupé and Spyder were avalable with both manual and robotized gearbox. The later offers the possibility to be driven in fully automatic mode. The manual version is refered to as Coupé GT and Spyder GT, while the version with robotized manual gearbox is called Coupé Cambiocorsa and Spyder Cambiocorsa.

The Maserati Spyder has a 220 mm shortened floorplan with respect to the Coupé and exists strictly as a two-seater only.


The body lines of the Coupé resemble much to its predecessor, the 3200GT, but the technical layout is completely new.
The boomerang-shaped taillights of the 3200GT were replaced by more traditional modelled units for American homologation reasons.
The Coupé and Spyder models introduced Maserati’s return to the American market.

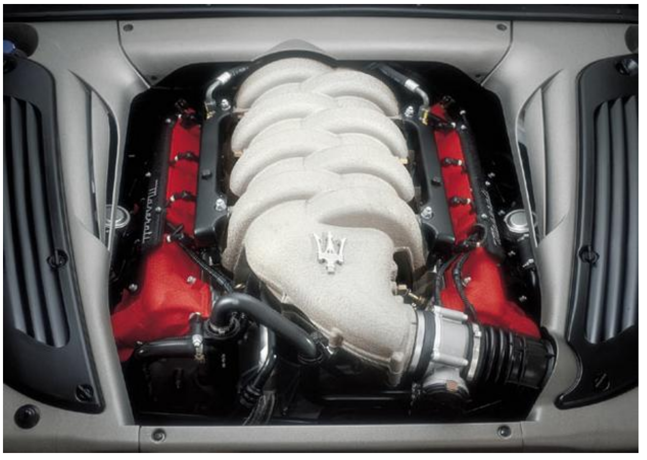
**Main characteristics:**

- Optimal weight distribution between front and rear axle (52% front, 48% rear for the Coupé, 53% front, 47% rear for the Spyder.
- Monocoque bodyshell reinforced with a tubular structure designed to respond to the highest standard in passive safety.
- Typical Italian muscular and harmonious body style with long hood and compact tail. Designed by Giugiaro's Italdesign
- Roof operated by an electro-hydraulic system.
- Roof of the Spyder operated by an electro-hydraulic system. Fully automatic opening and closing of the soft top by pushing a button in only 25 seconds. Soft top is fitted with a heated glass rear window.
- Spacious luggage compartment of 315 litres (Coupé) or 300 litres (Spyder). A tailor made set of leather suitcases is available upon request.
- Some modifications were made for MY03. New 7-spoke alloy wheels were available as an optional.
- A special series "Spyder 90° Anniversary" was presented at the 2004 Paris motor show to celebrate the brand's 90° anniversary. Only 90 pieces were made, all finished in a special "Blu Anniversary" blue colour.
- A special series "Coupé Vintage" was presented in 2005. This model had the same alloy wheels as the GranSport and is further recognisable by a small chrome grill on its side wings.

**Modifications for MY05:**

- Newly designed front bumper and new chrome grille in line with the GranSport model.
- Newly designed rear bumpers in line with the GranSport model.
- 7-spoke light alloy 18" wheels as standard.

## Engine



The Maserati M138 model series use a complete new  engine (F136R)

- Compact and light 8 cylinder in V, 90°
- 4.244 cc overbore engine
- Dry sump lubrication system, racing pedigree.
- Four overhead camshafts, driven by chains. Timing variators on the intake camshafts
- Four valves per cylinder, hydraulic tappets.
- Bosch Motronic ME7.1.1 integrated injection and ignition system, drive by wire.
- Immediate throttle response for a sporty driving style, maximum driving pleasure in daily use.
- Power output of 390 hp at 7000 rpm
- Torque output of 452 Nm at 4500 Nm

Engine evolutions:

- Complying Euro 4 standard from MY06 for the markets where necessary.
- Double fuel pump replaced by a single unit from MY06.
- New engine oil reservoir from MY06 for US/CDN specifications.

See chapter 3 for more details on the F136R engine.

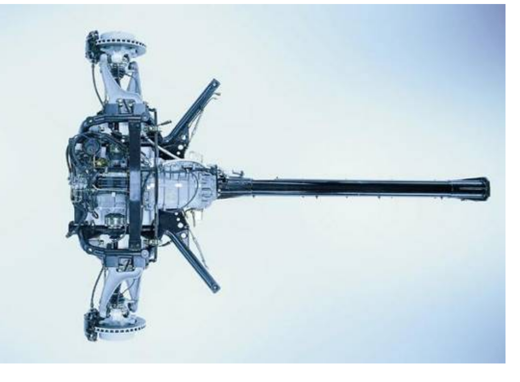
# Transmission

**Manual transmission:**

- Newly designed transaxle configuration with rear mounted gearbox/differential and torque reaction tube guarantee an excellent weight distribution between the front and rear axles.
- Dual plate clutch with reduced rotational inertia allows the engine to pick up and loose speed quickly.
- Standard 6-speed gearbox, made by Graziano.
- Limited slip differential, 25 % locking ratio during acceleration, 45 % during release.

**Cambiocorsa transmission:**


- Electro-hydraulic operation system for both gearbox and clutch control.
- Mechanical gearbox requires no modifications for adaption of the Cambiocorsa system
- Gerashifting by means of tho gearshift paddles behind the steering wheel.
- Possibility to be driven in boyh manual and fully automatic mode.
- Normal, Sport and Ice (low adherance) operation modes.



Evolutions:

- Software update to Sofast (CFC201) for smoother gearchange, more driving comfort and less noise.
- Adaption of Sofast II (CFC231) from assembly 12.204.

## Braking System

- Brembo braking system with light alloy 4-pistoncalipers.
- Ventilated and perforated brake discs, 330 x 32 mm front, 310 x 28 mm rear.
- Bosch 5.7 integrated ABS system concludes: ABS anti brake-lock system, EBD electronic brake force distribution, MSR to prevent the rear wheels from locking during downshifting, ASR traction control system and MSP stability control.

## Suspensions and Wheels

- Light alloy suspension levers, double wishbone type with antidive and antisquat geometry.
- Skyhook system with electronically controlled damping available upon request.
- Two operation logics for Skyhook: Normal and Sport.

Evolutions:

- New shock absorbers settings and new Skyhook system software and hardware for MY06.

## Safety Components

- Two dual stage front airbags
- Two side airbags, integrated in door panels
- Seatbelts with pyrotechnical pretensioners
- Inertia switch for fuel cut-off in case of a collision.

## Internals

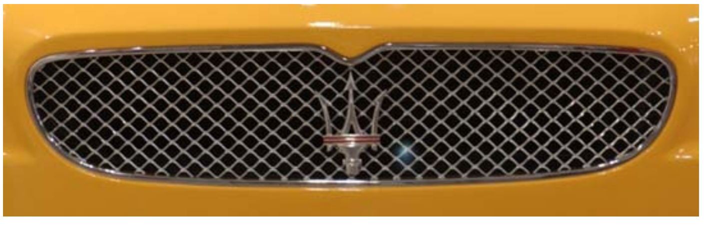
- The interior of the Coupé and Spyder is characterised by the use of precious materials, cured in every detail.
- Optimal driving position and ergonomic seats which are fully electrically adjustable.
- Easy Entry system for easy access to the rear seats (Coupé)
- Sportiness without compromising comfort, room for four adults (Coupé).
- Classical Analogue instruments, characterized by white dashes on a blue background.
- Maserati Info Centre with with a 5,8” colour info screen showing information about the sound system with CD player, and automatic climate control. On request also satellite navigation, GSM telephone and CD-changer.
- Traditional analogue clock integrated in the center of the dashboard panel.

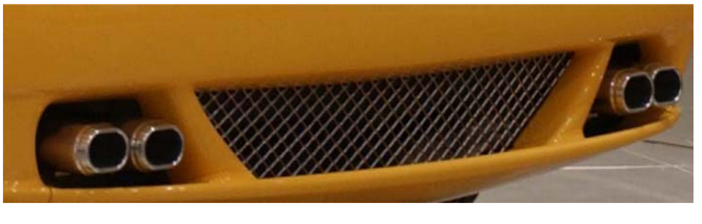
## GranSport

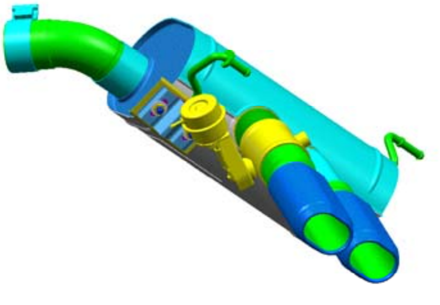
With the GranSport, presented at the Geneva motor show of 2004, Maserati revives one of the great names of its own motoring heritage to indicate the most dynamic version of the M138 model range. The GranSport name was used in the 1950’s to indicate an elegant two-litre coupe on the basis of the famous A6G model with Frua bodywork.
The GranSport incorporates all necessary ingredients to convert the Coupé from a great performance GT car in a true driving machine. The GranSport was joined later by an open GranSport Spyder version, presented at the Frankfurt motor show of 2005.

Various modifications gave the GranSport a more sporty temperament:

- Modified F136R engine delivers now 400 hp at 7000 rpm. 10 horsepower was gained by adapting a new engine control software, intake air ducts and valve seats were elaborated and internal friction was reduced by reworking several components.
- Newly designed exhaust system with electronically controlled pneumatic by-pass valves for the rear silencers provide a deep and sporty engine sound
- Excellent performances: top speed of 290 km/h and acceleration from 0 to 100 km/h in only 4.85 seconds. The standing kilometer is covered in 23 seconds.







- New light alloy wheels with Trident design inspired by the Trofeo championshiop cars. Diameter increased to 19” and new tyres.
- 10 mm lowered suspension and new suspension settings.
- New controlling software for Cambiocorsa gearbox (standard) leads to faster gearshifting (35% faster).
- 6° gear with a 5% longer ratio.

Externals:

- Various external modifications are the result of  intense testing work in the wind tunel.
- More muscular and sporty appearance
- Coefficient of drag of only 0,33: amongst the best in its category
- New and larger front grille with chrome mesh which reminds of the Quattroporte grille.
- Newly designed front and rear bumper.
- Newly designed sporty side sills
- Small bootlid spoiler

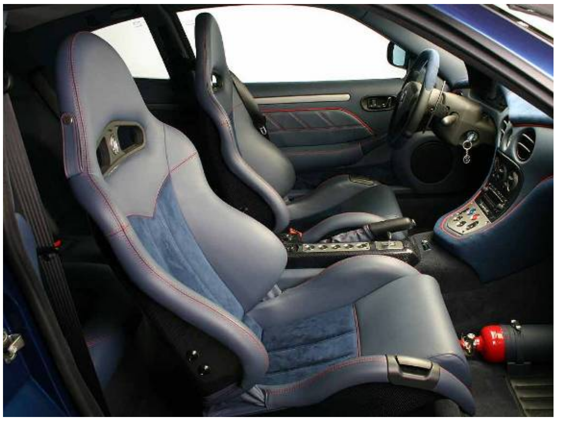
Internals:

- New leather upholstery and new special “technical” fabric for the dashboard coming from the nautical world
- New ergonomic seats with improved lateral support, fully electrically adjustable.
- Newly designed central console with carbon fibre inlay
- Blue “START” button on central console
- New instrument panel with sporty white graphics on a blue bachground
- New leather and carbon fibre steering wheel with ergonomic grip.
- New Becker “On Line Pro” audio system.
- New aluminium sporty pedals

## GranSport Contemporary Classic

This special edition of the GranSport was presented at the 2006 Paris motor show. The GranSport Contemporary Classic is recognisable by its alloy wheels with "Ball Polish" finishing and red painted brake calipers.

## GranSport MC Victory



To celebrate the winning of the Constructors Cup with its MC12 racing cars in the 2005 FIA GT Championship, Maserati enriches her model range with a special version of the GranSport  produced in a limited series of only 180 pieces. The GranSport MC Victory has the following specific features:

- Special "Victory Blue" external colour
- A numbered identification plate on the central console
- A newly designed carbon fibre front spoiler with lateral profiling improves downforce
- A small boot lid spoiler finished in carbon fibre
- 19" alloy wheels in titanium finishing
- Label with the Italian flag on both front side wings reminds to the MC12 racing cars
- Bucket seats made of carbon fibre are taken from the MC12, finished in blue leather and alcantara.
- Blue alcantara upholstery for the dasboard.
- Carbon fibre central console

# Quattroporte (M139)


## Technical Introduction

# 0. General Information

**Model Hystory**

The Maserati Quattroporte (model code M139) was presented in late 2003 at the Frankfurt motor show as the fifth generation of the Maserati high performance premium saloon. With its elegantly-designed Pininfarina body, the Quattroporte made a triumphant return in the highest segment, 40 years after the introduction of the first, Frua-boddied Quattroporte. Inimitable Trident style, sophisticated interior and spirited temperament characterise the new Maserati flagship which has won numerous important national and international awards. The Quattroporte offers superior handling due to a perfect weight distribution. This is thanks to an engine mounted behind the front axle and a rear mounted, transaxle gearbox. Since its first introduction, the model underwent various modifications and has been subject to a continuous improvement of quality. Also, various different versions were derived from the original model.

**Quattroporte**
The Maserati Quattroporte in its original configuration is equipped with a 4.2 V8 dry sump engine (F136S) and a rear mounted, robotized manual six-speed gearbox (Duoselect).

**Quattroporte Sport GT**
Presented at the Frankfurt motor show in September 2005, The Quattroporte Sport GT was created to meet the demands from customers who desired greater performance and sportiness from the Maserati flagship. The Sport GT has the following specific features:

- Specific 20” wheels
- Specific exhaust system for a more intens sound
- Specific Gearbox software for faster gearshifting (35% in Sport mode)
- Cross-drilled brake discs
- Metallic flexible brake hoses
- Specific software for the Skyhook variable suspension
- Standard fitted TPMS
- Various specific external and internal aesthetic features

**Quattroporte Executive GT**
Presented toghether with the Quattroporte Sport GT, the Executive GT represents the Quattroporte in its most elegant form. Comfort levels of the Executive GT are at their highest and most exclusive. Standard features include: alcantara roof upholstery, leather and wood steering wheel rim, rear seat heating, ventilation and massage functions, rear window curtains, rear stowable wooden tables and rear seat control panel for HVAC. Technical differences remain limited to newly designed 19 inch rims with ball polish finishing. Both Executive GT and Sport GT versions co-exist with the standard Quattroporte model.

**Quattroporte Automatic**
The most important technical evolution came with the introduction of the Quattroporte Automatic at the 2007 Detroit motor show. While the Quattroporte with Duoselect transmission has proven to be an ideal match for Maserati's sporty reputation, demand for a fully automatic version has always been present. The Quattroporte Automatic is much more then a Quattroporte simply fitted with a new gearbox. From the 16.500 components of which the Quattroporte is made, 4.800 are new. The powertrain is completely new with the adaption of a new wet sump engine (F136UC), gearbox, propellor shaft and limited slip differential.
Also the Quattroporte Duoselect benefitted from the important improvements and modifications introduced in the Quattroporte Automatic (MY07 onwards), such as the completely redesigned HVAC system and improved comfort due to modifications made at the wheel suspensions. The Quattroporte Automatic is available in standard version as well as Sport GT and Executive GT.

**Quattroporte Sport GT S**

The Quattroporte Sport GT S was presented at the 2007 Frankfurt motor show to replace the Sport GT. The Sporty character of the Sport GT was further enhanced with a number of new feartures:

- Suspensions with stiffer springs and stiffer, single rate dampers; a ‘racing’ setup and a lowered ride (10 mm at the front and 25 mm at the rear). Thanks to these modifications, bodyroll and pitch has been significantly reduced, while increasing driving agility.
- New tyres developped especially by Pirelli for the Sport GT S. Lateral accelleration has been significantly increased.
- A new revolutionary brake system developped by Brembo uses Dual-cast aluminium and cast iron discs (first time on a production car), front discs with increased diameter and six piston calipers.
- Various aesthetic modifications, such as door handles in body dolour, dark exhaust pipes and side window trims and dark chrome 20 inch wheels for what concerns the exterior. Internally, the sporty character is enhanced by the combination of Poltrona Frau leather and alcantara.

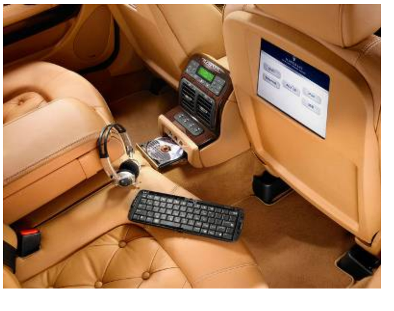
The Quattroporte Sport GT S is available with automatic transmission only.

**Quattroporte Collezione Cento**

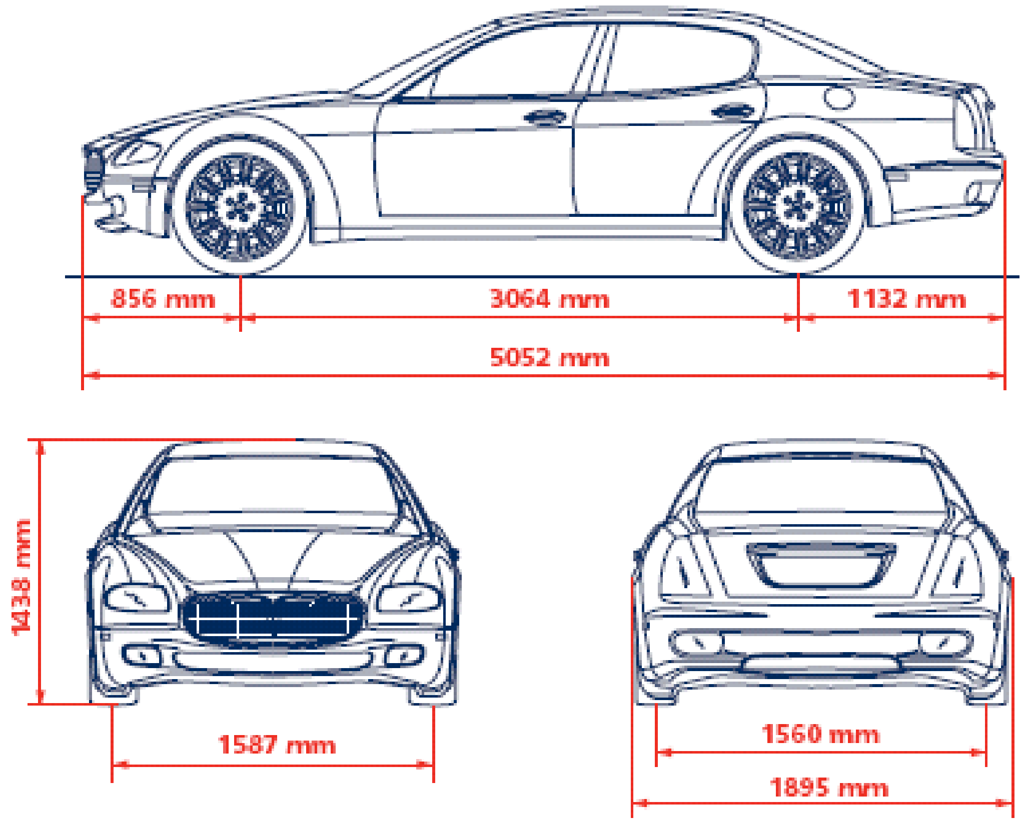
The Quattroporte Collezione Cento, of which just 100 units will be produced, has been conceived for those who seek the last word in luxury. Original design solutions combine ellegance and traditional Maserati comfort with cuting-edge technology that includes mobile office and entertainment facilities. This special version of the Quattroporte was presented at the Detroit motor show in Januari 2008 and is available with automatic transmission only.

The Quattroporte Collezione Cento features the following specific items:

- Exclusive plate numbered from 1 to 100 on instrument panel.
- Smart new ivory paint color with contrasting pin stripe.
- Chrome honeycomb grille and side vents.
- 19” or 20” ball-polished rims and silver coloured brake calipers.
- New tan leather coloured seats with specific stitching and buttons.
- New wenge wood inlays for steering wheel and central console.
- New beige grain leather headlining.
- Booth space with aluminium piping and tan leather pockets.
- Dual 10.4” touchscreen monitors installed in the front seatbacks.
- Rear DVD player and commands.
- AV aux, I-pod socked and two usb ports in rear armrest.
- Wireless headphones and bluetooth keyboard.



**Dimensions, capacities and weights**




| | |
|---|---|
| Trunk compartment capacity: | 450 l |
| Fuel tank capacity: | 90 l (included 18 l reserve) |

**Weights Quattroporte Duoselect:**

| | |
|---|---|
| Unladen weight (included 90L of fuel): | 1970 kg |
| Max. permitted weight: | 2345 kg |
| Weight distribution front / rear: | 47% / 53% |

**Weights Quattroporte Automatic**:

| | |
|---|---|
| Unladen weight: (included 90L of fuel): | 1990 kg |
| Max. permitted weight: | 2365 kg |
| Weight distribution front / rear: | 48,5 % / 51.5% |

**Performances and Fuel Consumption and emissions**

**Quattroporte Duoselect:**

| | |
|---|---|
| Top speed: | 275 km/h |
| Acceleration 0 – 100 km/h: | 5.2 s |
| Acceleration from standstill to 400 m: | 13.3 s |
| Acceleration from standstill to 1000 m: | 24.2 s |

Fuel consumption and emissions (2002/80B/CE standard):

| | |
|---|---|
| City cycle: | 23,2 (l/100 km) |
| Motorway cycle: | 11,5 (l/100 km) |
| Average fuel consumption: | 15,8 (l/100 km) |
| CO2 emissions (average): | 370 (g/km) |

**Quattroporte Automatic:**

| | |
|---|---|
| Top speed: | 270 km/h |
| Acceleration 0 – 100 km/h: | 5,6 s |

Fuel consumption and emissions (2004/3/CE standard):

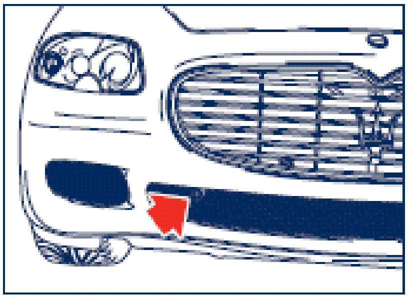
| | |
|---|---|
| City cycle: | 21,99 (l/100 km) |
| Motorway cycle: | 10,50 (l/100 km) |
| Average fuel consumption: | 14,73 (l/100 km) |
| CO2 emissions (average): | 345 (g/km) |

**Towing the vehicle**

In case it is necessary to tow the vehicle, screw the towing eye completely till the end into the towing eye attaching point. Put the gearbox in its neutral position ad disengage the EPB (QP Automatic).

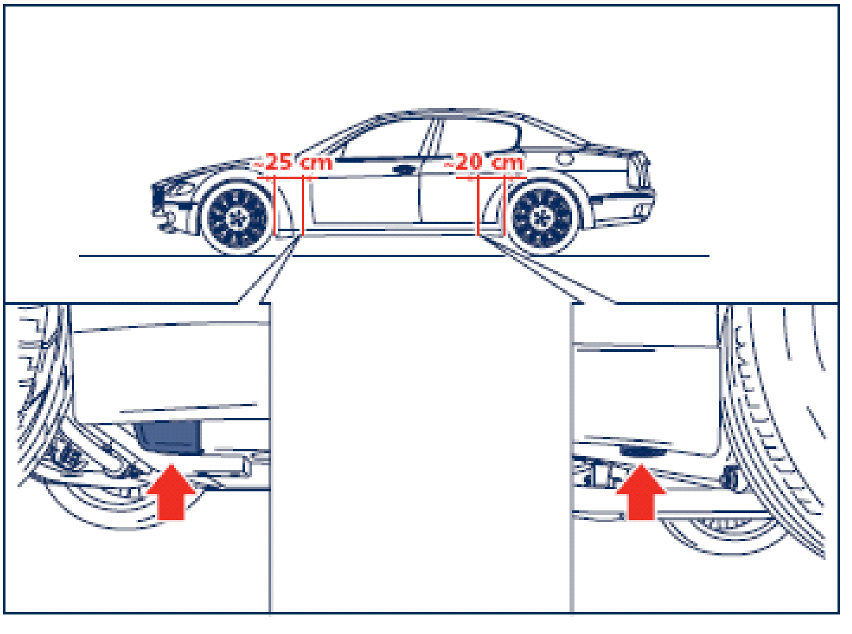
Note: if the vehicle is towed with the front wheels lifted and the ignition key ON, an error code will be stored if the MSP system has not been deactivated.

Note (2): towing of a Quattroporte Automatic must be limited (max distance 100 km and max speed 60 km/h) to avoid gearbox damage due to insufficient lubrication.



**Lifting and jacking**

Use the indicated points only for lifting or jacking of the vehicle:



## Scheduled Maintenance Quattroporte Duoselect:

### Main operations to be carried out at the indicated kilometres run/mileage

| Main operations / Kilometres run (x thousands) / Miles run (x thousands) | 20 / 12.5 | 40 / 25.0 | 60 / 37.5 | 80 / 50.0 | 100 / 62.5 | 120 / 75.0 | 140 / 87.5 | 160 / 100.0 | 180 / 112.5 |
|---|---|---|---|---|---|---|---|---|---|
| Belt for alternator, air conditioning compressor and hydraulic steering control | I | I* | I | I* | I | I* | I | I* | I |
| | Replace at least every 2 years | | | | | | | | |
| Engine oil and filter | R | R | R | R | R | R | R | R | R |
| | Replace at least every 2 years | | | | | | | | |
| Cooling system connections and lines | I | I* | I* | I* | I* | I* | I* | I* | I* |
| Air filter | R | R* | R | R* | R | R* | R | R* | R |
| Fuel injection system's connections and lines | I | | I* | | I | | I* | | I |
| Ignition system: cables and connections | I | | I* | | I | | I* | | I |
| Spark plugs | | | | | | R | | | |
| Active carbon filter and Lambda sensors | | | | | | | R | | |
| | Replace at least every 4 years | | | | | | | | |
| Air injection system: connections and pipes valves | I | I | I | I | I | I | I | I | I |
| Blow-by system | | | I | | I | | I | | I |
| Fuel emission control system: lines, connections and valves | | I | | I | | I | | I | |
| Differential and gearbox oil | R | R | R | R | R | R | R | R | R |
| | Replace at least every 2 years | | | | | | | | |
| "DuoSelect" system oil level | I | I | I | I | I | I | I | I | I |
| | Check every 2 years | | | | | | | | |
| Hydraulic steering fluid level (bleed if necessary) | I | I | I | I | I | I | I | I | I |
| | Replace every 2 years | | | | | | | | |
| Engine coolant level | I | I | I | I | I | I | I | I | I |
| | Replace every 2 years | | | | | | | | |
| Brake fluid level (bleed if necessary) | I | I | I | I | I | I | I | I | I |
| | Replace every 2 years | | | | | | | | |
| Brake system: lines, calipers, connections<br>Efficiency of the dashboard warning lights<br>Handbrake operation | I | I | I | I | I | I | I | I | I |
| Wear condition of the braking parts (disks, pads); replace if necessary | I | I | I | I | I | I | I | I | I |
| Joints for front and rear suspensions, front and rear under-chassis – tightening torques | I | I | I | I | I | I | I | I | I |
| Steering system components, joint protection, rack boots on the steering levers and on the axle shafts | I | I | I | I | I | I | I | I | I |
| Tightening of screws, nuts and bolts (including those for the exhaust system), connections, retaining clips and clamps | I | I | I | I | I | I | I | I | I |
| Pollen filter | R | R | R | R | R | R | R | R | R |
| | Replace every 2 years. In the event that the vehicle is frequently used in dusty or strongly polluted environments, a more frequent replacement is recommended | | | | | | | | |
| Starter motor and alternator: power absorption and charge | | | I | | I | | I | | I |
| Vehicle geometry check | I | I | I | I | I | I | I | I | I |
| Controls and adjustment systems in general, hinges, doors, front and rear lid | I | I | I | I | I | I | I | I | I |

| Main operations | Kilometres run (x thousands)<br>Miles run (x thousands) | 20<br>12.5 | 40<br>25.0 | 60<br>37.5 | 80<br>50.0 | 100<br>62.5 | 120<br>75.0 | 140<br>87.5 | 160<br>100.0 | 180<br>112.5 |
|---|---|---|---|---|---|---|---|---|---|---|
| Correct operation and reliability of the seats and seat belts | | I | I | I | I | I | I | I | I | I |
| Setting the weight sensors (USA version only) | | I | I | I | I | I | I | I | I | I |
| | | Check every 2 years | | | | | | | | |
| Fastening screws and nuts on the bodywork | | I | | I | | I | | I | | I |
| Headlight aiming | | I | I | I | I | I | I | I | I | I |
| Chassis and protected area intactness | | I | I | I | I | I | I | I | I | I |
| | | Check every 2 years | | | | | | | | |
| Leather interiors treatment | | I | I | I | I | I | I | I | I | I |
| Vehicle road test (any time this may be necessary) | | I | I | I | I | I | I | I | I | I |
| Check with SD3 diagnostics system | | I | I | I | I | I | I | I | I | I |

I = *Inspect and carry out any other necessary operation* A = *Adjust* R = *Replace*

## Scheduled Maintenance Quattroporte Automatic:

| Main operations | Service | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th |
|---|---|---|---|---|---|---|---|---|---|---|
| | Kilometres (x thousands)<br>Miles (x thousands) | 20<br>12.5 or<br>2 years | | | | | | | | |
| Belt for alternator, air conditioning compressor and hydraulic steering control | | I | I* | I | I* | I | I* | I | I* | I |
| | | Replace at least every 2 years | | | | | | | | |
| Poly-V flexible control belt for water pump | | I | I | I | I | R | I | I | I | I |
| | | Replace every time the part is removed | | | | | | | | |
| Engine oil and filter | | R | R | R | R | R | R | R | R | R |
| | | Replace at least every 2 years | | | | | | | | |
| Cooling system connections and lines | | I | I* | I* | I* | I* | I* | I* | I* | I* |
| Air filter | | R | R* | R | R* | R | R* | R | R* | R |
| Fuel injection system's connections and lines | | I | | I* | | I | | I* | | I |
| Ignition system: cables and connections | | I | | I* | | I | | I* | | I |
| Spark plugs | | | | | | | R | | | |
| Active carbon filter and Lambda sensors | | | | | | | | R | | |
| | | Replace at least every 4 years | | | | | | | | |
| Air injection system: connections and pipes valves | | I | I | I | I | I | I | I | I | I |
| Blow-by system | | | | I | | I | | I | | I |
| Fuel emission control system: lines, connections and valves | | | I | | I | | I | | I | |
| Gearbox oil | | I | I | I | I | I | I | I | I | I |
| Differential oil | | I | I | I | I | I | I | I | I | I |
| Hydraulic steering fluid level (bleed if necessary) | | I | I | I | I | I | I | I | I | I |
| | | Replace every 2 years | | | | | | | | |

I = *Inspect and carry out any other necessary operation* A = *Adjust* R = *Replace*

*Scheduled Maintenance Services*

| Main operations Service | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th |
|---|---|---|---|---|---|---|---|---|---|
| Kilometres (x thousands) Miles (x thousands) | 20 12.5 or 2 years | | | | | | | | |
| Engine coolant level | I | I | I | I | I | I | I | I | I |
| | Replace every 2 years | | | | | | | | |
| Brake fluid level (bleed if necessary) | I | I | I | I | I | I | I | I | I |
| | Replace every 2 years | | | | | | | | |
| Brake system: lines, calipers, connections Efficiency of the dashboard warning lights Handbrake operation | I | I | I | I | I | I | I | I | I |
| Wear condition of the braking parts (disks, pads); replace if necessary | I | I | I | I | I | I | I | I | I |
| Joints for front and rear suspensions, front and rear under-chassis – tightening torques | I | I | I | I | I | I | I | I | I |
| Steering system components, joint protection, rack boots on the steering levers and on the axle shafts | I | I | I | I | I | I | I | I | I |
| Tightening of screws, nuts and bolts (including those for the exhaust system), connections, retaining clips and clamps | I | I | I | I | I | I | I | I | I |
| Pollen filter | R | R | R | R | R | R | R | R | R |
| | Replace every 2 years. In the event that the vehicle is frequently used in dusty or strongly polluted environments, a more frequent replacement is recommended | | | | | | | | |
| Starter motor and alternator: power absorption and charge | | | I | | I | | I | | I |
| Vehicle geometry check | I | I | I | I | I | I | I | I | I |
| Controls and adjustment systems in general, hinges, doors, front and rear lid | I | I | I | I | I | I | I | I | I |
| Correct operation and reliability of the seats and seat belts | I | I | I | I | I | I | I | I | I |
| Fastening screws and nuts on the bodywork | I | | I | | I | | I | | I |
| Headlight aiming | I | I | I | I | I | I | I | I | I |
| Chassis and protected area intactness | I | I | I | I | I | I | I | I | I |
| | Check every 2 years | | | | | | | | |
| Leather interiors treatment | I | I | I | I | I | I | I | I | I |
| Vehicle road test (any time this may be necessary) | I | I | I | I | I | I | I | I | I |
| Check with SD3 diagnostics system | I | I | I | I | I | I | I | I | I |

I = *Inspect and carry out any other necessary operation* A = *Adjust* R = *Replace*

*All the operations marked with and asterisk (*) are not compulsory but rather recommended, in the event that the vehicle is frequently used in heavy-traffic conditions or on dusty or sandy roads.*

*The warranty concerning emissions and the Manufacturer's responsibility to recall the vehicle in case of problems shall not be invalidated if the Customer does not carry out the operations marked with the asterisk (*).*

## 1. Engine

The Maserati Quattroporte is fitted with two different engines (F136S and F136UC). Both engines are all-alloy 90° 8 cylinder V-engines with a total displacement of 4.2 litres. The main difference between both engines lies in the lubrication system. Power and torque figures of both engines are comparable.
The F136S dry sump engine is used in the Quattroporte models with Duoselect transmission. This engine is an evolution of the F136R engine as used in the M138 models. Certain modifications were made to the cylinder heads, intake manifold and engine software.
The F136UC wet sump engine is used for the Quattroporte models with ZF automatic transmission. Although this engine is considered as an evolution of the F136R/S engine, 80% of its components are new.
Both engines can easily be identified when opening the bonnet as the dry sump engine has red cylinder head covers, while for the wet sump engine they are painted in blue.


For the introduction of the Quattroporte with automatic transmission, a new engine with a traditional, wet sump lubrication system was developped. This solution is considered as more adequate for the application in Maserati vehicles as it is less noisy as a dry sump engine with its external, multiple oil pump. This engine has maintained the high power and torque values of the dry sump engine while at the same time it is technically less complex and thus more economical. Also, reliability and fuel economy of the new engine has been improved.

In order to obtain an ideal weight distribution the engine is put well back in the quattroporte chassis, positioned completely behind the front wheel axis. See chapter 3 for more technical details on both engines.

CAUTION!

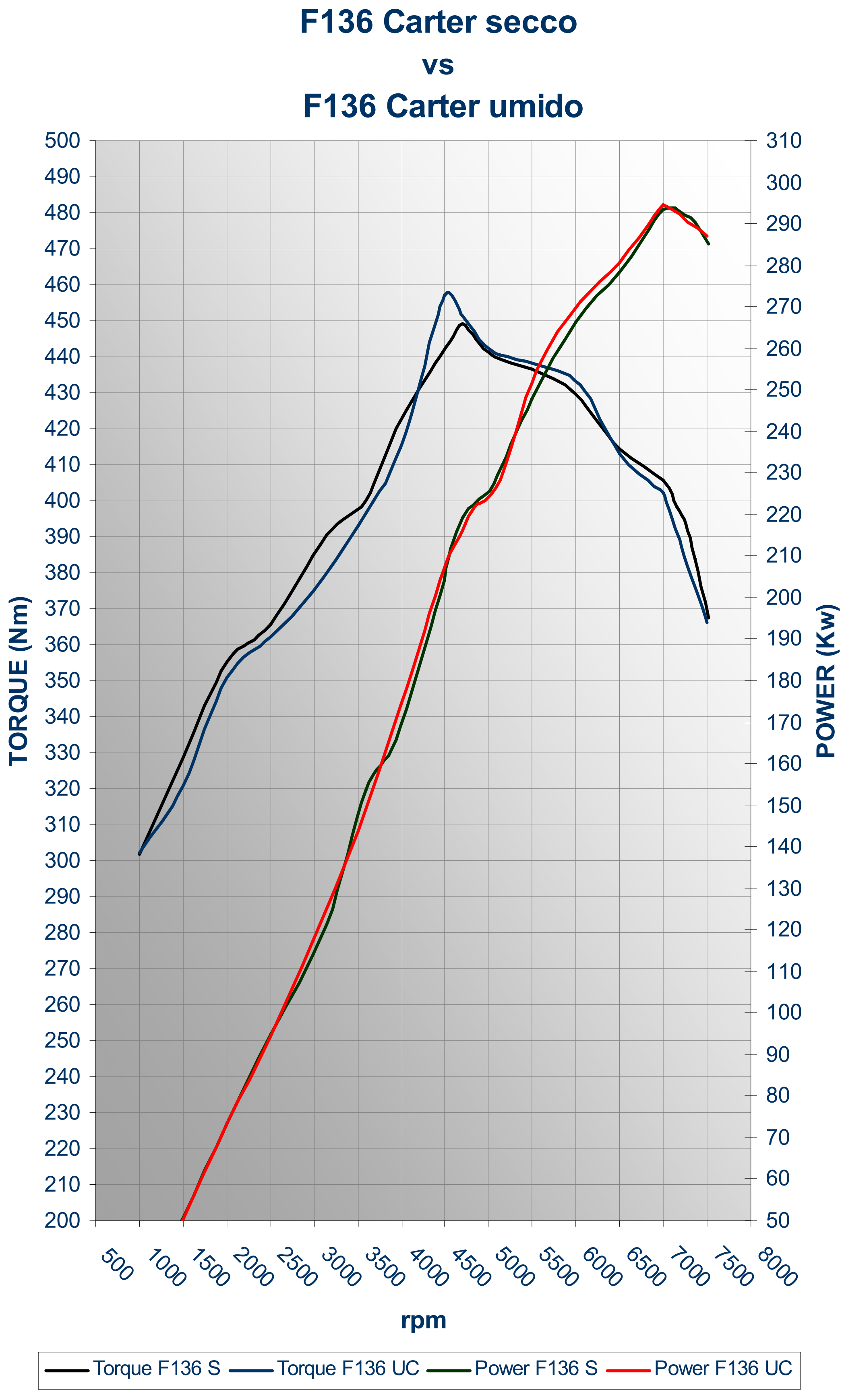
**Oil level check and filling procedures are specific for both engines**

**Engine specifications:**

| | | |
|---|---|---|
| Engine code | F136S | F136UC |
| configuration | V 90° | V 90° |
| Number of cylinders | 8 | 8 |
| Bore | 92 mm | 92 mm |
| Stroke | 79,8 mm | 79,8 mm |
| Total displacement | 4243,8 $cm^3$ | 4243,8 $cm^3$ |
| Compression ratio | 11: 1 | 11: 1 |
| Power output | 294,9 kW (400bhp) | 294,9 kW (400bhp) |
| Corresponding engine speed | 7250 rpm | 7000 rpm |
| Torque output | 444,5 Nm | 460 Nm |
| Corresponding engine speed | 4750 rpm | 4250 rpm |
| Lubrication system | Dry sump | Wet sump |
| Engine control system | Bosch Motronic ME 7.1.1 | |
| Timing variation system (intake) | High pressure | Low pressure |

**Note:** the quattroporte is complying with Euro 4 regulations from MY06 in the markets where necessary.

**Engine performance curves:**

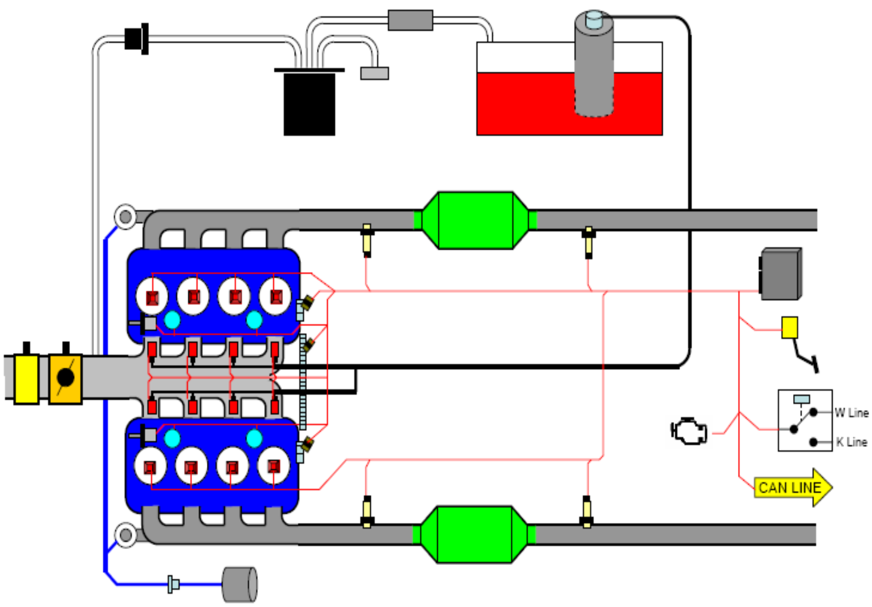


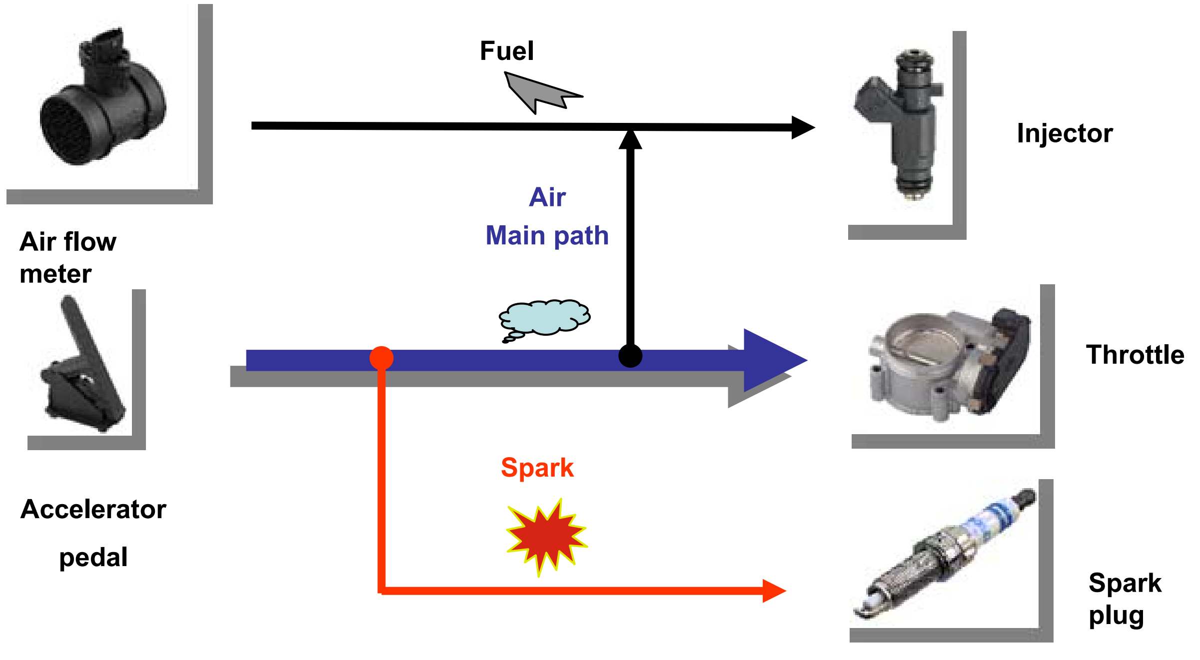
**Bosch Motronic ME7.1.1 engine control system**


**System components:**

- ME7 engine control unit
- Mass Air flow meter with integrated intake air temperature sensor
- Two Air Coolant temperature sensors
- Accelerator pedal unit with two integrated potentiometers
- RPM sensor on flywheel side
- Timing sensors on both intake camshafts
- Timing variators with solenoid valves on intake side
- 4 Knock sensors
- Wide-band oxygen sensors (pre-cat)
- Two-level oxygen sensors (post-cat)
- Motor-driven throttle body with integrated position sensors
- 8 fuel injectors
- 8 ignition coils
- Fuel pump unit
- Anti-evaporation system
- DMTL system
- Secondary air system

The engine management system is divided into two 4-cylinder units, with an ECU and integrated ignition/injection controls and fuel pump control. It is connected, via CAN line, to other vehicle control systems which interact with the engine management.
For the USA version: On-Board Diagnosis 2 complying with the California 96 regulations.
For the EUROPEAN version: on board diagnosis (EOBD) complying with European regulations. The ignition and injection systems are integrated and equipped with special technical solutions capable of detecting operating malfunctions in the engine control unit, so that compliance with the emission control standards is assured.
The accelerator is of the "*Drive by wire*" electronically controlled type and follows a precise operating logic: small angles or reduced pressure on the pedal are followed by optimally proportional opening angles of the throttle.



**Engine control system software version:**

| USA M139 | | MY 04/05 | | | MY 06 | | | |
|---|---|---|---|---|---|---|---|---|
| | | da assembly 21925 | | | da assembly 21926 | | | |
| | | M139 | Risanamento 142 | Aggiornamento | M139 | Aggiornamento | ESP8.0 ass.24275 | SPORT GT ass 24557 |
| MOTRONIC - NCM | File SD2/SD3 | INST5235 | INST5235 | INST5235 | * | AGGIORNAMENTO DIRETTO da SD3 | | |
| | Nome SW | 198428.002 | 198428.002 | 198428.002 | 219314.001 | 228926.001 | 222355.002 | 224756.001 |
| DUOSELECT - NCR | File SD2/SD3 | * | AGGIORNAMENTO DIRETTO da SD3 | | * | AGGIORNAMENTO DIRETTO da SD3 | | |
| | Nome SW | SOFAST III MDDD29U20 | SOFAST III MDDD31U21 | SOFAST III MDDD32U31 | SOFAST III+ MDED31A60 | SOFAST III+ MDED37A62 | SOFAST III+ MDED4BA66 | SOFAST III+ MDED4BC71 |
| | Hardware | CFC301 | | | CFC301 | | | |
| | Nome SW di diagnosi | NCR nodo cambio robotizzato magneti marelli SOFAST 3 | NCR nodo cambio robotizzato magneti marelli SOFAST 3 | NCR nodo cambio robotizzato magneti marelli SOFAST 3 | NCR nodo cambio robotizzato magneti marelli SOFAST 3+ | NCR nodo cambio robotizzato magneti marelli SOFAST 3+ | NCR nodo cambio robotizzato magneti marelli SOFAST 3 + | NCR nodo cambio robotizzato magneti marelli SOFAST 3 + |
| NOTE: * non disponibile sul portale | | | | | | | | |

**Example table, always check Modis for the latest release published!**

Checking of the engine node software combined with the transmission software is of fundamental importance for correct diagnostics.

Before making any replacements or disassembling any parts of the car involving problems related to the engine or transmission control unit, it is mandatory to check the correspondence between the Engine SW and the Transmission SW, as shown in the table published on Modis, which is constantly updated by the Maserati Technical Assistance Service.

Also in the event of replacement of a control unit it is indispensable to subsequently check correct matching as per the table, in accordance with the assembly N°, Model, Year, and hardware version of the node concerned.

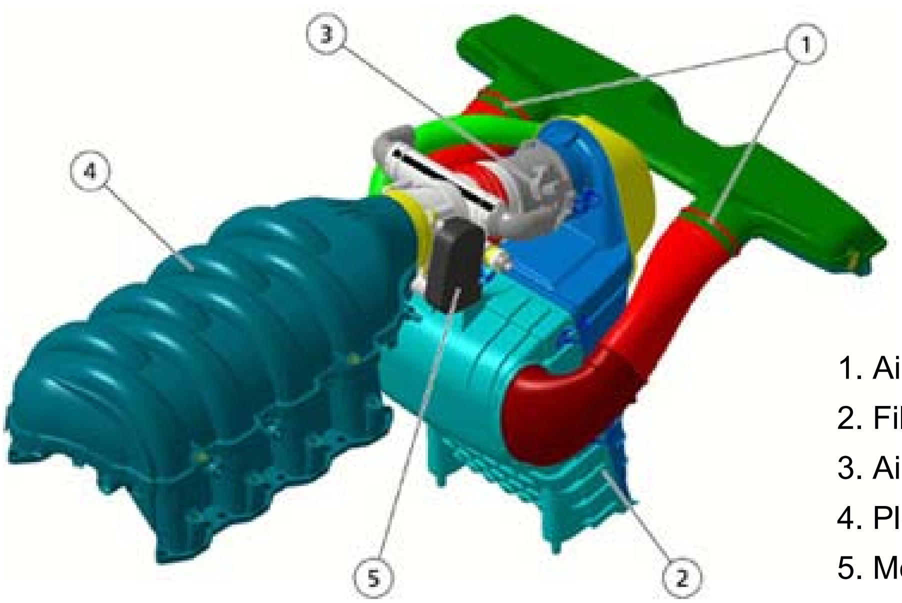
The Software is checked with SD3, interrogating the engine control node and the transmission control node and subsequently checking compatibility by means of the table and performing a remote download if necessary.

**Air intake system:**

The air intake system of the Quattroporte is composed of the following components:

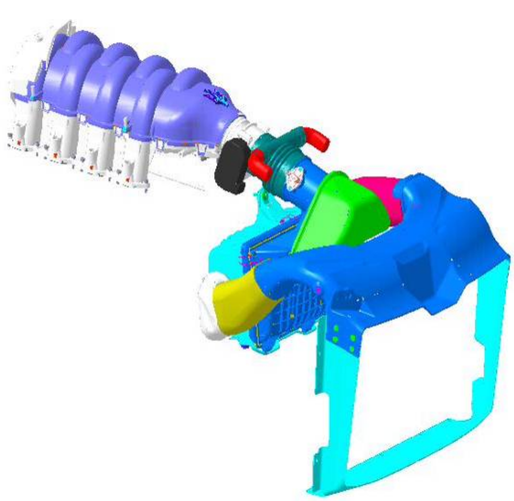
- Plastic intake manifold with optimised lengths
- Electronic throttle body
- Mass air flow meters
- Two resonators
- Air filter en filter housing placed in front of the engine.
- Dual air intake duct placed in high position.

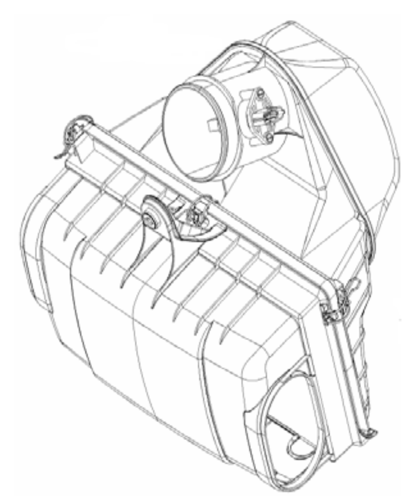
The minimum hydraulic diameter is 80 mm



1. Air inlet
2. Filter housing
3. Air flow meter
4. Plenum chamber
5. Motor-driven throttle body

For MY07 and Quattroporte Automatic, a new, horizontally positioned air filter and filter housing was introduced:





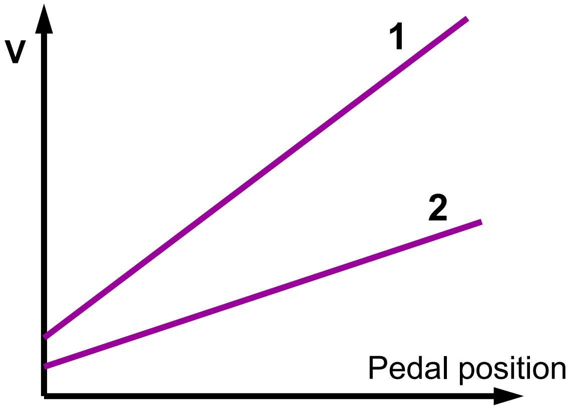
**Accelerator pedal module:**

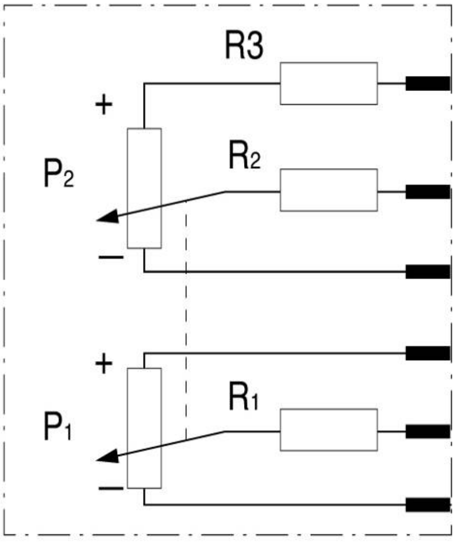
The accelerator pedal module is composed of two independent potentiometers with separate supplies to obtain a redundant signal for safety reasons. The signal value of one potentiometer is half that of the other.

**Reference values**

**Potentiometer 1**
- Rest position **= 0.65 ÷ 0.85 V**
- Max. position **= 3.7 ÷ 3.9 V**

**Potentiometer 2**
- Rest position **= 0.33 ÷ 0.42 V**
- Max. position **= 1.85 ÷ 1.95 V**



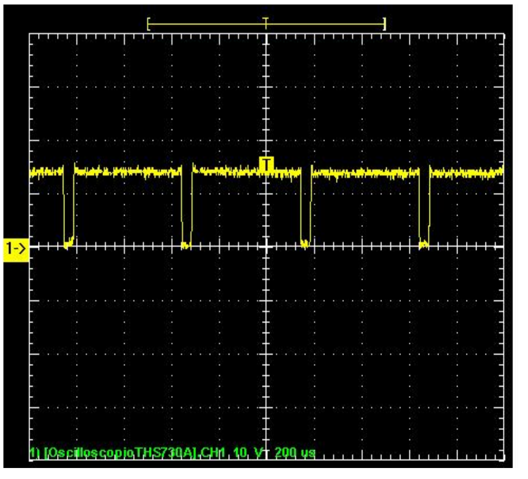

Potentiometer 1 = main
Potentiometer 2 = secondary

The recovery strategy in the event of a fault is different for the two potentiometers

**Motor drive throttle :**

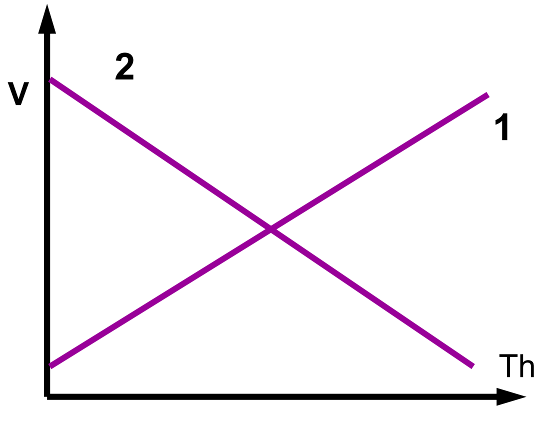
The throttle is driven by a PWM signal.

Throttle position control is provided by two complementary potentiometers. Idle speed is maintained by adjusting the position of the throttle directly. In the event of a fault a recovery position is guaranteed to arrive at an engine speed that is slightly higher than idling.




Technical data:

- Actuation: The throttle is actuated in a 0-12 V duty-cycle (PWM)
- Reading voltage: 0-5V
- Max. current: 9.5A
- Time to reach 90% of target opening: <100 ms
- Throttle opening with engine idling: 2-3%
- Throttle opening in recovery conditions: 8% (mechanical zero = 1600 rpm)




**1** = position sensor 1
**2** = position sensor 2

Whenever the engine is started the throttle resets to the idle speed position; for this reason the accelerator pedal should never be pressed during engine starting.

## Self-learning of the motor-driven throttle

For proper operation of the throttle a self-learning procedure must be executed. Throttle self-learning concerns 3 parameters:

- Throttle totally closed position
- Unpowered closed position.
- Checking the return springs and maximum opening

The self-learning values (stored in the ECU) are lost when power is disconnected from the ECU (battery disconnection or unplugging of ECU connector). Following a power disconnection the self-learning procedure must be performed when power is reconnected.

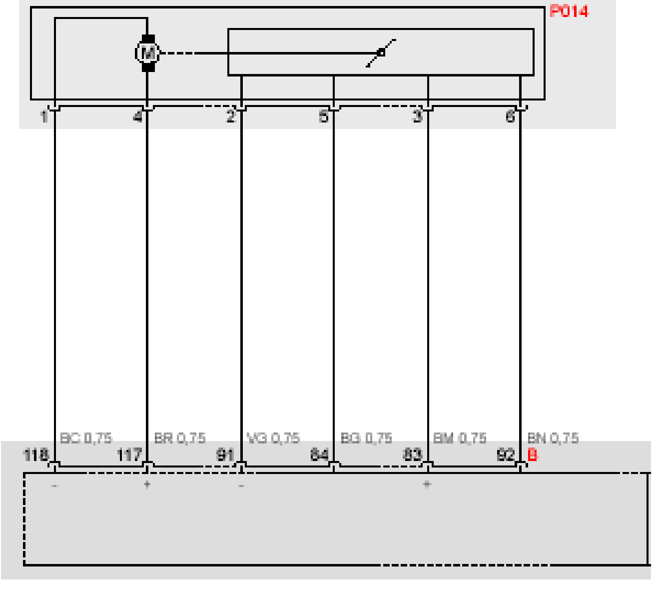
**Procedure: Key ON (without starting) > wait at least 20 seconds > Key OFF**

Tester SD3 can be used to check that the self-learning procedure has been executed correctly.

| | |
|---|---|
| Throttle self learning counter = 11: | self learning to perform or in execution |
| Throttle self learning counter = 0: | self learning completed |
| Throttle self learning counter = 1-10: | self learning not completed |

This latter condition may denote a problem with the motor-driven throttle or that the correct conditions for self learning have not been fulfilled.

**Motor-driven throttle circuit diagram:**



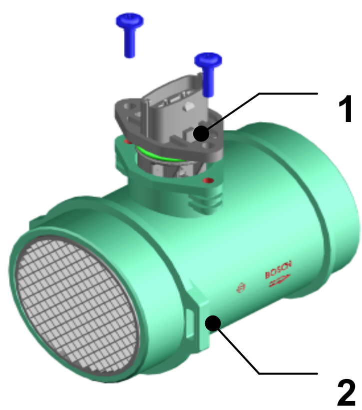

1. Ground
2. Throttle ground position
3. Stabiliser sensor 1 power supply
4. Fuel supply
5. Throttle position 2
6. Throttle position 1

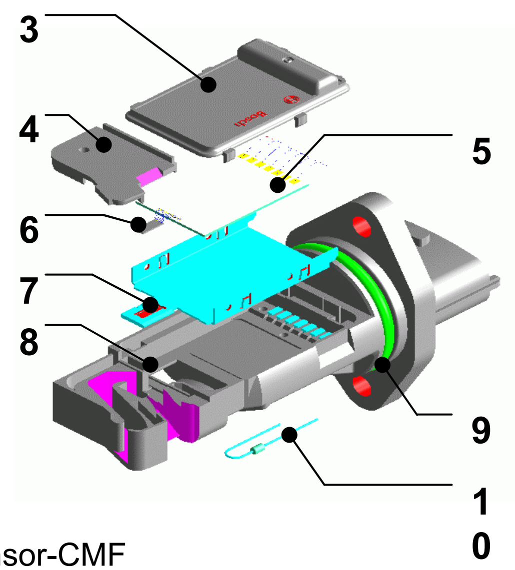
## Air flow meter:

The air flow meter supplies the value relative to:

- **Mass flow of aspirated air**
- **Temperature of aspirated air.**

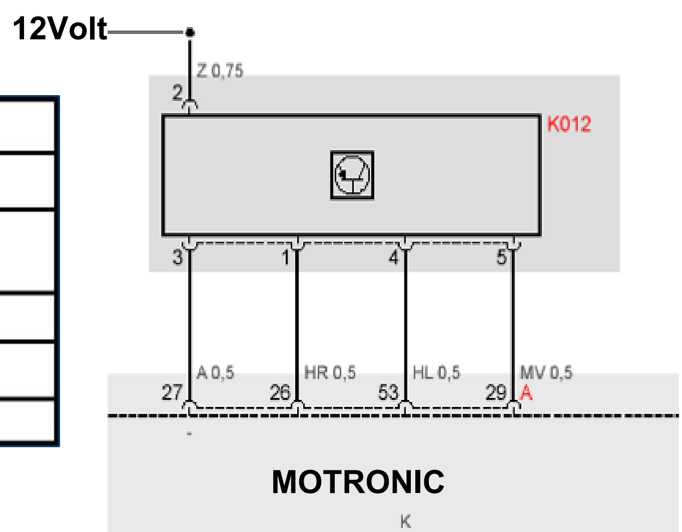
The sensor is supplied by a current value designed to maintain it as a reference temperature. When it is subjected to an air flow it tends to cool and the ECU must increase the current required to maintain the reference temperature. A variable NTC resistance indicates the aspirated air temperature value.



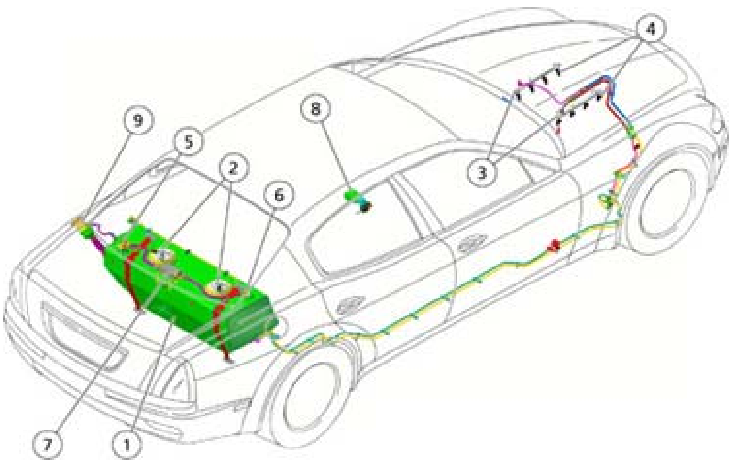

1 - Sensor
2 - Cylindrical Frame
3 - Casing
4 - Measuring channel cover
5 - Hybrid-SHF
6 - Sensor-CMF
7 - Carrying plate
8 - Plug-In Sensor Casing
9 - O-Ring
10 - Temperature sensor

| Pin | Denominazione | Tipo Segnale |
|---|---|---|
| 1 | Temperatura | Segnale Analogico |
| 2 | Tensione Alimentazione | 12V |
| 3 | Massa | GND |
| 4 | Tensione Riferimento | 5V |
| 5 | Portata | Segnale analogico |



**Fuel system:**

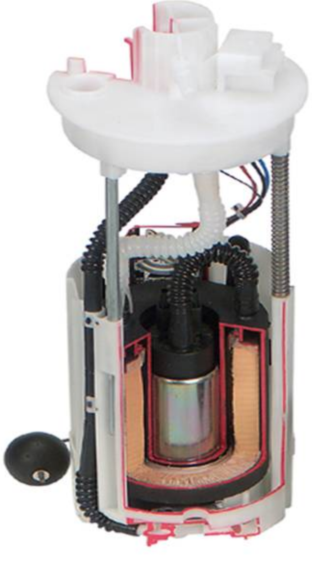
1. Fuel tank
2. Electric pump
3. Delivery pipe (rail)
4. Injectors
5. Multifunctional valve (ventilation, roll-over, tank filling stop)
6. Ventilation and roll-over valve
7. Decanter
8. Inertia switch
9. Fuel filler neck



The fuel systems utilised in Maserati cars are of the "Returnless" type

The fuel pump module is mainly composed of:

- Fuel filter
- Fuel pump with electric motor
- Pressure regulator: 3.5 bar
- Float with level sensor

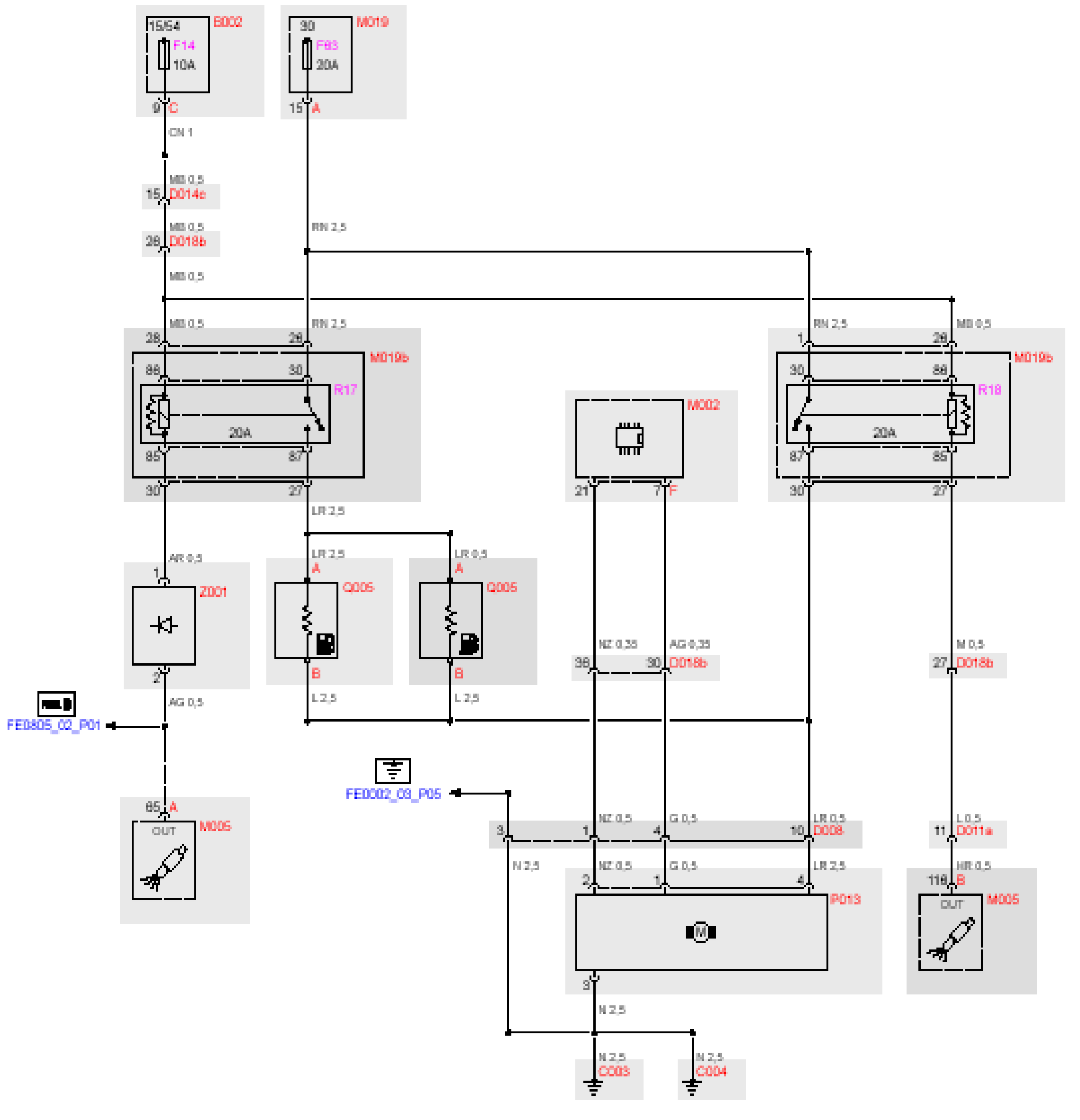


The two fuel pump relays are driven directly by the ECU. In contrast, the fuel level sensor is connected to the Body Computer. The ECU receives the information associated with the fuel level from the Body Computer via the C-CAN network.

When the fuel level is very low, the ECU changes the misfiring detection strategy. This means that a fuel shortage is not interpreted as a misfire. This strategy avoids storage of unjustified misfiring errors.
The fuel level is also important in order to enable or disable several diagnostic functions.

All cars from MY06 onward have a single fuel pump.

Fuel pump control circuit electrical diagram:




Pin 65 from the NCM has a dual function:

- Ground for relay R17 (Key ON)
- + 12V for TEST mode of the DMTL system (Key OFF)

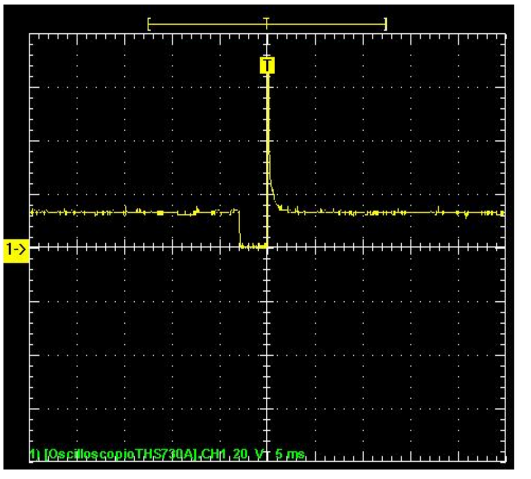
In order to reduce noise levels and avoid overheating of the fuel in the tank, the fuel pump runs at low speed (by means of R17 and two resistors) when fuel demand is low.
In hot start (water temp. > 120°C) and cold start conditions the fuel pump runs at high speed for a few seconds.

**Injectors:**

The injector is active when the pin from the engine ECU is connected to ground.

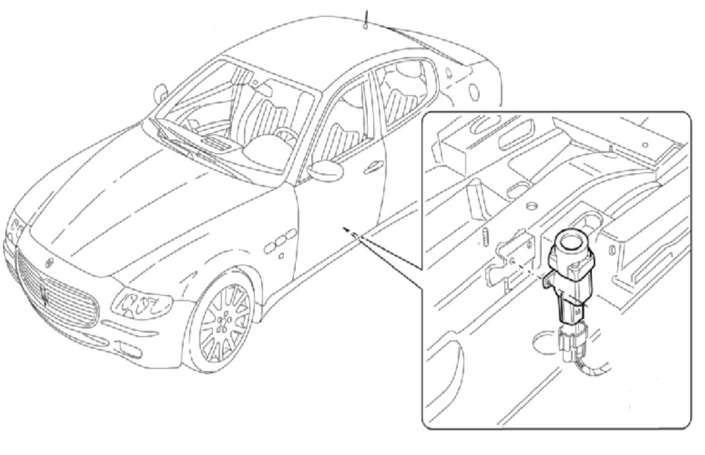
Technical data:

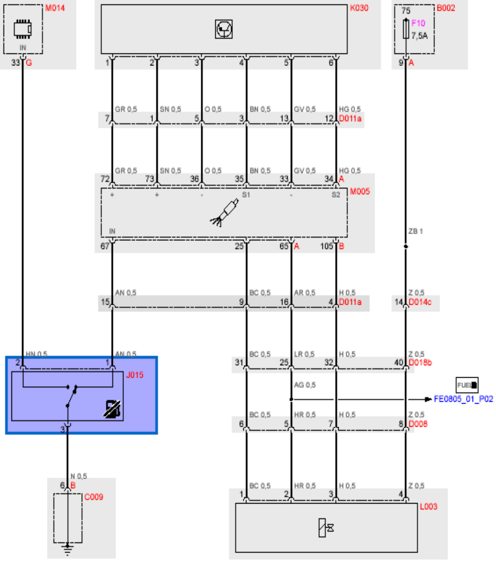
- flow rate: 239.7 g/min
- internal leakage: 2 mm$^3$/min
- voltage: 12 V
- injection time: 2-4 ms with engine idling
- injector resistance: +-12 Ohm (20°C)




**Inertia switch:**

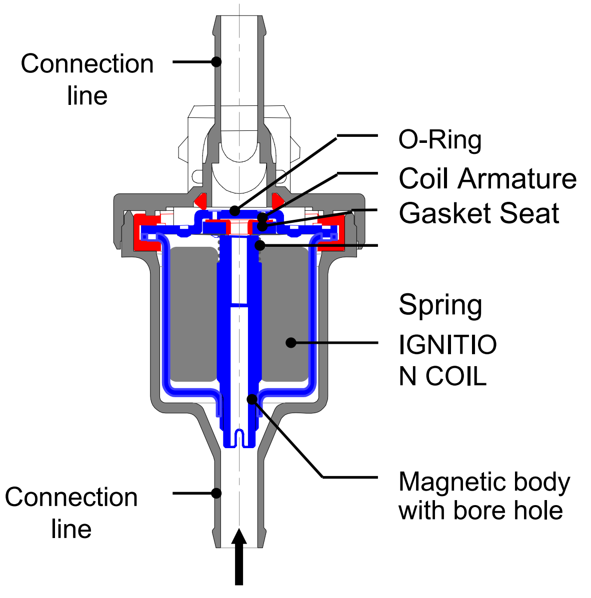
The operating logic of the inertia switch is implemented through the control of the common earth of the NCM and NVB nodes.
In the event of an accident, the switch cuts the earth connection (C009) with the NCM and “routes” the connection to the NVB. This way, fuel delivery is cut off and the NVB unlocks the doors and activates the hazard lights to facilitate the operations of the rescue team.

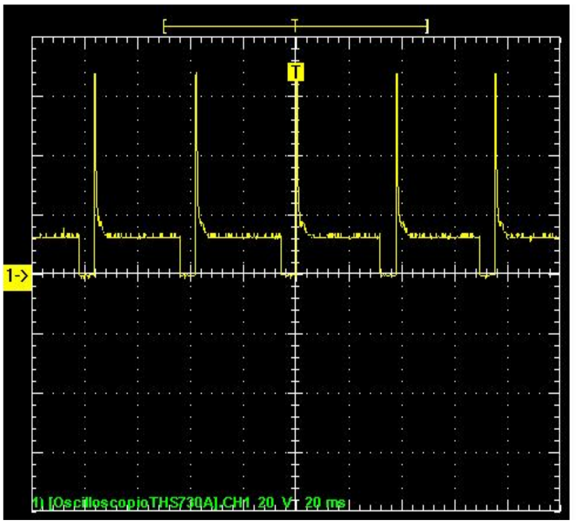




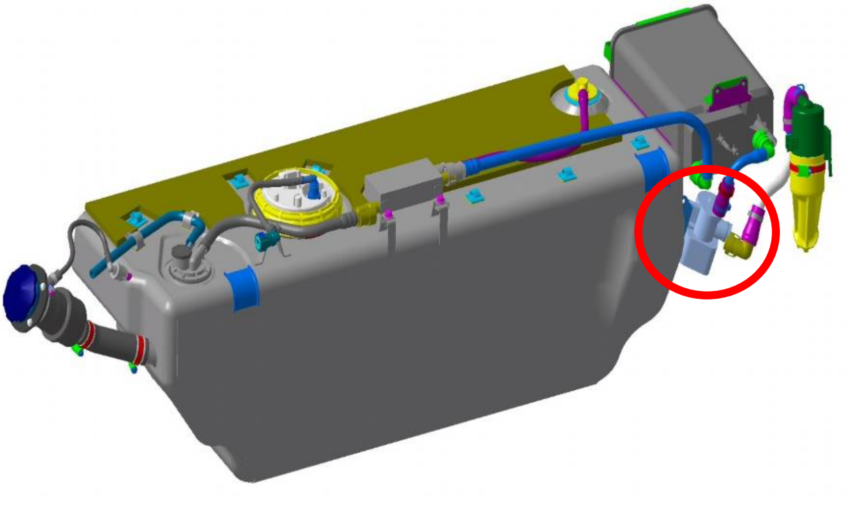
**Canister purge valve:**

The canister purge valve is controlled in Duty-cycle (PWM). The use of this valve makes it possible to eliminate fuel vapours from the tank system by routing them to the aspiration system. The engine control module activates the purge valve periodically and determines the necessary opening of the valve based on the engine running conditions and the fuel level in the fuel tank.

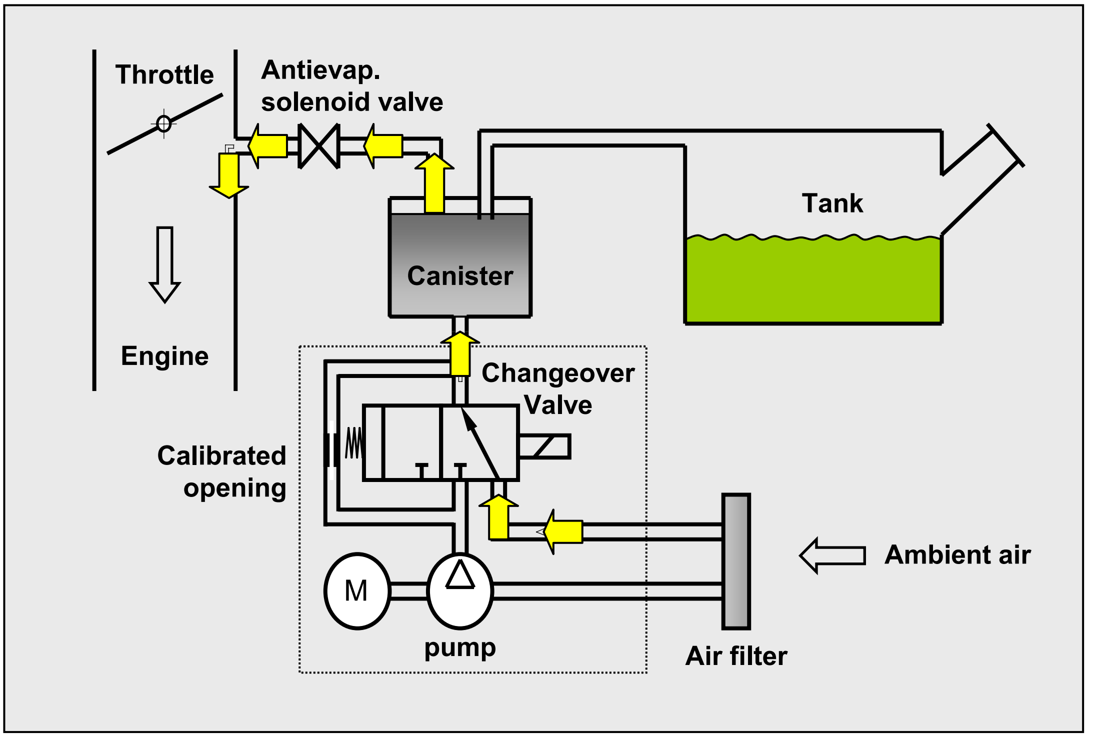



**DMTL system:**
The Diagnostic Module Tank Leakage (DMTL) is employed on cars for the US market for tank seal diagnostics and for canister purging. For diagnostic purposes, the reference used by DMTL is the current required to drive a motor that forces air through a 0.5 mm hole. Subsequently it pressurises the tank and, if it detects a hole, the required current will be lower than the reference current of the 0.5 mm hole.
In contrast, during canister purge mode, the DMTL controls the inlet of ambient air which then flows through the canister toward the aspiration system.

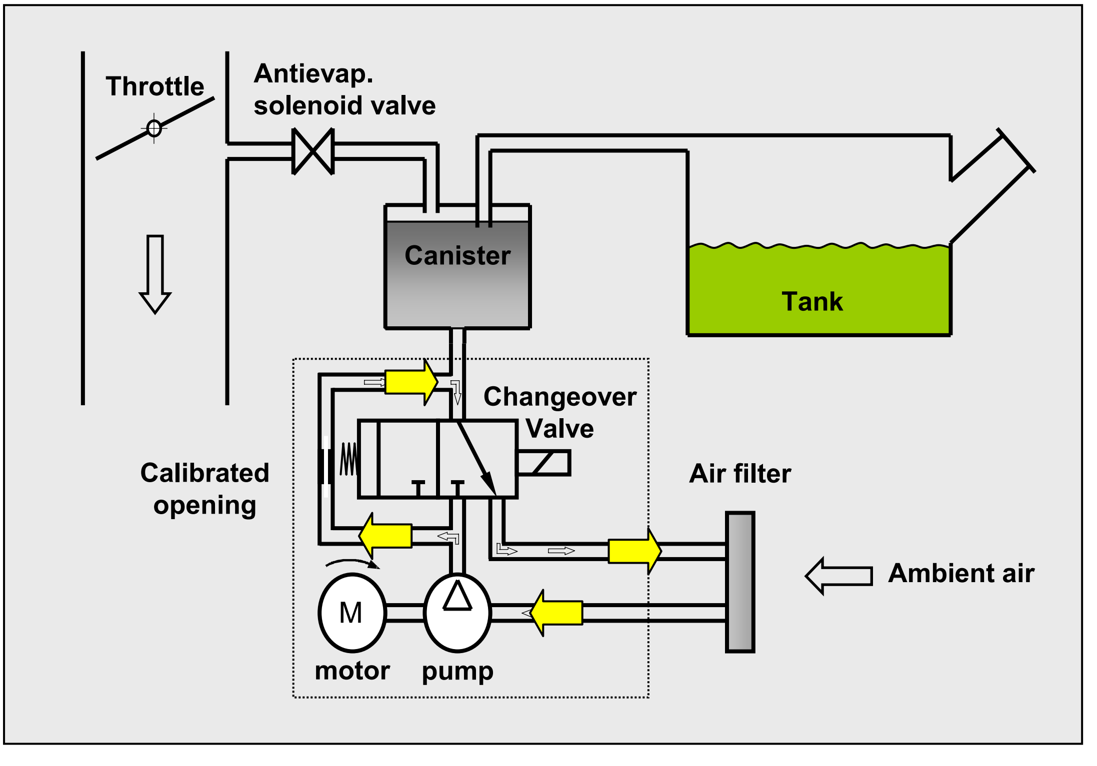


**Bleeding procedure:**



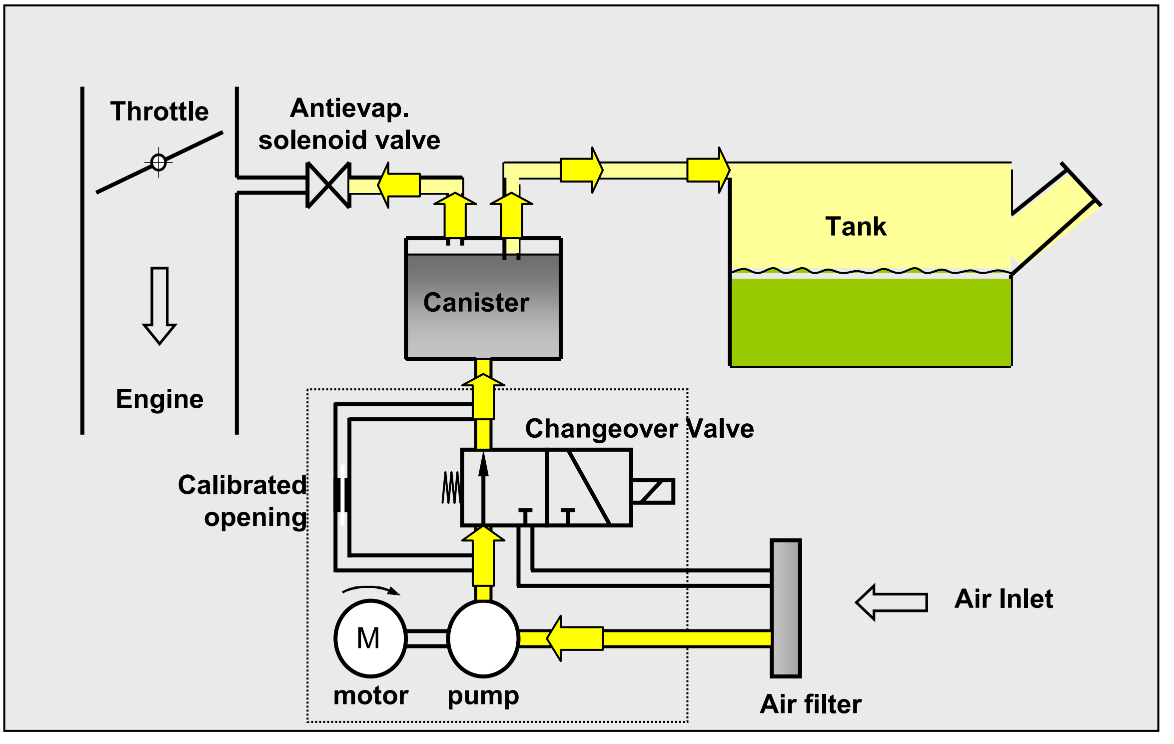

**Calibration procedure:**

The motor drives the pump and the air flows through an 0.5 mm calibrated hole, during which procedure the constant current absorbed by the motor, which is strictly dependent on the size of the hole, is recorded.



**Test procedure:**

The changeover valve is open and the anti-evaporation valve is closed. The canister/tank air circuit is set and held under pressure by the pump. The absorbed current is measured and compared to the reference current value.

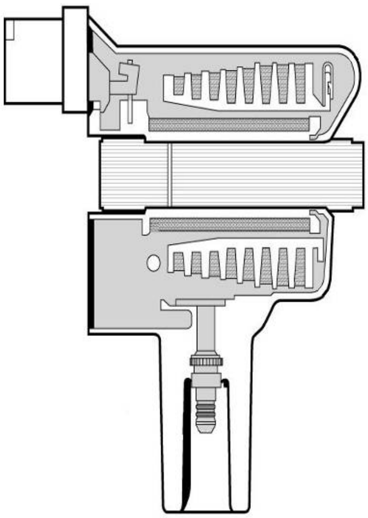


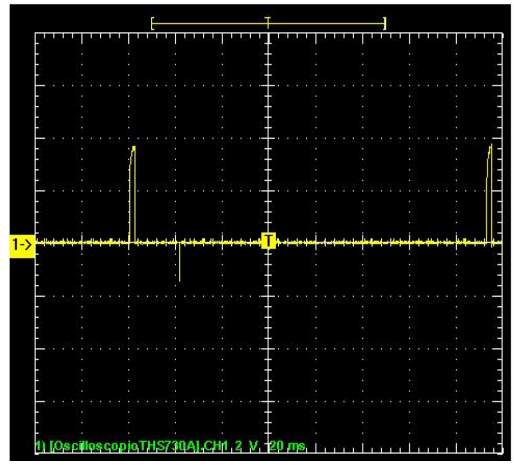

- engine rpm = 0
- altitude < 2800m
- engine temperature (off) > 3.8 °C
- ambient temperature 3.8 ° < T < 35,.3 °C
- fuel level from 15% to 85%
- vehicle speed = 0 Km/h
- battery voltage 10.95 < Vb < 14.5
- Correct operation of the altitude, engine temperature, vehicle speed, air pump, and anti-evaporation valve sensors.
- Driving cycle of at least 600 seconds, then
- Engine off for at least 5 hours, then
- Driving cycle of at least 800 seconds
- Test launched several seconds after KEY OFF

The test can also be launched manually by means of the short trip (cycle environment in SD3)

**Ignition coils:**

The ignition coil is of the magnetic closed circuit type. The windings are housed in a plastic casing immersed in epoxy resin and positioned one on top of the other around a central ferrous core.

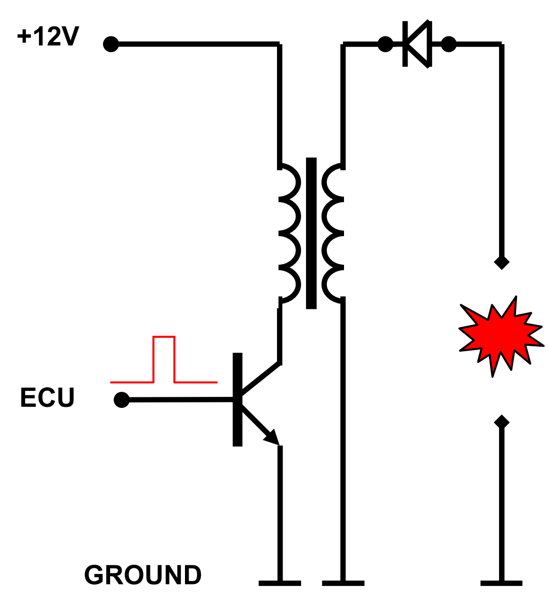





The Motronic activates the power stage (thanks to a series of transistors) on the coil for the necessary charge time to bring the primary winding current to its maximum value. The energy stored in the coil is proportional to the charge time.
At the time of ignition (which corresponds to the required advance) the power stage interrupts the flow of current on the primary winding. At this point the significant change in the magnetic field generates a voltage on the secondary winding. When this voltage is applied to the spark plug it results in the generation of a spark.

Technical data:

- Power supply: 12V
- Primary winding current: 7 A
- Charge control: 5V
- Dwell time: 2.8 ms
- Secondary winding voltage: 30 kV

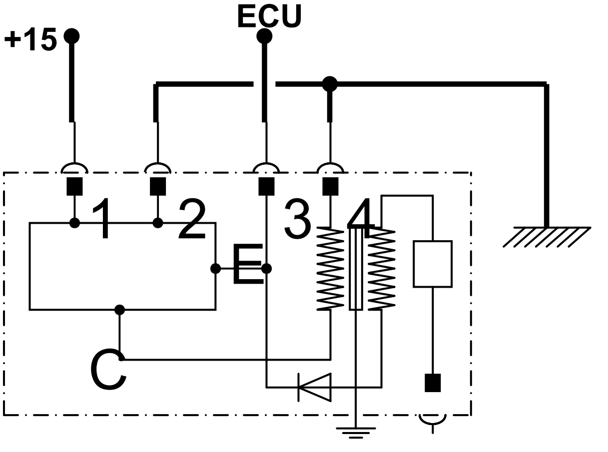


**Eldor coil:**

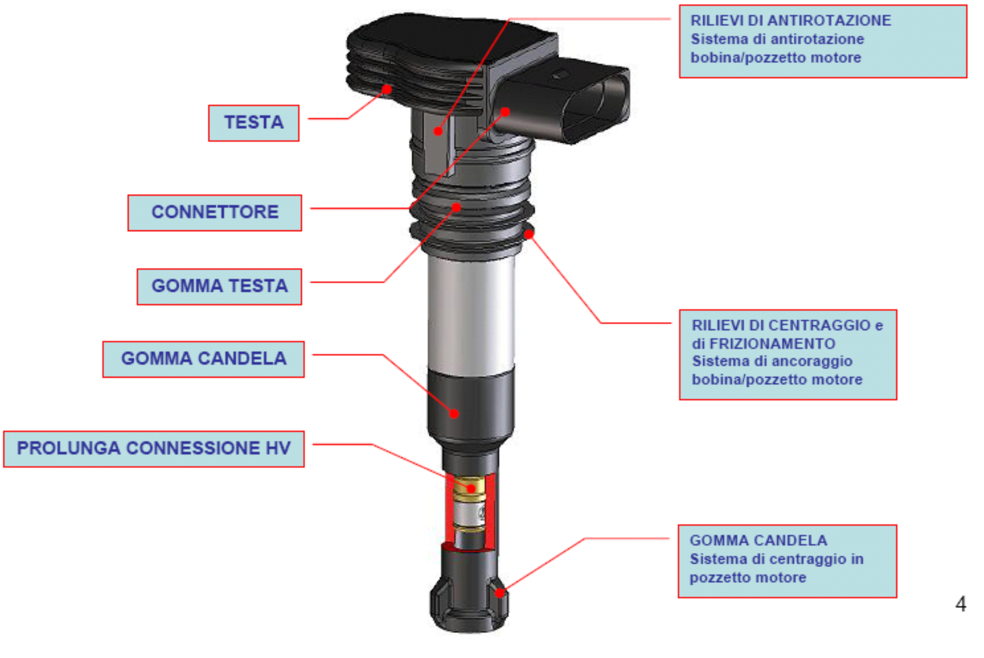
All Quattroporte vehicles from Assembly 24275 are fitted with Eldor type ignition coils.

Benefits of the Eldor coil:

- Simplification of fixing on the cylinder head covers.
- Provision to accommodate future developments for knock and misfiring diagnostics.
- More stable combustion at high revs.




**Pin 3 = 5V control signal from ECU**



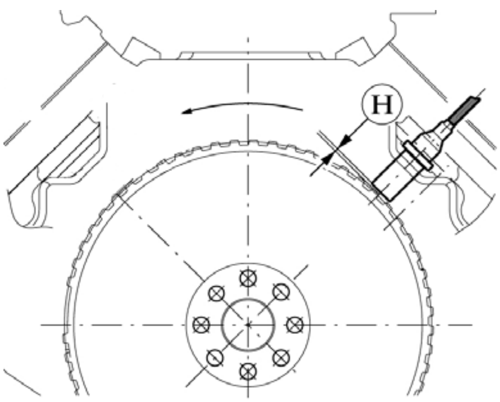

The Eldor coil requires a specific spark plug. This results also in a modification of the cylinder head for all engines equipped with Eldor coils. Always check the correct match when replacing spark plugs.

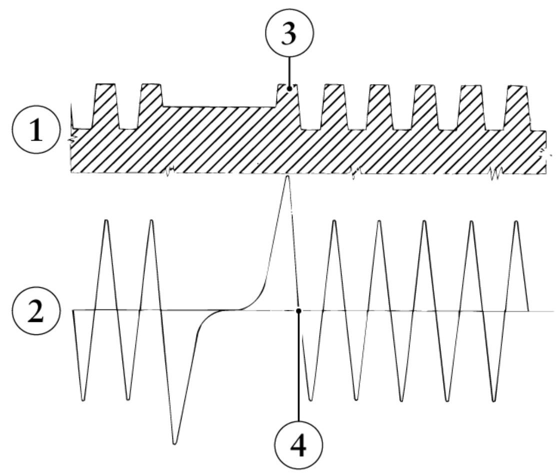
**RPM sensor:**

The RPM sensor is a variable reluctance transducer (also known as a pick-up or inductive sensor) located in proximity of the tone wheel keyed to the crankshaft.
The tone wheel has 58 (60-2) teeth.

Resistance = 1134 ÷ 1386Ω (20°C).

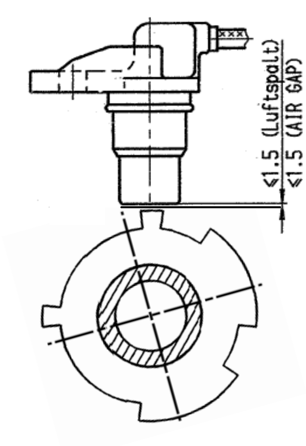
The prescribed gap between the tip of the sensor and the tone wheel to obtain correct readings is between 0.5 and 1.5 mm. The output voltage varies with the rotation speed.

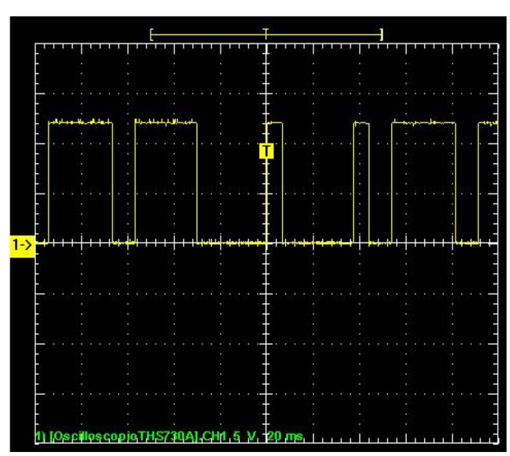



**Timing sensor:**

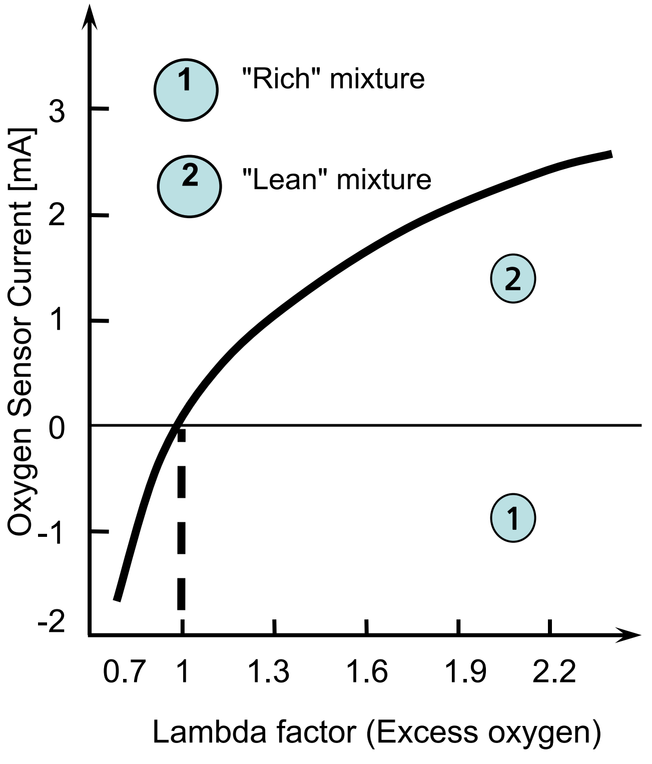
The timing sensor is a Hall-effect transducer fitted in correspondence with a tone wheel with four cams on the intake camshafts.
In normal conditions the timing sensor output signal is 5V, but when the magnetic cam is aligned with the sensor the signal is lost, thereby informing the ECU of the position of the camshaft (the ECU reads the downward flanks of the timing signal)
The timing sensor is an active transducer. This means that the position of the camshaft is recognised even when the engine is stopped. The timing signal is utilised to recognise the position of the engine and for the VVT system.

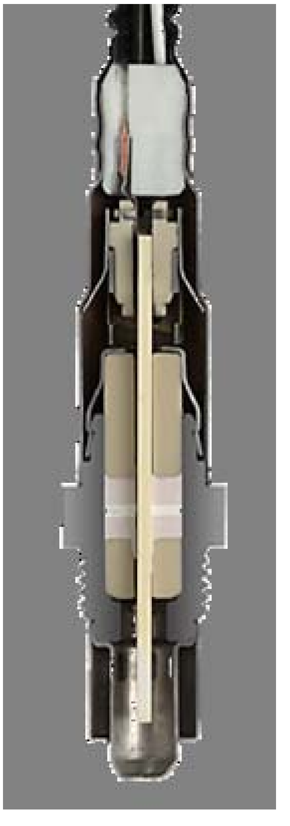


**Broad band oxygen sensor (Bosch LSU)**

The pumping or measuring cell is maintained with a stoichiometric A/F ratio. In the presence of excess oxygen in the exhaust gas, positive pumping current makes it possible to remove said excess oxygen. The opposite situation occurs with rich mixtures.
The pumping current therefore indicates the stoichiometric ratio and the concentration difference generates a current.



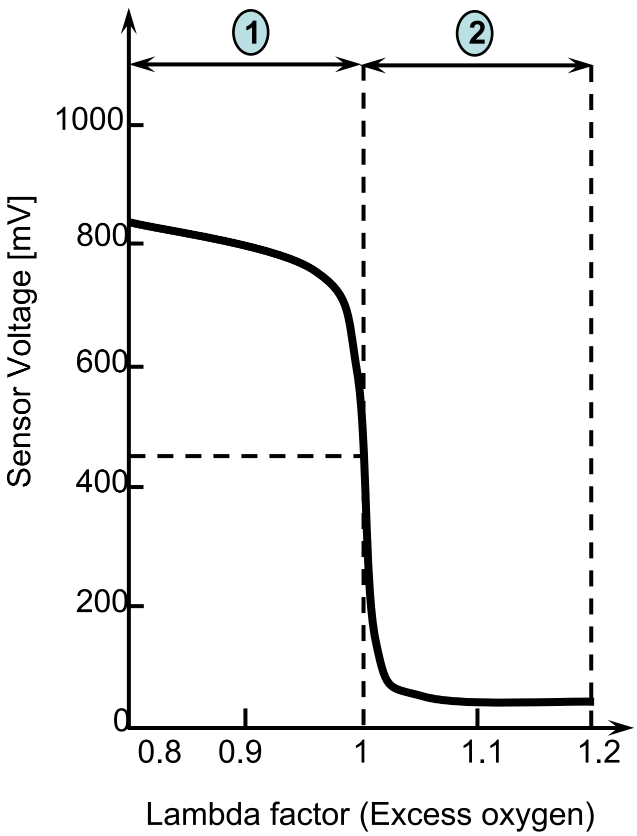



LSU type broad band oxygen sensors always function in CLOSED LOOP mode except during the "light off" period and for very short intervals during transients.

| PIN | Description |
|---|---|
| 1 | Sensor voltage (+) |
| 2 | Pump Output signal |
| 3 | Heater (+ batt.) |
| 4 | Heater (-) |
| 5 | Sensor voltage (-) |
| 6 | Pump input signal |

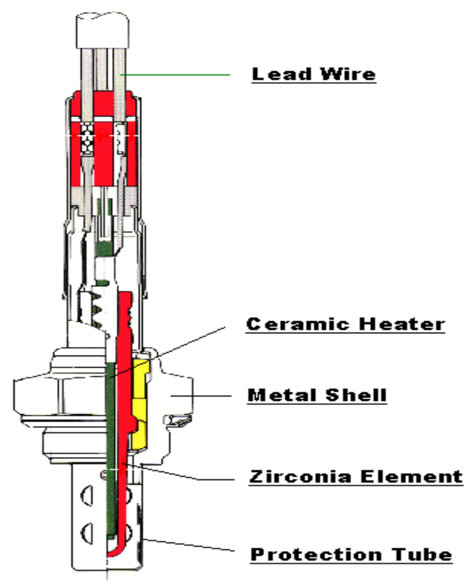
**Two-level oxygen sensor (Bosch LSF)**

The oxygen sensor measures the A/F ratio in burnt exhaust gas with respect to a stoichiometric composition. In practical terms, the sensor measures the difference in the concentration of oxygen in the exhaust gas and in ambient air.
Once the sensor has been heated by its internal heating circuit, the oxygen on the external electrode is broken down into ionic form by the catalytic film of the electrode. A similar process occurs on the internal electrode with ambient air. The concentration difference generates a voltage signal in mV. These sensors are capable of defining only whether the mixture is rich or lean, without providing any
quantitative information. The sensors are therefore also known as on-off or LSF sensors.




1 "Rich" mixture

2 "Lean" mixture

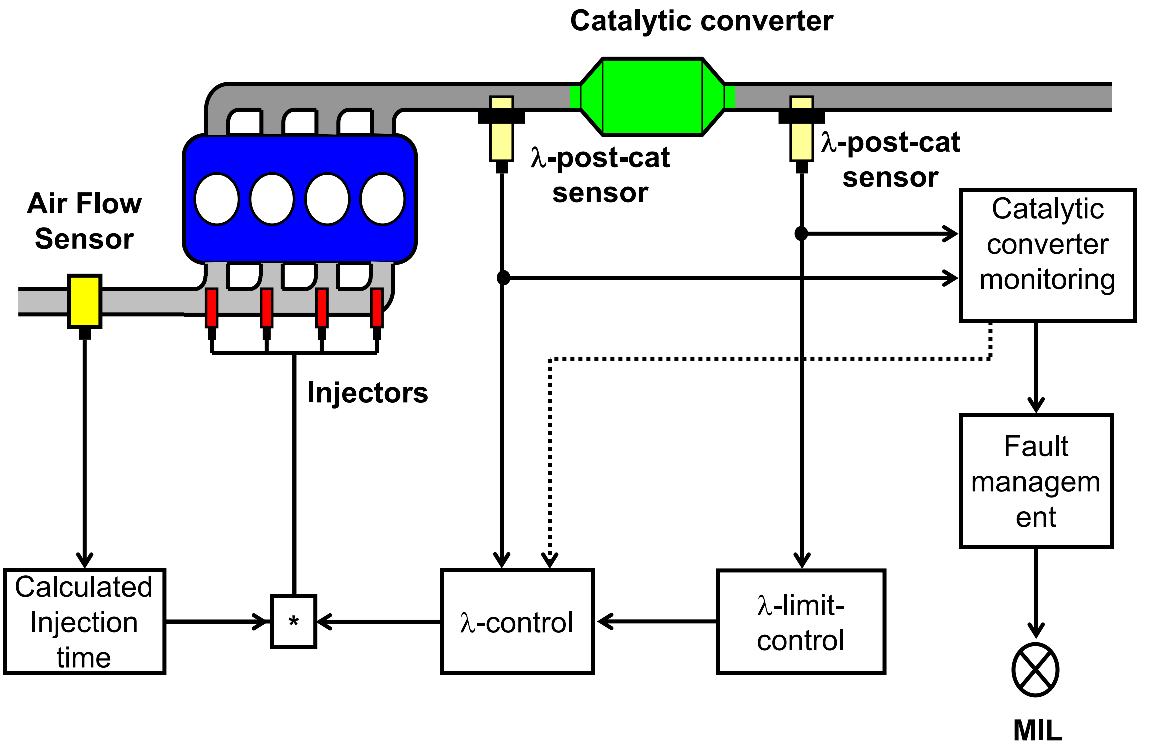



**Technical data:**

- Power supply: 12 V
- heater power: 7 W
- heating current: 2.1 A
- heating control: PWM 0-12 V
- exit: 0-900 mV

Closed loop check conditions: feedback on the rear oxygen sensors can be checked with a road test, by means of acquisition with SD3.

**Catalytic converter monitoring:**




**Pre-cat oxygen sensor = LSU**
**Post-cat oxygen sensor = LSF**

| | |
|---|---|
| **Lambda > 1 :** | **Mixture = lean** |
| **Lambda = 1:** | **Mixture = correct** |
| **Lambda < 1 :** | **Mixture = rich** |

**In accordance with regulations, the engine must always* run with Lambda = 1 (correct mixture)**

(*): except during a brief interval after cold starting and during short-term transients.

To obtain and maintain a correct F/A mixture the Lambda monitoring system must function in "Closed Loop" mode (with feedback). The "open loop / closed loop" state can be checked by means of tester SD3.

**Pre-cat lambda monitoring:**

The Lambda value for the two banks upstream from the catalytic converters is monitored by means of LSU type sensors (broad band oxygen sensors). These sensors make it possible to measure the Lambda value in real time and with high precision.
The measured Lambda value is subsequently compared by the ECU with the value calculated in accordance with a model and any changes are compensated by means of the "Fuel Trim" strategy (Closed Loop operation)

**Fuel trim:**

- The expression Fuel Trim is used in various regulations to indicate the correction of the quantity of fuel based on information supplied by the oxygen sensors.
- The ECU compares the real Lambda value measured by the pre-cat sensor with the target Lambda value.
- To maintain the correct stoichiometric air/fuel ratio the ECU calculates a correction of the injection quantity in real time.
- This real time correction is designated "Short Term Fuel Trim".
- The "Short Term Fuel Trim" is expressed as a percentage correction of the fuel quantity.
- When the mixture is too lean or too rich, the ECU continues to make corrections until the limit is reached (in both directions).
- The ECU transfers the Short Term Fuel Trim value continuously and progressively to the "Long Term Fuel Trim" (= integral correction). The Motronic subsequently corrects the carburetion map and adapts it by "moving it".
- A "Long Term" correction corresponds to a 1% correction of the map (positive or negative) and is saved in the ECU.
- When the Long term Fuel Trim reaches a certain limit (usually a 10% variation, although this depends on the standard), an error code is stored and the engine check warning light illuminates.
- This condition indicates the presence of a problem in the air or fuel system (malfunction of air flow meter, injectors, oxygen sensors, exhaust, EVAP system...).
- The Long Term Fuel Trim is specific for engine idling and for low/high engine load conditions.
- The Fuel Trim is specific for both cylinder banks and can be verified with the SD3 tester.

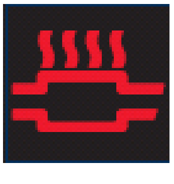
**Post-cat Lambda monitoring:**

The Lambda value down-stream of the catalytic converters is monitored by LSF type oxygen sensors (two-level sensors). These Oxygen sensors are less precise than LSU type sensors, and they are utilised primarily for diagnostic purposes.
The Lambda value down-stream from the catalytic converters is used to:

- Check proper operation of the catalytic converters: In the event of detection of low efficiency of the catalytic converters, the Motronic ECU stores a DTC and illuminates the MIL warning light.
- Check proper operation of the Oxygen sensors up-stream of the catalytic converters (plausibility check).
- Provide a minor contribution to the Fuel Trim.

**Slow Down strategy:**

- The catalytic converters may be damaged if the temperature rises excessively.
- A mathematical model integrated in the ECU makes it possible to calculated the temperature of the catalytic converters in real time.
- The parameters utilised for the calculation are as follows: engine coolant temperature, ambient temperature, engine load, ignition advance and Lambda value.
- The calculated temperature allows the ECU to protect the system from serious problems by implementing suitable strategies
- When the calculated temperature reaches 980°C the Slow Down warning light flashes on the dashboard to alert the driver to the presence of a critical situation.
- When the calculated temperature reaches 1040°C the Slow Down warning light remains steadily illuminated and the ECU switches off the engine. Higher catalytic converter temperatures would damage the converters and may result in a fire outbreak.



**Exhaust system:**

The exhaust system of the Quattroporte with dry sump engine (Duoselect) is composed of the following components:

- Two ceramic pre-catalytic converters, one per bank
- Two ceramic main catalytic converters
- Four Lambda sensors, two upstream (wide band) and two downstream (two level) of the pre-catalytic converters
- Central pre-silencer
- Two rear silencers
- Air-gap technology, external diameter: 75 mm, internal diameter: 65mm

The system has a specific design for USA and Europe specifications. With the introduction of the Euro 4 anti pollution standard (from MY06), the USA type exhaust system was used also for Europe specification vehicles.
The Euro 4 configuration was used from MY06 in the markets where necessary.

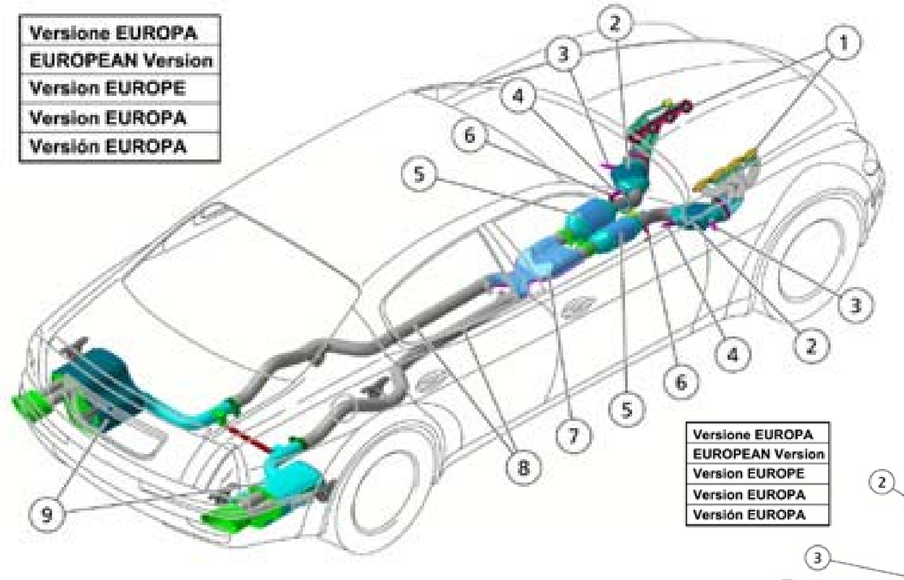
**Euro 4 markets:**

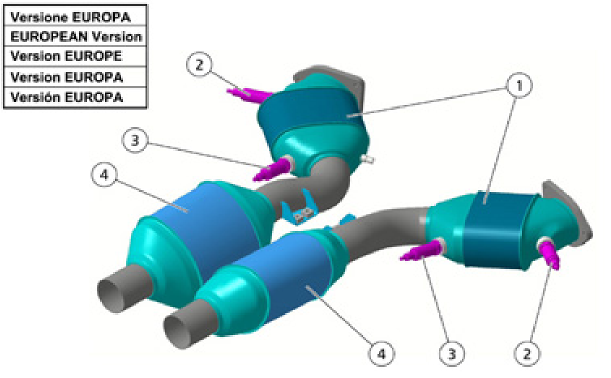
- Europe
- USA
- Canada
- Hong Kong
- Singapore
- Korea
- Taiwan

**Euro 3 markets:**

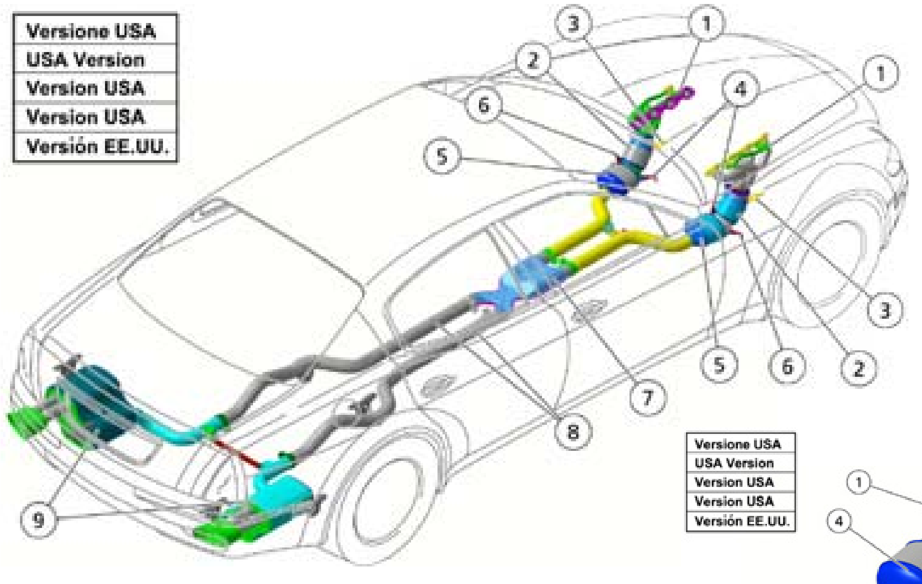
- South America
- Middle East
- Japan
- Australia
- China
- Russia
- Philippines
- South Africa
- Malaysia
- Indonesia

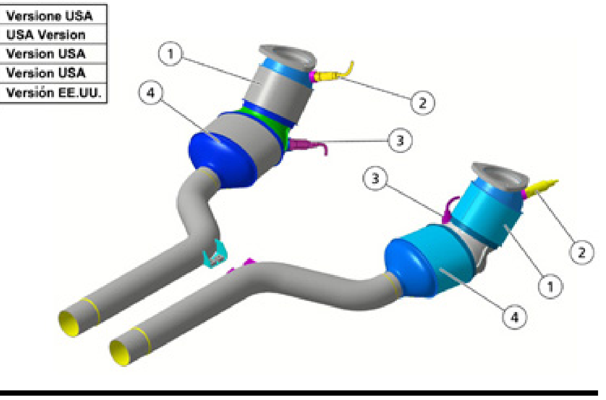
Euro 3 specification:



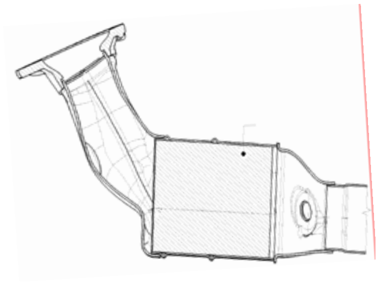



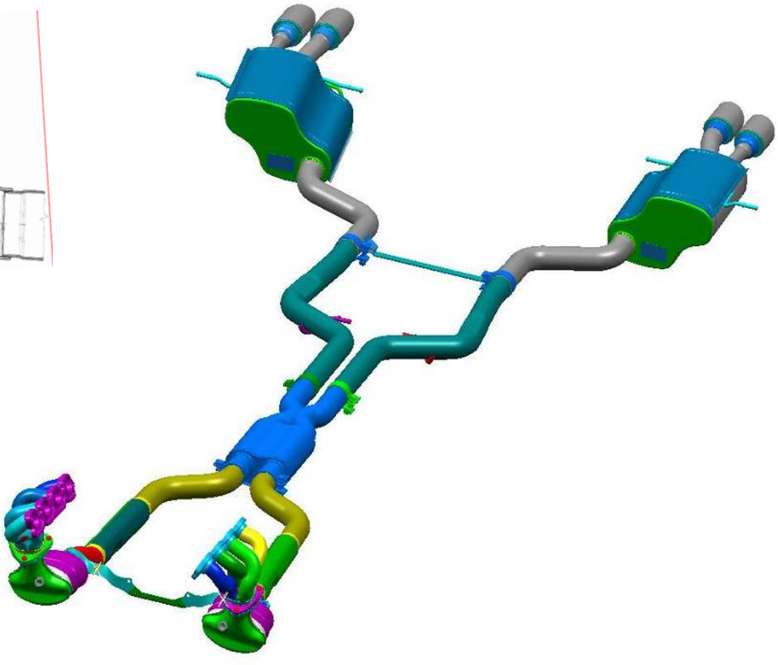

USA and Euro 4 specifications:



**Quattroporte Automatic (wet sump engine):**





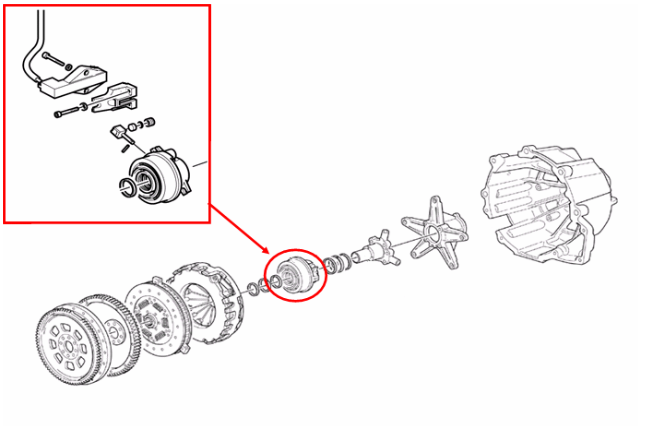
- Two main metal-core catalytic converters
- Four oxygen sensors
- Central pre-silencer
- Two rear silencers

For the Quattroporte versions with a wet sump engine, the exhaust system is newly designed for emission control. Modifications made to the secondary air system has allowed to eliminate the pre-catalytic converters. Catalytic converters in a single metal piece instead of the pre-catalytic converter solution upstream of the main catalytic converter.
The V8 is connected to an exhaust gas expulsion system which uses metal instead of ceramic catalytic converters: by means of a technology deriving from the racing world, the cell density is decreased, with consequent reduction of the section resistant to the gas flow and therefore less counter pressure upon exhaust.

## 2. Clutch

### Quattroporte Duoselect:

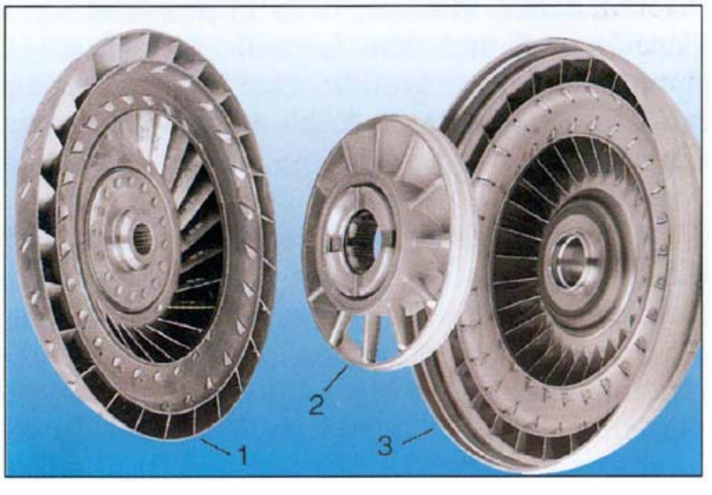
All Quattroporte Duoselect models are fitted with a dry 215 mm twin-plate clutch. This solution significantly reduces the rotational inertia and consequently allows the engine to pick up speed more quickly. A contact-less position sensor continuously monitors the actual clutch position.
See chapter 3 for more details.



- From assembly 18822 (Sofast III), a clutch actuator pressure sensor was applied.
- From assembly 21926 (Sofst III+), a new clutch with improved thermal inertia was introduced. This new clutch can be retrofitted on previous vehicles but such an operation includes replacement of the clutch housing.

### Quattroporte Automatic:

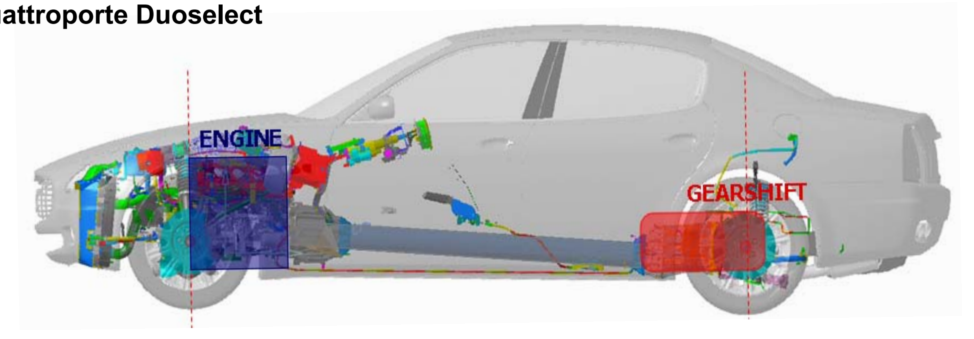
The Quattroporte Automatic is fitted with a hydraulic torque converter which at the same time operates as a drive-away clutch and contains an integral lock-up clutch. See chapter 3 for more details.



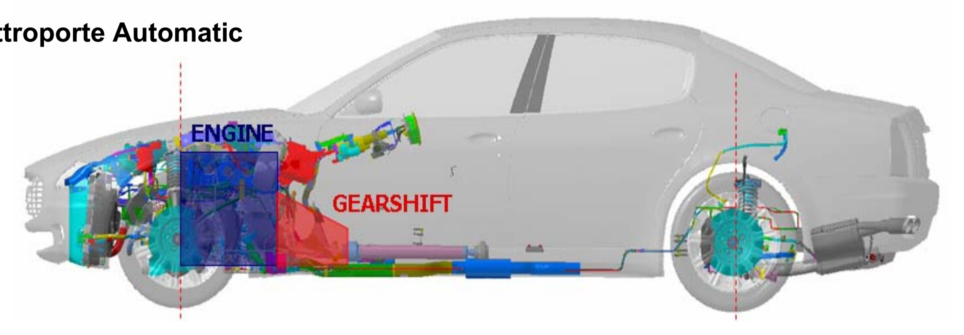

1. **Turbine**
2. **Stator**
3. **Pump**

## 3. Transmission

**Quattroporte Duoselect**



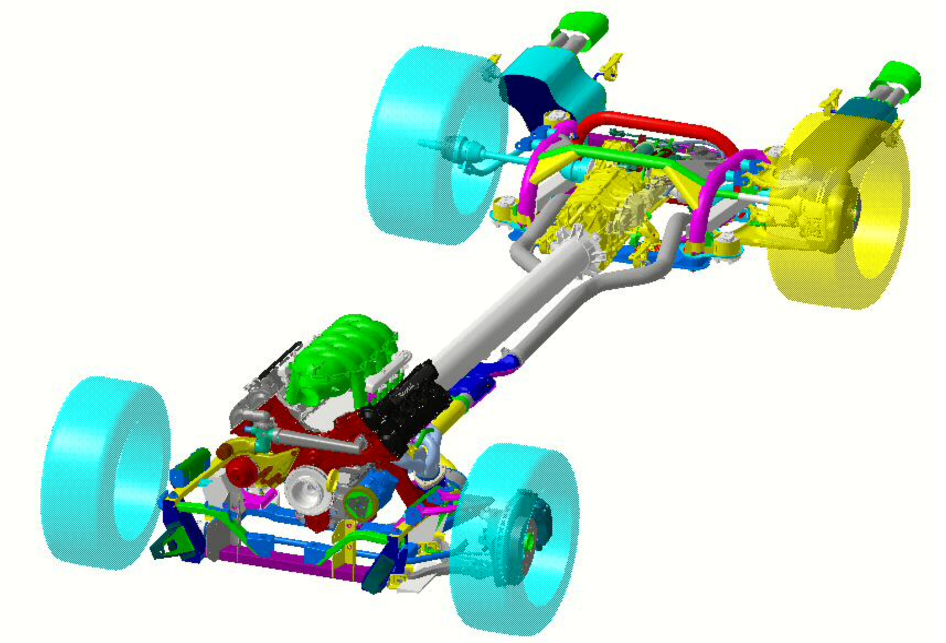

**Quattroporte Automatic**

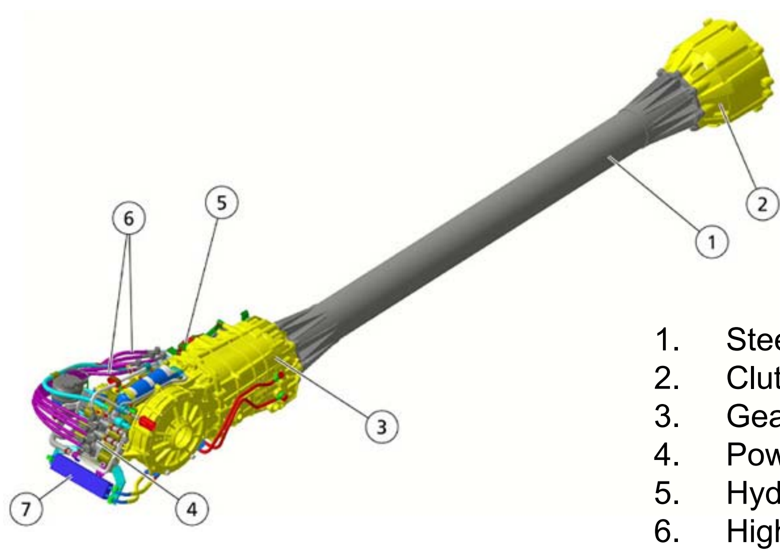



The Maserati Quattroporte is available with to different types of transmission:
The Quattroporte Duoselect has a transaxle configuration similar to the configuration of the M138 models. A robotized manual 6-speed gearbox is positioned at the rear of the car where it forms a sigle unit with the limited slip differential. A twin-plate clutch is mounted at the engine side. The propellor shaft is located inside a steel reaction tube which forms a solid connection between engine and gearbox.
From the beginning of 2007, the possibility is offered to costumers to enjoy the comfort of a traditional automatic transmission in their Quattroporte. The 6-speed automatic gearbox is made by ZF and has an adaptive shift strategy. A new limited slip differential is located at the rear side while the propellor shaft is of the composed type.
The new powertrain configuration of the Quattroporte Automatic has also a certain influence on the vehicle's weight distribution, with a weight transfer from the rear to the front axle of approximately 30kg. Total weight distribution remains however nearly perfect with a slight emphasis on the rear axle.

## Quattroporte Duoselect transmission

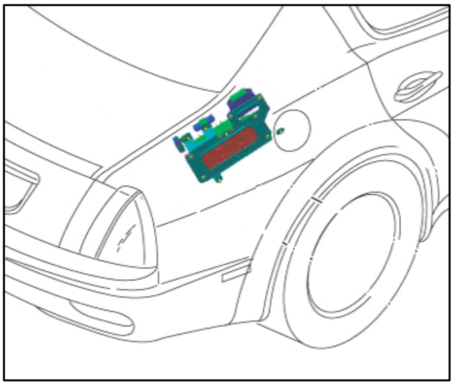
### System layout:






1. Steel reaction tube
2. Clutch housing
3. Gearbox with integrated differential
4. Power unit
5. Hydraulic shift actuator
6. High pressure lines
7. Gearbox oil cooler

**Electronic gearbox control:**



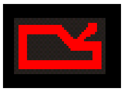
The transmission control unit (NCR – Nodo Cambio Robotizzato) is located in the trunk compartment, at the right hand side.

**CAUTION!**

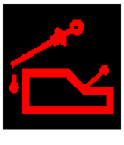
In case of replacement or software updating of engine or transmission control ECU's, always check if the correct software version is used. It is crucial that engine software and transmission software are matching. Note that transmission software is specific for various model versions, model years and markets (EU – USA). Always check the software version by means of the vehicle assembly number.
Refer to the technical publications from the Maserati SAT department to verify the correct software version.

**Indicator lights:**

The instrument cluster is fitted with following transmission-related warning lights:



The gearbox warning light is "ON" under self-test conditions and whenever an anomaly has been detected. The activation signal is sent over the CAN line.



The oil level warning light relating to the reservoir of the hydraulic circuit is not controlled by the NCR but by the imperial module (NIM). Activation passes through the CAN line.

**Duoselect operating strategies:**

**System activation**

By turning the ignition key to ON, the system will be activated and all the display segments on the information display will be activated, during which time a self-test of the system is performed. The gearbox malfunction indicator will go out after a few seconds if no anomalies were detected. The inserted gear will remain indicated on the display.

**Key ON, engine OFF**

When the engine is not running, only Neutral, 1st gear and Reverse gear can be selected. Driver requests to select other gears are ignored.

**Note:** if continuous gear changes are performed while the engine is not running, a protection strategy will be enabled which will disable further gear changes for a determined period depending on various parameters. This strategy is to prevent overheating of the electric pump and battery discharge. The rejection to perform further gear changes will be announced by the buzzer.

**Engine starting**

The engine can be started with the gearbox in neutral or in gear, always with the brake pedal depressed. The system opens the clutch, brings the gearbox in the neutral position and enables the engine control module (NCM) to activate the starter engine.

**Engine running**

Once the engine is running, the system behaves in the following way:

- When a gear is selected, the brake pedal is not depressed and the driver's door is opened, the gearbox will immediately return to neutral.
- When a gear is selected, the doors are closed and the brake pedal is not depressed, the gear will remain engaged. If no further actions are taken, the system will return to neutral after a 1 minute delay.
- When a gear is selected and the brake pedal is depressed, the gear will remain engaged for 10 minutes, after which the system will return to neutral if no further actions are taken.
- The gearbox will always return to neutral if the bonnet is opened.

**Driving away**

For driving away, the clutch has to close progressively. The engaging speed of the clutch depends on the engine speed and accelerator pedal depression speed.

**Note:** at cold temperatures, the clutch will be engaged at a higher engine speed.

**Note (2):** when taking off is continued or repeated excessively, there is a high risk of clutch overheating. The transmission control module (NCR) will detect the raise of the clutch temperature and activate the buzzer signal to warn the driver.

**Upshifting**

- Upshifts can be carried out by pulling the “Up” lever without lifting the accelerator pedal.
- Only one gearchange at a time can be performed. Wait until the gearchange operation is completed before demanding a next one.

**Downshifting**

- Downshifts can be carried out by pulling the “Down” lever.
- Only one gearchange at a time can be performed. Wait until the gearchange operation is completed before demanding a next one.

**Different gearbox operating modes**

| | Manuale | Automatica |
|---|---|---|
| Normale | x | x |
| Sport | x | x |
| Ice | x | |

The gearbox can be used in either “Manual” and “Automatic” mode, for manual or fully automatic operation. The “Sport” button enables the driver to opt between “Normal” or “Sport” operating modes. Normal mode aims to achieve the best balance between comfort, performance and fuel economy, while Sport mode adapts the gearshift strategy to maximise driving pleasure and vehicle performance.
The “Ice” button activates a specific gearshift strategy to offer maximum safety and handling on ice or low-grip road conditions.

**Note:** when both “Sport” and “Ice” modes are selected, Ice (low grip) mode has priority and the Sport mode will be cancelled.

**Normal-Manual operating mode**

In this mode the gears are selected by the driver using the gearshift paddles behind the steering wheel. The selected gear (R,N,1,2,3,4,5,6) will be indicated on the information display.
In Manual mode certain functions are still controlled automatically:

- When the vehicle is slowing down and the engine speed decreases to around 1200 RPM, the system engages automatically a lower gear to avoid under-revving of the engine.
- When the engine speed is reaching its maximum RPM with the accelerator pedal depressed (around 7200 RPM), a higher gear will be selected automatically.

**Normal-Automatic operating mode**
In this operating mode the gearshifts are performed completely automatically according to a gearshift map which is programmed in the transmission control module (NCR). The gearshift strategy is designed to offer the best compromise between driving comfort, fuel economy and vehicle performance.
In this mode, the actual gear is indicated on the information display together with the "AUTO" indicator.
**Note:** when driving in Automatic mode, gear changes can still be requested manually by using the gearshift paddles. By doing so, the gearbox will temporary return to Manual mode, during which time the "AUTO" indicator on the information display will flash for 5 seconds. After this the system returns to Automatic mode.

**Sport operating mode**
In Sport operating mode, the accent shifts towards driving pleasure and vehicle performance. This function can be selected in both Manual and Automatic driving mode and the "SPORT" indicator will be activated on the information display. Gearchanges are performed more quickly and more aggressively with respect to Normal mode. The shifting speed will also increase proportionally with throttle angle and engine speed.
When downshifts are performed at an engine speed superior to 5000 RPM, double-clutching is performed automatically to raise the engine speed before engaging a lower gear.

**Note:** in Manual-Sport mode, no automatic upshifts are performed when the engine speed reaches the maximum RPM and the accelerator pedal is depressed. The engine will remain at speed limiter revs if no manual upshifts are performed.

**Note (2):** in Manual-Sport mode, the automatic downshift function remains active to prevent under-revving.
**Note (3):** when Ice (low grip) mode is activated, the Sport and MSP OFF modes will be cancelled to give priority to driving safety.

**Ice (low grip) operating mode**

By pushing the “Ice” button, a specific gearshift strategy for low adherence conditions (rain, snow, ice,…) will be enabled and the “ICE” indication will be activated on the information display. The Ice function can be used in both Manual and Automatic driving mode and will cancel the Sport mode if it was activated. The Ice gearshift strategy operates as follows:

Downshift requests which cause an engine speed higher then 2800 RPM are ignored.

> **Note:** in Manual-Ice mode, the automatic upshift strategy is identical to that used in Manual-Normal mode. Automatic upshifts are performed when the engine reaches its maximum speed of around 7200 RPM.

**System safety**

The gear disengages:

- Immediately when the engine compartment is open;
- After 2 seconds when the door is open and the brake pedal is released;
- After 1 minute when the door is closed and the brake pedal is released;
- After 10 minutes when the door is closed and the brake pedal is depressed;

**Accoustic signals**

An accoustic warning signal will be given in the following situations:
When the reverse gear is engaged with key on and engine running.

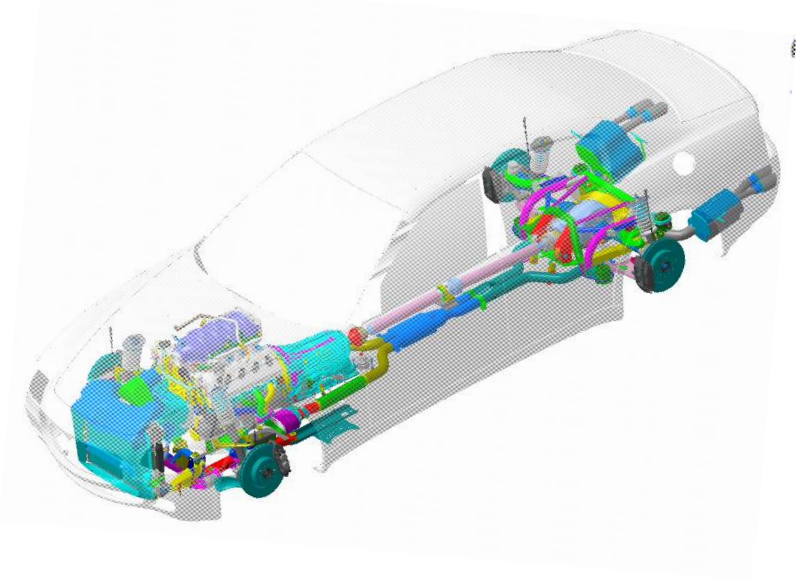
When you wish to park the vehicle in neutral (key on / neutral selected / key off).

When automatic shift to neutral is signaled in the following conditions:

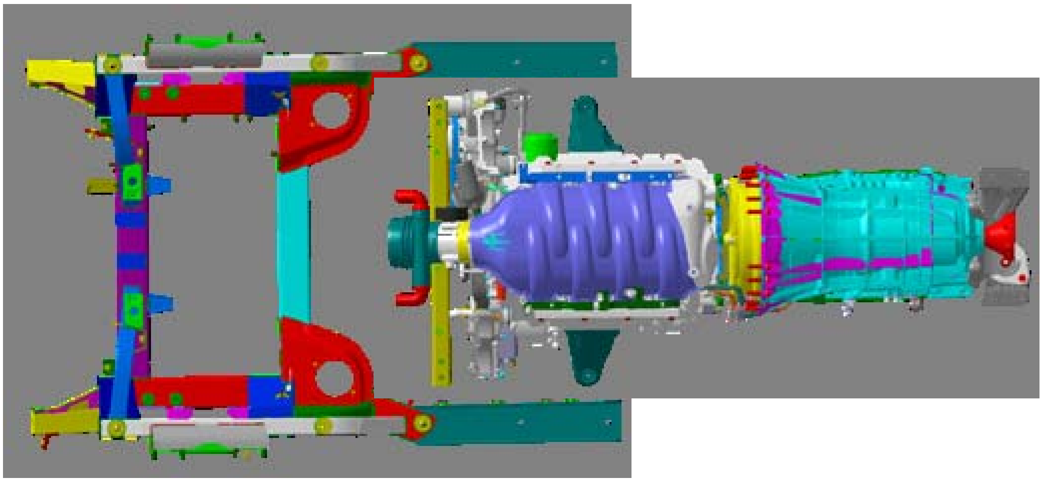
- Key on, engine running: if the accelerator and brake pedal are not pressed for at least 50 seconds.
- Key on, engine running: if the brake pedal is pressed for more than 10 minutes.
- Key on, engine running: If the door on the driver’s side is opened when the accelerator and brake pedal have not been pressed for at least 5 seconds.
- During the ignition stage: If a gearbox malfunction has been detected.

## Quattroporte automatic transmission

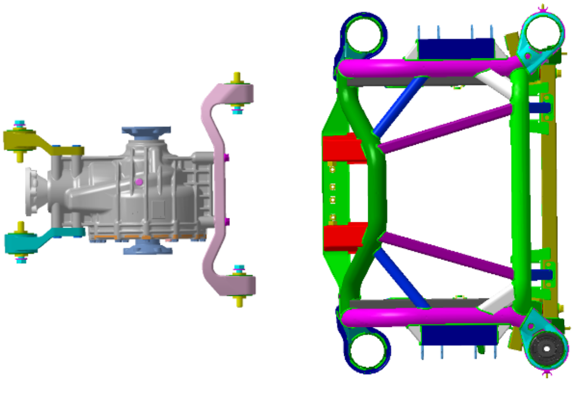
**System layout:**

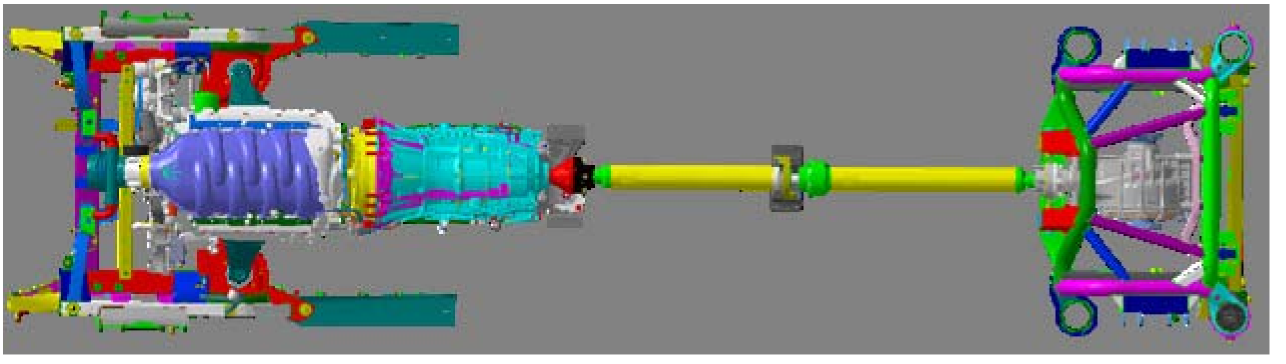


The Quattroporte Automatic uses the ZF 6HP26 6-speed gearbox with hydraulic torque converter with integrated lock-up clutch. The engine/gearbox assembly is supported by a front subframe which has been redesigned for this purpose.



The rear differential from the Quattroporte Automatic is completely new and is built by Graziano. The rear subframe has been redesigned and modified to house this new differential.





The Quattroporte Automatic has a completely new transmission shaft which is of the composed type and uses three constant-velocity joints. This solution was chosen because of a not perfect alignment between the gearbox output axis and the differential input axis. In case parts of the transmission have been removed or replaced (gearbox, transmission shaft, differential), a shaft balancing procedure must be performed. This is to avoid the appearance of vibrations inside the passenger's compartment when driving at highway speeds. See chapter 3 for more details.

**Gearshift operation:**

The automatic and electronically-controlled gearbox has six forward gears and one reverse gear, in addition to automatic gear engagement, the driver can also opt for manual gear engagement. The gearshift lever can be shifted to the following positions:

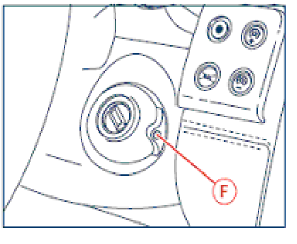
- **P** (park)
- **R** (reverse gear)
- **N** (neutral)
- **D** (drive)
- **+ / -** (Manual)

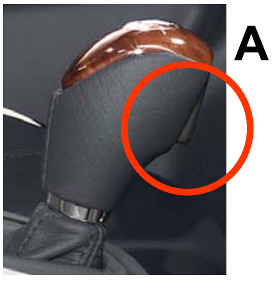

The lever position is shown on the gear display by the illumination of the corresponding letter. This letter is also shown on the instrument panel display. The engine can only be started when the gearshift lever is in P or N.

**WARNING**: After starting the engine and setting off, do not depress the accelerator pedal before and while shifting the gearshift lever. This is particularly important when the engine is cold.

**Shift-Lock**

This safety system allows you to shift from P (PARK) to another position only if the release button on the gearshift lever and the brake pedal are depressed. This prevents the vehicle from involuntarily jumping forward or backward.




**Key-Lock**

This function allows you to remove the key from the ignition switch only when the gearshift lever is in P and within a maximum time of 30 seconds; when this time has elapsed the key can no longer be removed from the ignition block. The gearshift lever can only be shifted from P when the ignition key is in MAR position and the button on the lever (**A**) and the brake pedal are depressed (Shift-Lock).

**WARNING:** In the case of an emergency, (e.g., breakdowns, battery flat, etc.) the ignition key can be removed even if the gearshift lever is not in P. To do this, turn the key to STOP, press the button F on the gearshift lever and at the same time remove the key.

**Parking**
When parking the vehicle, shift the lever to P. An integrated gearbox device will lock the rear wheels.

**WARNING**: To prevent accidental engagement, the gearshift lever can only be shifted from P to any other position when the button on the gearshift lever and the brake pedal are depressed.

**WARNING**: Shift the lever to position P only when the vehicle is stationary.

**WARNING**: Before getting out of the vehicle, check that the automatic parking brake is engaged. Shift the gearshift lever to P even when you need to get out of the vehicle for only a few seconds leaving the engine running.

**WARNING**: If you turn off the engine with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds. If the driver's door is opened with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds.

**CAUTION!**

When parking on steep slopes, it is recommended to shift the lever to PARK before leaving the vehicle (whether the engine is running or not). This is recommended since the EPB system installed in the vehicle is capable of ensuring that the vehicle is properly parked and stationary when fully laden only on a gradient up to 20%

**Automatic or Manual operating mode**
The gearbox can be used both in fully automatic (position D) and in sequential manual (positions + or -) mode. The operating modes can be activated through the following selections:

- **D** Automatic gearshifting (AUTO)
- **M** (+ / -) Sequential manual gearshifting (MANUAL)

The lever can always be shifted between these two positions even if the vehicle is moving and without depressing the brake pedal. The lever can continuously be shifted between D and M.
If automatic gearshift mode is selected, the word AUTO and the letter D will be shown on the instrument panel display, while for sequential manual gearshifting, the word MANUAL and the gear engaged will be shown.

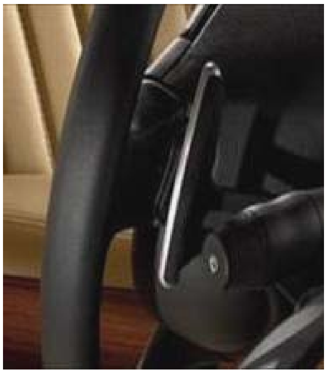
**Automatic operating mode**
Select this position when you wish to use of all the automatic gearshift functions.
With the vehicle stationary and the brake pedal depressed, shift the gearshift lever to D; if the gearshift lever is in P or R, also press the button A on the lever knob.
When the function is set, the letter D illuminates on the gear display and on the instrument panel.
With this function active, the ECU controls automatic engagement of the six gears. The gears will be engaged in relation to the travelling speed, engine RPM, accelerator position, speed with which the pedal is depressed, as well as the travelling conditions (uphill, downhill, curves).
The system is programmed to classify all driving styles related to the above mentioned parameters, matching them to ten different vehicle settings which go from extremely comfortable and fuel-economy driving to full racing-style driving. The setting is selected automatically.

**Kick-down strategy**
This strategy is activated by rapidly and fully depressing the accelerator pedal, which causes engagement of a lower gear than the current one; this function assists the driver when maximum acceleration is required. When the pedal is released, the best gear in relation to the vehicle speed and the position of the accelerator pedal is automatically engaged. The kick-down strategy can be activated only when automatic operation has been set, with the gearshift lever in position D.

**Strategies for downhill driving**
When the accelerator pedal is released and the transmission in “DRIVE” mode, the gearbox system detects that the vehicle is moving downhill and deactivates upshifting. When the accelerator pedal is depressed, upshifting is reactivated, however, with a delay of a few seconds.
When the brake pedal is depressed, the gearbox system downshifts to provide enhanced engine braking power.
In other words, when driving downhill, the gearbox system operates so as to avoid upshifting and shifting gears when the accelerator pedal is released, and delays gear engagement by a few seconds when the accelerator pedal is depressed. In addition, when the brakes are applied, it engages the lowest gear in order to provide enhanced engine braking power.
This strategy is aimed at making downhill driving safer.

**Strategies in curves**
The system detects when the vehicle goes into a curve through the lateral acceleration and the steering angle. Detecting this condition with the “DRIVE” mode selected, the system deactivates both upshifting and downshifting until the vehicle comes out of the curve. In particularly tight uphill curves the system downshifts.
Gearshifting is reactivated when the vehicle comes out of the curve at a distance that varies depending on the vehicle speed.

## Manual operating mode

To engage the gears, move the gearshift lever to the following two positions:

+ UP to engage a higher gear
- DOWN to engage a lower gear.

Gearshift paddles on the steering wheel (standard for the Sport GT, optional for other versions): in sequential manual operating mode, upshifting and downshifting can be controlled not only with the gearshift lever but also with the two levers positioned behind the steering wheel.
Also in automatic operation with the gearshift lever positioned in D (DRIVE), the driver can request a gear different from the current one by activating one of the levers. This action will temporarily switch the system to sequential manual operation. If the driver then keeps to a constant driving style (low longitudinal and lateral acceleration), the gearbox automatically switches back to automatic operation.

**WARNING**: Even if manual gearshifting mode has been activated, some functions are still controlled automatically. When the engine is overrevving or underrevving, the system automatically engages a higher or lower gear.

**WARNING**: If the driver requests a gearshift in conditions where the engine is overrevving or underrevving, the system will not accept the command.

**WARNING**: The electronic control unit is programmed to handle one gearshift at a time, therefore, fast and repeated requests will not necessarily result in a gearshift. The higher or lower gear is engaged only if the previous gearshift procedure has been completed.

## Acoustic signals

If the engine is turned off with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds.
If the driver’s door is opened with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds.
With the lever in R, the system emits an acoustic signal for a few seconds to warn anyone in the vicinity that you are about to reverse.

**Adaptive shift strategy (ASIS)**

Resulting from co-operation between ZF Getriebe GmbH, Robert Bosch GmbH and Maserati, a new software for electronic transmission control has been developped, containing a number of usefull functions. The ASIS system goes much further than a simple adaptation of the gearshift strategy on the actual uphill or downhill road gradient, as is used by most electronically-controlled automatic transmissions.
By increasing the interlinking of the transmission control with other vehicle control systems, such as engine control, brakes (ABS) and stability control, a number of signals are available that permit to describe the actual driving status.
By processing the information about lateral and longitudinal acceleration, engine speed and torque, position and movement of the accelerator pedal, steering wheel angle, turning speed of the individual wheels, oil temperature,… a conclusion can be drawn about the vehicle's load status and road topography, but also about the driving style of the driver, which is infinitely variable between very sporty (dynamic) and extremely economic driving.
These informations are applied to the transmission operation. This function is refered to as adaptive transmission control. It recognises the driver's intentions, takes note of his or her driving style and adapts its selection of gears accordingly. Manual intervention becomes thus unnecessary.
The ASIS functions can be divided in two groups:
1) Evaluation of the driving style and determination of the type of driver: ASIS contains 20 different gearshift maps (10 for Auto Normal mode and 10 for Auto Sport mode). For each driving mode the most suitable gearshift map is chosen according to the driving style.
2) Selection of the driving mode according to the driving situation, the topographical conditions and the load status: based on the calculation of the road gradient, ASIS can choose between 5 different gearshift maps (one for downhill driving, one for driving on level roads and three gradations of uphill driving). The road gradient and vehicle load status can be estimated by comparing the vehicle's actual acceleration with the theoretical acceleration given the vehicle's weight, selected gear and engine torque.
The ASIS adaptive shift strategy based on the driving style comprehends a long-term smoothing of the calculation of the driver's driving style in order to be able to select the most suitable gearshift map.

**Note:** the ASIS adaptive memory can be reset only by performing the cycle function with the SD3 diagnostic tool. This can be necessary, for example when the vehicle is sold to a new owner.

**Note (2):** the ASIS functions do not operate if the ICE mode is selected or if diagnostic or safety functions (i.e. hot mode) are active.

**Hot-mode strategy**

In the event that the transmission oil or coolant temperature or both are too high, the gearbox system reduces the maximum engine speed to 4000 RPM. For this reason, upshifting will occur at this limit.

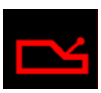
This strategy does not affect downhill driving, so as to always have the efficiency of engine braking together with the standard braking system.

**Gearbox failure**

This message, highlighted in red, indicates a gearbox system failure, therefore, if you are travelling, the ECU that controls the device sets an emergency program. In these conditions, we recommended that you stop the vehicle and turn off the engine for at least one minute. When restarting the engine, the auto-diagnostic system may cancel the malfunction, which will in any case be recorded by the ECU.

In failure conditions, the gearshift lever can however be shifted to R, N and D. When shifting to D, only a few gears will be available for shifting, depending on the malfunction found.

Automatic gearbox failure indication light:



depending on the message displayed it signals:
- a gearbox failure
- a too high temperature of the gearbox oil.

Low gearbox oil level indication light:

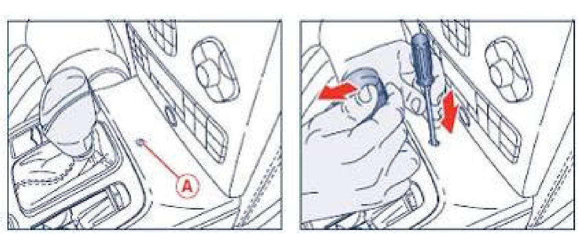
This icon indicates that the gearbox oil level is too low. If the warning light comes on, stop the vehicle. Check the gearbox oil level.

**Gearshift lever emergency release procedure**

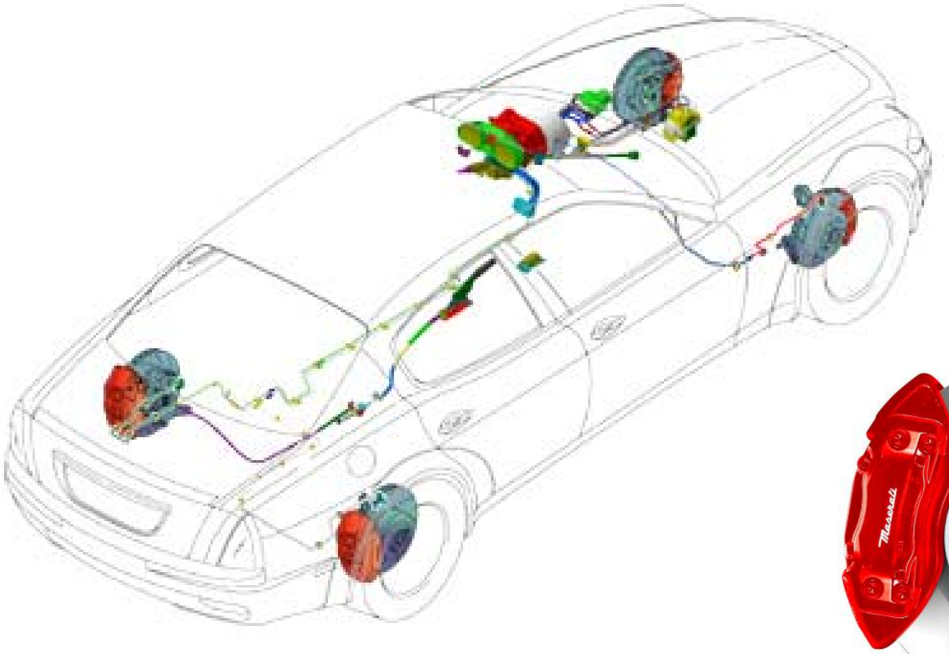
In the event of failure of the electrical power supply system with resulting dead battery, the vehicle may only be moved after the gearshift lever has been released from the P position and moved to the N position. When there is no power, the lever can only be released using the emergency procedure.

- Remove the cover (A) in front of the gearshift lever.
- Using the screwdriver contained in the toolkit, push on the release mechanism through the hole and at the same time shift the gearshift lever to N.
- The gearshift lever has now been released.

NOTE: In order to tow the vehicle, the emergency release procedure of the EPB system must also be performed.



## 4. Braking System



**Characteristics:**

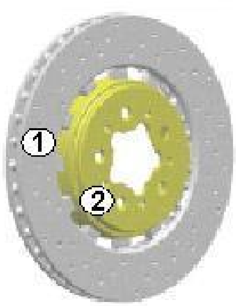
- Hydraulic brake circuit, X-separated (steel flexible brake lines on Sport GT)
- 15/16” master brake cylinder with 18+18 mm stroke
- Vacuum brake assistance Ø 8 + 9”, control ratio of 13.5
- Ventilated front discs, 330 x 32 mm (cross-drilled on Sport GT)
- Front brake calipers with 4 pistons
- Ventilated rear discs, 316 x 28 mm (cross-drilled on Sport GT)
- Rear brake calipers with 2 pistons
- Drum parking brake, integrated in rear brake discs
- ABS / stability control Bosch 5.7 containing the following functions: ABS, EBD, ASR, ESP, and MSR

**Upgrades:**

- Adaption of the new Bosch ESP 8.0 ABS / stability control system (from assembly 24275 onwards)
- upgraded rear brakes: 330 x 28 ventilated discs and 4 piston calipers (from MY07 onwards)
- Adaption of an electrically operated parking brake (EPB) for the Quattroporte Automatic.
- Adoption of the Pre Release function of the EPB system for Quattroporte Automatic for MY08 (assembly 34071 onwards)
- New revolutionary dual-cast ventilated front brake discs with increased diameter (360mm) and six piston calipers for the Quattroporte Sport GT S

**Dual-cast braking system**

For the Quattroporte Sport GT S, a new revolutionary braking system has been developed in collaboration with Brembo. This innovative technology uses dual-cast brake discs (cast iron and aluminium) for the front brakes. It is the first time such a technology has been employed on a road car.
This new technology, together with the larger disc diameter (360 mm) and new 6-piston calipers makes from the Quattroporte Sport GT S one of the fastest stopping road cars (from 100 km/h to standstill in little more than 35 m), while its reduced unsprung weight offers important benefits in terms of comfort and driving precision.
**Note:** the rear brakes are identical to those from the Quattroporte Sport GT.


1) Cast iron friction ring
2) Aluminium central part

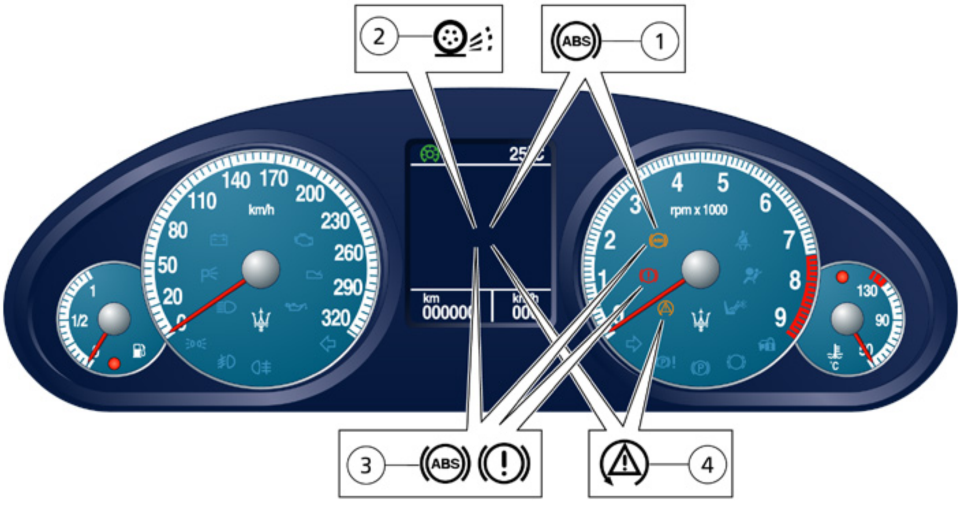
The co-cast or dual-cast floating brake disc is made of two materials, cast iron and aluminium. This new disc has many advantages: reduced weight (15% lighter), greater driving comfort, less corrosion, less wear and better brake performance.
The co-cast floating brake disc has a cast-iron braking surface and an aluminium hat: ideally combining the advantages of heat-resistance and excellent friction characteristics provided by cast iron with the lightweight properties of aluminium. The innovation is in the way the two materials have been combined to a single component, and in the behaviour of the disc during operation, functioning effectively as an integral disc at low temperatures, then as a floating disc at high temperatures, when maximum performance is needed and distortion tends to occur.
Unlike an integral disc, the co-cast brake disc presents a symmetrical braking surface, favouring a more uniform temperature distribution when the brakes are applied: this means considerably less residual deformation after the brake is released (–70%). This effectively emulates the performance capabilities of a floating disc, but without the number of components needed for a floating assembly.

**MSP (Maserati Stability Program)**

The MSP system (Bosch ABS/ESP 5.7) integrates the following functions:

- **ABS (Anti-lock Brake System):** This system prevents the wheels from locking during hard braking or braking under low adherence conditions. ABS guarantees the controllability of the vehicle under braking conditions (control of the longitudinal stability of the vehicle).
- **EBD (Electronic Brake force Distribution):** Electronic distribution of the brake force between front and rear axle.
- **ASR (Anti Slip Regulation):** Traction control. This systems prevents the driven wheels (rear wheels) from spinning during acceleration, improving traction in low-grip conditions. For this function, MSP interacts with the engine control system.
- **MSR (Motor Schleppmoment Regelung):** Electronic control of the engine brake torque under downshift conditions. This system prevents the rear wheels from locking under downshift conditions due to the high engine brake torque and thus guarantees the vehicle’s stability. Also this system interacts with the engine control system.
- **ESP (Electronic Stability Program):** This system monitors the vehicle’s stability during cornering. ESP can apply the four brakes independently to bring the vehicle back on track if a dangerous situation for the vehicle’s stability is detected (control of the lateral stability of the vehicle).
- **Hill Holder (from ABS/ESP 8.0):** this function will prevent the vehicle of moving backwards during uphill departing.

**Instruments and controls:**





1. ABS system failure warning light
2. ASR system failure warning light
3. EBD system failure warning light
4. MSP (ESP) system failure warning light

1. Sport switch
2. Low adherance switch
3. MSP off switch

**MSP operation logic:**

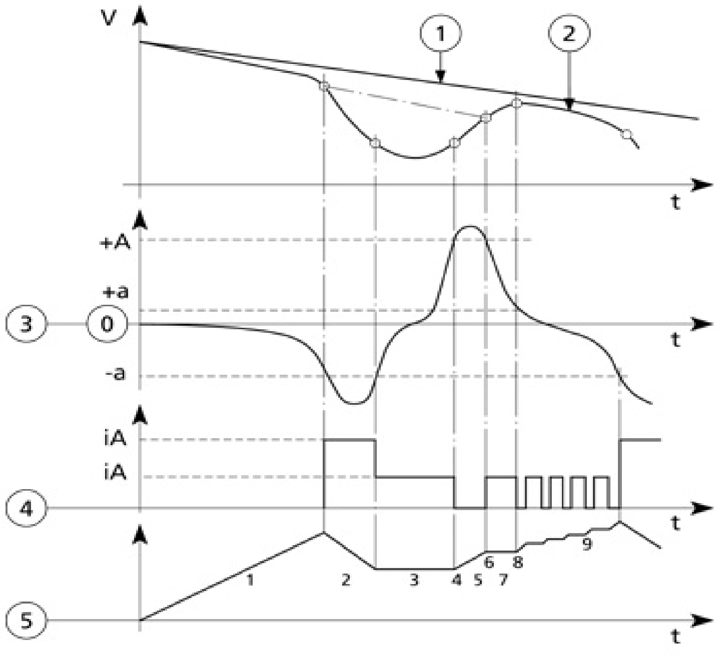
**NORMAL mode**
This mode provides maximum grip and the risks related to the most diverse driving conditions are reduced. This offers the driver an invisible "safety guard", for any driving style. If losing grip or in the event of skidding, the system operates in a targeted way braking one or more wheels, thus allowing the driver to fully control the vehicle. The operation is accurately performed without involving the driver. In this way, the vehicle will continue to move in the desired direction without taking account of the action on the accelerator pedal or the input transmitted to the braking system by the driver, whatever the road conditions.

**SPORT mode**
This is the second option provided by the management system. When this mode is set, the system will continue to provide the driver with an electronic protection system that is capable of correcting possible critical situations, but at the same time it will offer more demanding drivers enhanced driving freedom. For example, the vehicle is allowed to slide sideways until reaching an angle of six degrees so as to offer the driver a sufficient handling margin to express his vehicle control skills. This mode also offers the driver the opportunity to explore the limits of the vehicle in full safety.

**MSP OFF mode**
If the vehicle is driven under "extreme" conditions, the ESP, ASR and MSR systems can be fully deactivated by the driver. The vehicle will perform without any safety system and the driver will have to rely only on the vehicle and his driving skills for particularly exciting driving. Even if the control system is deactivated, ABS and EBD will remain active to prevent wheels from locking.
MSP OFF is also the applicable driving mode in case snow chains are installed.

**Low Adherance mode (ICE)**
This mode can be used on particularly slippery road surfaces (e.g., snow, ice) and it is activated/deactivated by pressing the button on the NIT. The word ICE will illuminate on the instrument panel display. In “Low-grip" mode the system uses 2nd instead of 1st gear. This means that when y start from a stationary position with the engine running - both in automatic mode and manual mode - the vehicle will start in 2nd gear. When sequential manual mode is selected with 2nd gear engaged, a downshift request will be ignored. While driving, the system automatically switches to the upper gear if the engine reaches the pre-established speed rate (3,000 RPM). “Low-grip" mode has priority over SPORT mode and assists the MSP system.
If “ICE” mode is activated when “SPORT” mode is active, during the transition stage it may happen that both the “ICE” and the “SPORT” messages are present on the CAN line. In this case, the system will give priority to the “ICE” message, immediately showing it on the display.

**ABS operating principle**



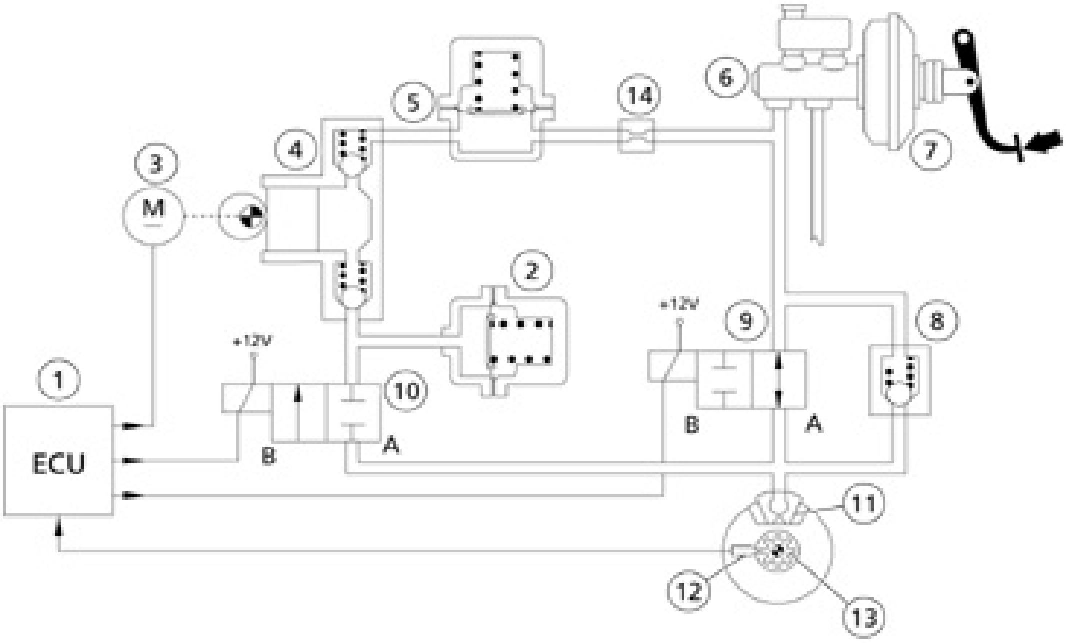

1. Vehicle speed
2. Wheel speed during braking
3. Wheel acceleration
4. Solenoid valve current
5. Pressure in the braking wheel's hydraulic circuit

Stage 1) Wheel deceleration nearing limit: locking risk (-a )
Stage 2) Circuit pressure reduction: brake force reduction, wheel deceleration reduction
Stage 3) Pressure maintenance: wheel speed decreases, then rises again
Stage 4) Pressure increase: wheel acceleration to value + A
Stage 6) Peripheral acceleration reduction
Stage 7) Maintenance
Stage 8) Pressure increase: wheel acceleration +a, vehicle and wheel speeds similar
Stage 9) Maximum pressure: maximum brake force

Operation speed: From 4 to 10 adjustments are carried out every second, depending on the friction conditions. Processing takes just a few milliseconds.

**CAUTION!**

Performance of the ABS system is strongly affected by the condition of the wheel/tyre assembly. For the correct operation of the system it is of most importance that the vehicle is fitted with rims, tyres and brake pads approved by the manufacturer and in perfect working order.




There are two solenoid valves for each circuit branch:

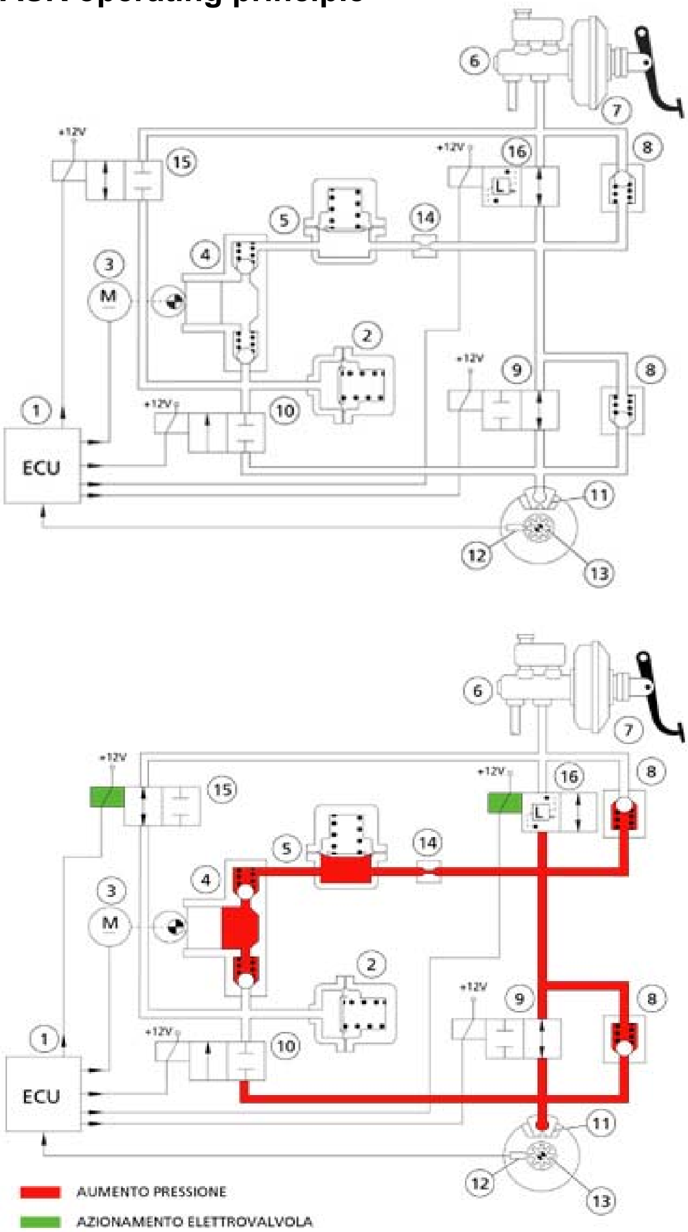
Inlet solenoid valve (9):
0 Volt = Open = Pressure on caliper
12Volt = Closed = Maintenance

Outlet solenoid valve (10):
0 Volt = Closed = No Pressure Relief
12Volt = Open = Pressure Relief
On Low Pressure Accumulator 2

Scavenge pump (4) delivers oil back to brake master cylinder high pressure accumulator (5)

**1** ECU
**2** Low pressure accumulator (tank)
**3** Scavenge pump control motor
**4** Scavenge pump
**5** High pressure accumulator (damping chamber)
**6** Brake control master cylinder
**7** Brake servo
**8** Fast pressure reduction valve
**9** Inlet solenoid valve
**10** Outlet solenoid valve
**11** Brake calliper
**12** Rpm sensor
**13** Toothed wheel
**14** Restraint

## ASR operating principle




1. ECU
2. Low pressure accumulator (reservoir)
3. Scavenge pump control motor
4. Scavenge pump
5. High pressure accumulator (damping chamber)
6. Brake control master cylinder
7. Brake servo
8. Pressure fast reduction valve
9. Inlet solenoid valve
10. Outlet solenoid valve
11. Brake caliper
12. Rpm sensor
13. Toothed wheel
14. Restraint
15. Intake solenoid valve
16. Control solenoid valve

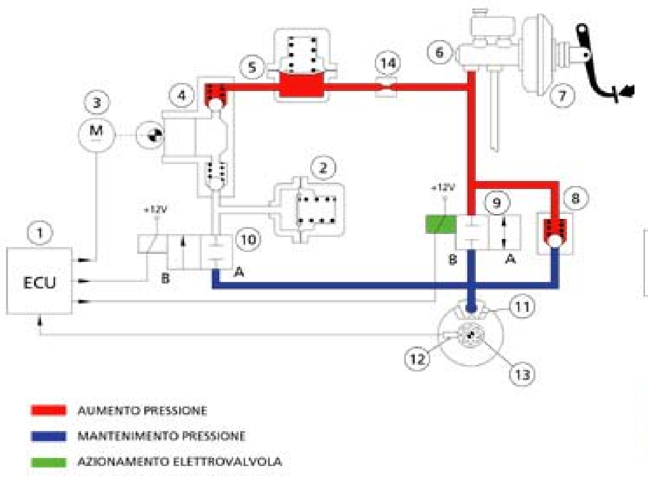
The purpose of ASR is to maintain traction (and thus guarantee the longitudinal stability of the vehicle) when the driven wheels have the intention of skidding. This is usefull while curving (dynamic load transfer between both driven wheels), when excessive engine torque is transmitted to the wheels or in situations of low adherance. When skidding occurs, ASR manages the following operations:

- **1° step: applying the brake(s) of the skidding wheel(s)**
- **2° step: reduction of torque delivered from engine:**
  - Reduction of spark advancing
  - Reduction of throttle valve opening and injection duration

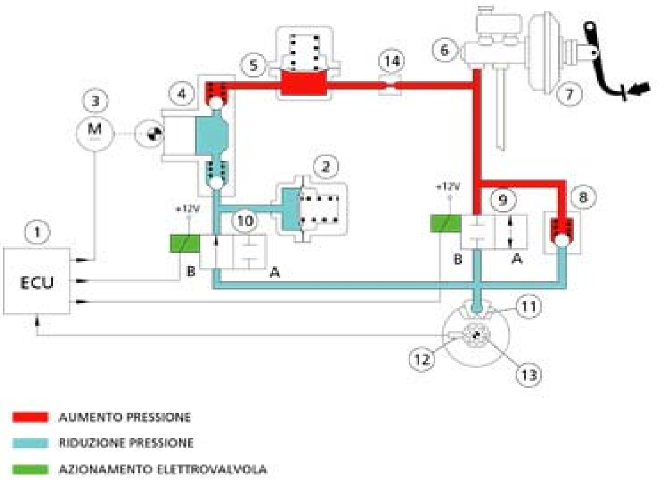
**Note:** The threshold of intervention of the ASR system is set at a higher level when the vehicle is driven in Sport mode.

## EBD operating principle

EBD reduces the hydraulic pressure on the rear brake circuit when excessive deceleration of the rear wheels is detected.




Pressure maintenance stage




Pressure reduction stage

## MSP (stability control) operating principle

This system monitors the vehicle's stability during cornering. ESP can apply the four brakes independently to bring the vehicle back on track if a dangerous situation for the vehicle's stability is detected (control of the lateral stability of the vehicle). Besides applying the brakes, MSP can also temporary deactivate automatic gearshifting in order not to compromise the vehicle's stability in emergency situations.

The MSP ECU processes the following signals:

- steering angle, steering wheel rotation (steering angle sensor is located on the steering column)
- lateral acceleration and yaw (a combined lateral acceleration / yaw rate sensor is located on the central tunnel, near the vehicle's centre of gravity.
- throttle valve position
- Rotation speed of each wheel
- hydraulic brake system pressure (pressure sensor integrated in HU)

**Note:** For both steering angle sensor / lateral acceleration and yaw rate sensor, a calibration procedure is required after replacement.

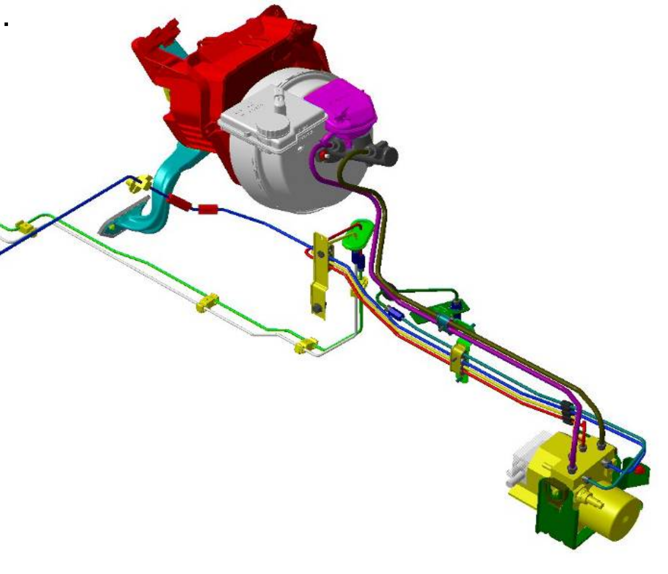
The MSP system with its integrated functions (ABS, EBD, ASR, MSR, ESP) is designed as a safety net only to secure the vehicle's stability in emergency conditions. Thanks to the Quattroporte's well-balanced chassis, ideal weight distribution and limited slip differential, MSP does not have to intervent under normal driving conditions. This is one of the aspects that make from the Quattroporte a superior driving machine amongst the luxury saloons.

**Bosch ABS/ESP 8.0**

From assembly number 24275 onwards, a new generation of the integrated ABS/stability control system was adopted to replace the current Bosch ABS 5.7 system. The Bosch ABS 8.0 system integrates the following functions: ABS, EBD, ASR, MSR, ESP and Hill Holder. The various operation strategies of the system have remained unchanged. The only difference from the costumer’s point of view is improved comfort during ABS/EBD intervention thanks to a more refined system operation.

Modifications with respect to Bosch ABS 5.7 system:

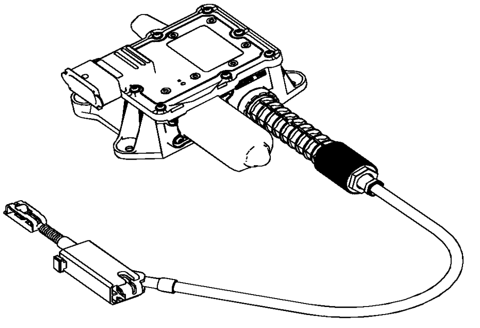
- Basic functions have remained identical
- Reduced weight by 25%: from 3 kg to 2,2 kg
- Reduced dimensions by 30%: from 2,5 l to 1,6 l
- Possibility to upload software updates.
- Improved noise behaviour on account of new inlet valves and pump motor speed control.
- Control of system pressure in ASR or ESP operation by PWM control of the electro-valve and failsafe monitoring.
- Submersible HU due to tight accumulator design and sealed motor.
- Improved performance of integrated ECU.
- Introduction of the Hill Holder function.

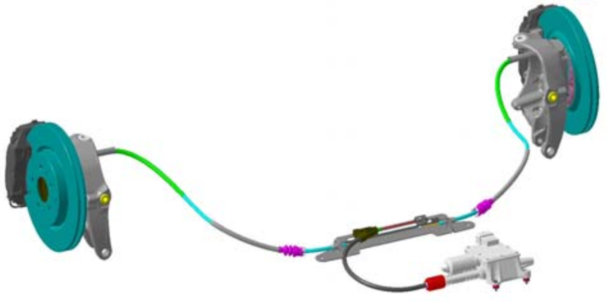


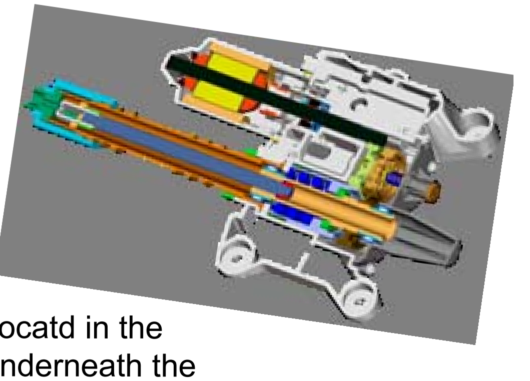
**Electric Parking Brake (EPB)**
With the introduction of the Quattroporte Automatic, a new, electrically-operated parking brake was introduced.

**EPB system overview:**
The system consists of the following components:

- Electro-mechanic EPB actuator with integrated ECU
- Drum parking brakes, integrated in the rear brake discs
- Brake cables and divider
- EPB activation lever
- EPB Off switch
- Emergency release tool
- Parking brake warning light







The EPB actuator is locatd in the trunk compartment, underneath the trunk floor.

EPB activation lever

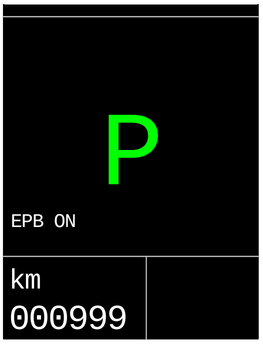


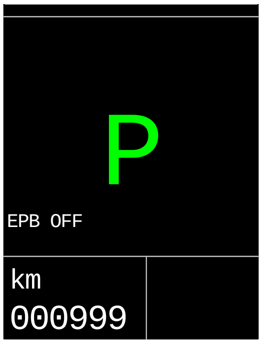
EPB Off switch

**EPB operating strategies:**

**Assisted parking brake**
The parking brake can be engaged and disengaged when the vehicle is stationary by pressing the EPB activation button on the centre console. To ensure activation of the EPB system, pull and hold the lever positioned on the gearshift lever console for about 2 seconds. The system can be deactivated by holding the brake pedal depressed and pulling the lever

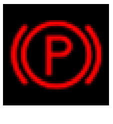
**Automatic parking brake**
Automatic parking brake engagement when the vehicle is stationary and the key is turned OFF (default condition); this function can be disabled by the EPB OFF switch on the central console before turning the key to OFF.
The PARK OFF switch positioned on the central console must be pressed before switching off the engine to prevent automatic activation of the EPB. The message PARK OFF is displayed on the instrument panel. The system is disabled only for next key-off action, and when the engine is next started the default status is reset.




When the electric parking brake is engaged, the specific warning light comes on. The EPB activation status is displayed on the instrument panel in the display area (EPB ON or EPB OFF).

When the EPB is engaged, the parking brake warning light is on.




**Parking brake warning light (EU, Japan specifications)**

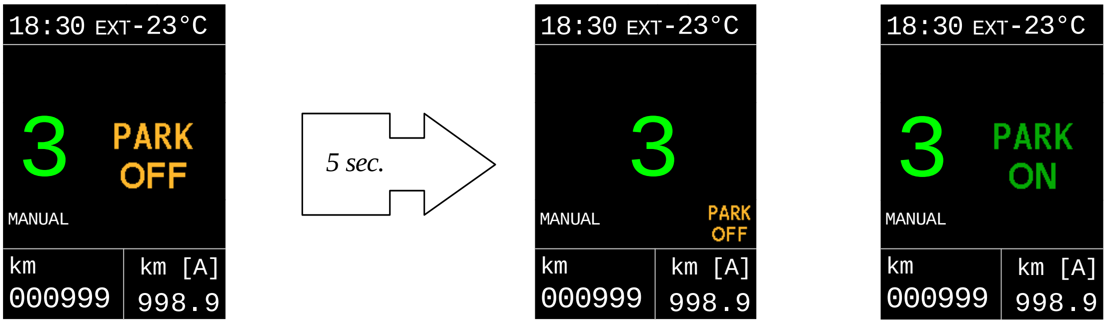

**Parking brake warning light (US specifications)**

**Key-ON conditions**

The parking brake is always active by default (PARK ON) and is not displayed on the instrument panel.

When pressing the PARK OFF switch, the PARK OFF message is displayed on the multifunctional display for 5 seconds.

Subsequently, if the PARK OFF switch is pressed again, the PARK OFF message disappears and is replaced with the message PARK ON, which is displayed for 5 seconds and then disappears.




**Key-OFF conditions**

When turning the key from ON to OFF, the EPB activation status is displayed on the instrument panel, regardless of whether PARK ON or PARK OFF has been set. If the engine is turned off when the PARK OFF function is active, the EPB function can be reactivated by commanding the EPB activation switch. The new strategy suggested will be shown on the display as EPB ON.

**Drive away**

Automatic parking brake disengagement during acceleration (accelerator pedal angle >3%), always active.

**Pre Release (from MY08 onwards)**

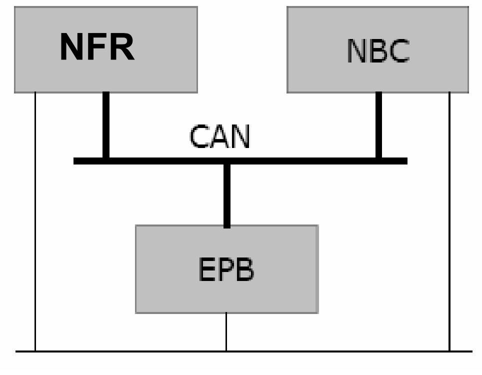
**Dynamic brake**

Dynamic braking (while the vehicle is moving) is controlled by the ABS/VDC system until the vehicle is stopped,

Keeping the EPB button active. In these conditions braking is controlled through the four brake calipers. When the vehicle has come to a stop, the parking brake is automatically engaged.

## EPB control logic

It must be possible to activate (but not deactivate) the parking brake also when the engine is off and for this reason, a specific power management strategy has been introduced. The EPB is connected to the C-CAN line for communication with other control modules and for diagnosis.

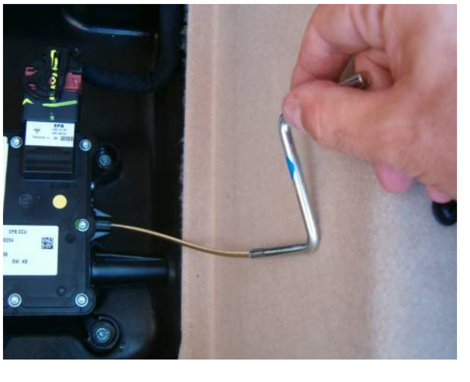



With the EPB, the ABS/VDC unit (NFR) is the system master and the EPB unit the slave. Therefore, it is the ABS/VDC unit that determines when and how to activate/deactivate the parking brake depending on the driving speed and the surrounding conditions (e.g., slope, engine on/off, engine power delivered, etc.).

## EPB emergency release procedure

If the EPB has jammed (complete system failure, dead battery,…) a special tool is required to manually release the parking brake cables. This tool can be found in the tool kit, delivered with the vehicle. A small opening can be found in the wall behind the driver's seat. To release the EPB, insert the tool in the tube and turn clockwise until the parking brake cables are fully released.

**Note:** after having performed the emergency release, the EPB system has to be calibrated with SD3. Therefore the vehicle has to enter an authorised service point.



**EPB SD3 functions:**

**Control cable release**
If replacing one or more components of the EPB system (control cables, brake shoes, etc.) the cable tension must be slackened until fully releasing the cables: this will allow you to remove the different parts.

**Actuator calibration**
Calibration is an operation whereby the nominal operating position of the ECU is set. In brief, the ECU pulls the cables until the nominal tension is attained, determining the zero position in the actuator stroke. This operation is absolutely essential after having removed or replaced components of the EPB system or after performing the emergency release procedure.

**EPB function for cable running-in function (Cable Bedding)**
If one or both the system cables are replaced, a running-in procedure must be performed using the SD3 tester. This procedure, which repeatedly tensions the cables in 5 different steps, allows the system to reach maximum operating efficiency, preventing residual elastic effects during the operating phases.

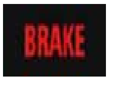
**EPB running-in function (Garage Braking)**
This function enables a running-in procedure of the parking brake shoes, to be performed after the rear brakes have been replaced.

**EPB system failure**

The electric parking brake failure information is sent to the instrument cluster via a signal from the B-CAN line. In these conditions, the “EPB failure” warning light comes on (for all markets except the USA where the BRAKE warning light is used) and at the same time a “Parking brake failure” message is shown on the display. This specific message is accompanied by an acoustic warning.

In case of a ABS/VDC system failure, also the EPB functioning will be disabled, this because the EPB unit is controlled by the ABS/VDC unit.

EPB failure light




EPB failure light
(US specifications)

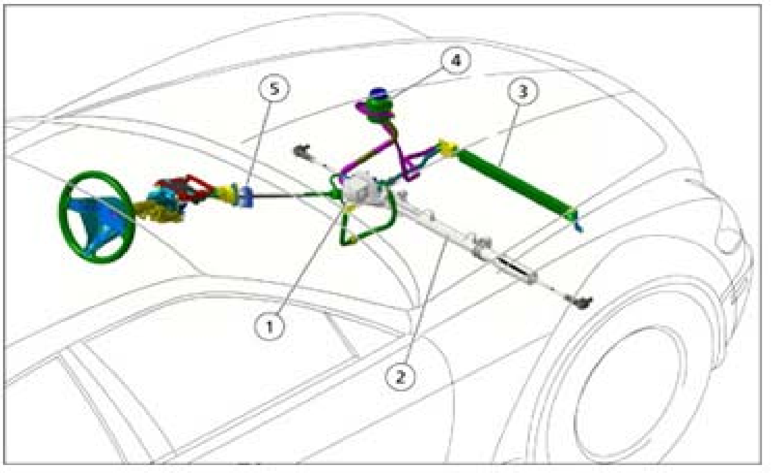
**CAUTION!**

when performing the emergency release procedure, a specific DTC will be stored in the EPB unit, indicating the mechanical release of the EPB. If afterwards the vehicle is driven and thus the EPB intents to operate, another DTC will be stored indicating the non-calibrated status of the EPB actuator.

In this case the EPB has to be mechanically released again, followed by the calibration procedure with SD3. Afterwards DTCs have to be deleted.

**Note:** in particular conditions where the battery voltage is low, the electric parking brake system may temporarily be deactivated. Therefore, typically upon starting the engine, when the battery voltage is reduced, the message PARK OFF may be temporarily displayed, indicating that automatic operation is momentarily disabled.

## 5. Driving Controls

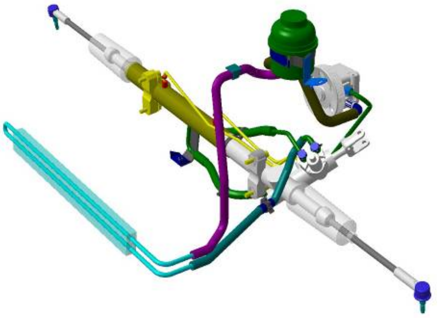


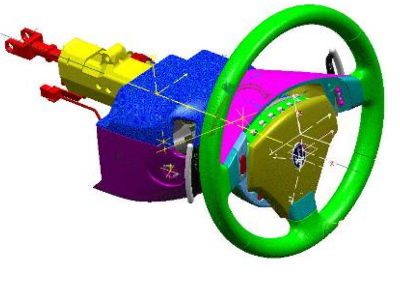

1. Hydraulic steering pump
2. Steering rack
3. Cooling radiator
4. Hydraulic fluid reservoir
5. Steering angle sensor

The Quattroporte is fitted with rack and pinion steering system made by TRW. The hydraulic power steering is vehicle speed sensitive. An electro-valve located on the steering rack variates the degree of powering by controlling the hydraulic flow. This electro-valve is controlled by the CSG unit (Centralina Servo Guida) and based on the vehicle driving speed. By this way the steering feel and the neeeded steering force are always in accordance with the driving conditions.

**Specifications:**

- Colapsible, electrically adjustable steering column with easy entry function
- Steering angle sensor located on steering column (for MSP)
- Speed sensitive power steering
- Belt drive hydraulic power steering pump
- Hydraulic steering fluid radiator
- Minimum steering diameter: 12,3 m
- Steering rack ratio: 60 mm / revolution
- Steering rack stroke: 200 mm
- Hydraulic fluid:

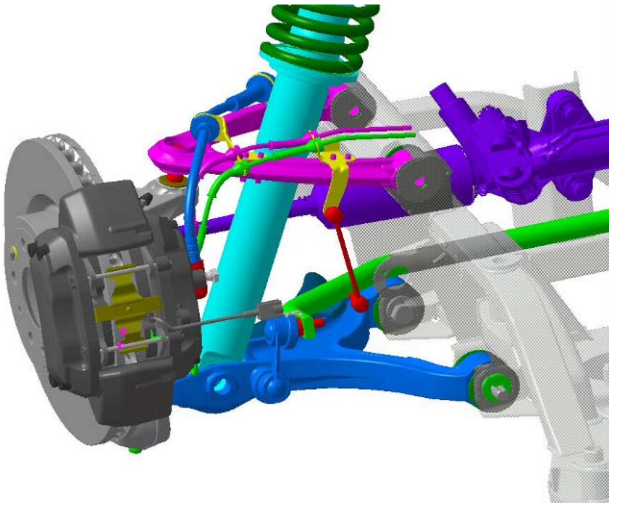




**Note:** for MY07 and Quattroporte Automatic, a new steering rack was introduced with new control valve with a larger number of internal grooves for greater driving accuracy and enhanced filtering of road bumps.

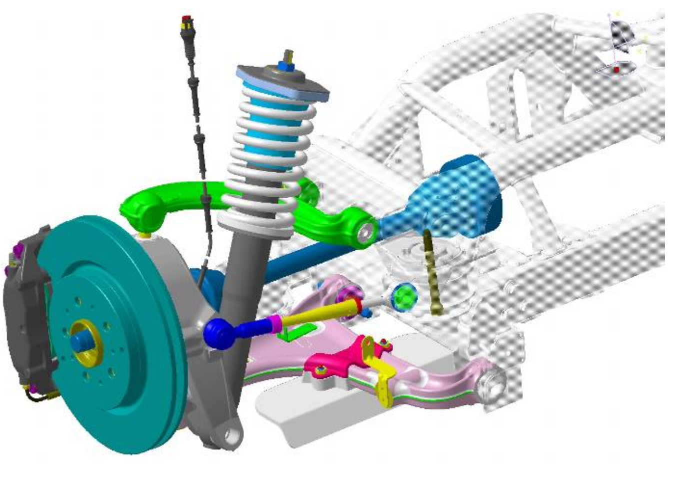
# 6. Suspensions and Wheels

### Front suspension



- Articulated quadrilateral independent wheel suspension with double oscillating triangle
- Anti-dive and anti-squat geometry
- Forged aluminium levers, aluminium hub carrier
- 25 mm ø articulated stabilizer bar on ball joints
- Aluminium hydraulic shock absorbers with Skyhook variable damping control
- Suspension mounted on a separate frame rigidly connected to the bodywork

### Rear suspension



- Articulated quadrilateral rear independent wheel suspension with double oscillating triangle
- Anti-dive and anti-squat geometry
- Forged aluminium levers, aluminium hub carrier
- 24 mm ø articulated stabilizer bar on ball joints
- Aluminium hydraulic shock absorbers with Skyhook variable damping control
- Suspension mounted on a separate frame rigidly connected to the bodywork

With the introduction of MY07 and Quattroporte Automatic, a number of modifications were adopted to improve the driving comfort and stability:

- The upper levers of the front suspension have been modified in the connection area to the chassis in order to house a larger bushing, using a softer and radially asymmetrical rubber, so as to allow the wheel centre to move further backward in the event of longitudinal impact (basically, the upper lever turns during opening on longitudinal impact).

- The fixing points of the rear toe-in control links has been slightly modified in order to reduce toe-in variations caused by vertical wheel movements

**Quattroporte Automatic:**
On top of the modifications described above, the shock absorber calibrations for the Quattroporte Automatic have been modified to enhance driving comfort and adopt to the different weight distribution of the vehicle.

### Tyre pressure monitoring system (Optional)

The Quattroporte can be optionally fitted with a Tyre Pressure Monitoring System or TPMS (standard for Sport GT and Sport GT S). The system consists of a TPMS control module (NTP) located in the drivers side floor area which receives information related to the tyre pressure and tyre temperature from 4 antennas located in the wheel arch areas. The 4 antennas receive data sent by the sensors which are integrated in the wheel valves. Each sensor has its own ID code, which is sent together with pressure and temperature related data using radio waves. The NTP sends information related to the TPMS to the instrument cluster (NQS) over the B-CAN line.


TRIP button: push this button to display the tyre pressure information for 10 seconds.

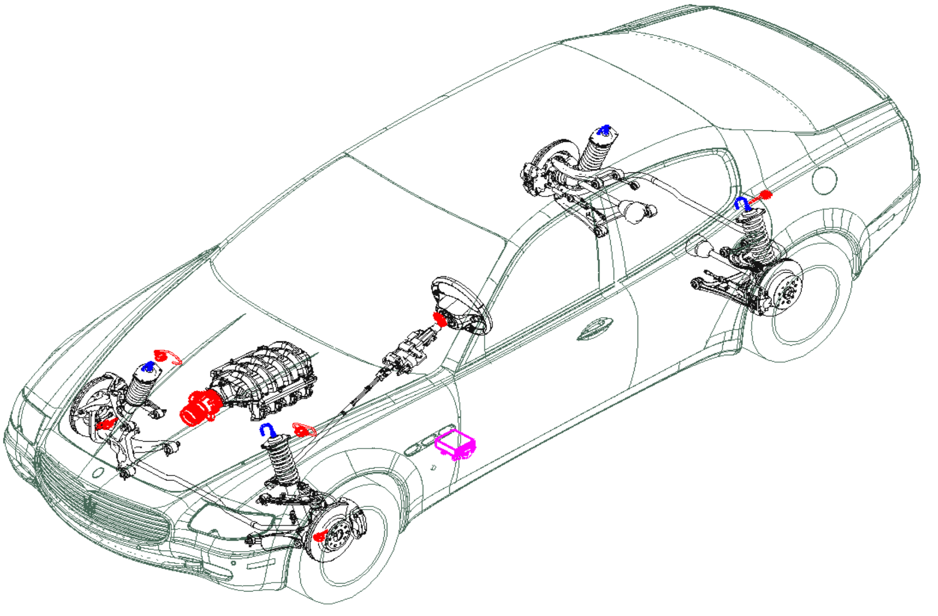
Information displayed :

- System temporarily inactive (for example : external radio interference)
- System not calibrated (for example : a tyre has been replaced )
- System failure
- System not active (if it is disabled by the diagnostics system)
- Low pressure or puncture in front LH, front RH tyres or rear LH and RH tyres
- Low pressure or puncture in unidentified tyre

**System Calibration**

After replacing or inflating one or more tyres, the system must be calibrated. This condition will be indicated on the information display by a message and the TPMS indicator light. To calibrate the system, press and hold the calibration button, located near the front ceiling light, for a time ranging between 4 and 10 seconds. The system takes a maximum of 20 minutes to complete the calibration procedure with the vehicle in motion, during which the message "Calibration started" will appear on the information display. If the user recalls the information page showing the pressure levels of each tyre, dashes "–.–" will be viewed in the place of the status.

**Skyhook suspension**



The Maserati Quattroporte is equipped with Skyhook continuous varible damping control. This system adapts the damping rate of the shock absorbers in function of the driving style and the road conditions.

An ECU controls solenoid valves inside the shock absorbers based on the signals from various sensors and informations received from other vehicle systems (received by CAN line). Skyhook monitors in continuation the vertical acceleration of both the vehicle body and the wheels by means of specific sensors.

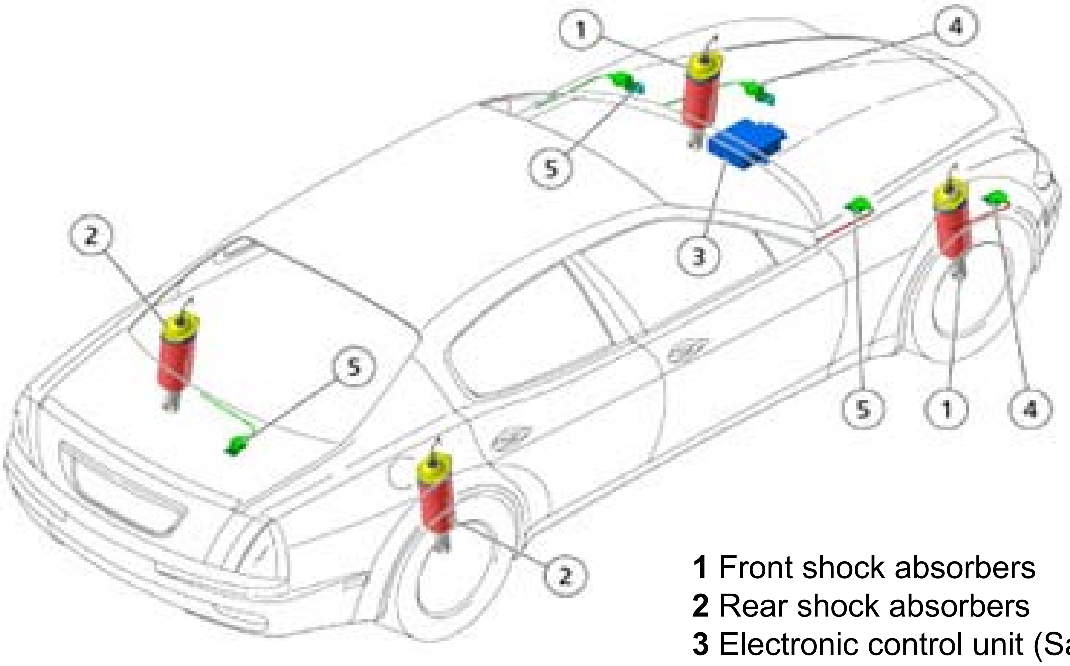
By calculating the relative body/wheels speed, it modifies the damping force of each wheel in terms of compression and extension to curb the absolute motion of the vehicle body in a vertical direction, as if the body were hooked up to the sky with a shock absorber.

With respect to a conventional system, Skyhook offers superior damping comfort while body roll and pitch angles during dynamic driving are reduced.

**Notes:**

- The Skyhook damping setting is affected by the selected driving mode (Normal / Sport). In Sport mode, the emphasis lies on the driving precision and the reduction of body roll and pitch angles, while in Normal mode precedence is given to comfort.
- The Skyhook control software for the Quattroporte Sport GT is specific, in order to offer a more firm ride and higer driving accuracy.
- The Skyhook control software for the Quattroporte Automatic is specific to meet the changed weight distribution of the vehicle, in order to maintain a balanced setup.
- Skyhook suspension is not available on the Maserati Quattroporte Sport GT S

**Skyhook system layout**

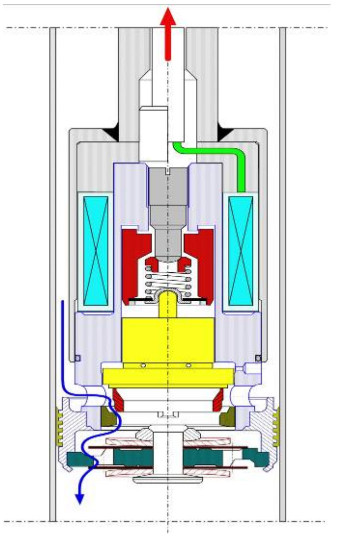



**1** Front shock absorbers
**2** Rear shock absorbers
**3** Electronic control unit (Sachs)
**4** Front wheel acceleration sensors
**5** Body vertical acceleration sensors

The Skyhook system is the result of a cooperation between Maserati and Sachs and consists of the following components:

- 4 telescopic shock absorbers with integrated CDC (Continuous Damping Control) valve
- Electronic control unit (NCS – Nodo Controllo Sospensioni), located in the left hand side floor area and connected to the C-CAN line
- Two front wheel vertical acceleration sensors, mounted on the front hub carriers
- Two front body vertical acceleration sensors, mounted on the body close to the front suspension struts.
- One rear body vertical acceleration sensor, mounted on the rear cross member.

Each shock absorber has an integrated solenoid valve which is commanded by the Skyhook ECU (NCS). The value of the current passing through the solenoid valves changes the opening of a calibrated orifice through which the damping fluid flows, thereby defining the damping factor and thus the shock absorber setting.



## Vehicle geometry

| Geometry | Front | Rear |
|---|---|---|
| Tyres | 245/45 R18 | 285/40 R18 |
| | 245/40ZR 19 | 285/35ZR 19 |
| | 245/35 ZR20 | 285/30 ZR20 |
| Rims | 8.5 x 18” ET52 | 10.5 x 18” ET50.5 |
| | 8.5”J x 19” | 10.5”J x 19” |
| | 8,5" J x 20" | 10,5" J x 20" |
| Camber | -0°30’ +/- 0°10’ | -1°30’ +/- 0°10’ |
| Toe-in | -2.0 +/- 0.4mm | +4.0 +/- 0.4mm |
| Caster | +3°48’ +/- 0°20’ | - |
| Heigt | 173+10/-5mm | 159+10/-5mm |
| Track | 1587mm | 1569.6mm |
| weight | 983 kg | 1136 kg |
| Steering angle | Int. 34.0° / ext.40.8° | - |

When adjusting the vehicle’s wheel alignment, follow the sequence as indicated below:

**Ride height (front and rear)**

**Camber rear**

**Toe in rear**

**Caster front**

**Camber front**

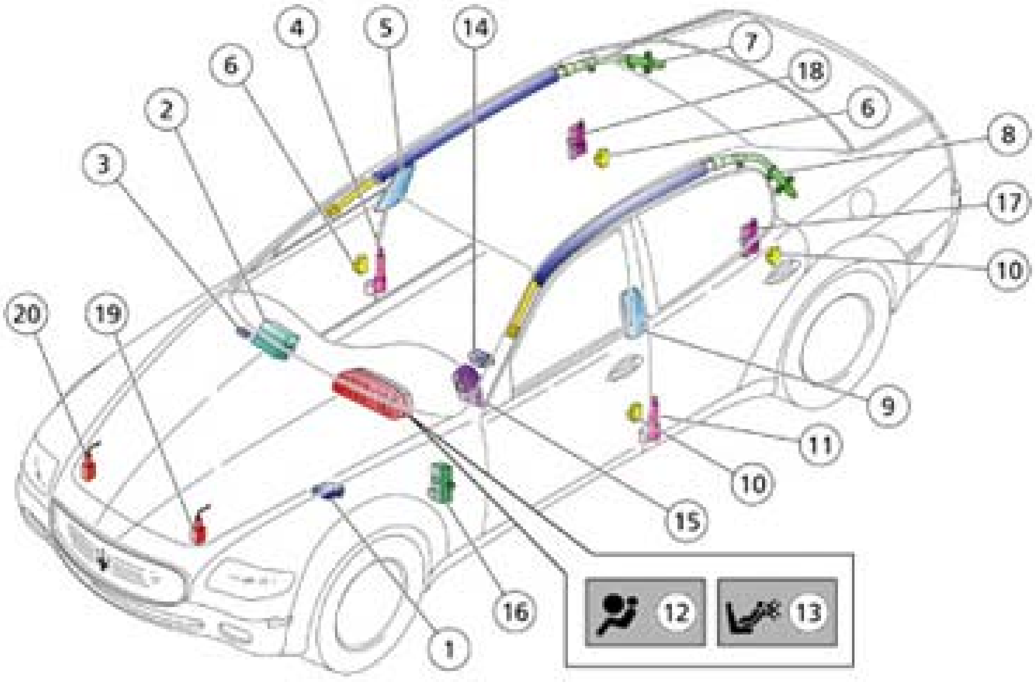
**Toe in front**

**Caution**

- The vehicle’s geometry must be verified during “static load” configuration, that is, with all the fluids on level tanks, the fuel tank full (90 litres) and 75 kg on each front seats.
- When verifying the vehicles geometry, it’s of most importance that the tyres are at the correct pressure and all components related to the wheel suspension are in good condition, without broken or deformed parts.
- See the workshop manual for more details and reference images.

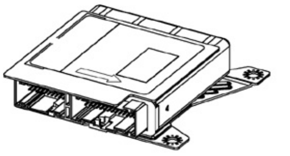
## 7. Safety Components

The Maserati Quattroporte is equipped with two dual-stage front airbags, two side airbags integrated in the front seats, two window bags and pretensioners for all 4 seatbelts.
The system is operated by a central ECU which calculates both the severity and the angle of an impact on the basis of one internal deceleration sensor and six external crash zone sensors.

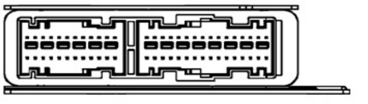



**1** Electronic control unit
**2** Passenger airbag module
**3** Key-operated cut-out switch
for front airbag on passenger side
(not for USA and Japan versions)
**4** Passenger side pretensioner
**5** Passenger sidebag module
**6** Right-hand side impact satellite sensor
**7** Passenger's windowbag module
**8** Driver's windowbag module
**9** Driver's sidebag module
**10** Left-hand side impact satellite sensor
**11** Driver's pretensioner
**12** Airbag system malfunction indicator
**13** passenger’s airbag deactivation
warning light
**14** Driver's airbag module
**15** Clock Spring
**16** Diagnostics socket
**17** Rear left-hand pretensioner
**18** Rear right-hand pretensioner
**19** Front Crash Zone Sensor (left)
**20** Front Crash Zone Sensor (right)

**Airbag control unit**



The airbag ECU (NAB – Nodo AirBag) manages the entire system, monitoring all its components. It is connected to the B-CAN line for diagnostics.
The ECU is fixed, rigidly, to the casing underneath the vehicle's central console, near the vehicle's centre of gravity, this is necessary for the correct operation of the integrated deceleration sensor.
Software is specific for USA versions with Advanced Weight Sensing system.



To guarantee the correct system management the ECU has a number of safety devices:

- Energy storage: the ECU can operate for a few fractions of a second even in the event of a power failure or voltage drop.
- Earth fastening check: The ECU checks the electric contact between the bodywork and the ECU.
- Fault memory: The ECU checks the circuit functions and all the system's electric parts, signalling the presence of faults by activating the "Airbag system fault" warning light on the instrument panel and memorising the relative error code.
- Crash memory: The ECU records information relating to impact situations which are followed by the activation of the pretensioners and the front or side airbag modules.

**System operation:**

**Front impact**:
Comparison of the front sensors' deceleration signal with the signal from the ECU's integrated sensor.
In accordance with the severity of the impact measured. If the passengers are not wearing their seat belts, the airbags' intervention threshold is altered, taking this into account.
N.B : The front airbags are dual stage airbags (they can be activated in two different ways).

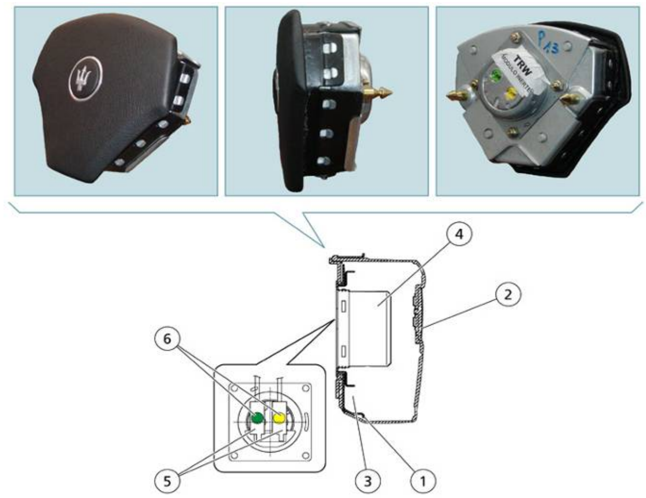
**Side impact**:
Comparison of the side sensors' deceleration signal with the signal from the ECU's accelerometer. Depending on the severity of the impact measured and the direction of the impact, the ECU controls the activation of the safety components on the side concerned.

## Driver’s front airbag module

The module is composed of:

- a plastic cover with a leather finish
- a woven nylon bag, with a volume of approximately 60 litres
- a dual-stage hybrid gas generator
- an external housing

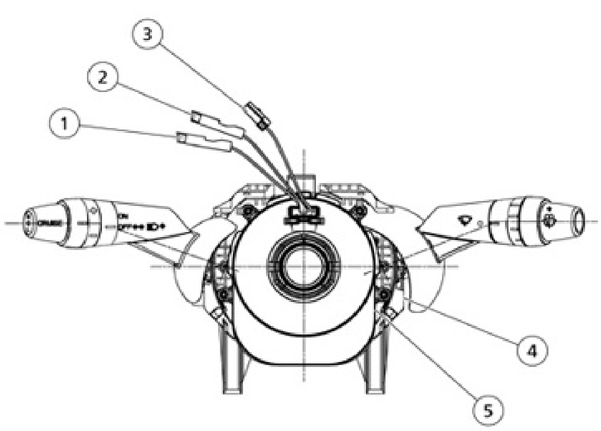
Operation:
depending on the intensity of the impact, the ECU determines both the activation of the first stage, and the delay before the second is implemented, so optimizing the bag inflation force.
Thanks to the permeability of its fabric, the airbag is deflated in tenths of a second.



**1** Fastening bracket
**2** Cover
**3** Folded bag
**4** Gas generator
**5** Warning plate
**6** Connectors with safety lock

## Clock spring

The clock spring has three cables on the steering wheel side, two of which are used to connect the airbag module (first and second stage) and one for the connection to the steering wheel's electrical functions (horn, radio controls).

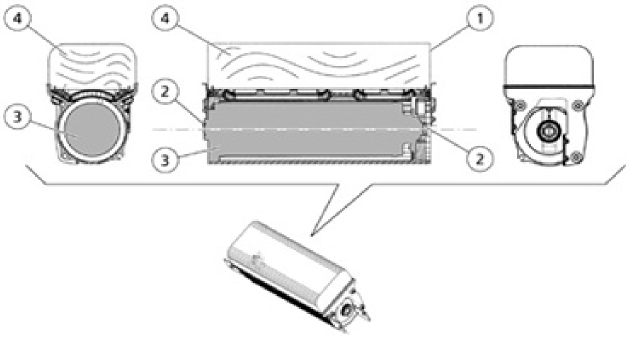


**1** Connector for first stage airbag (green)
**2** Connector for second stage airbag (yellow)
**3** Cable for steering wheel electrical functions
**4** Light switch
**5** Clock spring

### Passenger’s front airbag

The passenger’s side airbag module is located inside a compartment in the dashboard, just above the glove compartment.

Operation:
depending on the intensity of the impact, the ECU determines both the activation of the first stage, and the delay before the second is implemented, so optimizing the bag inflation force.
Thanks to the permeability of its fabric, the airbag is deflated in tenths of a second.



**1** Cover
**2** Connection points
**3** Gas generator
**4** Folded bag

### Passenger’s airbag deactivation switch (not for USA, Japan, Australia specs.)

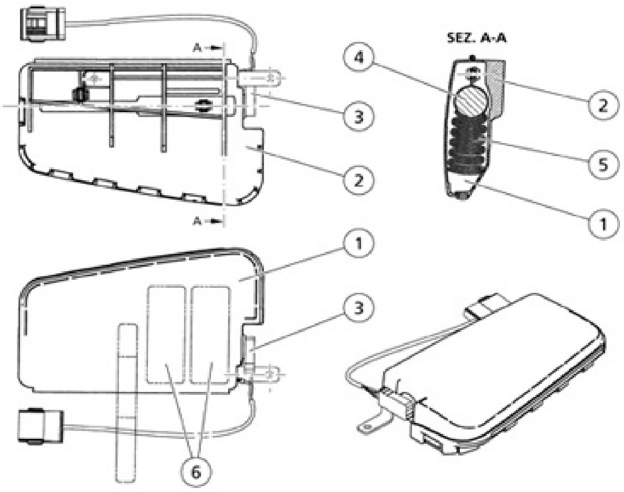
A switch operated with the ignition key can be used to enable (ON) or disable (OFF) the passenger's airbag module to allow the installing of a child seat
With the key in the OFF position, the ECU also controls the "passenger's airbag disabled" warning light located on the instrument panel and the "passenger's airbag disabled" warning light on the roof console.
The excessively bright warning lights is to ensure they are clearly visible to both the driver and the passenger.

## Side airbag module

The side airbag modules are integrated in the backrests of the front seats and are composed of:

- a plastic housing
- a gas generator
- a permeable nylon bag with a volume of approximately 12 litres

Operation:
In response to a signal produced by the ECU, a pyrotechnic ignition charge is set off which causes the expansion of the gases contained in the generator, bringing about the bag's inflation.
After being inflated with the gases, the airbag deflates in tenths of a second thanks to the fabric's permeability.



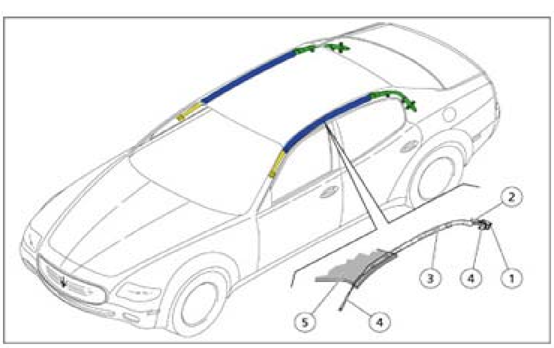

**1** External cover
**2** Casing
**3** Electrical connection point
**4** Gas generator
**5** Folded bag
**6** Warning plate

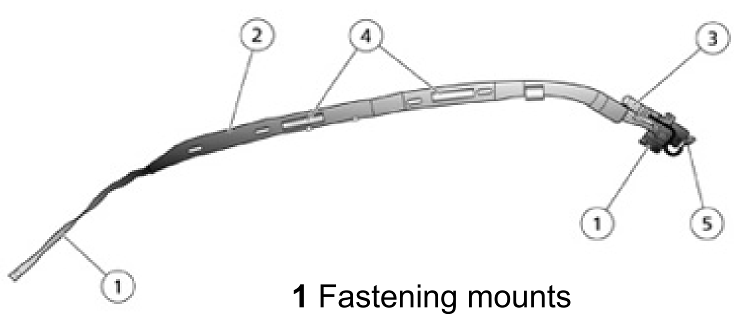
## Windowbag module

The windowbag module is designed to cover the vehicle's complete side glass area and thus offer protection to both front and rear occupants in case of a lateral impact. The module consists of:

- gas generator
- a steel pipe with calibrated holes, which diffuses the gas evenly along its length
- a bag with a volume of approximately 21 litres, made of a permeable nylon fabric
- a plastic housing which covers and protects the bag, and forces its inflation direction

Note: the windowbag is always activated together with the side airbag.





**1** Fastening mounts
**2** Plastic bag container
**3** Gas generator
**4** Warning plate
**5** Connector

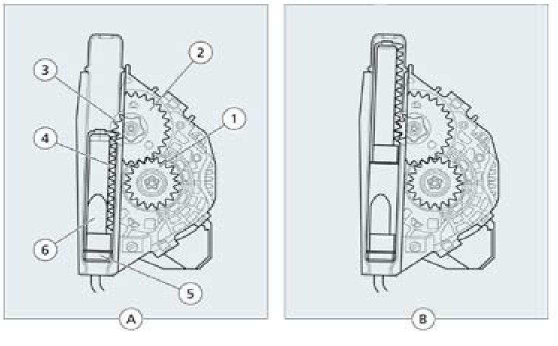
**Seatbelt pretensioners**

The front and rear side belt winders are fitted with pyrotechnic pretensioners operated by the airbag ECU, with a load limiting device.

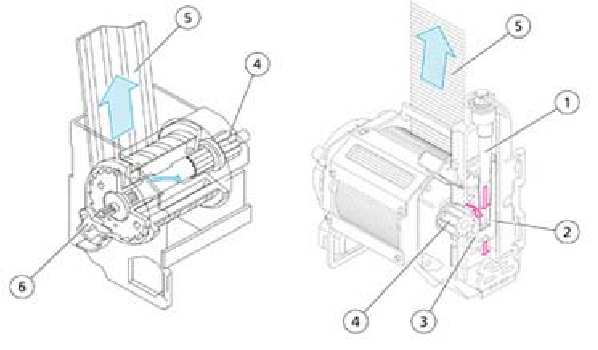
Operation:

In response to the signal generated by the ECU:

- The gas generators’ pyrotechnic charges (5) are set off.
- The pressure of the gas generates a force which pushes the rack piston (4) upwards.
- The seat belt is wound in by a few centimetres.




**1** Gearwheel
**2** Gearwheel
**3** Toothed bushing
**4** Rack piston
**5** Pyrotechnic charge
**6** Propellant
**A** Before activation
**B** After activation



**1** Gas generator
**2** Piston
**3** Rack
**4** Belt winder
**5** Safety belt
**6** Torsion bar

# 8. Electrical Systems and Devices

**Electronic vehicle architecture**

The electronic and electric functions of the various ECUs and nodes are controlled by the F.L.ORE.N.C.E system. The use of this new system, designed for CAN communication, has allowed Maserati to find immediate solutions as to communication, dimension, weight and cost problems. Each electronic control unit is positioned in the barycentre with respect to the functions it controls, so that the system is fully optimised. The Quattroporte is the first Maserati model that employs the F.L.ORE.N.C.E. architecture.

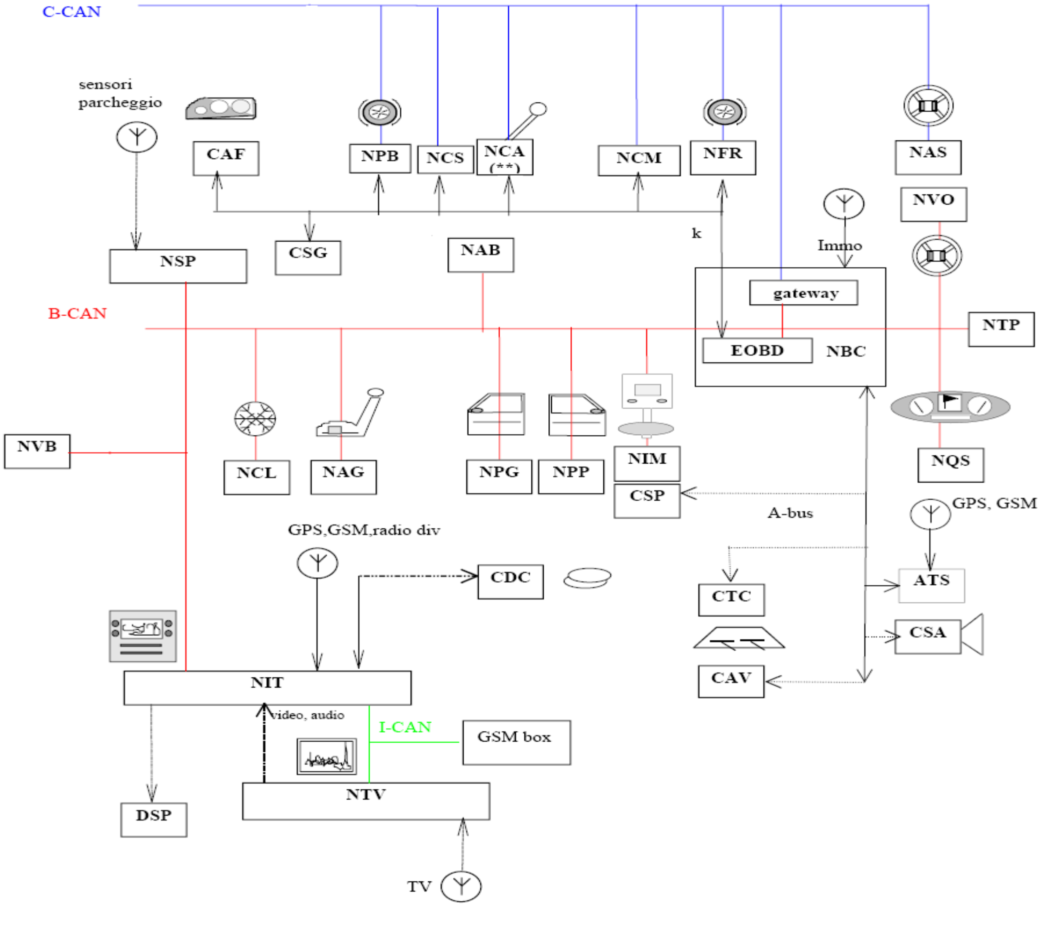
The F.L.ORE.N.C.E. system is made up of two CAN communication networks:

- **C-CAN network**: dynamic control and management of the vehicle (high speed);
- **B-CAN network**: control of the standard bodywork functions (low speed).

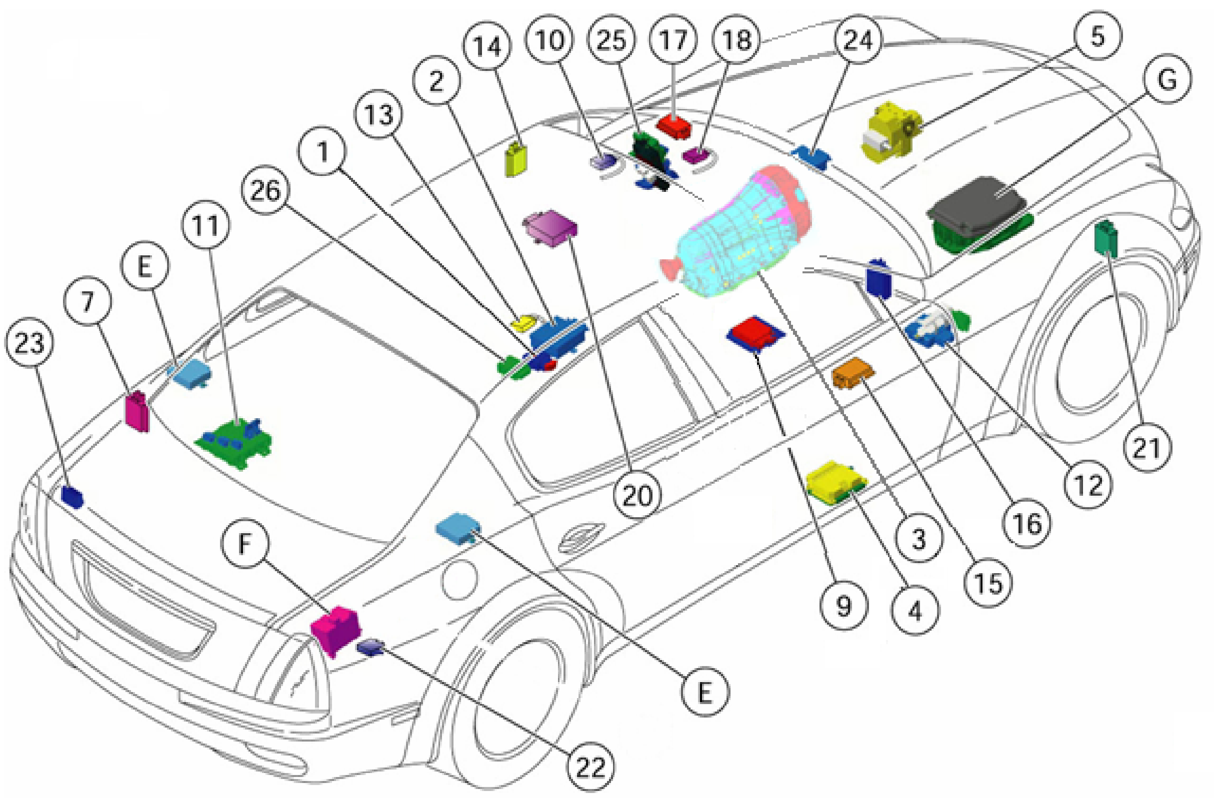
The C-CAN and B-CAN networks are connected to each other by the body computer unit which is equipped with both the interfaces and hence performs the network GATEWAY function for transferring information.

The system also provides a number of serial lines used for diagnostics and other specific functions:

- K-line diagnostics for NCM / NFR / CSG / NCS / CAF
- Serial line W for immobilizer recovery
- A-BUS serial line for alarm, windscreen wiper and twilight sensor control.



**Overview of controlling modules**




1. CAF Headlights ECU
2. NCS Suspension control node
3. NCA Automatic gearbox node
4. NCM Engine control node
5. NFR Braking system node
6. NAS Steering angle node
7. NSP Parking sensors node
8. CSG Power steering ECU
9. NAB Airbag node
10. NVO Steering Wheel Node
11. NVB Luggage compartment node
12. NCL HVAC system node
13. NAG Driver's position node
14. NPG Driver's door node
15. NPP Passenger's door node
16. NIM Inside roof node
17. NQS Instrument panel node
18. CSP Rain/ twilight sensor ECU
19. CTC Windscreen wiper ECU
20. CAV Motion-sensing alarm ECU
21. CSA Alarm system siren ECU
22. NTV TV node
23. DSP Hi-fi system amplifier
24. NIT IT node
25. NBC Body Computer Node
26. NTP Tyre Pressure Node

E Diversity amplifier

G Fuse box

**ECU self-learning**

Every time the battery is disconnected, a self-learning cycle is required in order to allow the correct operation of certain ECUs.

Motor-driven throttle:
Turn the ignition switch to the ON position (Key ON) and wait for at least 30 seconds.
Central door locking system:
Perform a lock/unlock operation with the remote control or the key.
NIT (IT Info Node):
Reset the correct time and date using the specific NIT service menu

Sunroof:
The following initialisation procedure must be carried out with sunroof closed and key ON:

- Rotate the selector switch fully, to the maximum tilting position (the part of the selector switch with three notches).
- Press the selector switch and, keeping it pressed, wait for the sunroof to lock mechanically.
- Release the selector switch.
- Within 5 seconds, press the selector switch again and keep it pressed.
- After a few seconds the sunroof will begin an automatic cycle (continue to keep the selector switch pressed).
- At the end of the movement, the initialisation is complete.
- Release the selector switch.

**Central door locking system**

Locking/unlocking the vehicle using the key:

Key rotated anticlockwise in lock on DRIVER's door (opening).
All 4 doors are unlocked (or driver's door only if set with NIT); if the alarm is connected: the red leds turn off for 4 seconds (after which they will start flashing again)

Key rotated clockwise in lock on passenger's door:
All 4 doors are unlocked; if the alarm is connected: the red leds turn off for 4 seconds (after which they will start flashing again)

N.B: When the vehicle is unlocked from the outside with the key, the alarm is not disarmed. To disarm the alarm, simply insert the key in the ignition lock. The immobilizer acknowledges the code automatically.

Luggage compartment opening button:
Long press: luggage compartment opens (when vehicle speed is below 4 km/h or when the ignition switch is set to off

Inertial switch:
The intervention of the inertial switch results in the release of all the doors and the luggage compartment, and the internal ceiling light and the four direction indicators switching on. It is located beneath the front seat on the driver's side.

Vehicle speed over 20 Km/h:
When the vehicle speed exceeds 20 Km/h the doors are locked if this function has been previously set in the IT Info Node (NIT) user menu

Luggage compartment closing:
To close the luggage compartment, simply rest it on the lock.

Vehicle closing with flat or disconnected battery:
The 2 front doors must be closed with the key and the 2 rear doors with the small lever hidden beneath the weather strip, near the lock.

Vehicle setup:
From the NIT user menu, the driver can decide whether tounlock all the doors or just the door on the driver's side.
Using the relevant menu, the driver can select whether the opening/closing of the luggage compartment should be linked to the central door locking or it should be independent.

**Locking/unlocking the vehicle using the remote control:**

Door lock button:
Single press: If the alarm system fails, the siren will emit a long beep and the red LEDs will start flashing quickly. If one of the doors has not been closed correctly , the doors do NOT lock and the alarm system is NOT activated, the direction indicators and the red LEDs flash nine times (three seconds).
Long press : closing of all 4 windows and sunroof (if fitted).
Stop long press : closing of 4 windows and sunroof is interrupted

Door unlock button.
Double press: Unlocks all the doors (if enabled by the NIT, driver's door only is unlocked), low beams switch on for 30 seconds
Long press : all four windows open and sunroof (if fitted).
Stop long press : opening of the 4 windows and sunroof is interrupted

**Antitheft alarm system**

Activation:
The direction indicators will light up, and the alarm siren will emit a synchronised beep. At this point, a red LED starts flashing intermittently to indicate the monitoring status.

Deactivation:
The direction indicators will double flash , the alarm siren will emit a double beep.
Note: the alarm system is also deactivated by inserting a key with an ID code which is acknowledged by the immobilizer.

Motion-sensing alarm and anti-inclination alarm:
When the alarm system is disarmed, the motion-sensing and anti-inclination alarm can be switched off using the specific buttons on the front ceiling lamp.

Luggage compartment opening:
The luggage compartment can be opened with the alarm armed; in this case, the motionsensors and inclination sensors are temporarily deactivated. If the luggage compartment is then closed, the sensors are reactivated.

**Power windows**

All the doors have a finger-trap prevention device for the power windows
If an obstacle is detected, the window's stroke is interrupted then reversed until it is fully lowered.
In case the finger-trap prevention device should fail, the automatic upwards movement is inhibited and the window can only move with a jogging motion. If the protective device should fail, this is signalled on the instrument panel.

**Internal lights**

Day/night condition
This is determined by:
- the light switch
-“night condition” detected by the vehicle’s twilight sensor.
-Therefore the activation of the position lights does not necessarily determine the activation of the internal lights.

Timing
3 minutes: Step lights under the door, and front and rear central ceiling lamps.
15 minutes: Glove compartment light, diver’s glove compartment light, sun visors' light, spotlight, front and rear central ceiling lamps if activated with the local control or by the inertia switch.
20 minutes: Luggage compartment light.

**External lights**

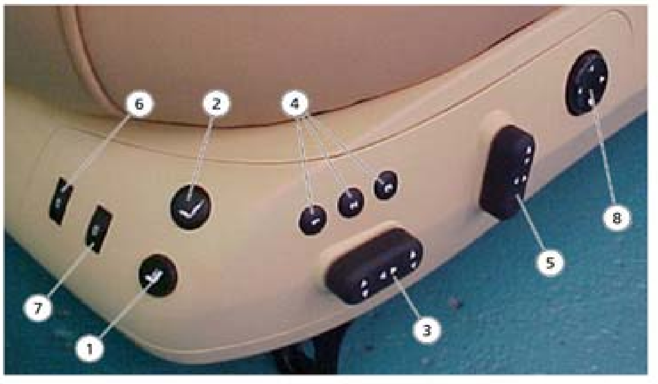
Lights managed by the twilight sensor (AUTO mode):
The external lights are activated automatically by the twilight sensor. From the NIT user menu, the driver can set the twilight sensor’s sensing level (3 levels).

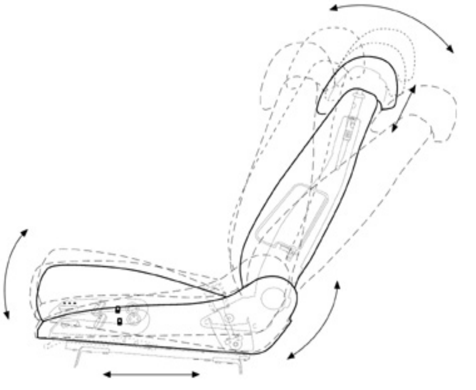
’Follow me home’:
Control enabling the position lights and low beams to switch on automatically for a timed period immediately after the vehicle is switched off (Key-OFF).
Activation: After Key-OFF, the flash lights control on the steering column stalk must be pressed. The instrument panel activates the ‘follow-me-home’ signal and displays the time (in seconds) during which the lights will remain switched on. (Signal active for 20 sec.)

Activation time increase: when the function is active, every time the flash lights control is pressed, the time the lights remain switched on is increased by a further 30 seconds (max. 210 sec.)
Deactivation: keep the flash lights control activated for over 2 seconds, then switch the ignition key from OFF to ON.

**Front seats**

Seat controls:



1. Adaptive (only on seat base)
2. Massage ON/OFF
3. Seat base shifting/tilting
4. Memories
5. Seatback angles/height
6. Ventilation
7. Heater
8. Lumbar support adjustment

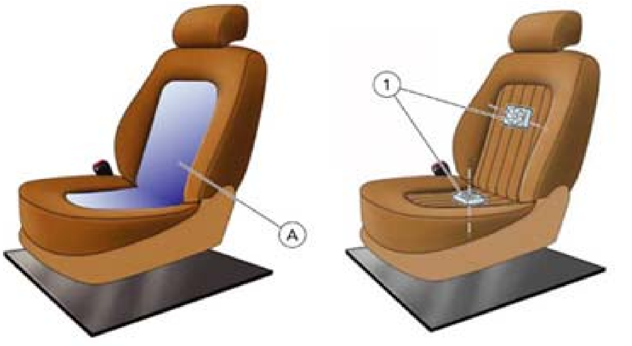
Memorisation:
With the three buttons (4) the user can store three different combinations of the following positions:

- Seat position
- Steering column position
- External rear view mirror position

The position combination is stored by pressing one of the three buttons for over 3 seconds.
To confirm a successful memorisation, the ECU sends the message via the CAN network to make the confirmation buzzer sound.

Heating:
The seats are designed with a heating pad stitched onto the lining of the seat back and the cushion's central sections.

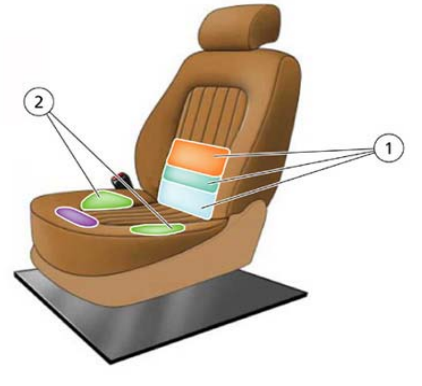

Ventilation:
The seats are built with a "forced" ventilation system with three levels of speed, operated by two brushless fans, controlled by an ECU.




A. Ventilated areas
1. Axial fans 80 x 80 mm

4- way lumbar support adjustment:
The front seats are standard equipped with electro-pneumatic lumbar support adjustment.
The adjustment at point X is carried out by inflating the lower bag (1) (the larger one). The adjustment at point Z is carried out by inflating the upper bag (2) (the smaller one)
The two bags, which partially overlap, are located between the padding and the support membrane.


Electro-pneumatic system:
An optional electro pneumatic adjustment system is available for the front seats. This system is composed of six inflatable plastic bags, an air compressor and an ECU with integrated solenoid valves.
This system operates the 4-way lumbar support adjustment, self-adaptive and massage functions.




The self-adaptive function, ensures the seat provides its occupant with the optimum support regardless of the person's shape and size.
Action: all bags are inflated to maximum pressure; subsequent and sequential deflation until the same pressure is obtained throughout the complete system. This cycle is repeated every 4 minutes.
This function is activated by pressing the corresponding button and it is switched off by pressing the same button again.

1. Three partially overlapped bags located between the padding and the support membrane
2. Seat base side bags are located inside the padding.

Massage system:
The massage function inflates and deflates the following bags in sequence:
Thigh / lower lumbar / central lumbar / upper lumbar / thigh
The repetition interval lasts approximately a minute and depends on:
- whether the maximum pressure is reached
- the time the pressure is kept constant.

The massage cycle lasts five minutes in total, after which the function cuts out and the previous settings are restored.

**Rear seats**

The rear seats are fitted with seatbacks engineered to guarantee the occupants the maximum safety in the event of a collision.

Headrest: two side rests with adjustable heights and tilting movement, and one central rest, which can be power tilted and then reset manually by the driver.

Armrest: can be folded-down and opened. Inside its compartment one will find:
- 12V socket,
- front passenger seat sliding control (on all versions),
- control switches for heating (Winter Pack and Comfort version) and for lumbar support adjustment, massage and ventilation (for Comfort version).

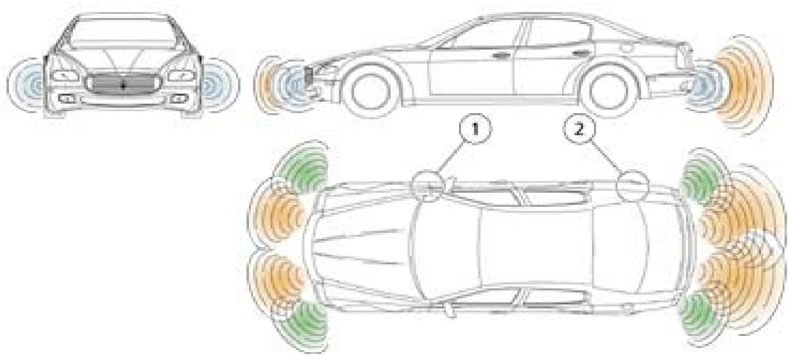


**Parking sensors**

The vehicle has two possible types of equipment for assisted parking:
rear parking sensors only or front and rear parking sensors.
N.B: The typology of the ECU supplied changes depending on the vehicle equipment

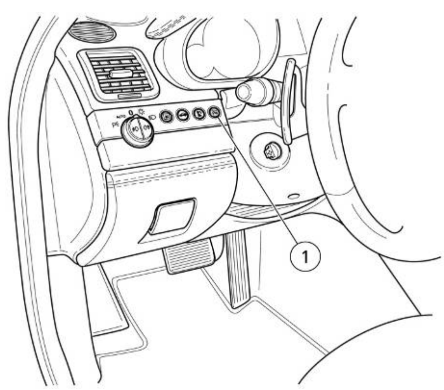
The driver is alerted about the presence/distance of the obstacle by means of warning signals from:
- a rear buzzer - for vehicles equipped with rear parking sensors;
- two buzzers, one at the front and one at the rear - for vehicles equipped with front and rear parking sensors

The frequency of the beeps also depends on how far away the obstacle is.




1. Front buzzer position
2. Rear buzzer position

The front sensors (when fitted) are activated/deactivated with the specific button on the control plate on the left-hand side of the steering column.




Ultrasonis sensors:
The sensor is an ultrasound transducer, which acts as a smart transmitter and receiver of ultrasound pulse packages. The pulses emitted are reflected off any obstacles there may be; so the transducer receives an echo which is amplified and converted into a digital signal, then sent to the ECU. Each sensor can also operate as a receiver only, so that it can perform a triangular measurement between two sensors. This technique provides a better detection of small obstacles and in situations where reflection is critical.

The front sensors are activated under the following conditions:
- key ON,
- vehicle speed below 15 km/h,
- deactivation button in OFF position.

The rear sensors are activated in the following condition:
- key ON,
- reverse gear engaged.

The front or rear buzzers start to beep as soon as an obstacle is detected and continue to beep with increasing frequency as the vehicle nears the obstacle.

Operating principle:

- The Electronic Control Unit controls the sensors (10 measuring processes per second).
- The signal, reflected off any obstacles, is intercepted by the sensor and sent to the ECU in digital form.
- The ECU compares the signal emitted with the one received and calculates, the time that elapses between the emission of the signal and the reception of the echo (transit time).
- This information is translated into distance and passed on to the driver in the form of beeps. The measurement accuracy is ±1 cm. A comparison with the previous measurements allows the system to establish whether the obstacle is getting nearer or further.

Note : a continuous beep indicates the obstacle is less than 30 cm away.

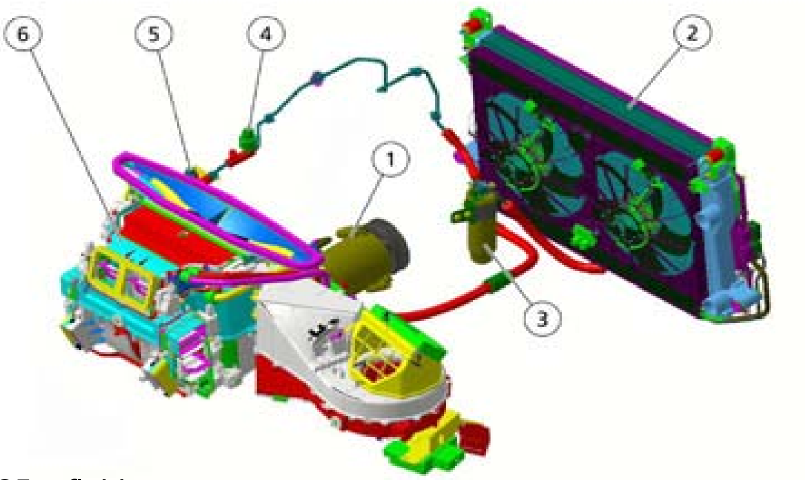
Recovery strategies:

- The system must be capable of automatically identifying any failures occurring during operation.
- Error which does not jeopardise the overall system operation: the system continues to operate.
- Error which jeopardises operation or performance reliability: the system cuts out automatically and sends out an error message, indicated on the instrument panel (both visually and audibly)

**Heating, ventilation and air conditioning (HVAC)**

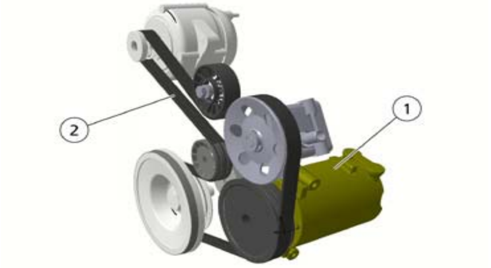
the air conditioning and heating system allows the user to adjust the temperature and humidity within the passenger compartment. Its main components are:

1. Compressor
2. Condenser.
3. Dehydrator filter.
4. 4-level pressure gauge.
5. Expansion valve
6. Distribution unit (made up of):
   - Electric fan
   - Evaporator
   - Anti-pollen filter
   - Heater radiator



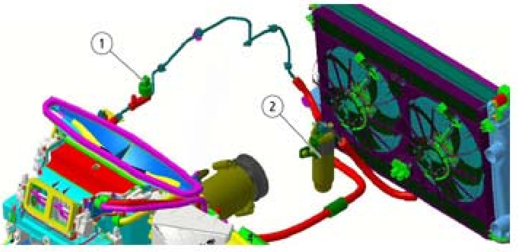

The refrigerant used is R134a.
The system is filled with 1100 ± 25 g fluid
The oil used is Ucon RL897 Oil
The system is filled with: 150 ± 10 cc oil

**Description of components:**

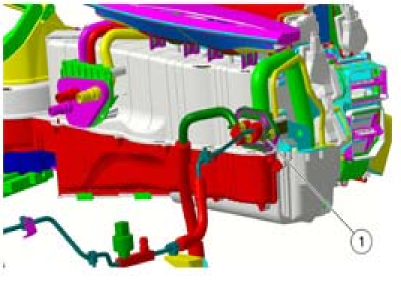



**Compressor:**
The variable piston compressor (1) makes it possible to change the coolant flow to the evaporator gradually. It is driven directly by the crankshaft by means of a Poly-v belt (2) and activated by an electro-magnetic clutch.

**Dehydrator / filter:**
The dehydrator / filter is connected to the condenser outlet and to the evaporator inlet. It performs the following functions: it filters any impurities in the coolant (which contains oil particles from the compressor), it separates the fluid to eliminate any humidity, it works as a reservoir for the coolant.

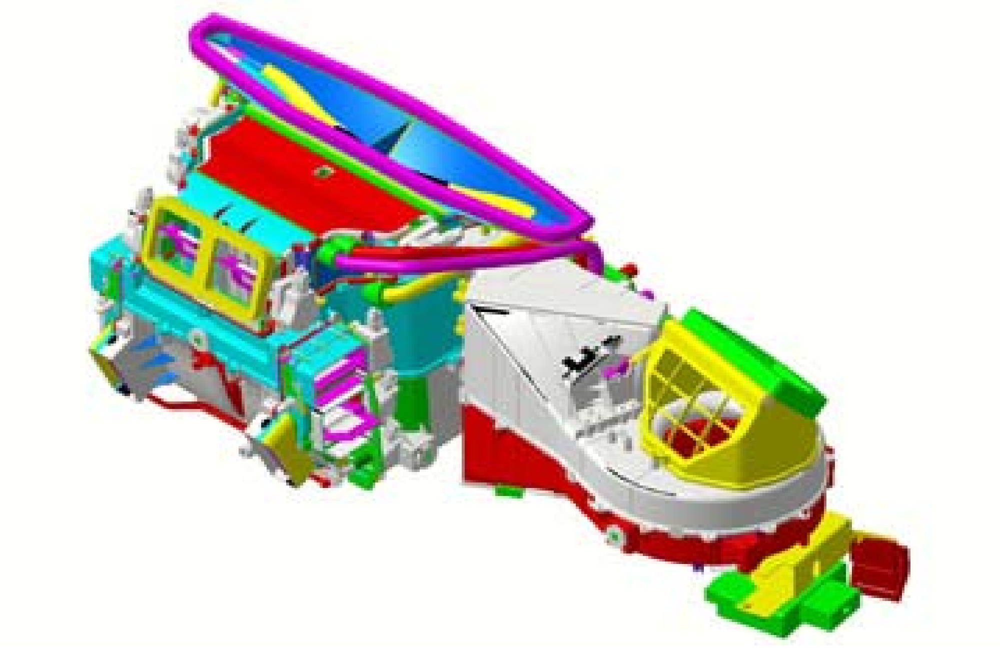



**Multi level pressure sensor (4 levels):**
This sensor controls the system operation, it controls the compressor and cooling fan activation/deactivation:
1st level (approx. 2,5 bar): minimum pressure enabling the compressor activation;
2nd level (approx. 15 bar): pressure requiring the activation of the electric fan's first speed;
3rd level (approx. 20 bar): pressure requiring the activation of the electric fan's second speed;
4th level (approx. 27° bar): max. pressure deactivating the compressor.




**Expansion valve:**
This valve regulates the flow and expansion of fluid R134a at the evaporator's inlet. Inside the valve, the coolant is subject to a sudden and sharp pressure and temperature drop

**Front air distribution unit:**
This is the housing within which, the external (or recirculation air) is conditioned/heated and distributed to the vents selected by the user. This unit contains:
Air flaps
Evaporator: this is a heat exchanger housed inside the air distribution unit. It is used to take off heat and humidity from the air conveyed to the passenger compartment. This is obtained by means the change in the coolant status – from liquid to gaseous – which takes place inside it.
Heater radiator: this is a heat exchanger connected to the engine cooling circuit by means of two lines: one line sucks warm water from the engine, the other returns the coolant to the engine. The heater is used to provide the heat required to warm up the air conveyed to the passenger compartment.
Flap actuators.
Air temperature sensors.
Anti-pollen filter: this is a combined air filter for the passenger compartment: particle + active carbon filter. It is used to filter the air entering the passenger compartment. The first filter layer (particle) prevents pollen and polluting particles from entering the passenger compartment; the second layer (active carbons) reduces nasty smells due to the humidity on the filter surface)
Electric fan: this is operated by a brushless electric motor, 12 V power supply, and can be controlled at different speeds by a signal coming from the NCL (HVAC control module). It is housed inside the air conditioning/heating unit, next to the evaporator



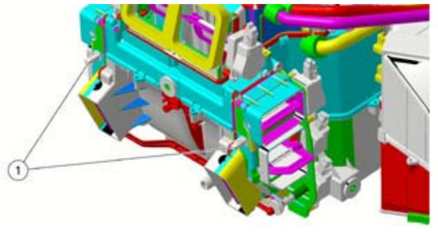
**Air pollution sensor:**

When the air pollution level exceeds the preset harmfulness thresholds, the recirculation flap closes the external air inlet and the NCL (HVAC control module) activates the recirculation of inside air. When the air pollution level goes back to acceptable preset values, the flap opens the external air inlet once again and the NCL deactivates the recirculation of inside air. This sensor is fitted in the external air inlet on the air distribution unit on the first generation models. From MY06 onwards, the location of this sensor has moved to the radiator housing.

**The demisting sensor:**
When the windscreen misting level exceeds the preset thresholds, the recirculation flap opens the external air inlet cutting-out the AQS sensor signal. When the windscreen misting level goes back to acceptable preset values, the recirculation flap will get to the status requested by the system. It is fitted on the internal rear view mirror

**Sun radiation sensor:**
The sun sensor is used to measure the thermal energy generated by the sun radiation. It is positioned on the dashboard, next to the windscreen. This is a DUAL ZONE type sensor, to optimize the control of the dual air conditioning / heating system temperature.

**External air temperature sensor:**
This is a NTC sensor fitted inside the external rear view mirror, driver's side. Its operating range is -40°C / 80°C.




### Treated air temperature sensors:

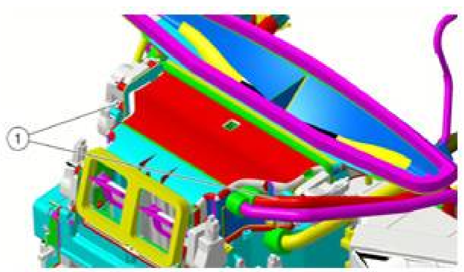
These sensors (1) are used to read the temperature of the air treated by the air conditioning/heating system before it is conveyed to the passenger compartment. The two treated air temperature sensors are positioned next to the central vents.


### Passenger compartment temperature sensor:

These sensors (1) are used to read the actual temperature inside the passenger compartment. This sensor is equipped with a tiny electric fan, fitted inside it. This fan is constantly powered, so that the temperature reading is not affected by any stationary air inside the dashboard.


### Air mixing flap actuators

The treated air temperature is adjusted using the temperature setting buttons (1 and 2).

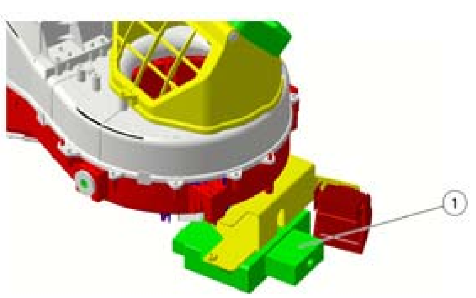



### Air distribution actuators

The actuator moves the distribution flaps into the 5 possible positions. Main positions: DEF, VENT, FLOOR. Combined positions: BILEVEL, HEAT

### Recirculation actuator

The recirculation actuator controls the flap rotation in the two threshold positions (dynamic air and air recirculation) without intermediate positions.




### The HVAC control module (NCL):

This module is positioned on the right of the front passenger's foot area, is fitted on the air conditioning/heating unit. It is connected to the low speed B-CAN network. The NCL receives the following information from the Body Computer (NBC) node, via CAN network:

- Outside air temperature
- Engine water temperature
- Engine Rpm
- Vehicle speed (tachometer signal)
- Battery voltage (battery charge status)
- Heated rear window activation
- Compressor status
- Vehicle light status.

Note: For MY06 (assembly number 21926 onwards), the software of the NCL module has been modified to improve performance.

**Modifications for MY07 and Quattroporte Automatic:**

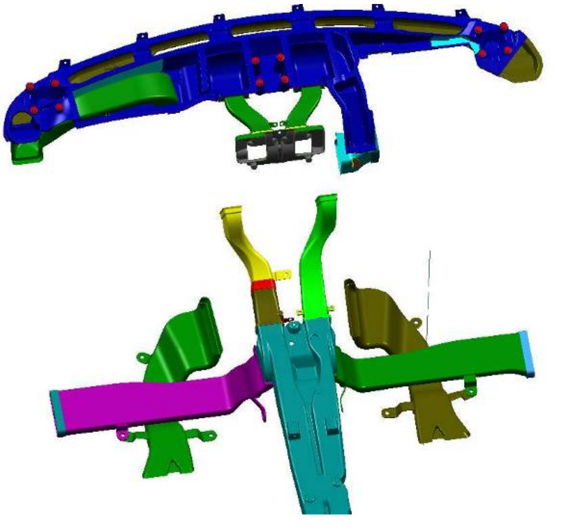
With the introduction of the Quattroporte Automatic and MY07 (from assemby number 27860 onwards), a number of important modifications were made to the HVAC system in order to improve its performance.

The amount of refrigerant gas and lubrication fluid has been changed due to a modified dehydrator / filter:

- Coolant: R134a PAG RL – 897, the system of this vehicle is filled with 1050 ± 20 g of coolant.
- Lubricant: the oil used is Ucon RL897 system is filled with: 200 ml ± 10 ml of fluid.

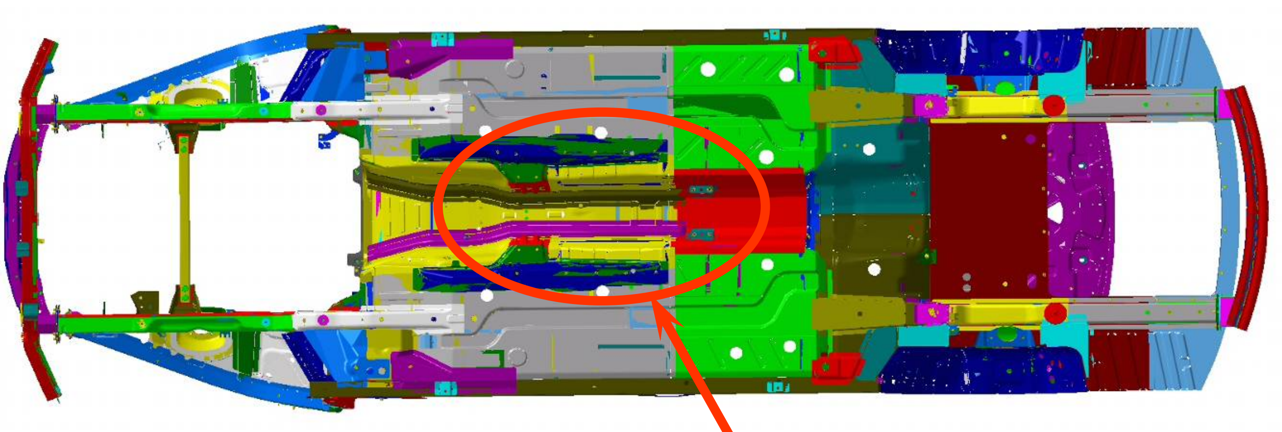
Also various parts of the front air distribution unit have been redesigned or modified. The heating radiator is new, as well as the anti-pollen filter. The ventilation motor is new and is now more powerfull while it is at the same time less noisy. The NCL unit has new software.

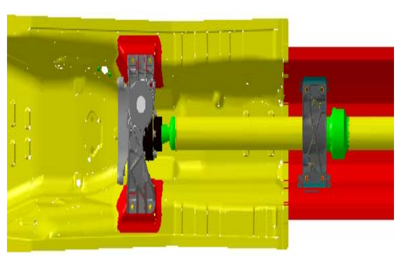
The air conditioning/heating system of the Quattroporte Automatic and MY07 provides enhanced air flow obtained with new and suitably dimensioned air lines.
Thanks to these modifications, the overall performance of the ventilation system has increased by 50% (370 m³/h instead of 240 m³/h previously).



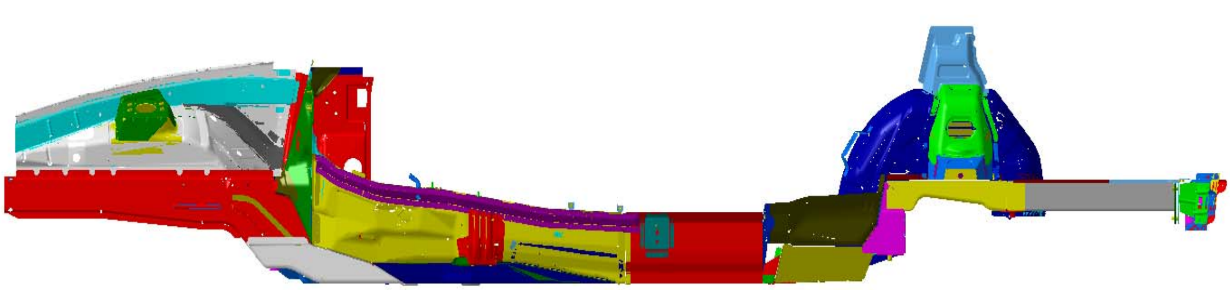
## 9. Body

The Quattroporte uses a steel sheet monococque body structure in combination with two auxiliary steel frames  to support the powertrain and wheel suspensions.
The quattroporte's floorplan has been modified with the introductiion of MY07 and Quattroporte Automatic to house the new automatic transmission. Attaching points were added  for the transmission support and the central supporting bearing of the propellor shaft while the transmission tunnel was enlarged to house the gearbox.





Central tunnel area modified to support the gearbox and propeller shaft



# Maserati Quattroporte MY09 (M139)


## Technical Introduction

# 0. General Information

The Quattroporte – the car which created the "Sport Luxury Sedan" category – can be considered as a true masterpiece of Maserati. After five years and more than 15.000 sold units, Maserati has decided to reinterpret the Quattroporte and bring it to a new level.
For the MY09 version, Maserati's flagship saloon car underwent an important technological and stylistic upgrade.
Pininfarina has further improved the Quattroporte's elegant body design by giving it a more modern look and enhancing the GranTurismo family feel.
Stilistic modifications include: new front bumper with a new grill, new headlight units, new tail lights, new rear bumper, new wheel design, new rear view mirrors and redesigned side sills.
Internally, the MY09 Quattroporte is fitted with a complete new infotainment system with extensive listening options and also new interior trim combinations are available.
Under the bonnet, the classic 4.2L V8 engine is now joined by a more powerful 4.7L version, always linked to an automatic 6-speed transmission.

The new Quattroporte range offers three variants:

- **The Quattroporte** is the Maserati luxury saloon in its purest form. Fitted with the 4.2L wet sump engine and focus on smoothness and driving comfort.
- **The Quattroporte S** is the flagship of the Quattroporte range. Fitted with a 4.7L engine and improved chassis dynamics to match the higher engine power. Luxury reaches new heights with the Quattroporte S.
- **The Quattroporte Sport GT S** (added in January 2009) is the most exciting combination of a luxury sedan and a performance sports car that Maserati has ever produced. Modifications to chassis, gearbox and exhaust system ensure maximum handling and performance to further heighten the driving pleasure.

**Quattroporte:**

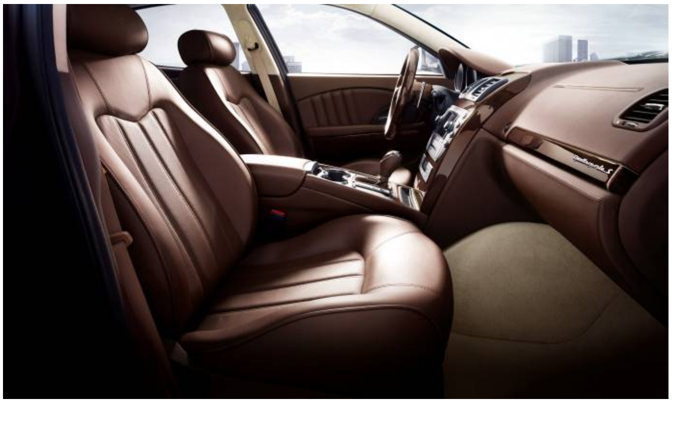
**New "*Quattroporte* " 4.2**

- Current 4.2 V8 400 hp, 460 Nm torque
- Single damping suspension rate with focus on comfort
- Skyhook suspension available as optional
- 18" wheels with new wheel design
- 330 mm brake discs with 4-piston calipers
- Acceleration 0-100 km/h in 5,6 s
- 0-1000 m with standing start in 25,2 s
- Max speed of 270 km/h

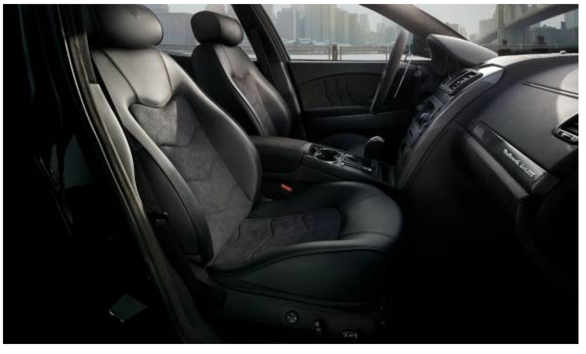
**Quattroporte S:**

**New "*Quattroporte S*“ 4.7**

- New 4.7L V8 430 hp, 490 Nm torque
- Skyhook suspension comes as standard for the best set-up between comfort and handling
- V-Style 19” wheels
- Chromed front grill with convex vertical fins
- 360 mm dual cast brake discs with 6-piston calipers
- Acceleration 0-100 km/h in 5.4 s
- 0-1000 m with standing start in 24,7 s
- Max speed of 280 km/h



**Quattroporte Sport GT S:**



**Esthetical features for QP Sport GT S**

- Black front grill with concave vertical fins
- Red accent in trident logos
- Black instead of chromed headlight surround
- Standard red brake calipers
- “Black line” window trim
- Door handles painted in body colour
- Oval exhaust tail pipes in black finishing
- Carbon fibre interior finishing
- Specific seat and door panel upholstery with alcantara
- Chrome line for window trims, door handles and exhaust pipes available on request

**New "*Quattroporte Sport GT S*“**

- New 4.7 V8 440 hp, 490 Nm torque
- Sport exhaust System
- Single-rate sport setting dampers and stiffer springs (+25% rate increase)
- Specific gearbox calibration
- 20” Multi Trident wheels with specific design
- 7-spoke 20” wheels available on request
- 360 mm dual cast brake discs with 6-piston calipers
- Longer gearshift paddles behind steering wheel to allow easy gear shifting during cornering
- Acceleration 0-100 km/h in 5,1 s
- 0-1000 m with standing start in 24,1 s
- Max speed of 285 Km/h

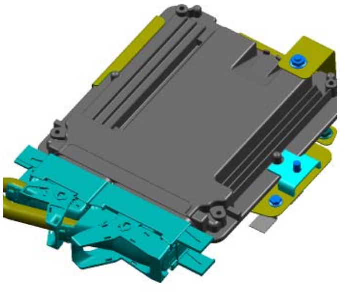
## 1. Engine

The new generation Quattroporte is exclusively available with the new generation of wet sump V8 engines (F136UC for Quattroporte, F136YG for Quattroporte S and F136YH for Quattroporte Sport GT S).

**Bosch Motronic ME9**

The Quattroporte models fitted with the new 4.7L engine introduce the new generation Bosch Motronic ME 9.1.1 engine control system.
Basic operating principles remain unchanged with respect to the previous generation Motronic ME7 system. A number of engine control related components have changed, but their operating principle remains unchanged. The most important difference concerns the engine control unit.

**The Motronic ME9 ECU is located in the engine compartment behind the left hand side wheel arch.**
**A shield is applied to protect the ECU from heat and possible brake fluid loss**

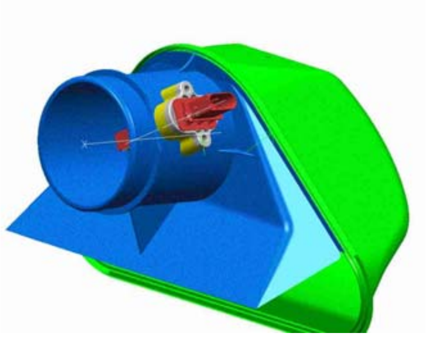


The most important modifications with respect to the ME7 system are the following:

- New, larger cast aluminium ECU housing with new connectors (94 pin vehicle side connector + 60 pin engine side connector) and new pin-out.
- New location of the ECU in the engine compartment to reduce wiring length.
- Increased calculating capacity of the ECU thanks to new, more powerful processor (GreenOak MPC564 64-bit, 56Mhz main processor)
- Eliminating of the K-line for diagnostics. All communication for diagnostics and programming passes through the C-CAN line in compliance with the new ISO 15765-4 standard.
- Immobilizer function is managed by the engine ECU and body computer through the C-CAN line only. The W-line for back up is eliminated.
- New hydraulic VVT actuators with a variation range increased to 60 degrees. The aim is obtaining a more smooth idling and better low-end torque for application in the new Quattroporte with 4.7L engine. The operating principle remains unchanged with respect to the actual 50-degree actuators.

**More open intake and exhaust system for Quattroporte Sport GT S**

The power increase of 10 hp of the Quattroporte Sport GT S with respect to the Quattroporte S is achieved by modifications to the air intake system and to the exhaust system, combined with a specific engine mapping.



The absence of a strainer for the mass air flow meter allows a more free air flow into the engine. This modification requires a specific calibration of the engine control system (in analogy with the GranTurismo S model).

In analogy with the GranTurismo S model, the Quattroporte Sport GT S is equipped with a sport exhaust system with bypass valves for the rear silencers. The opening/closing of the valves is linked to the Sport/Normal mode selection.

**“Normal” mode – valves closed**

In “Normal” mode special exhaust valves are closed, forcing the exhaust to follow a longer path.

A longer exhaust path means the exhaust will lose energy and as a consequence the engine sound is not as pronounced.

“Normal” mode is designed to ensure comfort on board but also limits top engine performance.

**“Sport” mode – valves opened**

In “Sport” mode, the exhaust flaps are opened allowing the exhaust to follow a shorter, quicker path.

A shorter path increases the exhaust flow, allowing the engine to develop its maximum power (440 hp).

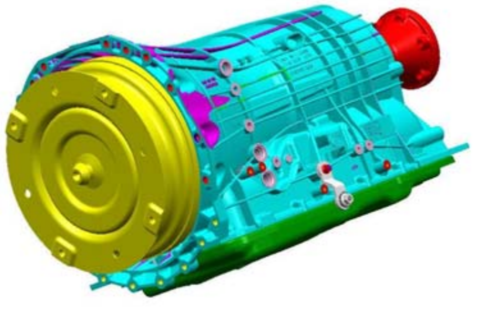
The “Sport” mode has to be selected in order to extract the maximum, overall performance.

## 3. Transmission

The Quattroporte MY09 model is available with automatic transmission only.

**Main ZF 6HP26 improvements**

The new, more aggressive torque supply of the 4.7L engine is coupled with transmission management software that has been tailored to optimize the acceleration and shifting sensation of the Automatic transmission.



The driving experience is characterized by:

- Optimum off-the-line acceleration, with ideal alignment of the increased torque
- New shifting feel between 4th and 5th gears: maximum power available to highest rpms, (7600)

**Specific gear shifting software for the Quattroporte Sport GT S with new features designed to heighten the "fun to drive" quotient:**

"MANUAL MODE": gear holding

- In manual mode, gear shifting is directly controlled by the driver, allowing the engine to reach the rev limiter.
- Finding the optimum gear point is facilitated by the car's "Tachometer", a carry-over from the GranTurismo S; the paddle shifters (Active Shifting, std) with ergonomic "Trofeo" shape (also carry-over GranTurismo S) always ensures optimal gear changes, especially on twisty roads.

"AUTO SPORT" mode : "Fast Start" strategy for max perfomance

- In order to optimize standing starts, the automatic transmission offers a new performance edge called "fast start" that is easy for the driver to control and repeatable with no limits (pls see Owner's Manual for instructions – not ideal for street use as MSP must be turned off). This strategy enables a reduction in the 0 to 100 km/h time from 5.4 seconds to 5.1 seconds.

"MANUAL SPORT"/"AUTO SPORT": Downshifting with throttle "blips"

- Throttle "blipping" while downshifting enables the engine revs to match the proper gear and, in the case of the Sport GT S, creates the right exhaust note ensuring driving pleasure. In "SPORT" mode the shifting quality offers a sporty feel with higher gear shift speeds.

## 4. Braking System

The Quattroporte models fitted with the 4.7L engine (S and Sport GT S) are equipped with the enhanced braking system as used on the GranTurismo S. This system features 360 mm front brake discs with dual cast technology and 6-piston brake calipers.
The brake calipers have standard grey finishing on the Quattroporte S and red finishing on the Quattroporte Sport GT S

All Quattroporte models are equipped the MSP system featuring ABS, ASR, ESP, EBD, MSR and Hill Holder function (Bosch ESP 8.0)

## 6. Suspensions and Wheels

**Wheels and tyres**
A number of new wheel designs have been introduced with the introduction of the MY09 version of the Quattroporte. The dimensions of wheels and tyres depends on the model version:

| Version | Wheels | Tyres |
|---|---|---|
| Quattroporte | Front: 8,5J x 18<br>Rear: 10,5J x 18 | 245/45 ZR 18<br>285/40 ZR 18 |
| Quattroporte S | Front: 8,5J x 19<br>Rear: 10,5J x 19 | 245/40 ZR 19<br>285/35 ZR 19 |
| Quattroporte Sport GT S | Front: 8,5J x 20<br>Rear: 10,5J x 20 | 245/35 ZR 20<br>295/30 ZR 20 |

**Note:** 19” wheels and 20” wheels are available as optional for the Quattroporte. 20” wheels are available as optional for the Quattroporte S.

**Suspensions**

The New Quattroporte range builds upon experience gained over the years with regard to suspension and braking improvements, focused on different driving needs and vehicle requirements.

- The New *"Quattroporte"* 4.2L has a comfortable, single damping suspension set-up developed to focus on smooth ride. The result is a more comfortable ride while still offering solid and poised driving behavior.
- *Skyhook* is optional for the Quattroporte 4.2L
- The New *"Quattroporte S"* 4.7L features an improved Skyhook Suspension system with new damper settings and consequently improved handling / balance. Moreover, the adoption of a new piston valve optimizes the frequency response.

**Quattroporte Sport GT S**

The Quattroporte Sport GT S features a sporty, single-rate damping suspension system (Skyhook available as option) designed to further complement the already ideal weight distribution and balance of the Quattroporte S.

The new suspension set-up reduces ground clearance accordingly: at the front, the fender gap has been reduced by 10 mm and at the rear by 25 mm additionally, the spring stiffness has been increased by 25%.

All these changes ensure:

- Body roll reduction.
- Lateral “G” force enhancement.

These improvements result in the following customer benefits:

- The Quattroporte Sport GT S conveys a higher sensation of agility from corner to corner (higher cornering speed) and greater feedback (road feel).
- Traction coming out of corners is more stable thanks to reduced weight transfer.
- Increased stability thanks to stiffer springs.

## 7. Safety Components

The MY09 version of the Quattroporte uses a new type of front passenger airbag. This new type airbag is of the “intelligent-LRD” type.

The passenger Low Risk Deployment bag represents an important evolution step for the occupant protection. With this feature the bag is able to provide the highest safety for front occupants of different age and size, from one year old kids placed in rear facing child seats to adults in all conditions of frontal collisions.

The airbag is designed with some elements that permit to adapt well to all possible conditions: additional vent holes allow a reduction of pressure when the bag hits an obstacle close to the dashboard, the lower shape is designed to adapt to the children head when placed on cradles. The shape of side panels is able to restraint the shoulder, reducing pressure on head and chest.

The airbag has been re-designed completely for volume, shape, features and folding in order to fulfil the most strict occupant protection regulations without the need of the complex Advanced Weight Sensing system (AWS) (for the markets where this system was used). Further, the new type of airbag offers improved aesthetics.

**Note:** the other components of the restraint system did not undergo modifications.

## 8. Electrical Systems and Devices

**New headlight features:**

- Bi-Xenon technology
- Additional driving beam (Flash to Pass)
- Position light – DRL function
- 10 led direction indicator
- Integrated sidemarkers (family look with GranTurismo)
- Headlight washing system
- Automatic level control
- Auto adaptive headlight system for cornering (up to a maximum angle of 15°) in analogy with the GranTurismo model

**New tail light features:**

- 17 led direction indicators
- 12 led stop function
- 2 led position light
- 2 led rear fog lamp
- 1 led integrated side marker
- Reverse lamp

**New infotainment system (NIT)**

The new Quattroporte features a new Multi Media System with extensive listening options, which is available in two variants:

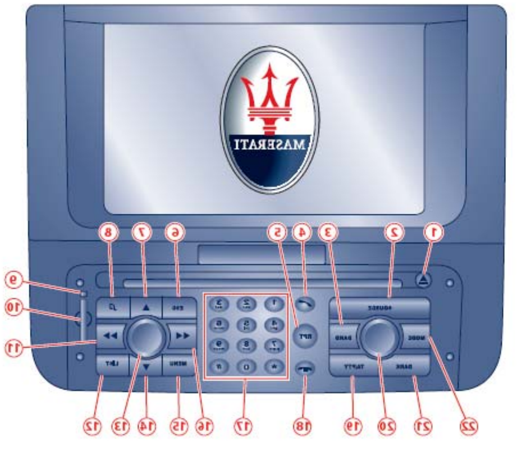
Maserati-Marelli multi media system:

- RDS tuner
- Satellite navigation system
- CD/CD-rom drive, MP3 compatible
- 30GB Hard disk Drive for MP3 music files and juke box function
- Bluetooth wireless technology
- USB / Aux input
- Voice control
- Steering wheel controls

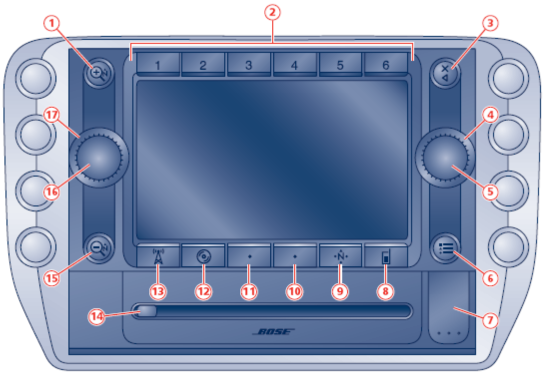
Bose multi media system, which additionally offers:

- DVD player
- Compatibility for reading files with the extension wav, wma, acc
- User interaction with UMusic virtual DJ and Music Library
- I-pod connection on request
- TV tuner on request

**User interface Marelli**

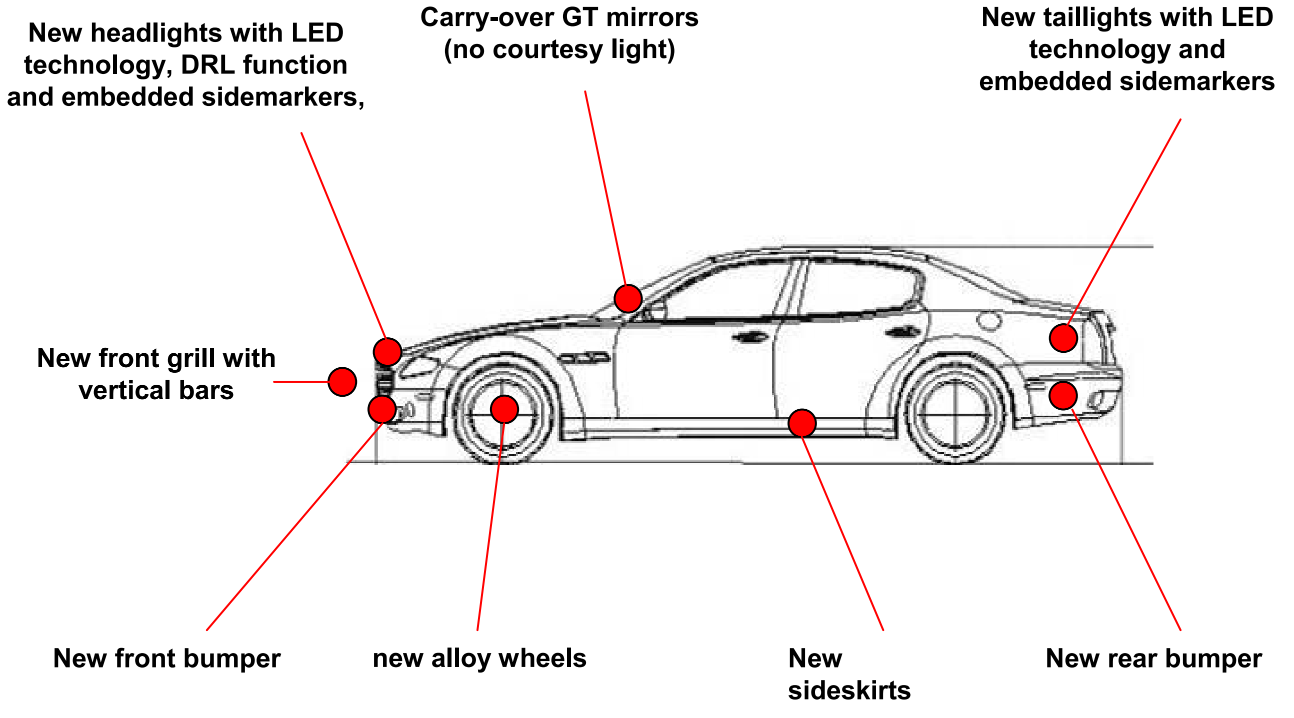


**User interface Bose**



# 9. Body

## Quattroporte MY09 Body Enhancements:



# Maserati GranTurismo (M145)

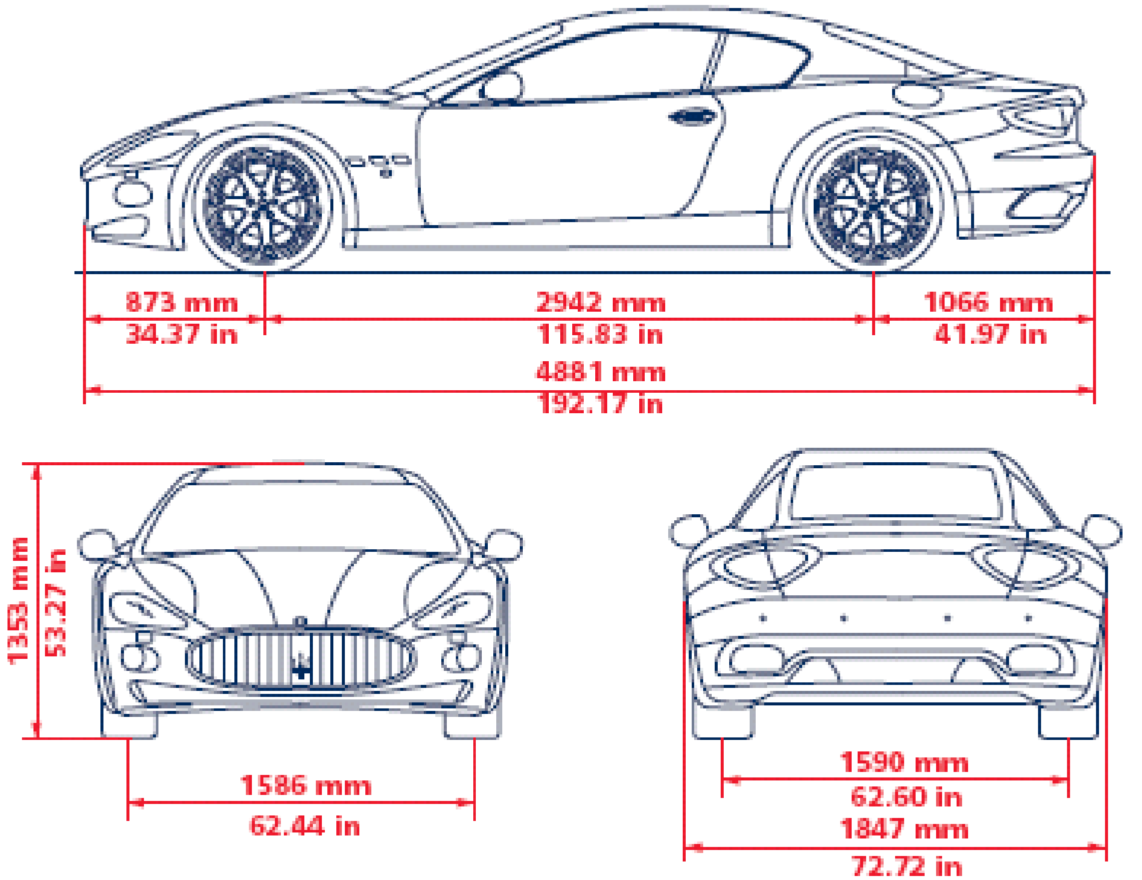
## Technical Introduction

# 0. General Information

The new Maserati GranTurismo, introduced at the Geneva motor show in March 2007, is a technical spin-off of the Quattroporte Automatic and reflects its power, stability and comfort features.
Its authentic and unmistakably Maserati style transmits an image of power and elegance. Pininfarina has tailor-made the sleek and sensual bodywork, developed around the GranTurismo project idea: create a sports car yet with plenty of space to suit one and all.
From the large oval mouth that envelops the radiator grille right through to the rear, the bodywork sits on the mechanics like a tight-fitting dress on sinuous hips. The resulting powerful, trim and elegant shape arouses an emotion that only a timeless design can give.
The elegant design of the interior, made warm and cosy by the quality materials and handmade finishes, embraces the passengers in a bright, comfortable and sporty atmosphere.
The new Maserati GranTurismo springs from the experience gained with the Quattroporte in the luxury car sector, and provides a unique implementation of those concepts that have made the model an unchallenged international success.
The new Maserati GranTurismo has the following features in common with the Quattroporte:

- the mechanical configuration designed to provide an emotional driving experience
- meticulous care in the choice of materials and equipment, aimed at creating a sophisticated and comfortable ambience.
- a complete range of customisation options so that the customers can express their own personality and satisfy their needs.

**Dimensions, capacities and weights**




| | | | |
|---|---|---|---|
| Length: | 4,881 mm | Front overhang: | 873 mm |
| Width: | 1,847 mm | Rear overhang: | 1,066 mm |
| Width: | 2,056 mm | Luggage compartment capacity: | 260 l |
| Height: | 1,353 mm | Fuel tank capacity: | 86 l |
| Wheelbase: | 2,942 mm | | |
| Front track: | 1,586 mm | | |
| Rear track: | 1,590 mm | | |

| | |
|---|---|
| Dry weight (UE version): | 1,780 kg |
| Unladen weight (UE version): | 1,880 kg |
| Kerb weight with driver (UE version): | 1,955 kg |
| Maximum permitted weight: | 2,180 kg |
| Technically permitted weight: | 2,250 kg |
| Kerb weight distribution: | 49% Front; 51% Rear |

**Vehicle performances**


| | |
|---|---|
| Top speed: | 285 km/h (at 7050 RPM in 5° gear) |
| Acceleration from 0 to 100 km/h: | 5.2 s |
| Acceleration from 0 to 400 metres: | 13.4 s |
| Acceleration from 0 to 1000 metres: | 23.9 s (output speed 225 km/h) |
| Pickup from 80 to 120 km/h: | 3.7 s |
| Stopping distance from 100 km/h to 0: | 35 m |

Weight distribution is one of the key reasons behind the stability and balance of the vehicle, which also enhances the safety features perceived while driving. The configuration designed for the GranTurismo was obtained by moving the engine assembly to behind the front axle which, in everyday driving, translates into smooth and predictable vehicle behaviour. This not only enhances comfort and handling but also maximises traction during acceleration and road holding.
With respect to the Quattroporte Automatic, overall vehicle performances have been improved, while fuel consumption has decreased (3%), notwithstanding the mechanical base is identical. This is thanks to the lower vehicle weight, improved aerodynamic efficiency (Cx: 0.33), specific software for engine and gearbox control, and a slightly shorter final drive ratio of the differential.

**Fuel consumption and emissions (2004/3/EC directive)**

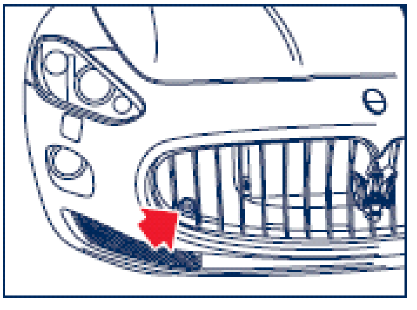
| | |
|---|---|
| City cycle: | 21.58 (l/100 km) |
| Motorway cycle: | 10.02 (l/100 km) |
| Average fuel consumption: | 14.31 (l/100 km) |
| $CO^2$ emissions (average): | 335.0 (g/km) |

**Scheduled maintenance**

The scheduled maintenance program for the Maserati GranTurismo is identical to the one for the Maserati Quattroporte Automatic.

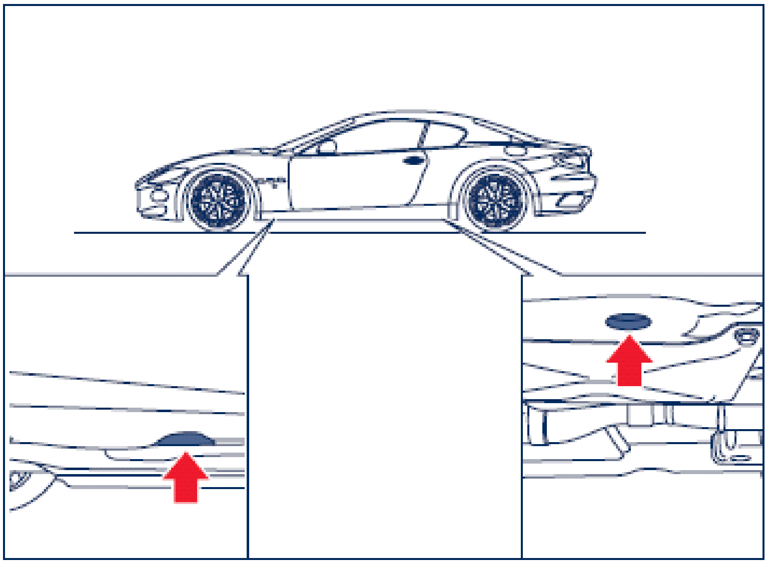
**Towing the vehicle**

If you need to tow the vehicle, observe the following recommendations:
if possible, have the vehicle transported on a vehicle equipped with loading platform and specific for roadside assistance and recovery.
If this is not possible:
tow the vehicle lifting the driving wheels (the rear ones). If this is not possible:
tow the vehicle for a distance of less than 100 km at a speed below 60 km/h. Tow the vehicle using the towing hook found in the toolkit. Screw the towing hook down tightly in its seat, on the lower, right-hand side of the front bumper.
In addition, for towing you must engage Neutral by moving the gearshift lever to position N. Do not extract the key, as the steering wheel will lock automatically and you will be unable to steer the wheels. WARNING: If you have to tow the vehicle with 2 wheels raised, ensure that the ignition key is in the STOP position. Otherwise, with the MSP activated, the relative electronic control unit stores a malfunction and the warning light on both the instrument panel and the display will come on; the vehicle will have to be taken to the Maserati Service Network to have the malfunction corrected.



**Lifting and jacking**

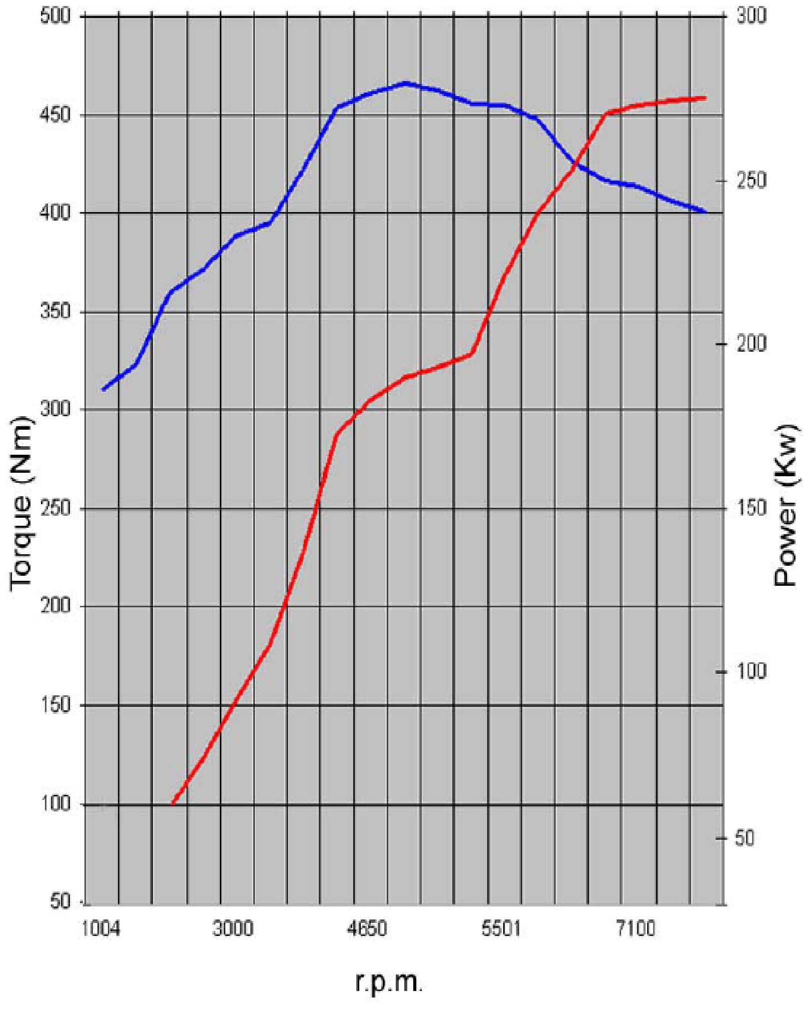
Use the the indicated points only for lifting or jacking of the vehicle.



## 1. Engine

The Maserati GranTurismo uses a 4.2 90° V8 wet sump engine, code named F136UD. This engine is basically the identical to the engine used by the Quattroporte Automatic (F136UC). Modifications were made only to the controlling sofware (different mapping), which gives the engine a slightly higher power output for the GranTurismo and more allert reactions to the commands of the accelerator pedal. This to enhance the dynamic characteristics of the vehicle.
The basic technical solutions of this new engine has been designed to obtain high specific power and to rapidly increase and decrease of the RPM, which is typical of competition engines, yet always with a watchful eye on fuel consumption, driving smoothness and silent operation.
The specific tuning of the V8 engine of the Maserati GranTurismo, unlike that of the engines used in the automatic versions of the Quattroporte, was aimed at improving the response to the accelerator commands (+20% in SPORT mode compared to the Quattroporte Automatic). In this configuration, the engine reaches its maximum 405 HP at 7100 RPM (specific power of 96.4 HP/litre) and the maximum torque of 460 Nm at 4750 RPM, 75% of which is already available at 2500 RPM.
See chapter 3 “Mechanical Components” for more detailed information about this engine.

**Engine performance curves:**

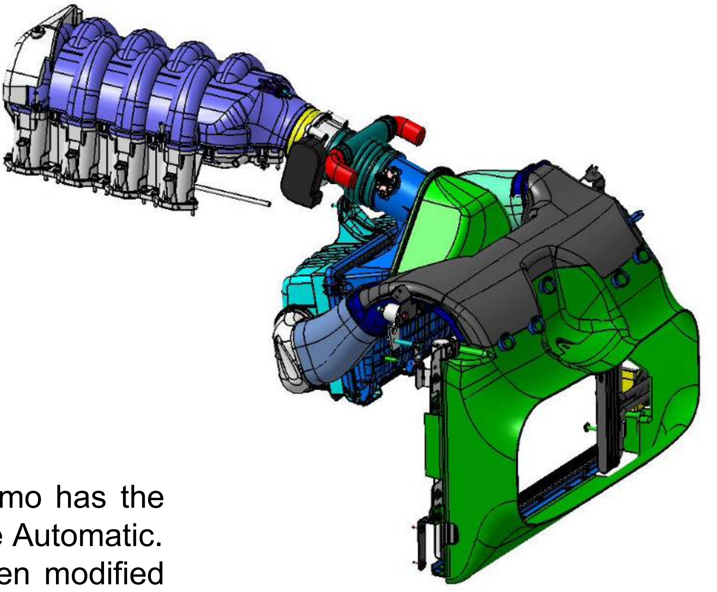



| | |
|---|---|
| **Max power:** | **297kW (405 HP) at 7100 rpm** |
| **Maximum torque:** | **460 Nm (47Kgm) at 4750 rpm** |

**Engine control system:**

The engine control system and its variuos components of the GranTurismo is identical to the system of the Quattroporte with automatic transmission. The used engine control system is Bosch Motronic 7.1.1; calibration software is however specific for the GranTurismo.
On the next pages are only described the systems or parts which have been modified for the GranTurismo.

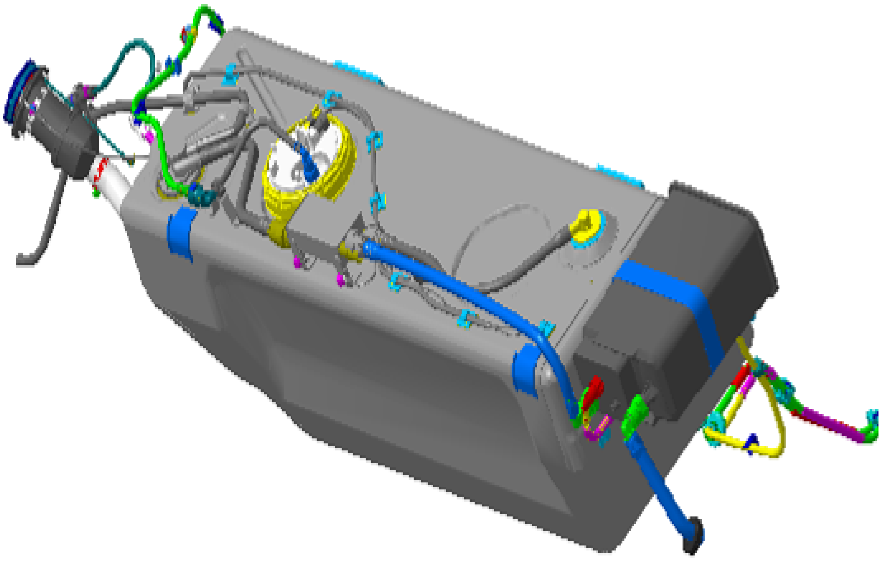
**Air intake system:**



The air intake system of the GranTurismo has the same characteristics as the Quattroporte Automatic. The shape of the front air duct has been modified and is thus specific for the GranTurismo.

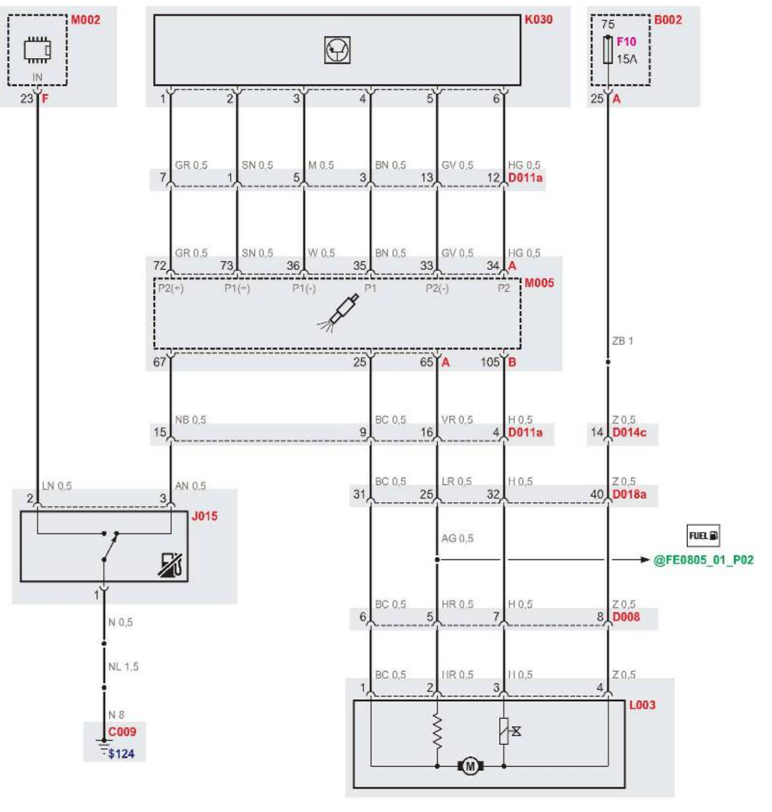
**Fuel system:**

The fuel and anti-evaporative system used in the Maserati GranTurismo has the same characteristics as the system used in the Quattroporte.

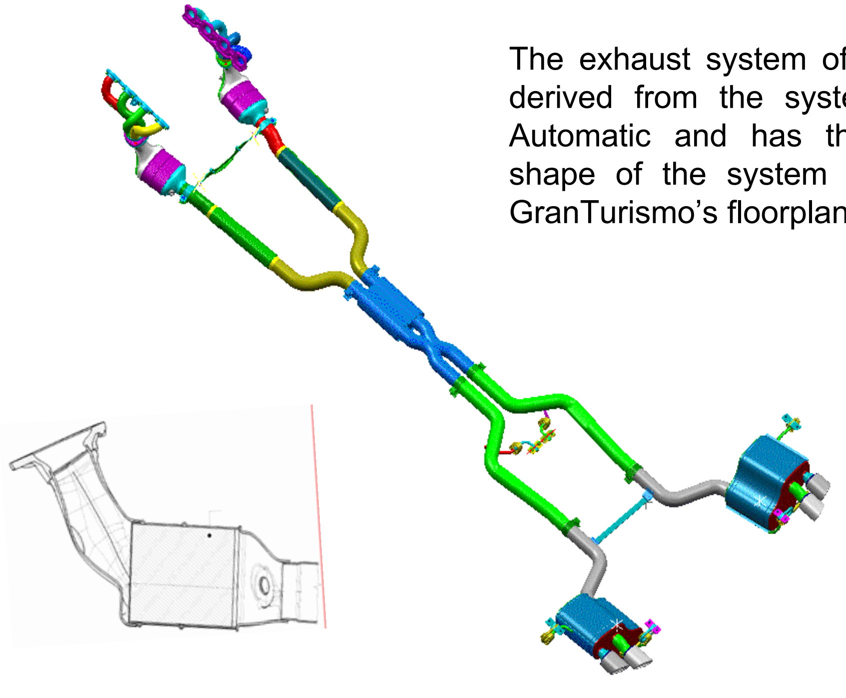


### Inertia switch:

The opertion logic and the location of the inertia switch in the GranTurismo is identical to the Quattroporte. The difference lies in the fact that the inertia switch is at one side now connected to the body computer (NBC).
The body computer will activate the hazard lights and the interior lighting and will unlock the doors in case a collision is detected.




### Exhaust system:



The exhaust system of the Maserati GranTurismo is derived from the system used in the Quattroporte Automatic and has the same characteristics. The shape of the system has been modified to fit the GranTurismo's floorplan. Tailpipes are specific.

## 3. Transmission

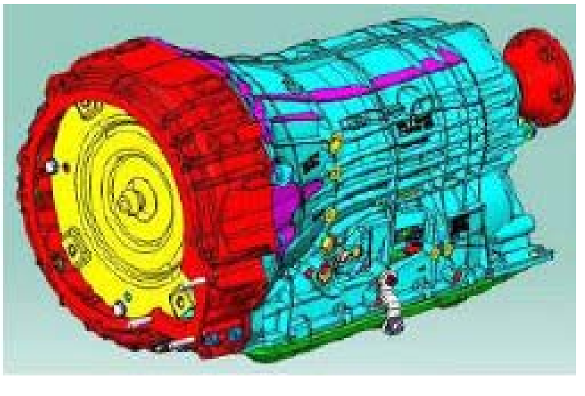
The automatic transmission of the Maserati GranTurismo has been engineered to offer the best possible compromise between performance, driving comfort and fuel economy. It consists of the following components:

**ZF 6HP26 automatic 6-speed gearbox:** hydraulic gearbox with torque converter, lock-up clutch and integrated control unit (Mechatronic). Various driving modes are offered: fully automatic gearchange in normal, sport or ice mode, or manual sequential gear selection by use of the gearshift lever or gearshift paddles at the steering wheel. This gearbox is mechanically identical to the one used in the Quattroporte Automatic. The controlling software is specific for the Maserati GranTurismo to enhance the sporty character of the vehicle (faster gearshifting).

**Composed transmission shaft:** the transmission shaft is composed of a front and rear part and uses three homokinetic joints. This solution was chosen because of a slight desaxation between the gearbox output shaft and the differential input shaft, both in the horizontal and in the vertical surface. The transmission shaft is sorter as the one used in the Quattroporte Automatic due to the sorter wheelbase.
Note: the transmission shaft requires a balancing procedure after the removal of transmission components (gearbox, transmission shaft, differential). This balancing procedure is identical for GranTurismo and Quattroporte Automatic.

**Graziano limited slip differential:** with respect to the differential of the Quattroporte Automatic, the final drive ratio has been changed. This was done to improve performances and reduce differential noise.

Note: see chapter 3 “Mechanical Components” for more detailed information on the individual transmission components.



**Adaptive gearbox strategy**
By enhancing and synchronising the transmission control with other systems in the vehicle (e.g. engine, braking system, driving wheels and steering wheel) a series of signals are made available: these provide a description of the driving condition in real-time. After applying longitudinal or lateral acceleration, the ECU activates (through acquisition of signals such as engine speed and torque, oil temperature, accelerator position and movement and the rotating speed of the individual wheels) implementation of additional functions of the electronic transmission control. Based on this information, the transmission control is capable of recognising whether the vehicle is in a curve and whether the driver is braking or wishes to accelerate. By means of these signals, it is possible to draw conclusions relating to the actual vehicle load and the topography of the road (uphill or downhill) which can then be applied to the transmission function. This system is known as automatic transmission with adaptive transmission control.
It is capable of recognising the driver's intentions, recording the driving style and consequently adapting the gear selection. Manual operation is therefore not necessary. ZF Getriebe GmbH and Robert Bosch GmbH have worked together with Maserati to produce new software for the electronic transmission control, which contains some very useful functions. The Adaptive Shift Strategy (ASIS) is based on a few important factors. Gear selection depends on the gradient of the slope while driving. The novelty is represented by the capability of continuously adapting the gearshifts to the individual driving styles which may vary infinitely from racing-style (dynamic) to extremely "economic" driving.
All the functions and their operating modes are described and represented in this brief description of ASIS. Examples of signals sent by other systems in the vehicle are given together with the evaluation these systems provide for electronic transmission control.

**Lateral acceleration**: The transmission 'learns' the driver's style and assigns a theoretical count system to certain driving scenarios. When it recognises an acceleration action, including after long periods of regular driving, it increases the number of counts for the driver until reaching the maximum level in approximately 10 seconds. The resulting counts for the driver and the time it takes to reach this level depends on the lateral acceleration level.

**Longitudinal acceleration**: The longitudinal acceleration is evaluated mainly to allow a decrease in counts when the driving style is constant and no other information is available (pick-up or lateral acceleration). When the driver brakes, the count system is stopped.

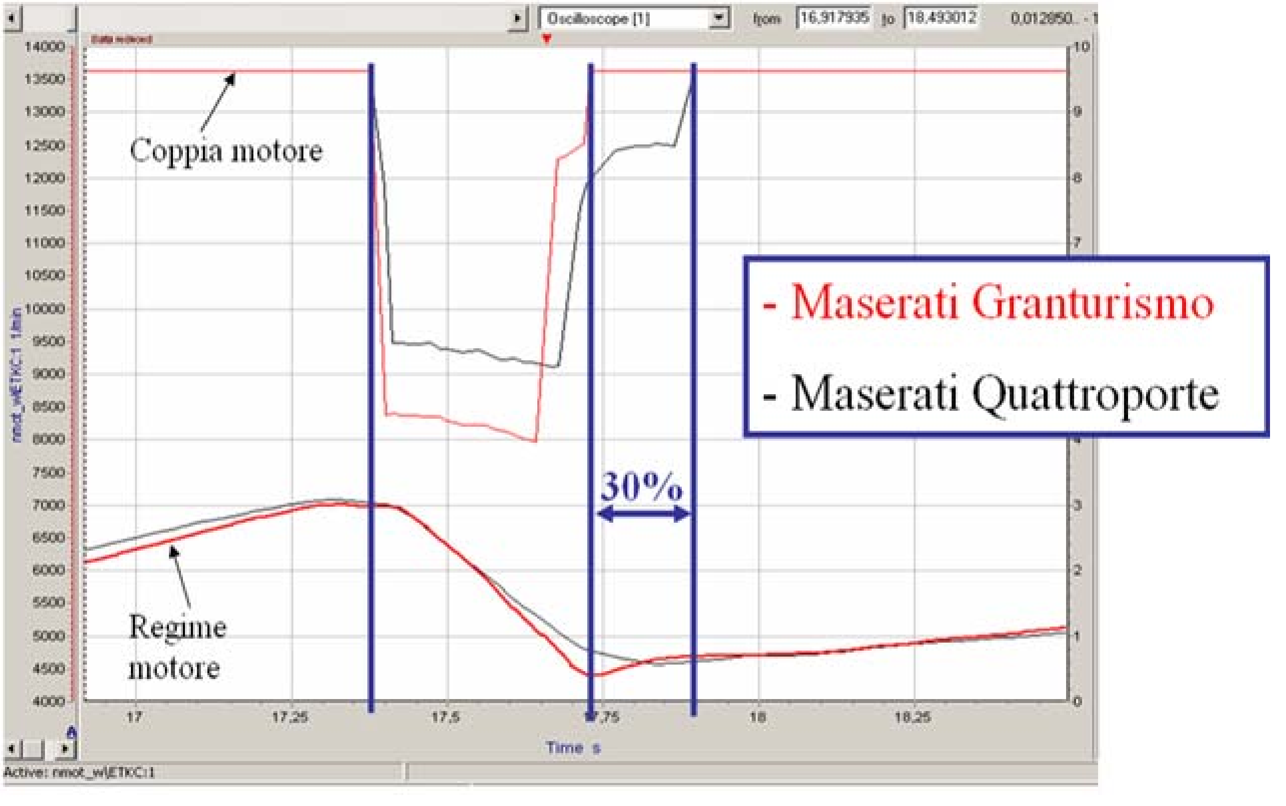
**Calculation of the road gradient**: The road gradient is calculated by comparing the actual acceleration of the vehicle with the acceleration the vehicle would have when driving on a thoroughly level road. Acceleration on a level road is calculated based on the vehicle weight and the actual torque delivered by the transmission. The ASIS system distinguishes 5 different categories of road gradient, each of which is associated with a gearshift map. The five conditions are: downhill, level, and three different uphill gradients.

**Auto Normal mode**

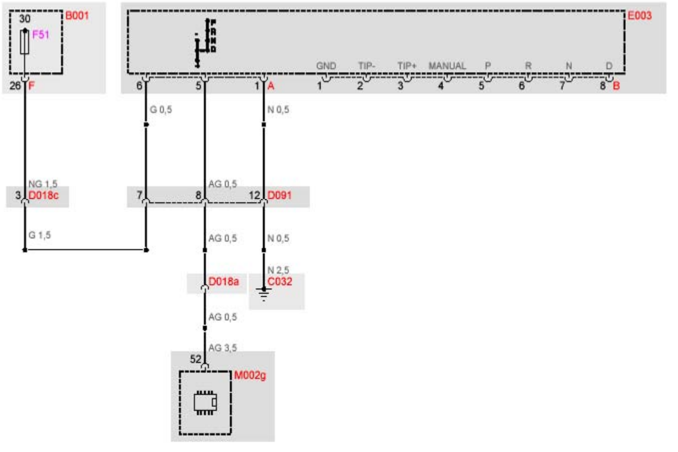

Normal driving style and reduced consumption. In the case of a driving style watchful of consumption and with reduced acceleration levels (longitudinal and lateral) the gearshift programmes are adjusted in such a way as to obtain maximum cruising comfort. In order to reduce vibrations and acoustic feedback of the engine to a minimum, upshifting must be performed as quickly as possible. Downshifting during pedal release or downhill driving (0% pedal depression) occur at 1000 RPM. Downshifting following the action on the accelerator and/or brake pedal is less aggressive than in the other modes.
Racing-style driving:
When a more racing-style driving is detected in Auto Normal mode, upshifting with reduced pressure on the pedal occurs at a higher engine speed. In this way, the gearbox and engine have a greater reserve of power without having to downshift. Anticipation of downshifting during braking considerably increases, so that the correct gear is engaged before entering a curve.

**Auto Sport Mode**
Generally, when using Sport mode, gearshifting occurs at much higher RPM and, at the same time, as a result of the *fuel cut-off*, gearshifting is faster than in Normal mode with a reduction of up to 40% in gearshift times.
This difference is very evident when the accelerator pedal is not fully depressed (i.e. pedal at 40%). The *fuel cut-off* technique designed for the Maserati GranTurismo (see the image that illustrates gear engagement from second to third gear at 7000RPM with accelerator pedal depressed by 40%) permits reducing the time necessary to cut the torque to the engine, shift gears and provide power once again. Normal driving style and reduced consumption.

When using Sport mode in normal driving conditions without high lateral acceleration, the gearbox management software as a rule uses a lower gear than would be used in similar conditions in Auto Normal mode. Without operating the accelerator/brake pedal, downshifting is requested at about 1500 RPM. This makes the gearbox response much more racing-like without significantly affecting driving comfort. When driving on a motorway, 6th gear is engaged at a speed of 125 km/h.
Racing-style driving:
In order to achieve the best reactivity, the gearshift maps are set to very high engine speeds. With reduced pressure on the pedal or with the pedal at 0%, upshifting occurs at approximately 4000 RPM. Downshifting, following an action on the brake pedal, is adjusted in such a way that the gear is engaged before going into a curve, so that the driver has optimal control and an adequate reserve of power to come out of the curve. This mode is therefore specifically designed for driving at high speeds or for very difficult road conditions.



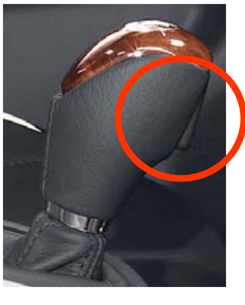
The automatic electronically-controlled gearbox has 6 forward gears and one reverse gear. In addition to automatic gear selection, the gears can also be selected manually.





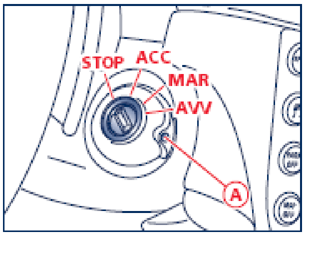
The lever position is shown on the gear display by the illumination of the corresponding letter. This letter is also shown on the instrument panel display. The engine can only be started when the gearshift lever is in P or N.
**WARNING**: After starting the engine and setting off, do not depress the accelerator pedal before and while shifting the gearshift lever. This is particularly important when the engine is cold.

***Shift-Lock***
This safety system allows you to shift from P (PARK) to another position only if the brake pedal is depressed. This prevents the vehicle from involuntarily jumping forward or backward.




***Key-Lock***
After turning off the engine with the gearshift lever in a position different from “P”, the key can be extracted within a maximum time of 30 seconds. When this time has elapsed, the key can no longer be removed from the ignition block. To remove the key, you must turn it to ON and then back to OFF.

**WARNING**: In the case of an emergency, (e.g., breakdowns, dead battery etc.) the ignition key can be removed even if the gearshift lever is not in P. To do this, turn the key to STOP, press the button A on the gearshift lever and at the same time remove the key.



**CAUTION!**

When parking on steep slopes, it is recommended to shift the lever to PARK before leaving the vehicle (whether the engine is running or not). This is recommended since the EPB system installed in the vehicle is capable of ensuring that the vehicle is properly parked and stationary when fully laden only on a gradient up to 20%

Selecting automatic or sequential manual operating mode:
The gearbox can be used both in fully automatic (position D) and in sequential manual (positions + or -) mode.
The operating modes can be activated through the following selections:

- D automatic gearshifting (AUTO)
- M (+ / -) Sequential manual gearshifting (MANUAL)

The lever can always be shifted between these two positions even if the vehicle is moving and without depressing the brake pedal. The lever can continuously be shifted between D and M.
If automatic gearshift mode is selected, the word AUTO and the letter D will be shown on the instrument panel display, while for sequential manual gearshifting, the word MANUAL and the gear engaged will be shown.

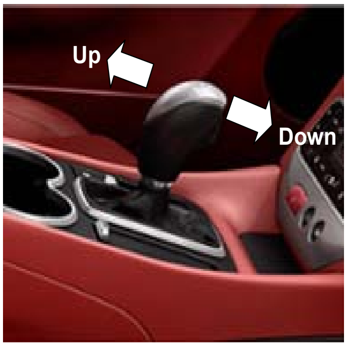
**Automatic selection operating mode**
Select the D (drive) position when you wish to use all the automatic gearshift functions.
With the vehicle stationary and the brake pedal depressed, shift the gearshift lever to D; if the gearshift lever is in P or R, also press the button A on the lever knob. When the function is set, the letter D illuminates on the gear display and on the instrument panel.
With this function active, the ECU controls automatic engagement of the six gears. The gears will be engaged in relation to the travelling speed, engine RPM, accelerator position, speed with which the pedal is depressed, as well as the travelling conditions (uphill, downhill, curves).
The system is programmed to classify all driving styles related to the above mentioned parameters, matching them to ten different vehicle settings which go from extremely comfortable and fuel-economy driving to full racing-style driving. The setting is selected automatically.

***Kick-down strategy***
This strategy is activated by rapidly and fully depressing the accelerator pedal, which causes engagement of a lower gear than the current one; this function assists the driver when maximum acceleration is required. When the pedal is released, the best gear in relation to the vehicle speed and the position of the accelerator pedal is automatically engaged. The kick-down strategy can be activated only when automatic operation has been set, with the gearshift lever in position D.

**Manual selection operating mode**
Push the gearschift lever to the left from the D position to select the manual mode. To engage the gears, move the gearshift lever to the following two positions:

**+ UP** to engage a higher gear
- **DOWN** to engage a lower gear.

The Maserati GranTurismo has gearshift paddles behind the steering wheel as a standard feature. In sequential manual operating mode, upshifting and downshifting can be controlled not only with the gearshift lever but also with the two levers positioned behind the steering wheel.
Also in automatic gearbox operation with the gearshift lever positioned in D (drive), you can request a gear different from the current one by activating one of the levers. This action will temporarily switch the system to sequential manual operation. If you then keep to a constant driving style (low longitudinal and lateral acceleration), the gearbox automatically switches back to automatic operation.




**WARNING**: Even if manual gearshifting mode has been activated, some functions are still controlled automatically. When the engine is overrevving or underrevving, the system automatically engages a higher or lower gear.

**WARNING**: If you request a gearshift in conditions where the engine is overrevving or underrevving, the system will not accept the command.

**WARNING:** The electronic control unit is programmed to handle one gearshift at a time, therefore, fast and repeated requests will not necessarily result in a gearshift. The higher or lower gear is engaged only if the previous gearshift procedure has been completed.

**Parking**
When parking the vehicle, shift the lever to the P position (park). A gear device inside the gearbox will lock the driving wheels.

**WARNING**: To prevent accidental engagement, the gearshift lever can only be shifted from P to any other position when the button on the gearshift lever and the brake pedal are depressed.

**WARNING**: Shift the lever to position P only when the vehicle is stationary.

**WARNING**: Before getting out of the vehicle, check that the automatic parking brake is engaged. Shift the gearshift lever to P even when you need to get out of the vehicle for only a few seconds leaving the engine running.

**WARNING**: If you turn off the engine with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds.
If you open the driver's door with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds.

**Strategies for downhill driving**
When the DRIVE mode is selected and the accelerator pedal is released, the gearbox system detects that the vehicle is moving downhill and deactivates upshifting. When the accelerator pedal is depressed, upshifting is reactivated, however, with a delay of a few seconds.
When the brake pedal is depressed, the gearbox system downshifts to provide enhanced engine braking power. In other words, when driving downhill, the gearbox system operates so as to avoid upshifting and shifting gears when the accelerator pedal is released, and delays gear engagement by a few seconds when the accelerator pedal is depressed. In addition, when the brakes are applied, it engages the lowest gear in order to provide enhanced engine braking power. This strategy is aimed at making downhill driving safer.

**Strategies in curves**
The gearbox system detects when the vehicle is in a curve through the lateral acceleration and the steering angle. Detecting the DRIVE mode, the system deactivates both upshifting and downshifting until the vehicle comes out of the curve. In particularly tight uphill curves the system downshifts. Gearshifting is reactivated when the vehicle comes out of the curve at a distance that varies depending on the vehicle speed.

**Hot-mode strategy**

In the event that the engine oil or coolant temperature or both are too high, the gearbox system reduces the maximum engine speed to 4000 RPM. For this reason, upshifting will occur at this limit.

This strategy does not apply to downhill driving, so as to always have the efficiency of engine braking together with the standard braking system.

**Acoustic signals**

If you turn off the engine with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds.

If you open the driver's door with the gearshift lever in a position different from P, an acoustic signal will sound for a few seconds.

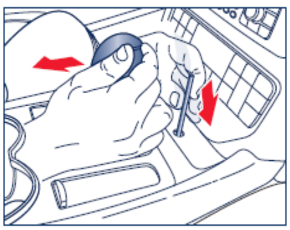
With the lever in R, the system emits an acoustic signal for a few seconds to warn anyone in the vicinity that you are about to reverse.

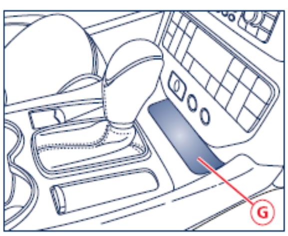
**Gearshift lever release in emergency conditions**

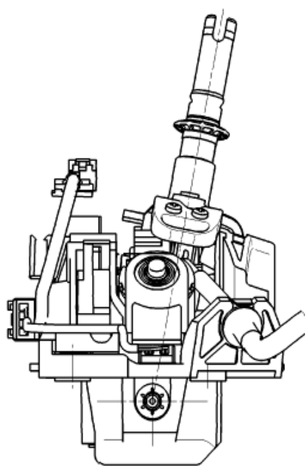
In the event of failure of the electrical power supply system with resulting dead battery, the vehicle may only be moved after the gearshift lever has been released from the P position and moved to the N position. When there is no power, the lever can only be released using the emergency procedure.

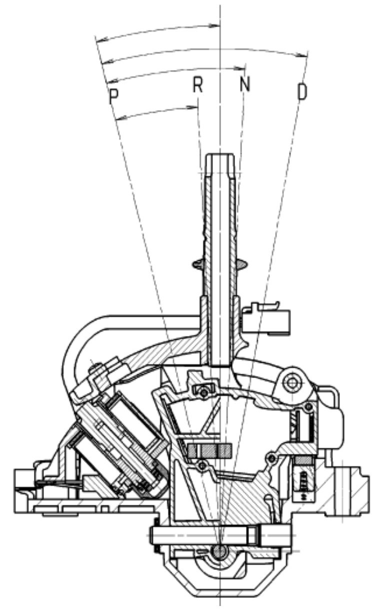
- Remove the cover **G** in front of the gearshift lever.
- Using the screwdriver contained in the toolkit, push on the release mechanism working through the hole and at the same time shift the gearshift lever to N.
- The gearshift lever has now been released.

NOTE: In order to tow the vehicle, the emergency release procedure of the EPB system must be performed.





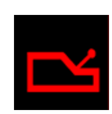



**Low gearbox oil level**

The red icon indicates that the gearbox oil level is too low. If the warning light comes on,  stop the vehicle. The gearbox oil level must be checked.
Note: the gearbox does not contain an oil level sensor or switch. The gearbox oil level is a calculated estimation made by the electronic control unit.

**Automatic gearbox failure**

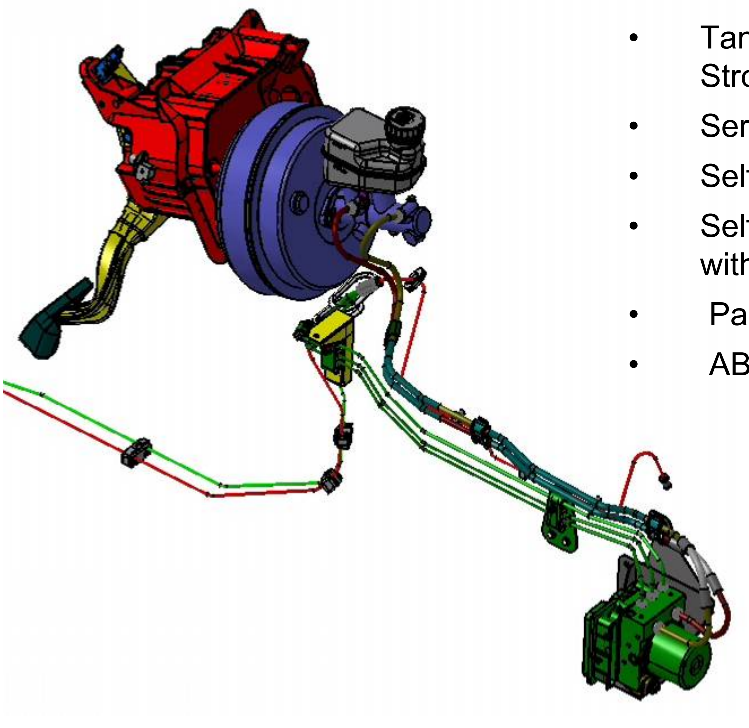
Depending on the different related messages, the symbol may indicate:
- a gearbox failure (error code stored)
- a too high actual temperature of the gearbox oil (no error code)



**Gearbox failure**

This message, highlighted in red, indicates a gearbox system failure, therefore, if you are travelling, the ECU that controls the device sets an emergency program. In these conditions, we recommended that you stop the vehicle and turn off the engine for at least one minute. When restarting the engine, the autodiagnostic system may cancel the malfunction, which will in any case be recorded by the ECU.
In failure conditions, the gearshift lever can always be shifted to R, N, D and P. When shifting to the latter position, only a few gears will be available, depending on the malfunction found.

## 4. Braking System



**System components**

- Brake servo 8+9“Ø
- Tandem brake master cylinder 15/16" Stroke 18+18mm
- Servo control ratio 13.5
- Self-ventilated front discs 330x32mm
- Self-ventilated rear discs 330x28mm with new brake calipers
- Parking brake with electric activation
- ABS/ESP **Bosch 8.0**

The Brembo braking system of the Maserati GranTurismo is equipped with 4 ventilated discs on the front and rear wheels (front 330 mm Ø x 32 mm, rear 330 mm Ø x 28 mm) with 4-piston calipers.

**Brake performance:**

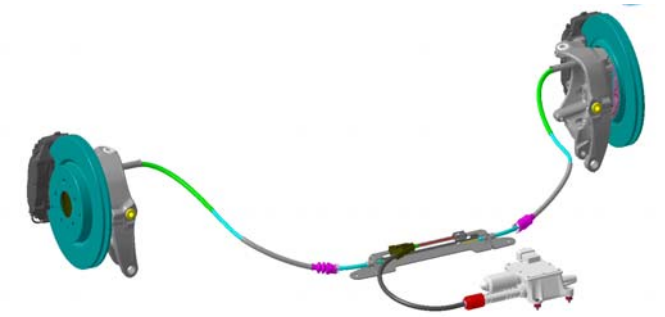
| | |
|---|---|
| Stopping distance: from 100 to km/h: | 35 m |
| Maximum deceleration: | 1.24 g |

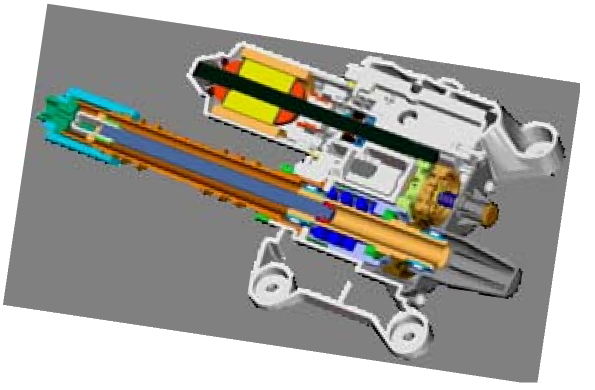
From a safety point of view, the vehicle is equipped with ABS, which prevents the wheels from locking during braking, and EBD, which provides optimal brake force distribution between the front and the rear; both are integrated in the MSP system (Maserati Stability Program). MSP contains further electronic stability control (ESP), traction control (ASR) and engine brake torque control (MSR).
To help the driver during uphill starting, the Maserati GranTurismo is fitted with the “*Hill Holder*” device which, in the case of sloped roads, immobilises the vehicle for a few seconds to allow the driver to move his foot from the brake pedal to the accelerator pedal without the vehicle rolling back.

The standard brake calipers have black finishing; on request, they can be supplied in five different colours: red, yellow, titanium, blue and silver. The Maserati name is black (for the red, yellow and silver calipers), white (for the black and blue calipers) and red (for the titanium calipers).

**Electric Parking Brake (EPB)**

The Maserati GranTurismo is standard fitted with an electric parking brake (EPB). The system is identical to the one used in the Quattroporte Automatic.





**The EPB system is composed of:**

- EPB actuator (cable puller) with integrated ECU
- Primary cable
- Equalizer / divider
- Secondary cables (LH + RH)
- Drum parking brakes, integrated in the rear brake discs.
- Parking brake command switch
- “Park off” button
- Emergency release tool (integrated in the toolkit)


System operation and various functions are identical to the Quattroporte Automatic system. See Quattroporte for more details.
**Note:** Al GranTurismo vehicles are fitted with the PRE RELEASE function.

**Maserati Stability Programm (MSP)**

The Maserati Quattroporte Automatic has a new stability control system integrated in the Bosch ESP 8 ECU. The dynamic performance of the Maserati GranTurismo is supported by the Maserati Stability Program (MSP), specifically developed by the Trident engineers to provide greater safety and optimise the dynamic performance of the vehicle. The system is based on a set of sensors capable of detecting any vehicle failure with respect to ideal dynamic performance. It acts on the brakes and engine to stabilise their setup and restore proper performance. The Maserati Stability Program (MSP) performs the following functions:
− if the system detects a tendency to side skidding, it reduces the torque; it activates the brakes and stabilises the vehicle in just a few milliseconds (ESP);
− it prevents the wheels from locking during braking (ABS);
− it distributes the brake force between the front and rear axle, preventing the rear wheels from locking (EBD);
− it prevents slipping of the driving wheels, improving traction in low-grip conditions (ASR);

**SPORT mode**

Also for what concerns the MSP, the driver can choose Sport mode: in normal conditions, the system acts both on the engine torque and the brakes; when the SPORT button is pressed, the stability program is less "invasive" and permits enhanced racing-style driving without however affecting safety. In fact, the operating threshold is raised and the system mainly operates on the brakes without cutting power to the engine.

**MSP OFF mode**

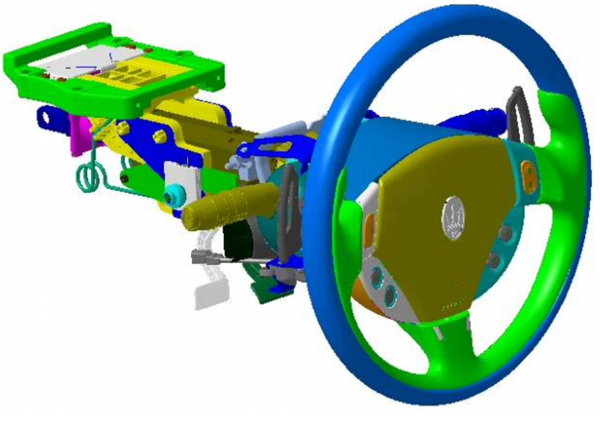
Pressing the “MSP OFF” button you can deactivate all the driving control systems (ESP, MSR and ASR), leaving only the ABS and EBD systems active. In emergency conditions, depress the brake pedal to reactivate all the driving control functions.
If The vehicle will perform without any safety system and the driver will have to rely only on the vehicle and his driving skills for particularly exciting driving. Of course, it is advisable to use the “MSP OFF” mode only on dry roads and on tracks closed to traffic. Even if the control system is deactivated, the Anti-Lock-Braking System (ABS) will remain active to prevent wheel locking or skidding. In order to prevent unstable driving conditions, the MSP system may request the gearbox system to disable automatic gearshifting. This request is processed by the system which, depending on the gear engaged and the engine RPM, will evaluate the appropriate gearshift or temporarily deactivate this feature.

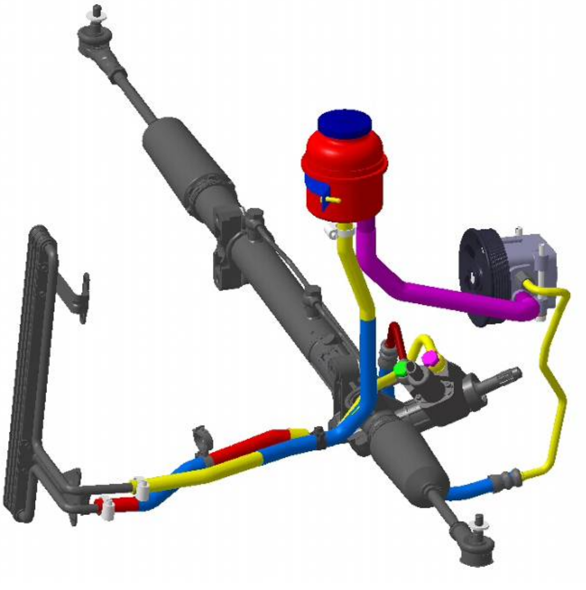
**ICE mode**


This mode can be used on particularly slippery road surfaces (e.g., snow, ice) and it is activated/deactivated by pressing the button on the NIT. The word ICE will illuminate on the instrument panel display. In “Low-grip" mode the system uses 2nd instead of 1st gear. This means that when you start from a stationary position with the engine running - both in automatic mode (gearshift lever in D) and manual mode (gearshift lever in M) - the vehicle will start in 2nd gear. When sequential manual mode is selected with 2nd gear engaged, a downshift request will be ignored.
When sequential manual mode is selected with 2nd gear engaged, a downshift request will be ignored. While driving, the system automatically switches to the upper gear if the engine reaches the pre-established speed rate (3,000 RPM). “Low-grip" mode has priority over SPORT mode and assists the MSP system.
If “ICE” mode is activated when “SPORT” mode is active, during the transition stage it may happen that both the “ICE” and the “SPORT” messages are present on the CAN line. In this case, the system will give priority to the “ICE” message, immediately showing it on the display.

## 5. Driving Controls

The standard steering column has manual adjustment for height and depth. Instead of the steering column with manual adjustment, you can request the version with electrical adjustment in combination with the comfort pack for the seats (this includes storage of the settings and heating).
The steering rack (TRW) and vehicle speed sensitive power steering are similar to the one used in the Quattroporte. The steering ratio has been changed with respect to the Quattroporte (more direct) to offer a more dynamic vehicle control.
Steering diameter (from pavement to pavement): 10.7 m





## 6. Suspensions and Wheels

### Wheels

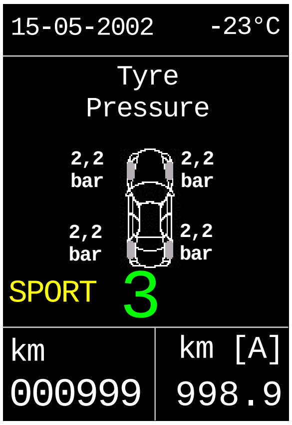
In the standard configuration, the Maserati GranTurismo is equipped with 19” aluminium wheel rims with different-sized front and rear tyres: for better power discharge to the ground, the rear tyres have a wider tread than the front ones.
The 19” wheel rims are in light alloy; front 8.5J x 19, profile H2; rear 10.5J x 19, profile H2; Front tyres 245/40 R19, rear tyres 285/40 R19.

A racing-style 20” version is available, which, although slightly reducing comfort, increases handling and response to steering movements, thanks to the effect of the smaller drift angle. The look is inspired by that of the Birdcage 75° wheels and further underlines the power of its mechanics.
Optional: 20" light alloy wheel rims; front 8.5J x 20, profile H2; rear 10.5J x 20, profile H2; Front tyres 245/35 R20, rear tyres 285/35 R20.

Both types are available with *Ball-Polished* treatment and in mercury grey:
− The ball-polished treatment emphasises the mechanical features at the same time gives a brilliant effect even if not as eye-catching as the chrome-plated wheels.
− The dark mercury grey further highlights the racing-like character of the GranTurismo.

## Tyre pressure monitoring system (optional)

**TRIP button** : displays the "Tyre pressure" information for 10 seconds



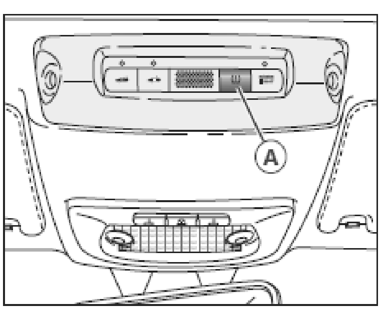

Information displayed :

- System temporarily inactive (for example: external radio interference)
- System not calibrated (for example: a tyre has been replaced )
- System failure
- System not active (if it is disabled by the diagnostic system)
- Low pressure or puncture of the LH front, RH front, LH rear and RH rear tyres
- Low pressure or puncture in unidentified tyre

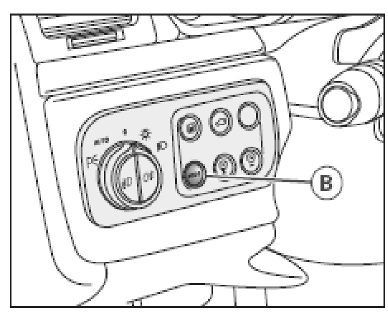
Note: If the system is not calibrated (for example: a tyre has been replaced) calibrate the system by pressing the button on the front ceiling light (from 4 to 10 sec.). The completion of the calibration procedure is indicated on the instrument panel.

**System calibration**

After replacing or inflating one or more tyres, the system must be calibrated once again. To calibrate the system, press and hold button **A**, located on the inside roof, for a time ranging between 4 and 10 seconds. The system takes a maximum of 20 minutes to complete the calibration procedure with the vehicle in motion. A green symbol will appear on the display together with the message "Calibration started". If the user recalls the information page showing the pressure levels of each tyre, dashes "–.–" will be viewed in the place of the values.
You can access the information screen page that shows the pressure values of each tyre by repeatedly pressing the "Mode" button **B**.





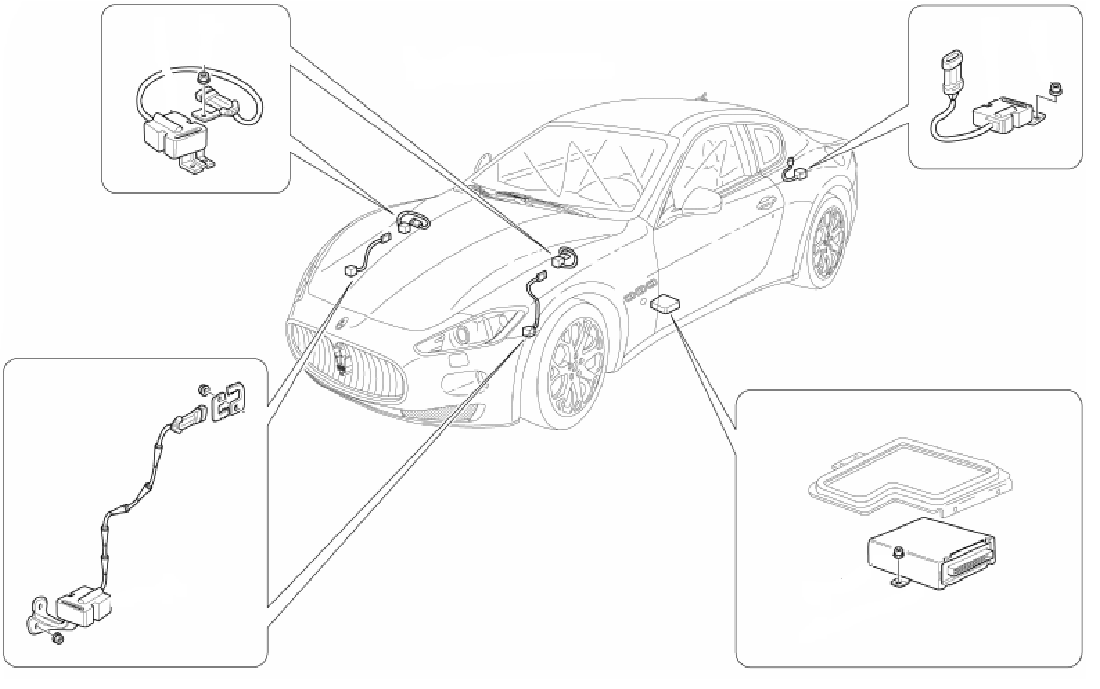


## Suspensions

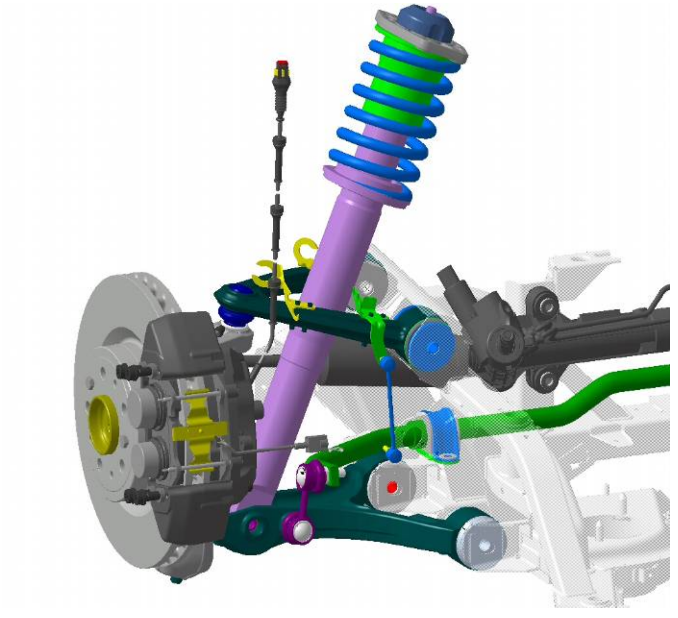
The chassis of the Maserati GranTurismo is fitted with overlapping-triangle front and rear suspension with forged aluminium hub carrier and arms, with the aim of reducing the unsprung weights of the vehicle.
As an optional, the Maserati GranTurismo can come equipped with aluminium gas shock absorbers with Skyhook system for automatic and continuous damping adjustment. This technology is used to assure optimal comfort levels with any road condition, without affecting performance and the racing-style character of the vehicle.
The Skyhook system acts by means of acceleration sensors which record the movements of each wheel and the bodywork. The ECU processes the information received, analyses the driving style and the road conditions and immediately adjusts the shock absorbers by acting on the proportional valve of each of them.
In the case of the fixed calibration system, the suspension set-up is optimised for handling:

- The standard suspension has been designed for those customers who prefer good handling over driving comfort.
- The standard suspension provides a vehicle set-up which is quite similar to that used with the Skyhook system in Sport mode.
- The Skyhook suspension offers superior driving comfort with respect to the standard suspension.

## Skyhook layout

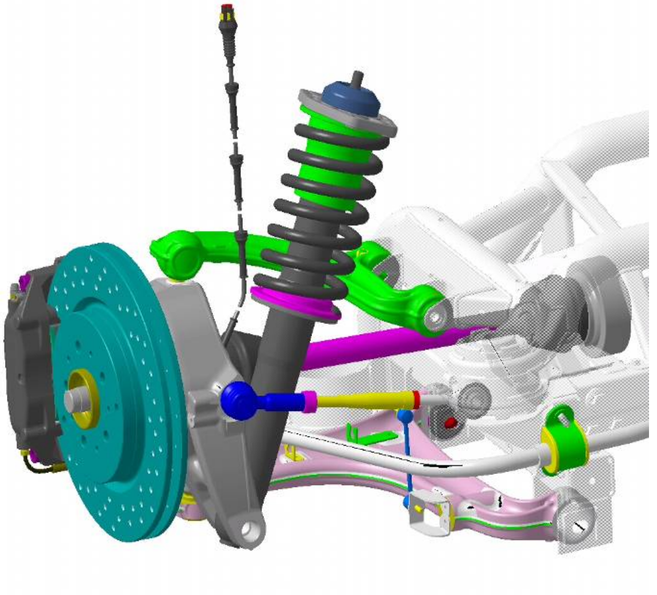


**Front suspensions**



- Articulated quadrilateral independent wheel suspension with double oscillating triangle
- Anti-dive and anti-squad geometry
- Forged aluminium levers, aluminium hub carrier
- 25 mm ø articulated stabilizer bar on ball joints
- Optional Skyhook variable-damping aluminium hydraulic shock absorbers
- Suspension mounted on a new separate frame rigidly connected to the bodywork

**Rear suspensions**



- Articulated quadrilateral rear independent wheel suspension with double oscillating triangle
- Anti-dive and anti-squat geometry
- Forged aluminium levers, aluminium hub carrier
- 24 mm ø articulated stabilizer bar
- on ball joints
- Optional Skyhook variable-damping aluminium hydraulic shock absorbers
- Suspension mounted on a new separate frame rigidly connected to the bodywork

**Wheel alignment**

**Front**

Camber : -0.30°±0°10’ on each wheel
Caster : 3.30°±0°10’ on each wheel
Total toe-in: -2,1 ±0.4mm (1,05 mm opening on each wheel)

**Rear**

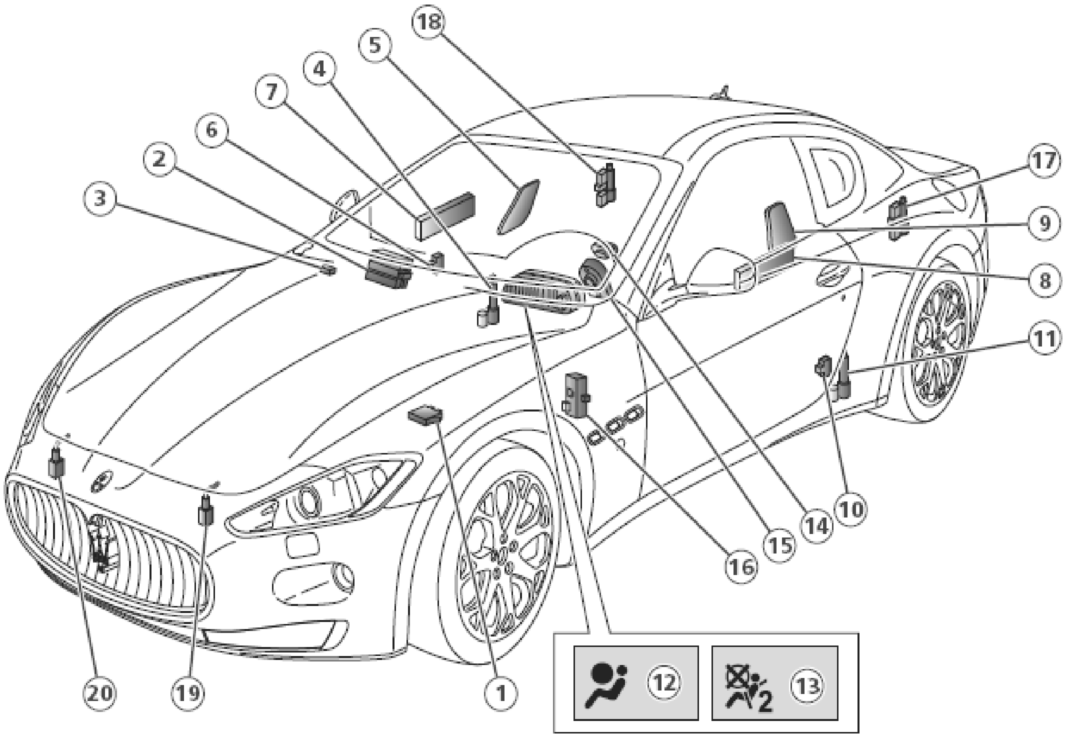
Camber : -1.30°±0°10’ on each wheel
Total toe-in: 4.2 ±0.4mm (2,1 mm closing on each wheel)

**Caution**

The characteristic angles must be adjusted during “static load” configuration, that is, with all the fluid tanks filled, the fuel tank full (90 litres) and 75 kg on both front seats.

## 7. Safety components

The vehicle is equipped with 6 airbags (2 front and 4 lateral ones) and electronically-operated pretensioners for all of the seat belts.




The system components are the following:

**1)** Electronic control unit
**2)** Passenger's front airbag
**3)** Air bag deactivation switch passenger's side
**4)** Passenger's front seat belt pretensioner
**5)**Passenger's side bag
**6)** Satellite crash sensor on passenger side
**7)** Passenger-side door-mounted airbag
**8)** Driver-side door-mounted airbag
**9)** Driver's side bag
**10)** Satellite collision sensor on driver side
**11)** Passenger's front seat belt pretensioner
**12)** Airbag system failure warning light
**13)** Passenger’s airbag deactivation warning light
**14)** Driver's front airbag
**15)** Clock Spring
**16)** Diagnostics socket
**17)** Rear left-hand pretensioner
**18)** Rear right-hand pretensioner
**19)** Front left-hand Crash Zone pretensioner
**20)** Front left-hand Crash Zone Sensor.

If replacing the **NAB** or a component of the airbag system, the initialisation procedure must be performed on the new component. To perform the initialisation procedure, detach the electrical connectors for the driver's airbag, passenger's airbag and side bags positioned under the front seats.

**CAUTION**
**Follow the instructions and relative safety regulations for removal and storage of the airbag modules.**

✓Connect the SD3 diagnostics tester to the NBC diagnostic socket.
✓Access "CYCLE ENVIRONMENT", select the airbag node configuration cycle and continue. After entering the vehicle data, select "CONTINUE" and turn the key to ON.
✓Wait for the checks to be completed and then follow the guided procedure, by means of which the tester will check the information available in the ECU.
Continue with the cycle until the tester prompts you to connect the driver-side airbag connectors, but without fitting the two secondary locks (safety devices for the connectors).
Connect the two secondary locks, first connecting the yellow one and then the green one.
Subsequently, the page **"ATTACH THE CONNECTOR THAT KEEPS THE PASSENGER AIRBAG LINE 1 IN SHORT-CIRCUIT" will be displayed**.
The part number of the fake connector is **900027450**. This can be ordered from the Maserati Spare Parts Department. Connect the fake connector **900027450**
Wait until the next screen pages prompt you to remove the fake connector **900027450** and to attach the passenger-side airbag connector. Attach the passenger-side airbag connector. Subsequently the screen page prompting you to attach the sidebag connectors will be displayed. Connect the sidebag connectors.
The diagnostic tester will then perform a check of the switches for the front and rear seat belts.
Buckle the seat belts in the following order:

- Front seat, driver's side
- Rear left-hand seat
- Rear seat, passenger's side
- Front seat, passenger's side

The buckled seat belts are displayed in red.
The diagnostic tester then asks the user if the manual deactivation device for the passenger-side airbag is fitted. Reply "yes" and continue with the cycle.
Perform the requested operations to check that the manual airbag deactivation device is properly functioning.
The diagnostic tester will then prompt you to check that the airbag warning light on the instrument panel is off. Subsequently, the summary of the initialisation cycle progress appears, which should be printed and filed.
Refit all the components previously removed to access the electrical connections of the airbag system.

# 8. Electrical Systems and Devices

**Electronic vehicle architecture**

The electronic and electric functions of the various ECUs and nodes are controlled by the F.L.ORE.N.C.E system, a technology that Maserati introduced with the Quattroporte. The use of this new system, designed for CAN communication, has allowed us to find immediate solutions as to communication, dimension, weight and cost problems. Each electronic control unit is positioned in the barycentre with respect to the functions it controls, so that the system is fully optimised.

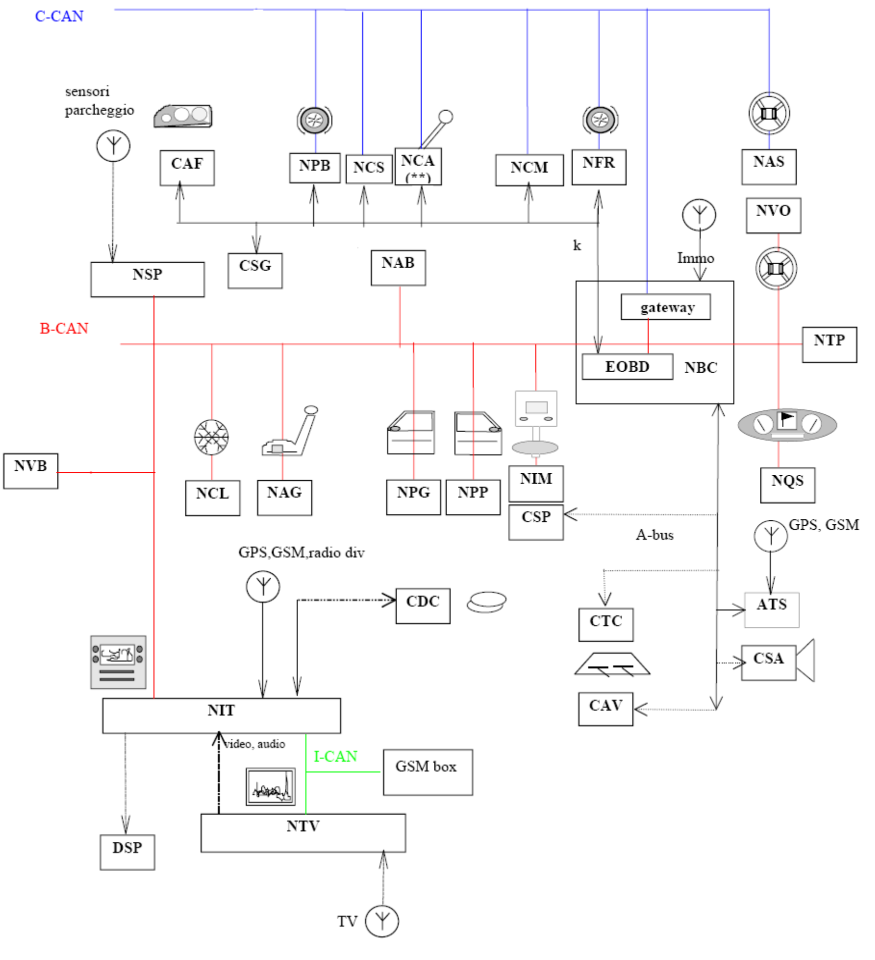
The F.L.ORE.N.C.E. system is made up of two CAN communication networks:

- **C-CAN network**: dynamic control and management of the vehicle (high speed);
- **B-CAN network**: control of the standard bodywork functions (low speed).

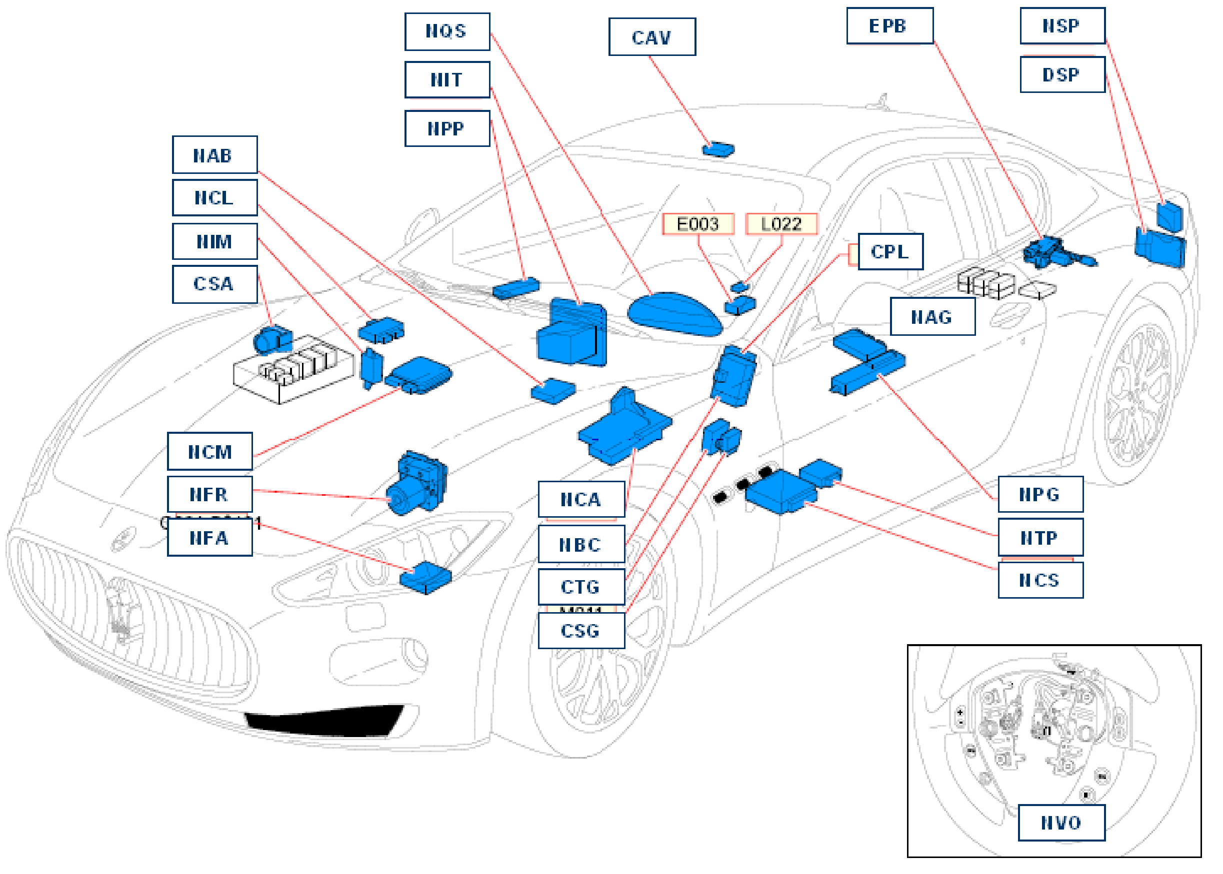
The C-CAN and B-CAN networks are connected to each other by the body computer unit which is equipped with both the interfaces and hence performs the network GATEWAY function for transferring information.

The system also provides a number of serial lines used for diagnostics and other specific functions:

- K-line diagnostics for NCM / NFR / CSG / NCS / CAF
- Serial line w for immobilizer recovery
- A-BUS serial line for alarm, windscreen wiper and twilight sensor control.



## Overview of controlling modules




## Switch Matrix cable harness for diagnostics

For use of the cable harness, it is essential that the key is turned to OFF when the SD3 is activated, until the ECU to be diagnosed has been selected. This is because in certain conditions, some errors may occur on the CAN lines, which would cause the warning lights on the instrument panel to flash.

## EOBD socket connections

1: B-CAN B
2: Dedicated
3: Dedicated
4: GND
5: GND
6: C CAN-H
7: K-line (NCM – NFR)
8: Dedicated

9: B-CAN C
10: Dedicated
11: Dedicated
12: K-line
13: Not used
14: C CAN-L
15: Not used
16: +30 EOBD

## Central door locking system

**Locking/unlocking the vehicle using the remote control:**

Door lock button:

Button pressed once: If the alarm system fails, the siren will emit a long beep and the red LEDs will start flashing quickly. If one of the doors has not been closed properly, the doors do NOT lock and the alarm system is NOT activated. The direction indicators and the red LEDs flash nine times (three seconds).

Button pressed at length: the windows close.

Releasing the button: the windows stop closing .

Door unlock button:

Button pressed twice: All the doors are unlocked (if enabled by the NIT, only the driver's door is unlocked), Low beams activated for 30 seconds

Button pressed at length: the windows open.

Releasing the button: the windows stop opening.

**Locking/unlocking the vehicle using the internal buttons:**
Luggage compartment opening button: button pressed at length: the luggage compartment is opened (when the vehicle speed is below 4 Km/h or when the vehicle is off)

**Locking/unlocking the vehicle using the button on the external revolving pawls:**

Key turned anticlockwise in DRIVER'S door lock (Opening): all doors are unlocked (or driver's door only if set through the NIT)
If the alarm is enabled: the red LEDs will turn off for 4 seconds (when this time has elapsed, they will start flashing again). When a door is opened the acoustic alarm is activated.

Key turned clockwise in PASSENGER'S door lock (opening): all doors are unlocked.
If the alarm is enabled: the red LEDs will turn off for 4 seconds (when this time has elapsed, they will start flashing again)

**NOTE**: When the vehicle is unlocked from the outside with the key, the alarm system is not deactivated. To deactivate the alarm system, simply insert the key in the ignition block. The immobilizer acknowledges the code automatically.

**Locking/unlocking the doors and the luggage compartment**

**Inertia switch:** the activation of the inertial switch unlocks all the doors and the luggage compartment and turns on the internal dome light and the four direction indicators. This is located underneath the driver's seat.

**Vehicle speed over 20 Km/h :** when the vehicle speed exceeds 20 Km/h the doors are locked if this function has been previously set through the IT Info Node (NIT) user menu

**Dead battery:** vehicle closing. The two front doors must be locked.

**Vehicle setup**: From the NIT user menu, you may decide whether to unlock both the doors or just the door on the driver's side.
From the relative menu, you can choose whether the luggage compartment should be connected to the door locking or whether it should be operated independently.

**Alarm System**

The alarm system of the Maserati GranTurismo is identical to the system used in the Quattroporte.

**Activation: the direction indicators will turn on permanently**, and the alarm siren will emit a synchronised beep. A red LED will now start flashing intermittently to indicate a "surveillance" status.

**Deactivation: the direction indicators will flash twice**, the alarm siren will emit a double beep. NOTE: The alarm system is also deactivated by inserting a key with an ID code in the ignition key barrel, so that the immobilizer can recognise it.

**Motion-sensing and anti-inclination alarm:** when the alarm system **is deactivated**, the motion-sensing and anti-inclination alarm can be turned off using the buttons provided on the front dome lamp.

**Luggage compartment opening:** the luggage compartment can be opened using the remote control; in this case, the motion and inclination sensors are temporarily deactivated. If the luggage compartment is then closed, the sensors will be reactivated.

**ECU self learning:**

Every time the battery is removed, a self-learning cycle is required so that certain ECUs can operate correctly.

• Motor-driven throttle: turn the ignition switch to the ON position (Key ON) and wait for at least 30 seconds.

• Locking/unlocking the doors and luggage compartment: lock and then unlock the doors using the remote control or the key.

• NIT (IT Info Node): reset the correct time using the specific NIT service menu

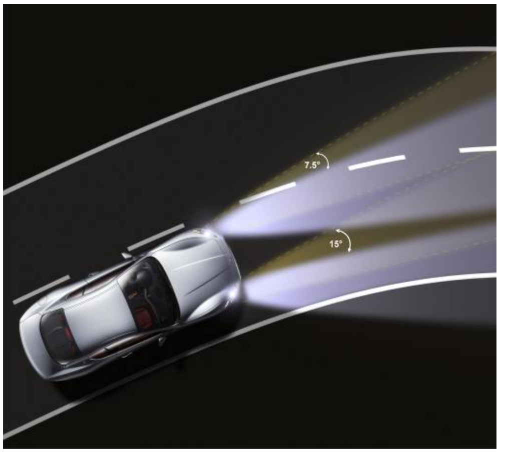
## External lights


**(1)** The side markers, provided as a standard equipment for all the markets, improve driving safety and are also an attractive aesthetic element
**(2)** Front direction indicator repeater
**(3)** Position light
**(4)** Bi-xenon headlight – low-beam + high-beam
**(5)** Additional low-beam (*Flash to Pass* ) – the bi-xenon lamps take some time to reach maximum efficiency, therefore, while the bi-xenon headlights are off, the flashing function is assured by a conventional light.
**(6)** Front headlight cleaning system
**(7)** Fog light

**Adaptive light adjustment**
The Maserati GranTurismo is fitted with a set of self-levelling bi-xenon headlights with fully automatic adjustment system. The high performance of the bi-xenon headlights is enhanced even further by the rotation function which, by improving the illumination of the road and surrounding areas, contributes to increasing driving safety during night-time on particularly twisty roads. The high-beam and low-beam control unit instantaneously receives and processes the information on steering, camber and driving speed and acts on special electric motors that turn the light cones in order to increase side illumination.

Operating strategy:

- The system is activated at a speed of 5 km/h.
- The maximum headlight rotation inside a curve is 15° and for the headlight outside a curve 7.5° (always half);
- From 90 km/h to 120 km/h the rotation is less
- Over 120 km/h and in reverse, the system is deactivated for safety reasons.



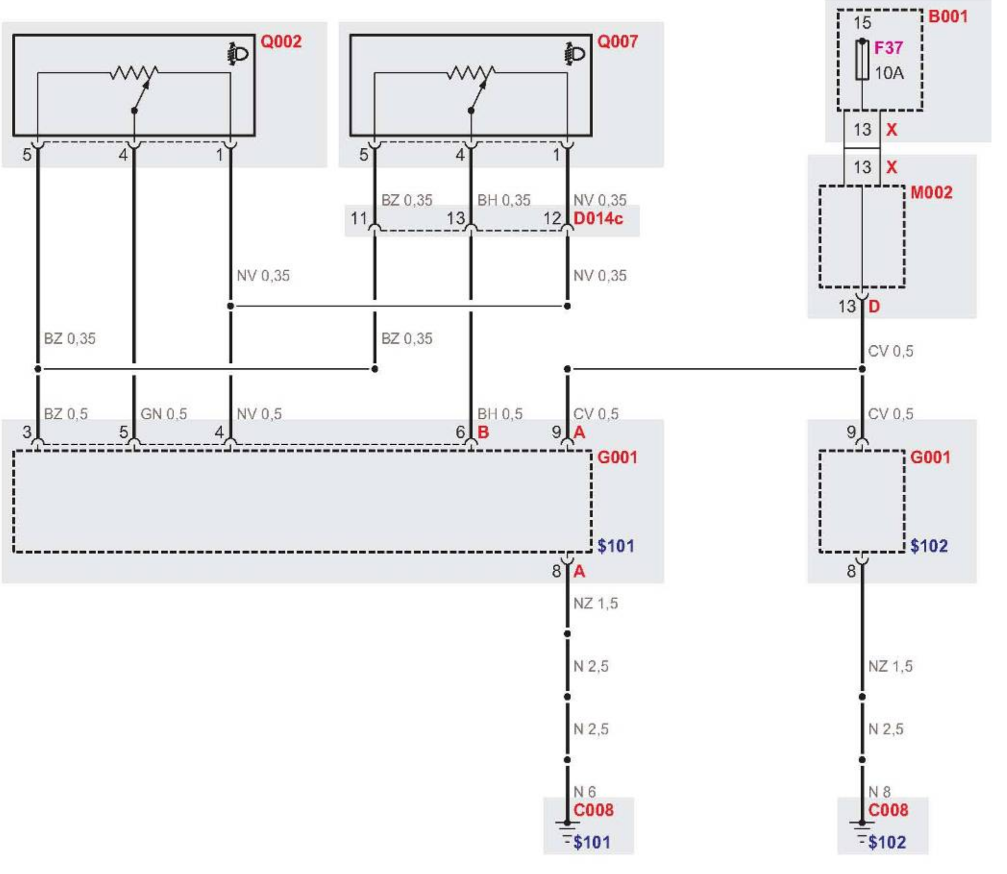
When replacing the left-hand headlight, perform the two calibration cycles on both NFA ECU.

• Connect the diagnostic tester to the EOBD socket on the Body Computer Node and calibrate the Self-adaptive Headlight Node (NFA). This cycle involves the calibration of the left-hand headlight (MASTER) and subsequently of the right-hand one (SLAVE).

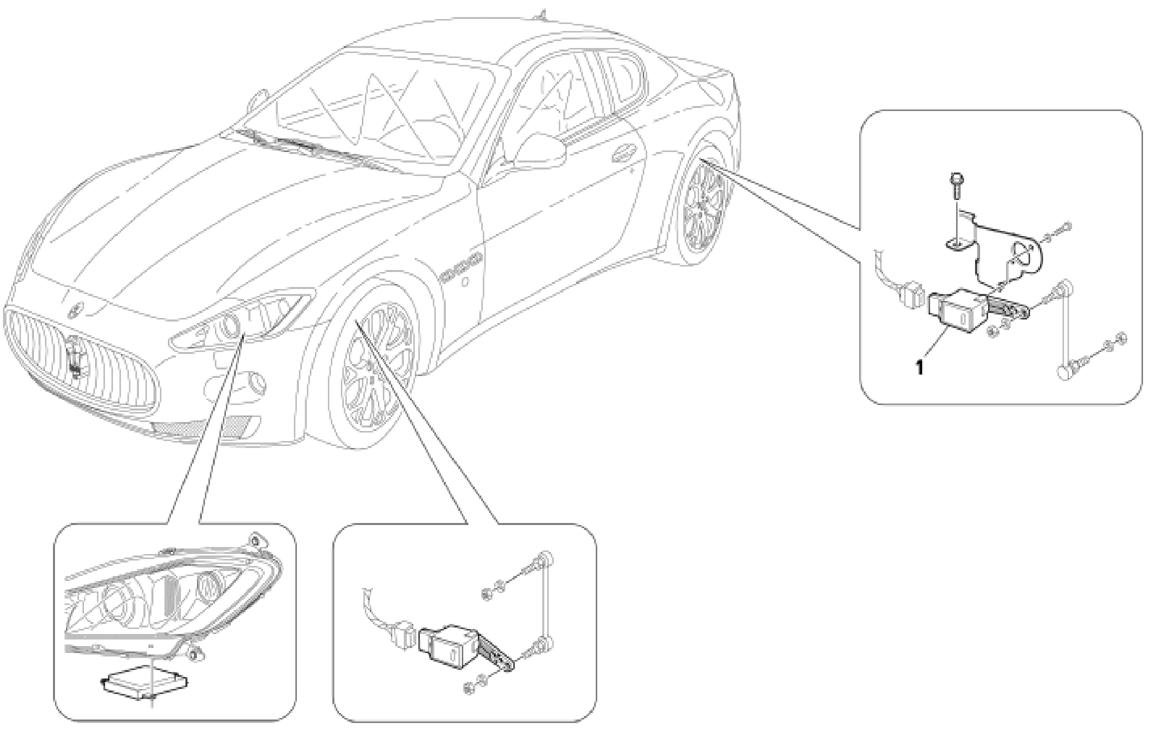
• The two cycles are independent, therefore you will have to launch first the MASTER calibration cycle and then the SLAVE one.

• In the event of a collision involving the left-hand headlight, the signal connector for the CAN line may be damaged. The damaged connector may interfere with proper vehicle starting. Therefore, if the vehicle cannot be used after a collision and the headlight is damaged, detach the CAN line connector and check engine starting.

If replacing the battery, the PROXY alignment procedure does not have to be performed; when the key is next turned to on and with the headlights on, the node performs a self-learning process as calibration.




| | |
|---|---|
| Q007: | Rear potentiometer for headlight aiming adjustment |
| Q002: | Front potentiometer for headlight aiming adjustment |
| G001: | Headlight cluster |
| M002: | Body Computer node (NBC) |




**Lights managed by the twilight sensor (AUTO mode):** the external lights are activated automatically by the twilight sensor. From the NIT user menu, you can set the twilight sensor's sensing range (3 levels).

**Follow me home**
This control enables the position lights and low beams to switch on automatically for a timed period, immediately after the vehicle is turned off (Key-OFF).

**Activation**: After turning the key to OFF, you must operate the control for flashing the headlights, found on the steering column stalk. The instrument panel activates the 'follow-me-home' signal and displays the time (in seconds) during which the lights will remain on. (Signal active for 20 sec.)

**Activation time increase**: When this function is active, every time you flash the headlights, the time the lights remain on is extended for a further 30 seconds (max. 210 sec.)

**Deactivation:**
- keep the control for flashing the headlights active for over 2 seconds.
- turn the ignition key from OFF to ON.

**Tail lights**

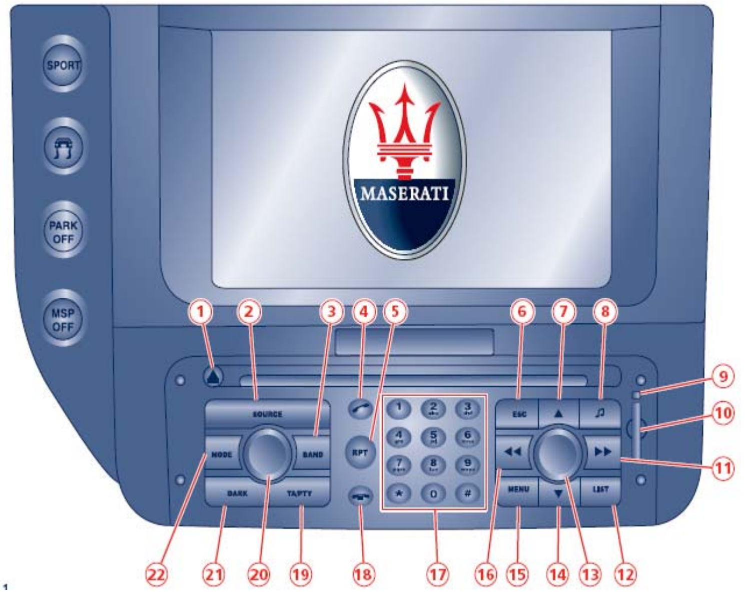

**(1)** Position light – LED technology (the function of the rear side marker is performed by the external section of the lighting device)
**(2)** Rear fog light
**(3)** Reverse light
**(4)** Stop – LED technology
**(5)** Direction indicator – LED technology
**(6)** Side reflector
**(7)** Reflector

**Internal lights**

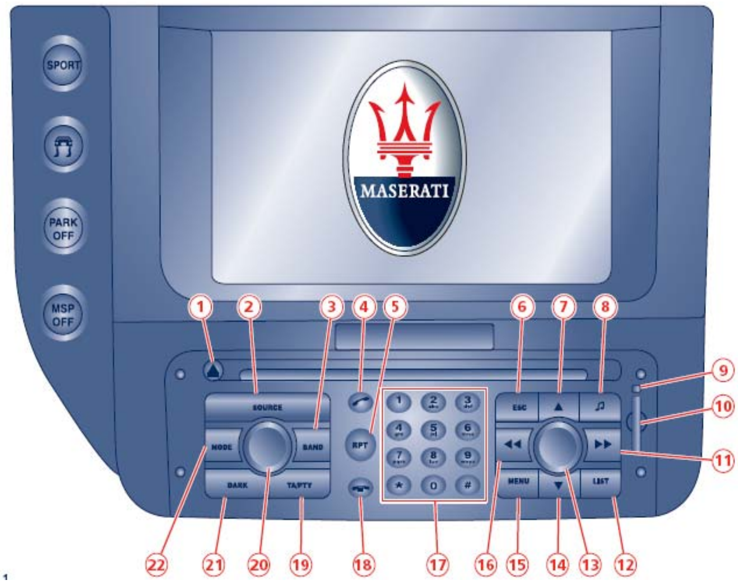
**Day/night condition.** This is determined by:
- the light switch
-"night condition" detected by the vehicle's twilight sensor. Therefore, the fact that the position lights are on does not necessarily mean the internal lights will be turned on.

**Timing:**
3 minutes : Step lights under the door and and front dome light.
15 minutes : Glove compartment light, diver's glove compartment light, sun visors' light, spot light, front and rear central dome lights if activated using the specific control or by the inertia switch.
20 minutes : Luggage compartment light.

**Multi Media System (MMS)**




**1)** CD eject.
**2) SOURCE** Mode selection: Radio, CD or Jukebox.
**3) BAND Radio mode**: Frequency band selection FM1– FM2 – FMAST – AM.
**Radio mode**: Automatic storage of the stations in FMAST (Autostore).
**4)** Telephone mode activation. Send call. Answer call.
**5) RPT** Activates repetition of the navigation message.
**6) ESC** Exits from a selection list
**7) Radio mode**: Radio frequency shift in fixed steps to the next station
**MP3 CD and Jukebox mode**: album selection previous.
**8)** With basic HI Fi system: **Radio, CD and Jukebox mode**: audio adjustment (music ambience, bass, treble, F-R balance, L-R balance, loudness, automatic volume adjustment).
With Bose Hi-Fi system (optional): **Radio, CD and Jukebox mode:** audio adjustment (bass, treble, F-R balance, L-R balance, Center Point ).
**9)** SIM card adapter eject button.
**10)** SIM card adapter 40
**11) Radio mode**: Automatic search of the next radio station.
**CD and Jukebox mode**: Goes to the next track.
**Menu:** scrolls through the menus.
**CD audio mode**: track fast forward
**12) LIST Radio mode**: displays the list of stations receivable in alphabetical order.
**CD audio mode**: displays the list of tracks.
**CD, MP3 and Jukebox mode:** displays the list of albums and tracks.
**Radio mode**: updates the list of stations




**13) Telephone, Navigation, Audio mode**
**(Radio, AUDIO CD, MP3 CD Jukebox) and Trip:**
opens the function-related menu. **Menu:** turn the knob to select the function, the item and the value, which are then confirmed by pressing the same knob.
**14 Radio mode**: radio frequency shift in fixed steps to the previous station starting from the station you are currently tuned into.
**MP3 CD and Jukebox mode**: selects the next album.
**15 MENU** Access to main menu
**16 Radio mode**: Automatic search of previous radio station.
**CD and Jukebox mode**: goes to the previous track if pressed within the first 3 playing seconds, otherwise restarts playing the track.
**CD audio mode**: track fast rewind.
**17 Radio mode**: recalls the stations stored (1– 6)
**Telephone mode**: Dial phone number: (1 – 12) or input text. Quick selection of a name in the directory and on the SIM card that starts with the selected letter. Stores the station you are listening to (1 – 6).
**18 Telephone mode**: Reject incoming call. Drop call.
**19 TA/PTY** TA (Traffic Announcements): enables automatic reception of traffic information. Functions available only in the countries where RDS is available.
**20** With the key in position MAR or the engine on: Audio OFF/ON With the key in STOP position or the gearshift lever in PARK position: activation / deactivation of the system. Rotation: to adjust the volumes.
**21 DARK** 1st pulse: partial display darkening. 2nd pulse: total display darkening. 3rd pulse: back to normal display brightness. System reinitialisation.
**22 MODE** Changes the current display on the right-hand side of the screen (radio, map, onboard computer (TRIP), telephone).

**Audio adjustments**
With the key in position **MAR** you can turn the audio section on and off by pressing the switch. Depending on the system installed, the audio adjustments may be:
✓ *Basic*: Radio, CD and Jukebox mode:
audio adjustment (music ambience, bass, treble, F-R balance, L-R balance, loudness, automatic volume adjustment, automatic volume adjustment).
✓ *Bose*: Radio, CD and Jukebox mode: audio adjustments (bass, treble, F-R balance, L-R balance, Center point).
To adjust the audio, press the AUDIO button (**8**) repeatedly to adjust the bass tones (BASS), treble tones (TREB), loudness (LOUD), fader (FAD), balance (BAL), automatic volume and sound type (musical ambience). The system stores the data and deactivates audio adjustment when the **ESC** button is pressed or after a few seconds if no adjustment is made.
WARNING: Bass and treble tone adjustment is specific to each source, and they can therefore be adjusted differently in the RADIO, CD or JUKEBOX modes.

**Loudness function (LOUD)**
This function is not available with the Bose® Surround Sound System (optional), since it is automatically controlled by the system. This function automatically amplifies the bass and treble tones when the volume is low. To activate or deactivate the function, turn the knob (**13**).

**Automatic volume correction**
This function is not available with the Bose® Surround Sound System (optional), since it is automatically controlled by the system. This function automatically adjusts the volume in relation to the vehicle speed. To activate or deactivate the function, turn the knob (**13**).

**Musical ambience**
This function is not available with the Bose® Surround Sound System (optional), since it is automatically controlled by the system. This function allows the user to set the various types of sound desired (classic, jazz, pop, etc). Select the desired sound by turning the knob (**13**). After setting the desired sound, select and confirm ("OK") by pressing the knob and the system will automatically return to the previous menu.

**Center point**
This function is available only with the Bose® Surround Sound System (optional) and when the CD source is active. Equalizing system that converts the stereo recordings into 8 separate channels, thus assuring absolute precision with any volume level. The automatic output frequency balancing makes manual adjustments through switches or knobs unnecessary. To activate or deactivate this function, select and confirm the corresponding options by turning and pressing the knob (**13**).

**CD / Jukebox mode**

To ensure optimal sound reproduction you are advised to use original CDs.

WARNING: Do not use AUDIO CD or MP3 CD mediums in 8 cm format, not even with a specific adapter; using this format will damage the system. After inserting a CD with the printed side facing up, it will automatically start playing. If you are listening to another audio source and there is already a CD in the player, press the button **SOURCE** (**2**) or **SCR** (**27**): the CD will automatically start playing.

**Fast forward/backward**

Press and hold down the button (**11**) or (**16**) to fast forward or backward to a track on the AUDIO CD; release them to go back to the normal playing speed.

WARNING: This function is not available for MP3 CD and Jukebox.

**CD / Jukebox mode menu**

Repeatedly press the **MODE button** (**22**) until the AUDIO mode is displayed. Pressing the knob (**13**) the display will show the following menu:

- Copy CD to Jukebox
- Activate Introscan
- Activate random mode
- Activate repeat


Confirming this function with the knob (**13**) you will access a submenu containing the following options:

• Copy complete CD
• Multiple selection (allows copying a series of tracks selected by the user)
• Complete album (only with MP3 CD)
• Current track.

During copying in Audio mode only the Radio function is active.

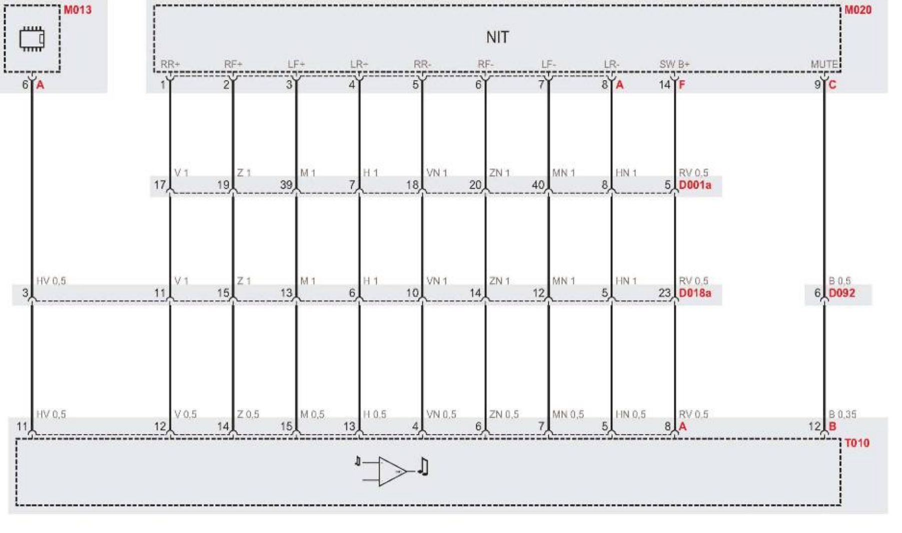
**Activate Introscan**

Once selected and confirmed, this function allows you to listen to the beginning of all the tracks on the CD or in the Jukebox in actual order. To deactivate this function, press the knob (**13**) then select "Deactivate Introscan" and confirm.

**Configuration mode menu**

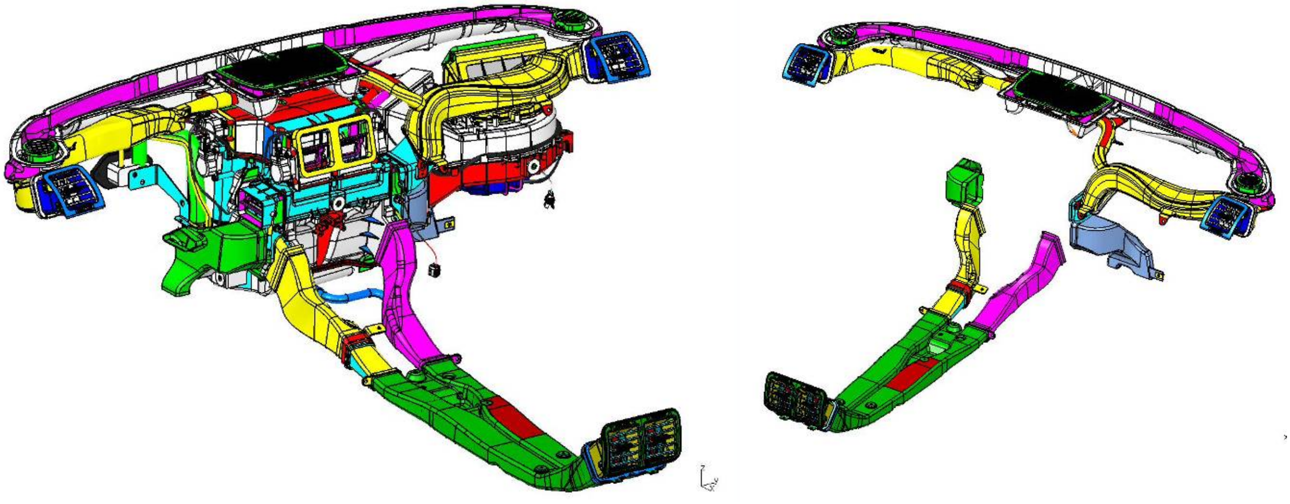
To access the“Configuration” menu, press the **MENU button** (**15**), select the icon. the display will show the following menu:

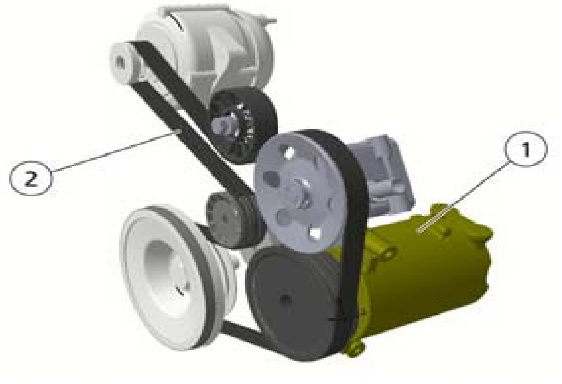
- Display configuration: to select colour, brightness and used units
- Sound: voice command, speech synthesis and buzzer settings
- Define vehicle parameters: settings for speed limit, central door locking, twilight sensor, instrument cluster display and parking sensors.
- Set date and time: note: the analogue central dash panel watch is to set manually.
- Select language

## Heating, Ventillation and Air Conditionning (HVAC)

The air conditioning/heating system of the GranTurismo provides enhanced air flow obtained with new and suitably dimensioned air lines.
The system has been designed to assure comfort in all possible weather conditions.

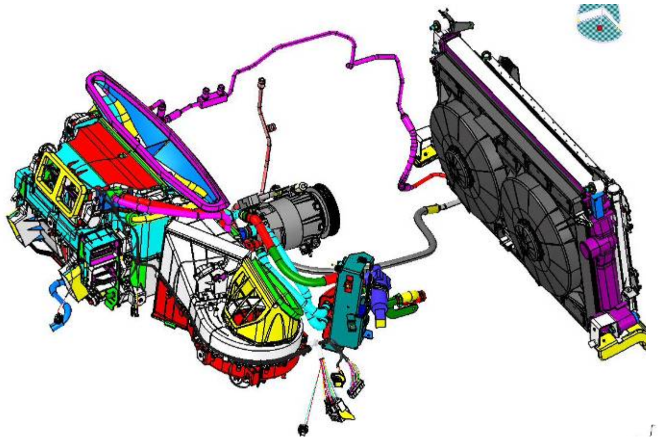


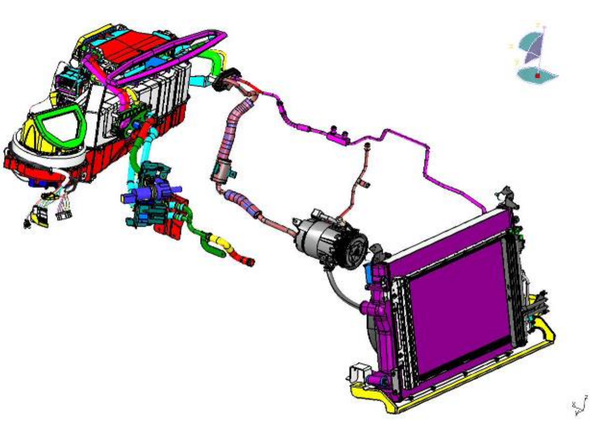



**Coolant**
The coolant used is R134a. PAG RL - 897
This vehicle system is filled with: 600 ± 20 g of fluid

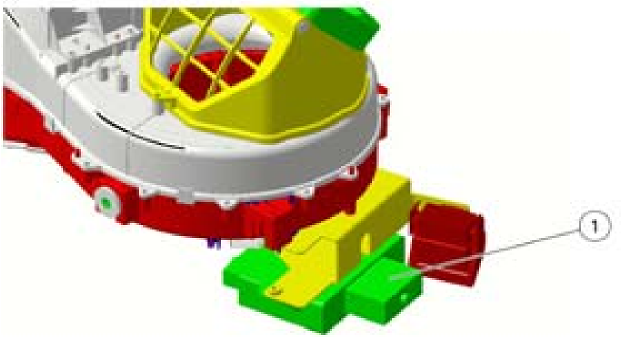
**Lubricant**
The fluid used is Oil Ucon RL897
This vehicle system is filled with: 200 ml ± 10 ml of fluid.

**Compressor**
The compressor (1) allows the system to vary the flow rate of the coolant reaching the evaporator gradually.
It draws the motion directly from the crankshaft by means of the poly-V belt (2).





- **Front distribution unit:** this is the housing inside which the external air, or recirculating air, is conditioned and distributed to the vents selected by the user. The distribution unit houses air flaps
- **Evaporator:** this is a heat exchanger housed in the air distribution unit. It is designed to draw heat and humidity from the air blown into the passenger compartment, by exploiting the coolant transformation from the liquid to the gaseous state.
- **Radiator heater:** this is a heat exchanger connected to the cooling circuit of the engine by means of two lines: one draws the hot water from the engine, the other allows the coolant to return to the engine. The heater is designed to provide the heat required to heat up the air blown into the passenger compartment .
- **Air flap actuators**
- **Air temperature sensors**
- **Pollen filter:** this is a combined air filter for the passenger compartment : particles and active carbons. It is designed to filter the air coming into the passenger compartment. The first layer (particles) prevents pollens and pollutant particles from entering the passenger compartment; the second layer (active carbons) reduces bad odours due to humidity that forms on the surface)
- **The electric fan** is controlled by a 12 V brushless electric motor and is operated at different speeds by a signal from the NCL (A.C. system node). It is located inside the air conditioning/heating unit near the evaporator)
- **Anti-mist sensor:** the anti-mist sensor is an electronic device which is designed to send a control signal to the recirculation flap: When the windscreen mist index exceeds the preset thresholds, the flap is forced open to allow intake of outside air regardless of the recirculation mode set by the user. When the windscreen mist index returns to the preset acceptable values, the recirculation flap resumes the mode active before this operation. It is fitted on the internal rear-view mirror.
- **Sunlight sensor:** the sunlight sensor measures the thermal energy generated by the sun. It is positioned on the dashboard near the windscreen. It is a DUAL ZONE sensor, which ensures optimal control over the air conditioning and heating system temperatures.
- **Outside air temperature sensor:** this sensor (1) is designed to read the outside air temperature. It is an NTC sensor fitted inside the external rear view mirror, on the driver's side. It has an operating range of -40°C / 80°C.



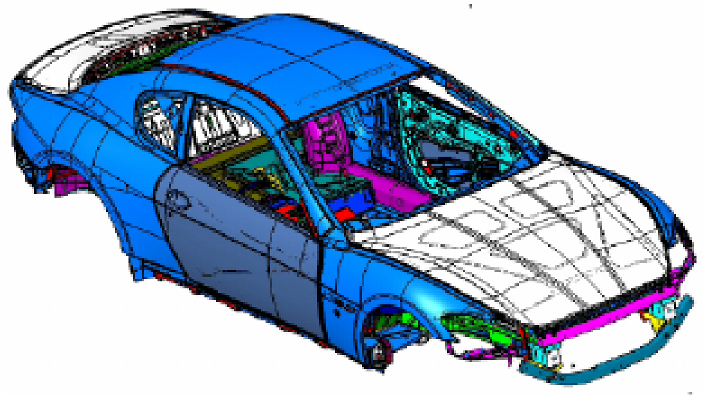

**HVAC node (NCL)**

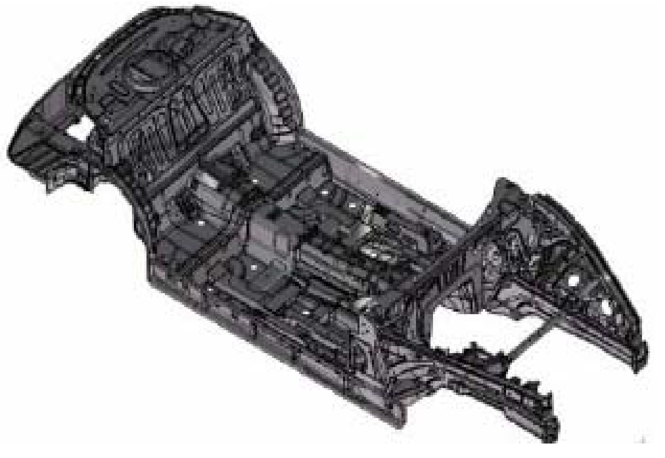
The HVAC node (NCL) (1), located on the right-hand side at the front passenger's feet, is fitted on the air conditioning/heating unit. It is connected to the low-speed B-CAN network. The air HVAC node (NCL) receives the following information from the Body Computer node (NBC), through the CAN network:

- outside air temperature
  - engine water temperature
  - engine RPM
  - vehicle speed (tachometric signal)
  - battery voltage (battery charge level)
  - heated rear window activation
  - compressor status
  - status of the vehicle lights.

## 9. Body

The chassis of the Maserati GranTurismo derives from the Quattroporte, but has a smaller wheelbase and rear overhang (wheelbase: - 125mm; rear overhang: - 66 mm). It is composed of high-resistance boxed steel sheets and incorporates a tubular structure in position with the rear section, which supports the suspension and the differential, and a front section which supports the suspension and the engine.
Due to the reduced wheelbase, the torsional rigidity of the GranTurismo chassis has been significantly improved with respect to the Quattroporte.





Different materials and technologies have been used in the construction of the new load-bearing body for optimal weight distribution. The structural component is made of steel, the lid and the front reinforcement cross member of the bumper is made of aluminium, and thermo-hardening plastic was used for the luggage compartment (a technology known as *Sheet Molding Compound* - SMC)
The luggage compartment is made out of one single piece that incorporates the aerodynamic lip. As well as offering greater resistance to light impacts and corrosion, the SMC technology has allowed reducing the weight of the
components and has given the designer the possibility to best express his creative spirit.
The high rigidity values allow the suspension to operate with extreme precision, to the advantage of dynamic handling, at the same time reducing vibrations and undesired movements of the internal components. All this amounts to greater driving comfort on any road surface.

Maserati Academy – March 2009

# Introduction to Maserati

# Volume 2

**2009 Edition**

**English version**

Training Documentation for Maserati Service Network

# Index

## Volume 1



## Volume 2

# Maserati GranTurismo S (M145)

## Technical Introduction

## 0. General Information

The new **GranTurismo S** (M145GL) is a natural evolution of the Maserati GranTurismo automatic and incorporates numerous innovative features, including the new 4700 cc engine and gearbox with super fast MC-Shift strategy.

One year after the launch of the GranTurismo in March 2007, Maserati returns to the International Motorshow in Geneva with yet another world first, the GranTurismo S, the ultimate expression of the Trident coupé's sporting pedigree. This new interpretation of the perfect balance between sportiness and comfort shifts the emphasis onto performance and driving enjoyment.

The new 440 hp V8 4.7 engine, electro-actuated gearbox with super fast MC-Shift, Transaxle layout, sporty exhaust and brakes made with dual-cast technology make the GranTurismo S the new flagship for Maserati sporting flair, with acceleration from 0 to 100 km/h in just 4.9 seconds and a maximum speed of 295 km/h, the highest ever reached by a production Maserati.

The compact and lightweight 4.7 litre V8 engine develops maximum power output of 440 HP at 7,000 rpm and peak torque of 490 Nm at 4,750 rpm. It also ensures high specific power output as well as more torque at lower speeds, without affecting the capacity to up the revs quickly, a feature typical of racing engines.

The increase in power output and torque has not affected the versatility of the power unit, which continues to be readily harnessed even during everyday use. It sounds deep and throaty, but the exhaust valve pneumatic control can also be activated to make it discrete and subdued.

An electro-actuated 6-speed gearbox is paired with the 4.7 litre V8 engine, and has MC-Shift software which harnesses the new engine's power output, ensuring gearshift performance that is unbeatable within the sports car segment.

The engine and gearbox on the Maserati GranTurismo S are arranged in the Transaxle layout, typical of high-performance sports cars and representing the Maserati technological DNA. The front-mounted engine and the gearbox, which is located to the rear, are rigidly connected by a tubular element containing the propshaft. This solution gives excellent weight distribution, 47% over the front axle and 53% over the rear axle, which translates into excellent dynamics and top performance. At the wheel, the Maserati GranTurismo S is more rigid and compact, thanks to the suspension layout developed specifically to support the new weight distribution. Vehicle roll has been reduced significantly as a result of the modified springs, dampers and rear torsion bar, and this has benefited handling and performance.

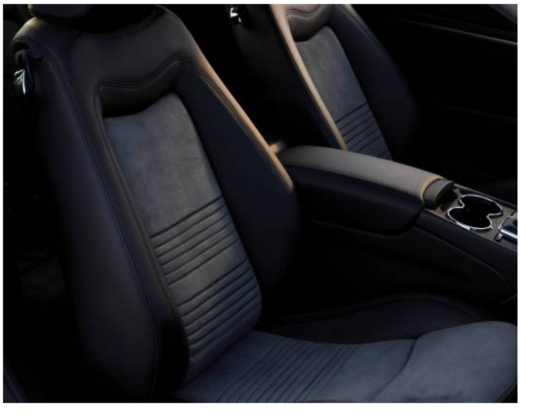
**Exterior overview**

On the outside, the Maserati GranTurismo S is distinguished by a number of aesthetic modifications which, although discrete, are highly effective and make the car body appear sportier without abandoning the sleekness of the lines masterfully designed by Pininfarina. The spoiler integrated into the boot lid and the new-design side skirts help to improve the air flows around the car. On top of that, the Maserati GranTurismo S boasts special new 20” rims, which are designed to resemble the Trident, Maserati’s symbol.

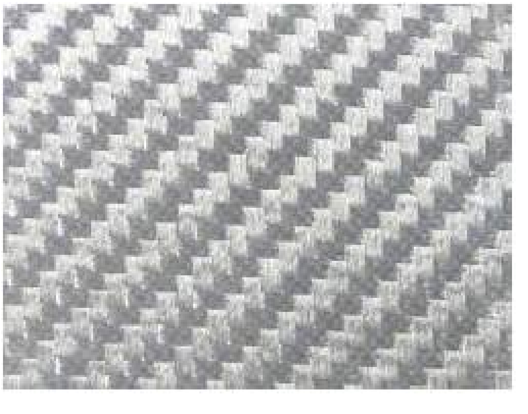

The sporty look is complemented by the generously proportioned oval-section exhaust tailpipes. The radiator grille and headlight casings are black, while the Trident on the grille and the Saetta logo on the C pillar are decorated with red prongs, in true Maserati racing tradition.

**Interior overview**

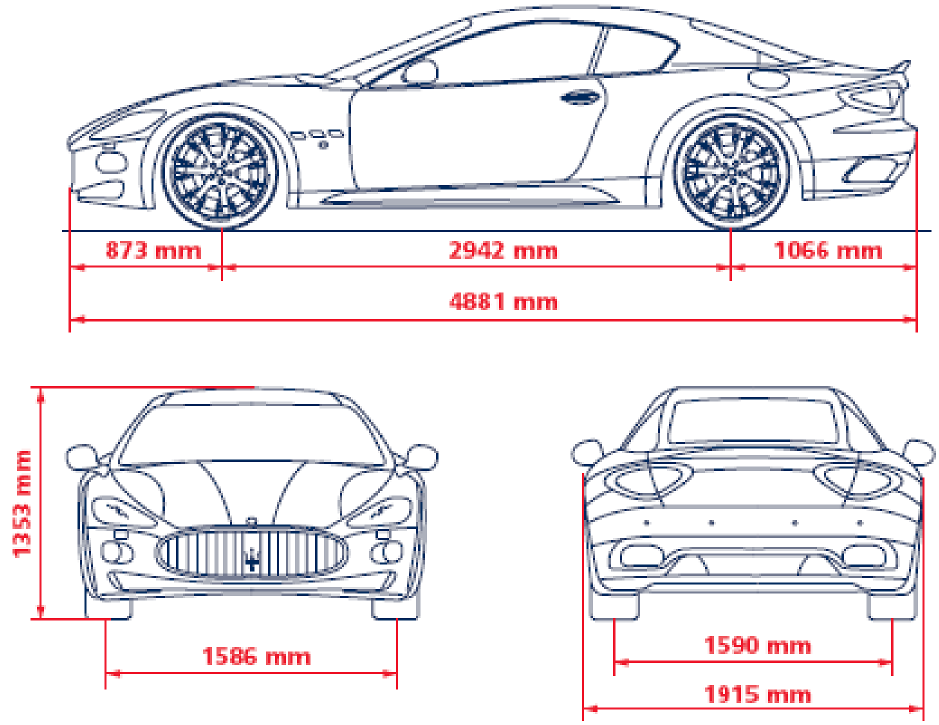
The interior upholstered in Poltrona Frau leather and Alcantara (used for the steering wheel and centre of the seat with the option to extend to the whole of the headlining) reflect the sporty flair of the Maserati GranTurismo S; the front and rear seats are distinguished by their new dynamic design with horizontal piping on the seats and seatbacks.
As an alternative to the standard leather/Alcantara, classic trim interiors are available in all Poltrona Frau leather, or in full-grain Pekary leather with a sporty and more refined look.
The Maserati GranTurismo S is available in the same vast range of materials and colours as the GranTurismo: the standard version is available in Alu Grey or Smoked Quartz, while upon request it is possible to choose from among three types of wood (Rosewood, Walnut and Tanganyika wood) and five varnished hues (Piano Black, Sigillo Red, Laque Blue, Ice White and Decoro Yellow).



This is in addition to a new upholstery option named AluTex, an aluminium-coated fibreglass fabric with a hi-tech, modern look. What makes AluTex so special is the autoclave process it undergoes during manufacturing - a fine powder of pure metal is applied to the surface which gives the fibres an unusual brilliance and three-dimensional effect.



## Dimensions and Weights




| Dimensions | | |
|---|---|---|
| Length | mm | 4,881 |
| Width | mm | 1,915 |
| Width (incl. mirrors) | mm | 2,056 |
| Height | mm | 1,353 |
| Wheelbase | mm | 2,942 |
| Front overhang | mm | 873 |
| Rear overhang | mm | 1066 |
| Front track | mm | 1586 |
| Rear track | mm | 1590 |

| Weights | | |
|---|---|---|
| Dry weight | kg | 1780 |
| Kerb weight | kg | 1880 |
| Maximum permitted technical weight | kg | 2250 |
| Weight distribution | % | 47/53 |

**Capacities, performance, fuel consumption and emissions**

| **Capacities** | | |
|---|---|---|
| Boot capacity | litres | 260 |
| Fuel tank capacity | litres | 86 (incl. 14 L reserve) |

| **Vehicle performance** | | |
|---|---|---|
| Top speed | km/h | 295 |
| Acceleration 0 - 100 km/h | s | 4.9 |
| Acceleration to 400m from standstill | s | 13 |
| Exit speed | km/h | 180 |
| Acceleration 0-1000 m | s | 23 |
| Exit speed | km/h | 233 |
| Pickup 80-120 km/h in 6th gear | s | 8.65 |
| Stopping distance from 100-0 km/h | m | 35 |

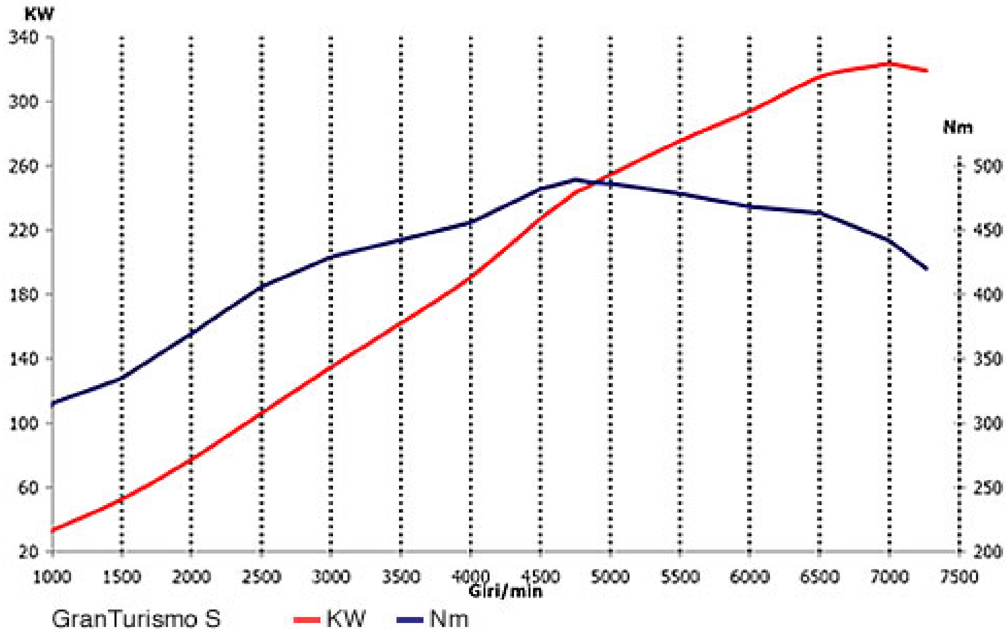
| **Fuel consumption and CO2 emissions** | | |
|---|---|---|
| Urban driving cycle | L/100 km / g/km | 25.21 / 567 |
| Extra-urban driving cycle | L/100 km / g/km | 11.36 / 270 |
| Combined driving cycle | L/100 km / g/km | 15.8 / 377 |

## 1. Engine

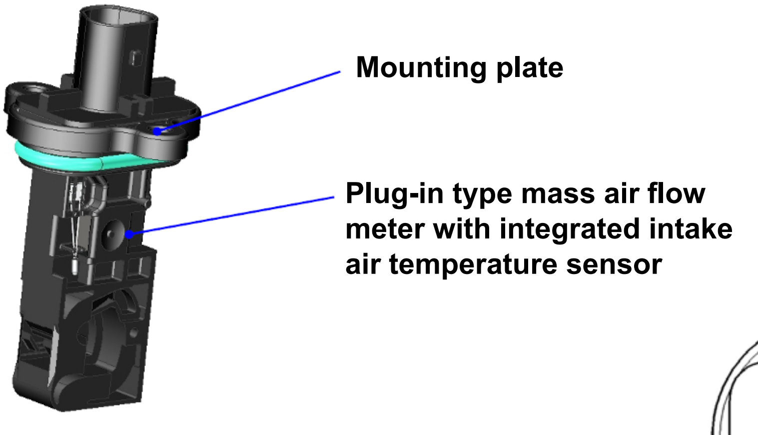
The main technical innovation on the Maserati GranTurismo S lives under the bonnet, where the latest version of the new family of wet-sump power units is fitted (F136YE).
The new and more powerful 4.7 litre V8 engine is capable of developing power output of 440 HP at 7,000 rpm and peak torque of 490 Nm at 4,750 rpm.
In keeping with the philosophy of the most recent Maserati engines, the 4.7 litre power unit adopts a lubrication system with wet sump, first introduced with the launch of the Quattroporte Automatica, and also adopted on the GranTurismo with automatic transmission and now applied for the first time on a model fitted with an electro-actuated gearbox.
Compared with the previous dry sump solution, the wet sump uses fewer pumps to recover the oil and reduces operating noise considerably, to the benefit of driving comfort and improved balance between comfort and performance.

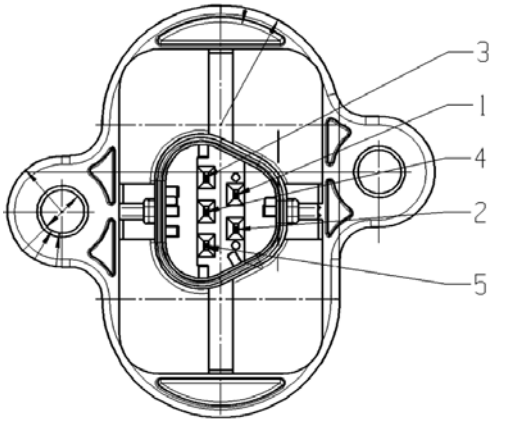
Recognisable on the outside by the red cylinder head covers, the new 4.7 L engine was developed specifically to increase the car's performance and provide the driver of the Maserati GranTurismo S with an even more exhilarating driving experience.
The new engine is ready to comply with future Euro-5 regulations for Europe and LEV2 regulations for the USA.

**Engine control system:**
The GranTurismo uses the same Motronic ME7.1.1 engine control system as used on the GranTurismo with automatic transmission. Mapping is however specific to obtain an increased power output.



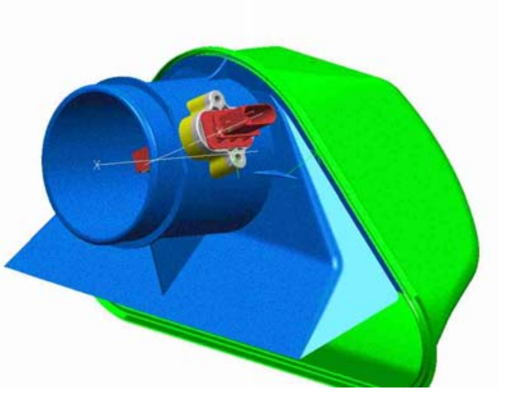

On the GranTurismo S, a new plug-in type air flow meter is used: the Bosch HFM7. The HFM7 air flow meter can be easily identified from the HFM5 type meter due to the new connector design.



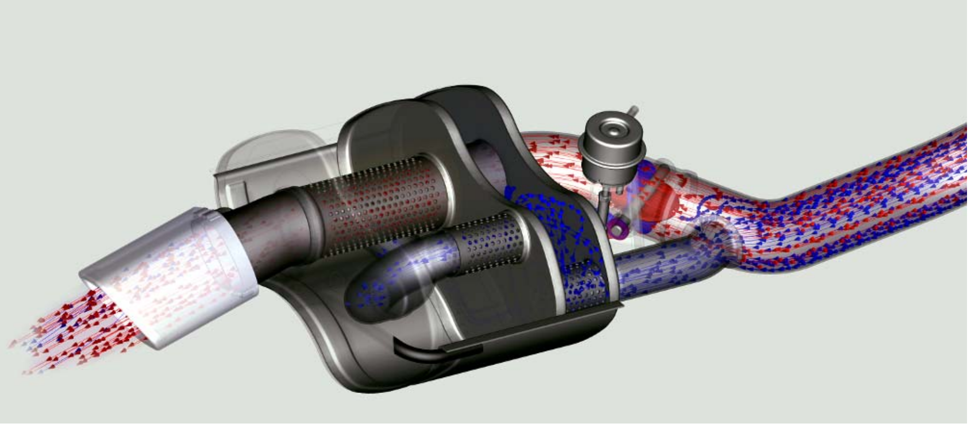

**Pin-out HFM7 air flow meter:**
1. Ground
2. 5V reference voltage
3. 12V power supply
4. Intake air temperature analogue signal
5. Mass air flow analogue signal

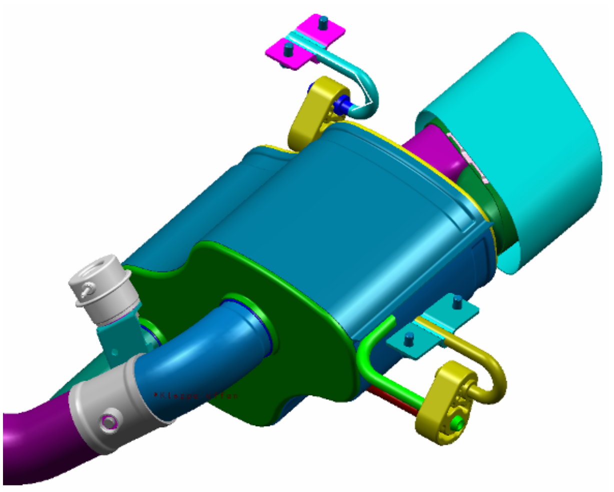
Except from the new sensor design, the air flow meter used on F136YE engine is characterised by the absence of an air flow strainer. The task of an air flow strainer is to ensure a regular and laminar air flow inside the sensor duct. At the same time the strainer also forms an obstruction to the incoming air flow.
By eliminating the strainer, a power advantage of 7-8 hp is obtained thanks to a more free air flow.
The absence of the strainer will cause turbulences in the sensor duct which translates into an unreliable mass air flow signal. For this reason the mass air flow is no longer the main parameter to calculate the injection quantity, but will only be used to apply corrections on the fuel quantity. Instead, throttle position and engine speed are used as main parameters. This modification implicates a specific calibration of the engine control software.



**Exhaust**

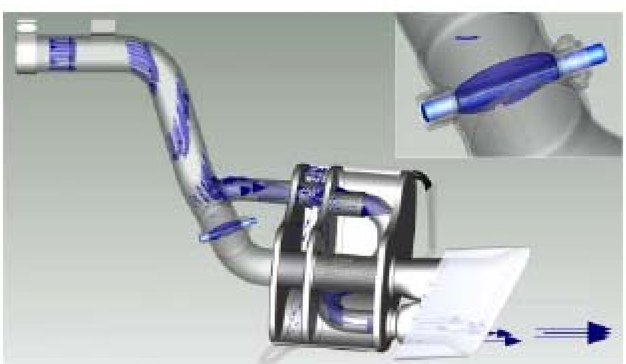
The Maserati GranTurismo S gives a voice to its 440 HP with a special sporty exhaust system, designed to emphasise the deep throaty growl of the new V8 engine, but also provide the level of on-board comfort expected from a GranTurismo.
The steel exhaust system consists of two exhaust lines, one for each bank of cylinders, compensated with a central silencer. Two pneumatic valves, controlled electronically by the engine control unit and operated by the driver through the "Sport" button on the centre dashboard, are fitted close to the two rear silencers.





In aesthetic terms, the modified design of the two exhausts with dual oval chrome tailpipes make the new system instantly recognisable.
As on all Maserati models, the Maserati GranTurismo S adopts an exhaust system with metallic rather than ceramic catalytic converters. This solution reduces the density of the cells inside the catalytic converters and as a result lessens the section resistant to exhaust gas flow.

In normal conditions the valves are closed, forcing the exhaust gases along a long and tortuous route so that they lose their energy and are emitted outwards with very little noise. This all changes when the "Sport" button is pressed: the valves which were initially closed, open up through a pneumatic control and the flow of exhaust gases is channelled down a route that leads directly to the outside. This provides enthusiasts with a distinctive resonance.



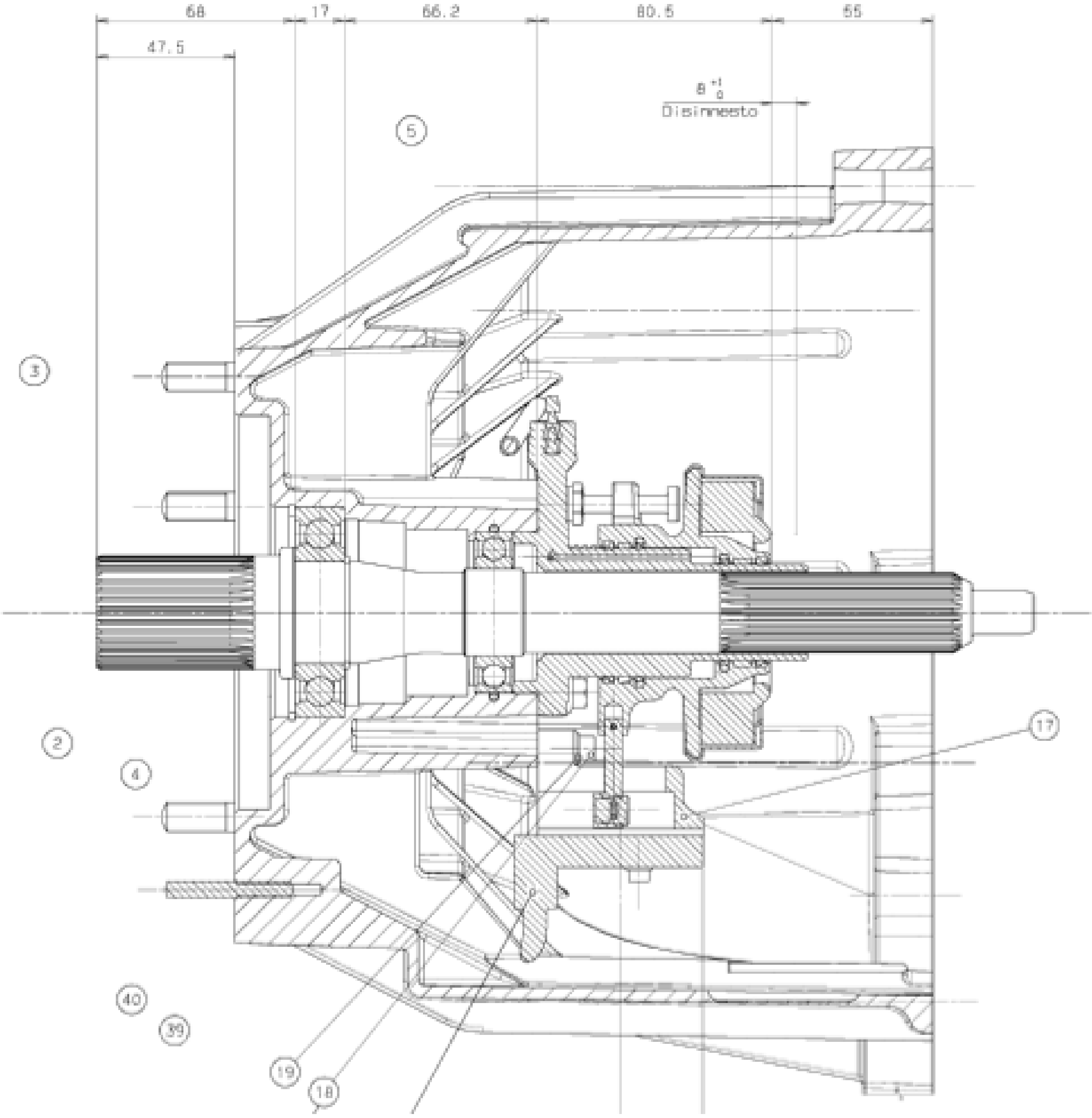
BY-PASS VALVE CLOSED

BY-PASS VALVE OPEN

## 2. Clutch

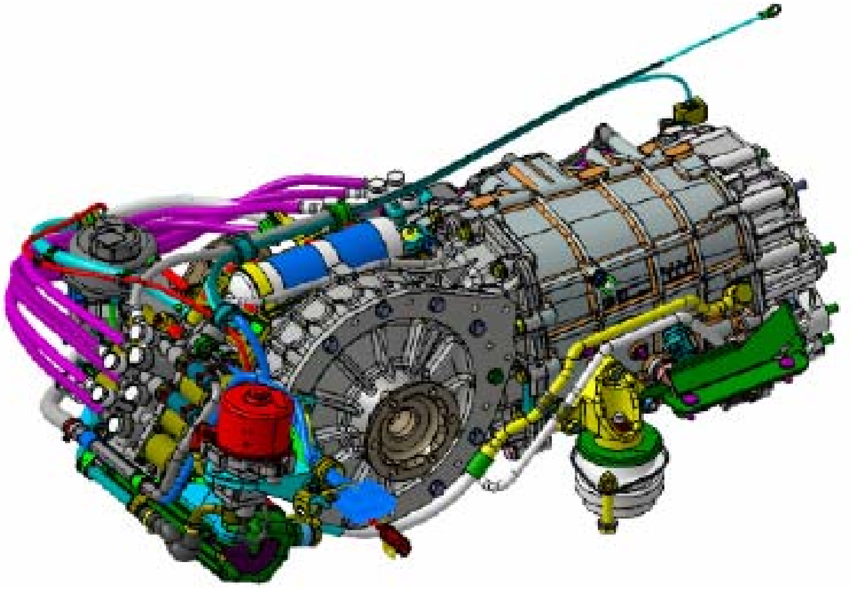
For the GranTurismo S, the clutch has been modified with respect to the clutch as used on the latest Maserati variant with robotized transmission (M139 MY06 Duoselect).
This new cluch, indicated as “Ribbed Finger”, has a newly designed diaphragm spring and new friction material in order to reduce noise and wear.
The main characteristics of the clutch have remained unchanged: dry twin-plate, 215 mm disc with hydraulic control. The PIS value has remained unchanged at 4,2 mm (327 bit). The clutch position sensor is new with improved thermal isolation for the wiring harnas.

The clutch housing has been redesigned and contains now a clutch support shaft with double support bearing. This solution reduces bearing noise and wear.



## 3. Transmission

The GranTurismo S has a robotized manual transmission with an innovative super fast gearshift strategy (MC-SuperFast). The system layout is of the transaxle type with the longitudinal engine front-mounted behind the front axle, rigidly connected by means of a steel tube to the longitudinal gearbox, which is rear-mounted in unit with the differential.
This gearbox is an evolution of the Quattroporte Duoselect gearbox. See chapter 3 "Mechanical Components" for more details.



- Robotized gearbox electro-actuated 6-speed transmission, with hydraulic management operated electronically using the paddles mounted behind the steering wheel, integral with the steering column. Triple-cone synchronisers on 1st and 2nd, and double cone on 3rd, 4th, 5th and 6th.
- Steel 20 mm propshaft flexibly supported on four bearings inside an engine-gearbox connection pipe.
- Segmented limited-slip differential with asymmetrical lock factor (25% in traction, 45% in release).
- Maserati Stability Program (MSP), integrating traction control (ASR), release torque regulation (MSR), anti-lock braking (ABS) and electronic brake force distribution (EBD).

Transmission gear ratios:

| Gear | **1** | **2** | **3** | **4** | **5** | **6** | **R** |
|---|---|---|---|---|---|---|---|
| Ratio | **3.21** | **2.05** | **1.43** | **1.1** | **0.9** | **0.76** | **3.29** |

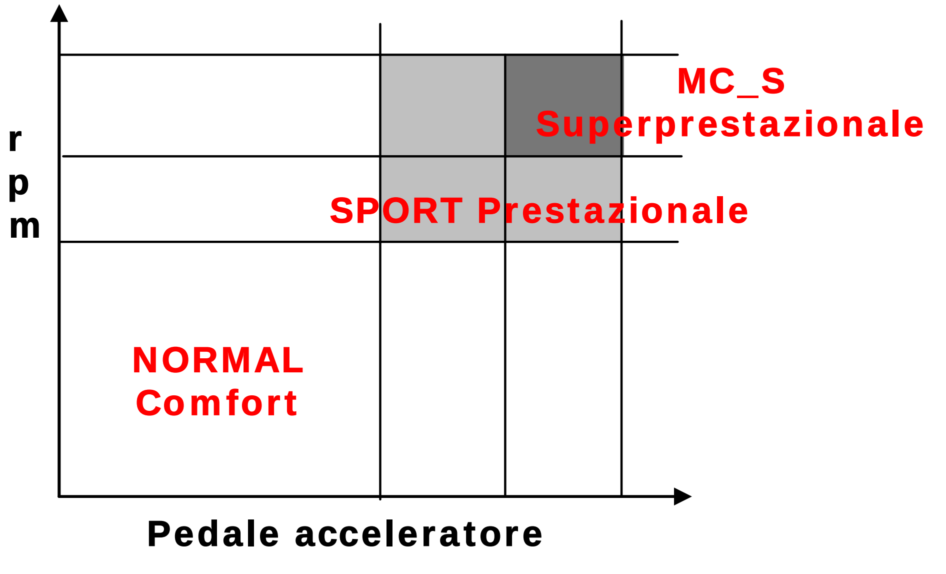
Final drive ratio: **4.18**

**Electronic gearbox control GranTurismo S:**

The transmission of the GranTurismo S is equipped with the Sofast 4 electronic control system (CFC 301). The gearbox has two main operating modes: **MANUAL** and **AUTO**. Both modes can be overlapped with the **SPORT** function, which makes gear changes quicker. In particular, in **MANUAL+SPORT** mode the Maserati GranTurismo S activates the innovative **MC-SuperFast** gearshift function.

The Maserati GranTurismo S Robotized gearbox system has a total of six operating modes:

- **Manual Normal**
- **Manual Sport**
- **Manual Sport with MC-SuperFast shift**
- **Auto Normal**
- **Auto Sport**
- **Ice**



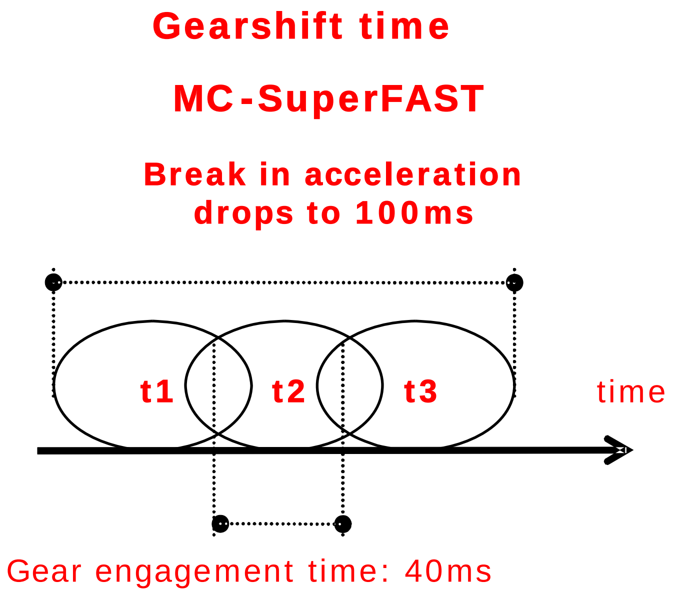

**Manual-Normal mode:**
In MANUAL NORMAL mode the choice of gear lies solely with the driver. To ensure greater driving enjoyment the system holds the gear when the limiter is reached; the control unit merely checks that the gear requested matches engine speed, so as to avoid taking it beyond the limiter when shifting down, or below the minimum speed when shifting up.
With engine speed above 4,000 rpm and the accelerator depressed through more than 80% of its travel, the fuel cut-off strategy is activated on each gear change: during the gearshift this function shortens the time taken to discharge torque and limits engine speed reduction, enabling quicker gearshifts.

**Manual-Sport mode:**

In MANUAL mode, pressing the SPORT button causes the transmission control system to adopt a more performance-oriented gearshift strategy, with much shorter times to change between one ratio and another.
When moving down to lower gears, each shift is accompanied by a more pronounced double de-clutching effect.

**MC-SuperFast Shift:**

The MC-SuperFast gearshift function is the most recent innovation of the electro-actuated Robotized gearbox system: this mode exploits the elastic energy of the transmission parts and delivers top performance in terms of gearshift times. This means that the shift time (calculated as the break in acceleration) drops to 100 ms, ensuring maximum sports characteristics and exhilarating driving.




The Robotized gearbox management software enables gear engagement/ disengagement to take place in parallel with the opening/closing of the clutch. In this way the gearshift time, which is calculated according to the acceleration gap (and not just the time it takes to engage the gear) is reduced by activating the various operations at overlapping times:

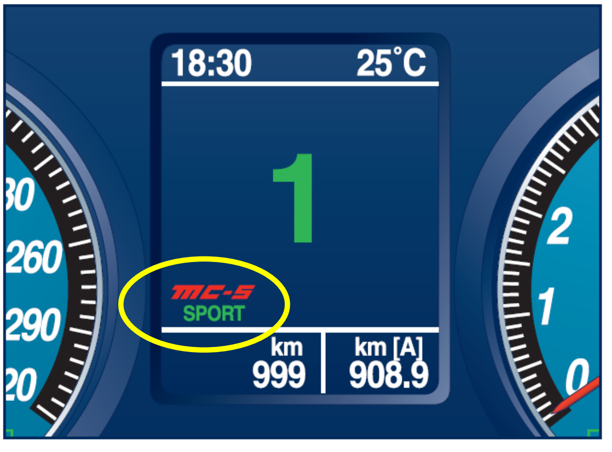
1. Torque interruption and clutch disengagement (t1)
2. Gear disengagement, selection and engagement (t2)
3. Clutch engagement and torque recovery (t3)

SuperFast shift is available only when shifting up and in Sport mode. With regard to gearbox hardware, in order to support SuperFast shift the hydraulic pump has been oversized to be able to deliver the increased pressure of the system, which under extreme conditions is twice as high compared to conventional use. A direct wire connection has been installed between the transmission control unit and the engine control unit, to increase the communication speed with respect to the conventional CAN communication line.

**When is MC-SuperFast shift available?**

SuperFast shift is only available in MANUAL SPORT mode.

With the vehicle in a steady state with hydraulic circuit oil and engine coolant at operating temperature and the clutch at normal operating temperature, in Manual Sport mode the letters **MC-S** light up on the dashboard display.




Moreover, the following conditions must are present:

- Engine speed > 5500 rpm
- Accelerator pedal fully depressed (>80%)
- Lateral acceleration <0.9g
- ASR inactive
- No wheel slip present

If one or more of the conditions above are not met, a normal gearshift occurs instead of a superfast gearshift.

**Note:** there is no Superfast shift for downshifting

**Auto-Normal mode:**

In Auto mode the gear change is managed completely automatically by the transmission electronic control system. The control unit determines engine speed and moment of the shift as well as its speed, based on parameters such as vehicle speed, engine speed and the driver's request for torque and power. In AUTO mode a gear can also be requested manually through the paddles behind the steering wheel (gear suggestion).
The system recognises the type of driver by means of functions that assess the driver's style of driving through lateral and longitudinal acceleration and accelerator pedal movement. If a sportier driving style is recognised, the "UP" shifts are moved to a higher number of engine revs. The control system also recognises the type of road, adapting gear changes when the road climbs or falls, on a bend, in town and on motorways.
AUTO NORMAL mode is the mode most designed for comfort: changing to a higher gear is required as soon as possible in order to obtain the lowest level of vibrations and acoustic return from the engine. Shifting is managed in such a way as to ensure that gear changes are ultra-smooth. This mode also ensures lower fuel consumption when combined with a normal and non-aggressive driving style.
This does not mean, however, having to give up on the car's sporty nature: during sports driving, with frequent opening of the throttle, gearshift speeds approach those of the AUTO SPORT mode.
In AUTO mode, the engaged gear will be indicated on the info display on the instrument cluster.

**Auto-Sport mode:**

AUTO SPORT mode is activated with the transmission in auto mode and by pressing the SPORT button located on the centre dashboard: gear changing is still managed automatically by the transmission control unit, but by varying the speed of the operations to open up and reduce torque, disengage, select and engage gear, close the clutch and restore engine torque. The result is a faster gear change and a more sporty driving feel.
Compared to AUTO NORMAL mode, shifting up takes place at higher engine speeds, whereas moving down a gear is accompanied by a more pronounced double de-clutching effect.

**Ice mode:**

This mode can be used on particularly slippery road surfaces (snow, ice), or more generally in low-grip conditions. It is activated through the ICE button located on the centre tunnel. When switched on, the system avoids having to run the engine at more than 3,000 rpm.
ICE mode takes priority over SPORT and MSP OFF modes: this means that when the driver requests the ICE mode, Sport mode is deactivated automatically (if it was on) and the stability control (MSP) restored (if previously deactivated).

**Automatic mode with Easy-exit:**

The default configuration of the gearbox is Automatic mode. If requested, the Auto mode can be switched off (and Manual mode activated) by pushing the “Auto” button on the centre console.
If the engine is switched of with the gearbox in Manual mode, at the next engine start the system will activate the “Automatic with Easy-exit” configuration. This configuration will last for two minutes during which the “Auto” indication on the info display will flash.
If during this period while the car is driving a gear is selected manually, the gearbox will exit the Auto mode en go to Manual mode. If during this time no gearchange request is made, the gearbox will go to Auto mode.

**Note:** for what concerns the “Sport” and “Ice” modes, at engine restart the robotized gearbox configuration is the same as when the engine was switched off.

## 4. Braking System

The Maserati GranTurismo S is fitted with a high-performance brake system, which uses dual-cast technology for the front brake discs, developed in collaboration with Brembo and used for the first time in the automotive field on the Maserati Quattroporte Sport GT S.
In contrast to conventional cast-iron discs, the dual-cast disc consists of a cast-iron braking ring and an aluminium hub, making it possible to combine the advantages offered by cast iron's performance at temperature with the aluminium's light weight.

At the front, the dual-cast discs (360 x 32 mm) are combined with six-piston aluminium monobloc brake calipers of differentiated diameter (30/34/36 mm), with Ferodo HP1000 pads. The monobloc calipers are more resistant to deformation than calipers made of two parts; this means that lighter materials, in this case aluminium, can be used and component weight minimised even further. The caliper is also more efficient at any operating pressure and this translates into lighter use of the pedal use when braking.
At the rear, 330 x 28 mm discs are fitted with 4-piston calipers of differentiated diameter (32/36 mm), and Jurid 673 GG pads.
The brake calipers fitted as standard on the Maserati GranTurismo S are red. The customer may personalise the colour of the calipers by selecting from one of a further 5 alternative shades: Titanium and Yellow for a more sporty look, Silver and Blue for a more elegant configuration, or the classic Black.
The braking system in the Maserati GranTurismo S also features ABS, which prevents the wheels from locking up when braking, and EBD for better distribution of braking force between the front and rear wheels, both integrated with MSP Bosch version 8.0.

**MSP system:**
The GranTurismo S is fitted with the Bosch ESP 8.0 system which incorporates the following functions: ABS, EBD, TCS, ASR, ESP and Hill Holder.
Functionality is identical to the system used in other Maserati vehicles.

**Electric Parking Brake (EPB)**
The Maserati GranTurismo S is equipped with Electric Parking Brake (EPB)

## 5. Driving Controls

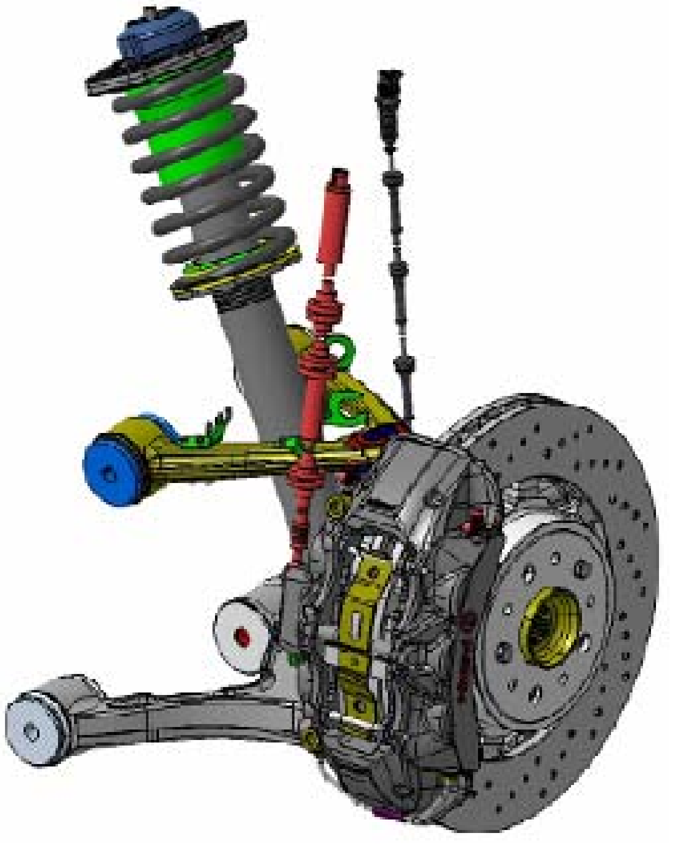
**Steering**
Rack and pinion steering box with speed-sensitive hydraulic power steering, on-road steering ratio of 64 mm per turn.
Steering diameter (from pavement to pavement): 10.7 m.

Gearshift paddles behind the steering wheel are longer as those on the standard GranTurismo model to improve the control during cornering.

## 6. Suspensions and Wheels

**Single-rating sports suspension to enhance the sporty driving feel**

The Maserati GranTurismo S offers the same suspension layout as the 4.2 L engine version. However, it also features a special development designed to really exploit the greater power output of the 4.7 V8 and harness the capabilities offered by the Transaxle system.
The Maserati GranTurismo S is fitted as standard with fixed-rating steel dampers modified with the introduction of new springs and dampers, which offer 10% more damping force and are repositioned in terms of compression/extension ratio so as to match the car's different specification. The diameter of the rear torsion bar has also been increased to make it more rigid.
These modifications have resulted in a 10% reduction in body roll which, combined with the excellent weight distribution, makes the Maserati GranTurismo S particularly agile and responsive to driver instructions: in a succession of bends it appears quick and intuitive when entering and finding the centre of the bend and speedy when negotiating the bend. Furthermore, the driver can accelerate earlier when coming out of the bend due to the reduced load transfers.
As an alternative to the standard fixed-rating suspension, the Maserati GranTurismo S may be provided, upon request, with Skyhook electronic control suspensions featuring aluminium body dampers with continuous damping variation; in this case the hardware modifications are accompanied by special management software.



**Optional Skyhook suspension:**
The Skyhook electronic suspension management system is able to continuously monitor the suspension damping: the system acts through acceleration sensors which record the movements of each wheel and thus ensure that any surface unevenness is absorbed and the highest level of comfort guaranteed.
A further advantage of the Skyhook electronic suspension control system is that the driver can choose from two different settings: Normal, which allows travel with the highest level of driving comfort, and Sport, which gives a harder ride setting with more reduced roll angles and load transfers, thereby enhancing the agility and stability of the car body. In the Sport configuration the handling of the Maserati GranTurismo S is comparable with that guaranteed by fixed-rating dampers.

**Wheels and tyres**

20" diameter wheels in light alloy fitted as standard.

- Front wheels 8.5J x 20" H2 profile with 245/35 R20 front tyres.
- Rear wheels 10.5J x 20” H2 profile with 285/35 R20 rear tyres.

**Vehicle alignment**

| CONFIGURATION | FRONT | REAR |
|---|---|---|
| Tyres | 245/40 ZR19 (opt)<br>245/35 ZR20 | 285/40 ZR19 (opt)<br>285/35 ZR20 |
| Pressure | 2.2 bar | 2.2 bar |
| Wheels | 8.5 J x 19” (opt)<br>8.5 J x 20” | 10.5 J x 19” (opt)<br>10.5 J x 20” |
| Camber | -0°30’ +/- 0°10’ | -1°30’ +/- 0°10’ |
| Toe | -2.1 +/- 0.4 mm | +4.2 +/- 0.4 mm |
| Caster | +4°03'36"+-0°10' | |
| Overall height | 165 +/- 5 mm | 152 +/- 5 mm |
| Track | 1585.2 mm | 1589.8 mm |
| Wheelbase | 2940.2 mm | |
| Steering angle | Int. 34.15°/ext.40.2° | |

Static load configuration: full fluid levels (including fuel) plus 75+75 kg on the front seats.

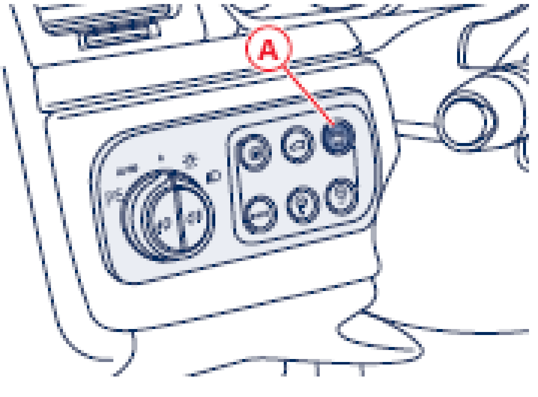
## 7. Safety Components

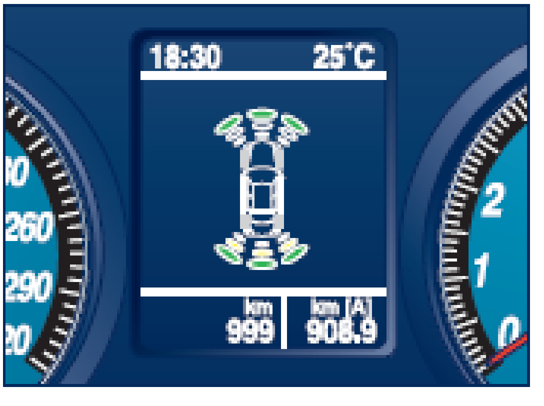
In analogy with the MY09 Quattroporte model, also the GranTurismo will introduce the new “intelligent LRD”-type front passenger airbag.
This new type of airbag is fitted on the new GranTurismo S 4.7L Automatic and will shortly after be introduced on the existing GranTurismo 4.2L Automatic and GranTurismo S models. See the part of the MY09 Quattroporte for more detailed information.

**Note:** all airbags are specific for each model, as they are tailored on the interior design.

## 8. Electrical systems and Devices

**Parking sensors**
With the ignition key in the **ON** position, the front and rear parking sensors are activated automatically when reverse gear is engaged.
If the car is equipped with front sensors, these sensors can be activated by pressing button **A**; when the front sensors are active, the button is backlit with an amber light. To switch off the front sensors, press **A** once again. All the sensors remain active when reverse gear is disengaged. The rear sensors remain active for 60 seconds until the vehicle speed reaches around 18 km/h. The front sensors remain active until the vehicle speed reaches around 18 km/h (11 mph). On activation of the front or rear sensors, a beeper warns the driver that the system is active. When the sensors are on, the system begins emitting beeps as soon as an obstacle is detected. The beep frequency increases as the vehicle approaches the obstacle. The beeps are emitted from two beepers, one located under the dashboard (if the vehicle is equipped with front sensors) and one near to the luggage space (if the vehicle is equipped with rear sensors). When the obstacle is less than 35 cm from the bumper, a continuous beep is emitted. The beep stops immediately if the distance from the obstacle increases.
The tone cycles remain constant if the distance measured by the central sensors remains unchanged. However if the same situation occurs with the side sensors, the beep is interrupted after 7 seconds, to avoid continuous beeping when manoeuvring along a wall, for example.



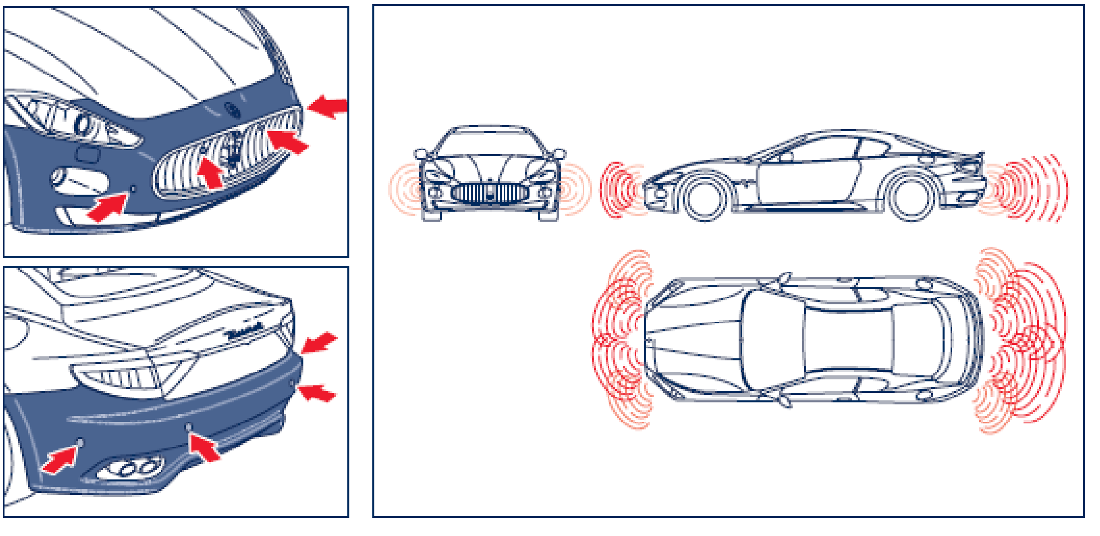



The distance from the obstacles can also be viewed on the instrument panel by means of a graphic display, which shows the vehicle surrounded by symbols indicating the detected obstacle's distance (maximum, medium and minimum distance) and position (front/rear, central/side). The colour represents the distance, the field represents the position. The maximum detected distance is displayed in green, the medium in yellow and the minimum in red. If the vehicle is only equipped with rear sensors, the front sensors are omitted from the graphic display. If the vehicle is equipped with front and rear sensors and only the front sensors are active, the rear sensors are omitted from the graphic display.

**Stop &Go function**

The car is equipped with a Stop &Go function, which can be activated by means of the Multimedia System. The Stop &Go function can be enabled/disabled from the “Setup” menu, by selecting the option “Define vehicle parameters”, selecting the Stop&Go parking option and changing the setting to "ON". With the Stop &Go function active, the front sensors are automatically activated whenever the vehicle speed drops below 18 km/h (11 mph).

WARNING: The Stop&Go function is only available when front parking sensors are installed.



The sensors enable the system to monitor the front and back of the vehicle; their position covers the median and side zones of the vehicle, both at the front and rear ends. If an obstacle is located in the median zone, it is detected at distances of less than 0.9 m to the front and 1.5 m to the rear, according to the type of obstacle and in proportion to its dimensions. If the obstacle is positioned in the side zone, it is detected at distances of less than 0.8 m.

**Maserati Multimedia system: Bluetooth technology**

The MMS uses Bluetooth technology, which means that the system can be connected to a Bluetooth-enabled mobile phone. The connection enables the MMS to be used for making or receiving calls (by means of the hands-free function), and for managing the mobile phone address book. The connection can be established in two ways:

1. By pairing a mobile phone with the MMS.

2. By linking a stored mobile phone to the MMS.

The mobile phone only has to be paired with the MMS on the first connection.
Pairing can only be done from the mobile phone; it cannot be done from the MMS interface, since the system is not configured to search for Bluetooth devices. Linking a stored mobile phone connects the MMS to a phone which has already been paired with the system. A link must be established each time that the user wishes to operate the Bluetooth mobile phone via the MMS. Unlike pairing, this operation can be performed either from the mobile phone or from the MMS.

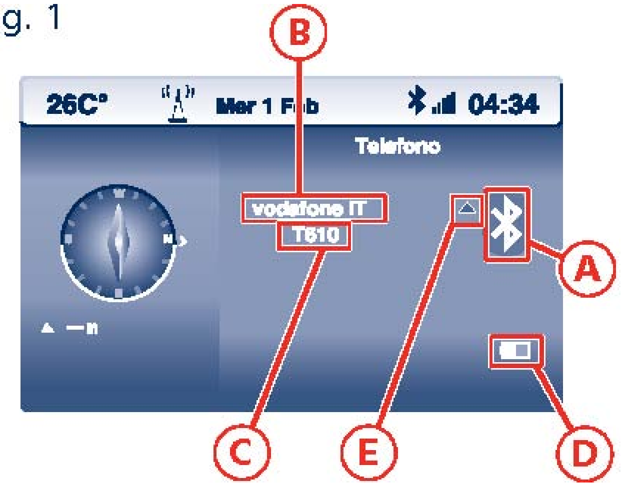
**Pairing a mobile phone**
WARNING: Before proceeding with the connection, consult the user guide of the mobile phone to be paired with the MMS system.
To pair a phone with the system, the Bluetooth function must be activated on both devices. To prepare the MMS for pairing with a mobile phone, proceed as follows: - switch on the mobile phone; - turn the ignition key to ON without starting the engine; - switch on the MMS by pressing the rotary knob **20**; to activate the Bluetooth pairing function on the mobile phone, refer to the instructions in the user guide supplied with the phone. During the pairing operation, the phone requests a PIN code from the user, see page 5 “Authentication code”. If the code is entered correctly, the connection between the two devices is established. Depending on which address book synchronisation mode is set, see page 5 “Address book synchronisation mode”, address book contacts stored in the mobile phone can be browsed directly from the MMS. Once the connection is established, a message appears on the MMS display informing the user that the pairing operation is complete.
The MMS can be paired with up to 10 devices. If 10 paired devices are already stored in the system, to store a new one simply select a listed device, which will be deleted in favour of the new device.

***Bluetooth main screen***

Press the MODE button, or press the MENU button and select Telematic mode, to access the Bluetooth screen, see Fig. 1. The screen indicates the following parameters:

A) connection status
B) network operator
C) name of the paired device
D) battery charge level
E) roaming indicator (if enabled)

Fig. 1



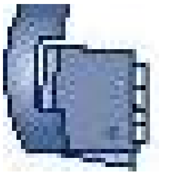

***Disconnection***

The Bluetooth connection may be interrupted in one of three ways:

1. By interrupting the connection from the mobile phone, following the steps described in the corresponding user guide, or by switching the mobile phone off;
2. By means of the MMS interface.
4 "List of connected devices";
3. By moving the Bluetooth-enabled phone away from the MMS so that the signal leaves the MMS reception area. Disconnection is indicated by the pop-up message shown in Fig. 2.

Disconnecting the telephone does not delete the list of calls stored in the call log. To delete the list, proceed as follows:

- press the MENU button
- select icon A and confirm by pressing the rotary knob
- select and confirm, by pressing the rotary knob, the **“Telephone Functions"** option;
- select and confirm, by pressing the rotary knob, the **“Delete call log”,** option,
see Fig. 3. The log will not be deleted until the operation has been confirmed a second time.

**Icon A**

***Switching on the MMS***

Each time that the MMS is switched on and provided that Bluetooth mode is active, the system searches for previously paired devices (stored in the memory). The search begins with the last paired device and moves on to previous devices in chronological order.
The search ends when the MMS detects a paired phone and establishes the connection, or when it detects an unpaired phone. In the latter case, to establish a connection, first pair the telephone by selecting ”PAIR TELEPHONE”. If the system fails to find a device, the search ends and the Bluetooth function is disabled.

***Making and receiving calls***

Calls can be managed either from the mobile telephone or from the MMS. The MMS display indicates the status of the active call, whether incoming and outgoing. To make an outgoing call from the MMS, open the Call menu as follows:
- press button (**4**) or
- in Telematic mode press the RH rotary knob (**13**)
-in Telematic mode, select and confirm the "Call" function using the RH rotary knob (**13**).
The display shows the following functions:

- Call list
- Dial
- Directory

**Functions linked to Bluetooth mode**
In the Telematic mode menu you will find "Bluetooth functions"


***Bluetooth functions***
Select "Bluetooth functions" by rotating the knob (13), then press to confirm and access the following functions (see Fig. below)
- Bluetooth activation modes
- List of connected devices
- Change the system Bluetooth name
- Authentication code
- Address book synchronisation mode

**Bluetooth activation modes**
Use this menu to select the Bluetooth operation mode from the following options:
-Off
- On and visible
-On and hidden

*Off*
When this function is selected, Bluetooth is disabled and therefore the system cannot detect any devices.

*On and visible.*
The MMS is configured to connect with previously stored devices or to pair with new devices. Note that the MMS only permits new pairings when no link is established with a previously stored device. The MMS can only be linked with one mobile phone at a time; further linkup requests will be ignored.


*On and hidden*
The MMS is configured to connect with previously stored devices, but not to pair with new devices.

**List of connected devices**
This menu displays the list of paired devices. The devices are listed in chronological order, starting with the most recently connected device. If a listed device is paired with the system, the corresponding item will be highlighted. If an active link is established with a listed device, this will be indicated by means of an icon on the display. At the bottom of the screen (see Fig. 7), the following four buttons are displayed:

- Connect/disconnect.
- Delete.
- Delete all.
- OK.

*Connect/disconnect:*
Use the rotary knob (13) to select the item corresponding to the telephone that you wish to connect/disconnect. This function is used to connect or disconnect the telephone from the MMS.

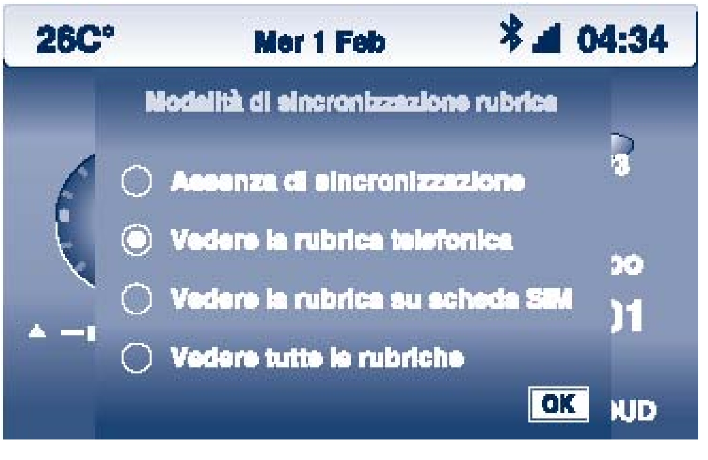
*Delete :*
Select this option to delete the selected telephone from the list of stored devices.


*Delete all :*
Select this option to delete the entire list of stored devices.

*Ok :*
Select this option to close the window without making any changes.

**Change the system Bluetooth name**
Select this function by rotating and pressing the rotary knob (13), to change the name that the MMS assigns to the mobile phone during and after pairing. The buttons at the bottom of the screen control the operations relating to this function. The screen corresponding to this function is shown in Fig. 8. To exit the function and save the new name, confirm the selection by pressing “OK"


**Authentication code**
Select this function by rotating and pressing the rotary knob (13), to change the PIN code which must be inputted on the mobile phone during connection to the MMS. If you need to correct the code during input, select the "Correct" button located at the bottom of the screen. To exit this function and save the new code, confirm the selection by pressing “OK”.
Address book synchronisation mode
Use this function to download address book contacts so that they can also be browsed from the MMS.



The options available on the corresponding screen are:

- No synchronisation
-View address book
-View address book on SIM card
-View all address books

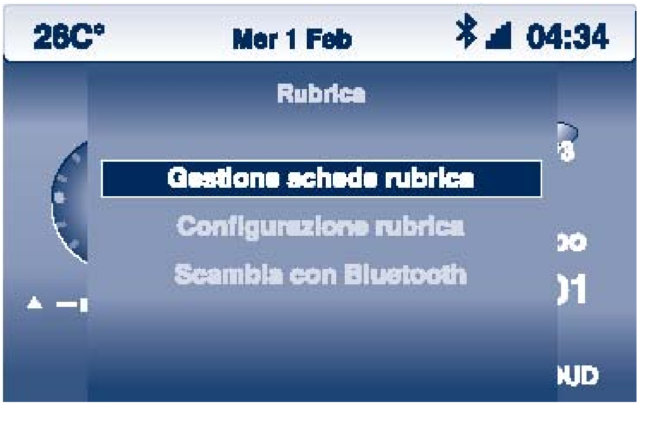
Depending on which function is enabled, contacts stored in the mobile phone address book will be downloaded onto the MMS during the pairing operation. Downloaded contacts may then also be consulted from the MMS.
Successful/failed download operations are indicated by the relevant pop-up message on the display.

***Address Book Menu***
In the Address Book menu you will find an “Exchange using Bluetooth” function, see Fig. 10, which enables contacts in the mobile phone address book to be downloaded to the MMS address book. Use the rotary knob (13) to select and confirm this function. The display then lists the following options:

-Get all elements
-Get one element

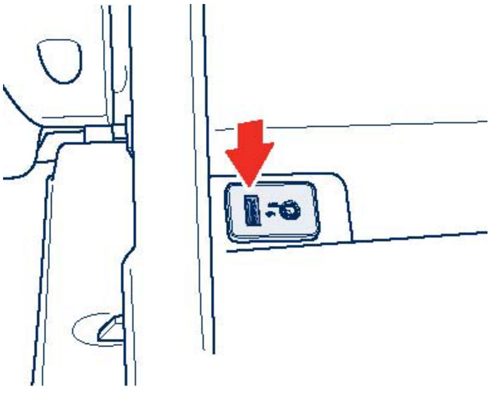
*Get all elements :*
Select this option to copy all the addresses and numbers in the mobile phone address book. During the operation, a message indicates that copying is in progress. To interrupt the operation, press ESC.

*Get one element :*
Select this option to copy a specific entry from the mobile phone address book to the MMS address book. When this function is opened, the display lists all entries stored in the mobile phone address book. Use the right-hand knob (13) to select and confirm the entry that you wish to copy. During the operation, a message indicates that copying is in progress.



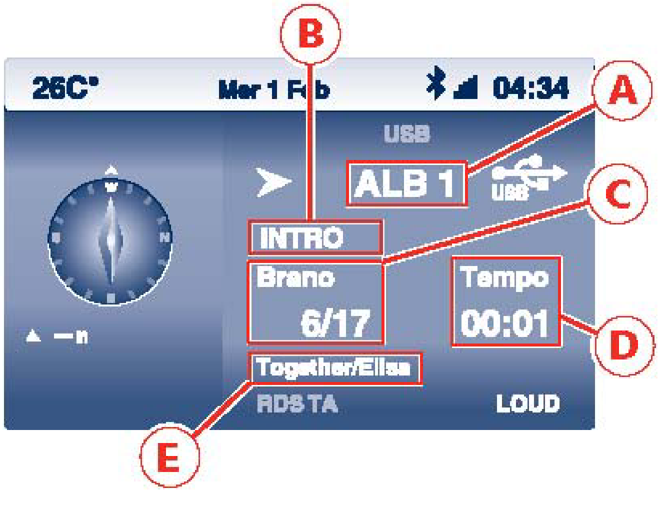
**USB port full**

The USB port is located inside the glove box. It allows for the exchange of data and the recharging of connected sources. If the connected memory stick contains MP3 files, these files are played automatically. This does not occur if another music source is currently selected. In this case, select the USB function by repeatedly pressing the Source button (**2**). In any case, playback always begins after the memory stick has been read by the system. The time taken for the read operation depends on the type of content stored in the USB device.



The USB screen shows the following information:

A - name of the folder containing the file being played;
B - status of the Introscan/Random/Repeat functions;
C - number of the file being played and total number of files;
D - elapsed playing time of the current track;
E - track title and album title (if available).



***Select album***
With USB mode active, press button (**14**) to select the next album. Press the button again to move forward by one album. Alternatively, press button (**7**) to select the previous album

***Select track***
To select a track, proceed as follows:
Next track:
-briefly press button (**11**).
Previous track:
-briefly press button (**16**).
To replay the current track; press again to select the previous track.

**USB mode menu**
Repeatedly press the **MODE button** (**22**) until USB mode is displayed. Press the rotary knob (**13**) to display the following menu:

- Copy USB to Jukebox
- Remove USB
- Introscan ON
- Random ON
- Repeat ON

***Copy USB to Jukebox***
Confirm this function by pressing the rotary knob (**13**), to display a submenu containing the following options:

-All content
- Select multiple
- Current album
- Current track

During the copy operation, the REC icon appears on the display and the only functioning source in Audio mode is the Radio. This menu may be opened from the main menu (press the MENU button **15**), by selecting the “Audio functions” mode and then “USB” from among the listed options.

***Remove USB***

This function enables the USB stick to be removed from the port. It generates a pop-up message authorising the user to proceed. Do not remove the USB stick without first enabling this disconnect function. Failure to do so may result in data loss.

***Introscan ON***

Select and confirm this function to listen to a preview of all the tracks contained in the USB stick, in their listed order. To disable this function, press the rotary knob (**13**) then select “Introscan OFF” and confirm.

***Random ON***

Select and confirm this function to listen to tracks from the USB stick in random order; when this mode is active, the letters RDM are shown on the display. To turn this function off, press the rotary knob (**13**) then select “Random OFF” and confirm.

***Repeat ON***

Select this function using the rotary knob (**13**) to play a folder / album repeatedly. To disable this function, press the rotary knob (**13**), then select “Repeat OFF” and confirm.

**LIST function**

Displays a list of albums stored in the memory stick which is currently plugged into the USB port. To activate this function, press the LIST button (**12**) during playback in USB mode. To access a particular track list, select the desired album using the rotary knob (**13**) and press to confirm. To play a track from the list, select the desired track using the rotary knob (**13**) and press to confirm.

# 3

# Mechanical Components

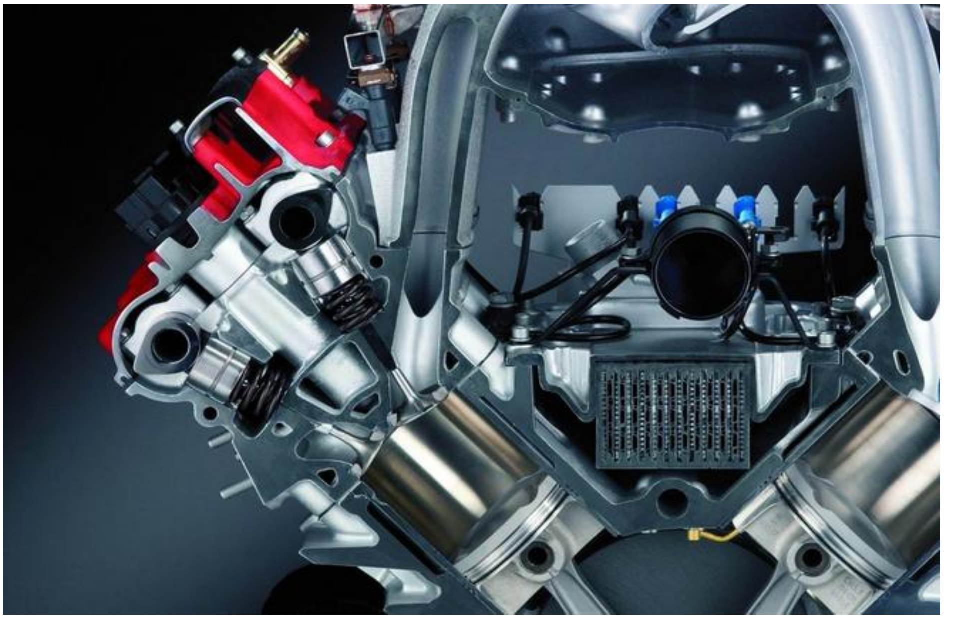
## Technical introductions

# 4200 Dry Sump Engine

**INTRODUCTION**

With the introduction of the F136 engine family in 2001, a new technical area started for Maserati. After a period of more than 10 years in which only turbocharged engines were produced, Maserati returned to normally aspirated engines.
This was also the first Maserati engine which was not produced in-house. Assembly of this engine was carried out by group partner Ferrari in Maranello, at about 20 km from the Maserati factory. This new engine was the result of a close technical collaboration between Maserati engineers and their colleagues from Maranello and is technically an absolute masterpiece.
Compact and light design; four overhead camshafts and 48 valves with a small valve angle; dry sump lubrication system to lower the center of gravity and allow sufficient lubrication in even the most extrem conditions; nicasil-coated aluminium cylinder liners… all aspects which are usually reserved for racing engines.
This engine is found in the complete M138 model range (F136R) and in a slightly modified version (F136S) also in the M139 model with Duoselect transmission.

**ENGINE CHARACTERISTICS:**



- All-alloy 90° V8 over-bore engine with competition pedigree, compact and light construction.
- Stepless variable valve timing with timing variators on both intake camshafts. This system is operated by means of a high pressure hydraulic system (12-14 bar). A dedicated high pressure pump is driven by the camshaft and a hydraulic pressure accumulator is located underneath the intake manifold.
- Hardened aluminium/silicon alloy cylinder heads with high volumetric and thermodynamic efficiency combustion chamber.
- Hardened aluminium/silicon alloy crankcase with pressed-in nikasil cylinder liners.
- Single-cast crankshaft in hardened steel, individually balanced, resting on five main journals.
- Four overhead camshafts (two per bank) and four valves per cylinder, driven by hydraulic tappets.
- Chain-driven timing system, with hydraulic tensioners.
- Lubrication system with dry sump, oil/water exchanger incorporated into the upper crankcase (inside the V-angle).
- Aluminium intake manifold for F136R version.
- Plastic intake manifold, with optimised line lengths for F136S version.
- Integrated Bosch Motronic ME7 ignition-injection with motor drive throttle.

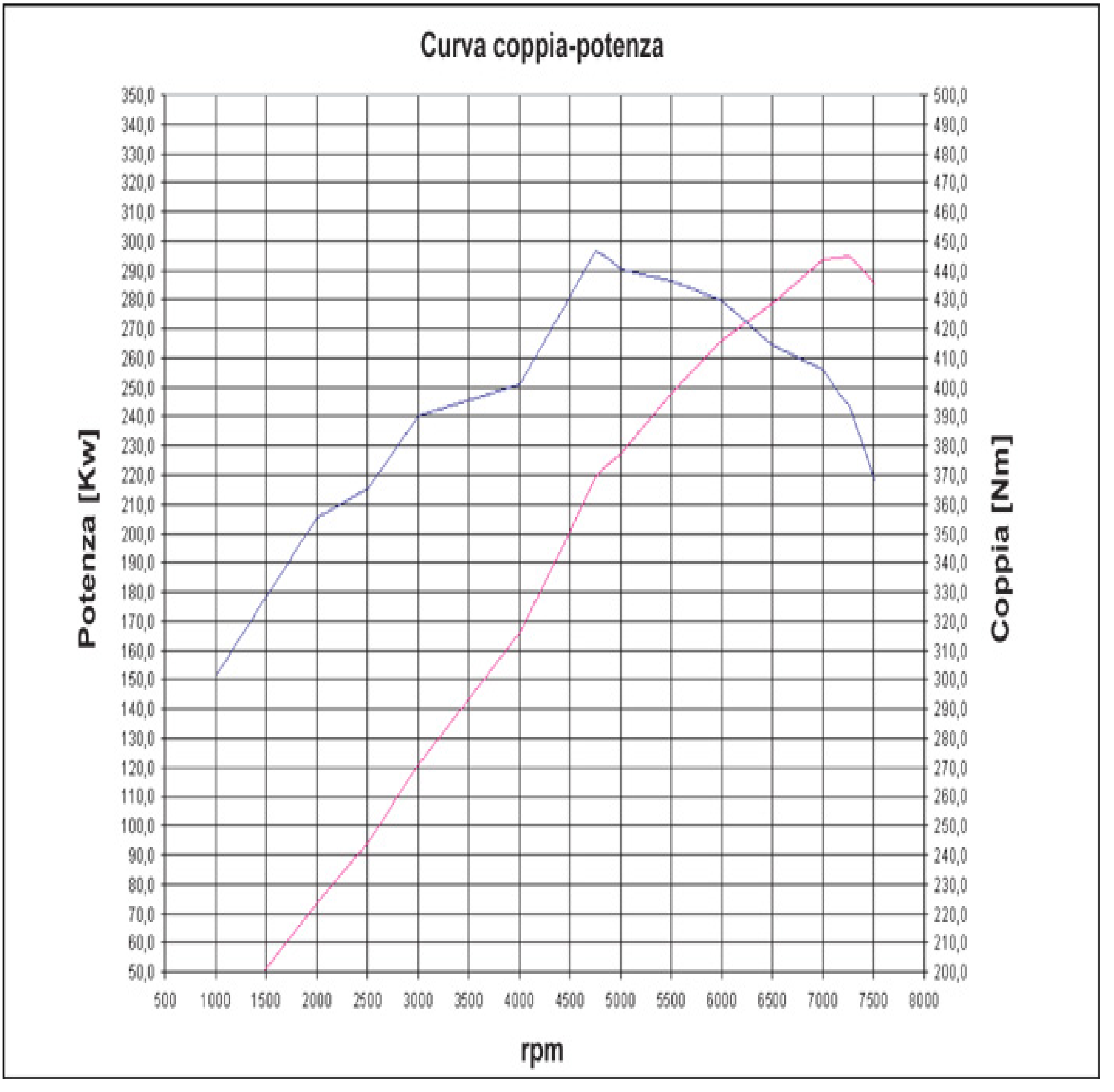
**SPECIFICATIONS F136R:**

| | |
|---|---|
| Vehicle ID code | M138 |
| Cycle | Otto |
| Cylinder number and position | 8-90° V |
| Number of valves per cylinder | 4 |
| Bore and stroke | 92x79.8 mm |
| Total displacement | 4244 $cm^3$ |
| Compression ratio | 11.058 ± 0.2:1 |
| Max power (EEC) | 287 kW – 390 HP |
| Corresponding speed | 7000 rpm |
| Max Torque (EEC) | 451 Nm - 45.9 Kgm |
| Corresponding speed | 4500 rpm |
| Valve diameter | |
| Intake | 37.8 mm |
| Exhaust | 31.0 mm |
| Engine timing | |
| Intake | -15°/66° ± 1° |
| Exhaust | -35°/ 6° ± 1° |
| Crank angle | 90° |
| Engine RPM in idle (95°C) | 800 rpm |
| Normal lubrication pressure | |
| at 100°C/6000 rpm | 5-6 bar |
| Engine control system | Bosch Motronic ME7.1.1 |
| Ignition | static ignition |
| Ignition sequence: | 1-8-6-2-7-3-4-5 |
| Ignition coil: | Bosch ZS-K-1X1E |
| Spark plugs | NGK PMR8A |
| Alternator | Denso 12 V - 150 A |
| Battery | FIAM 12V 100Ah - 850A |

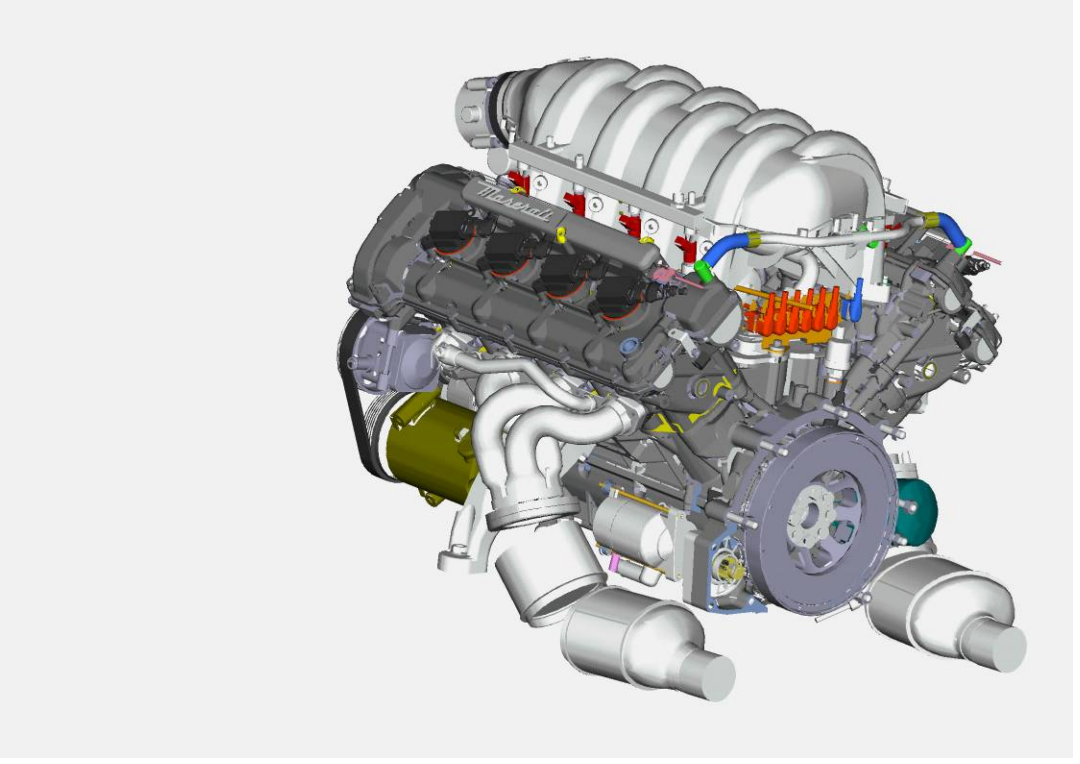
**SPECIFICATIONS F136S:**

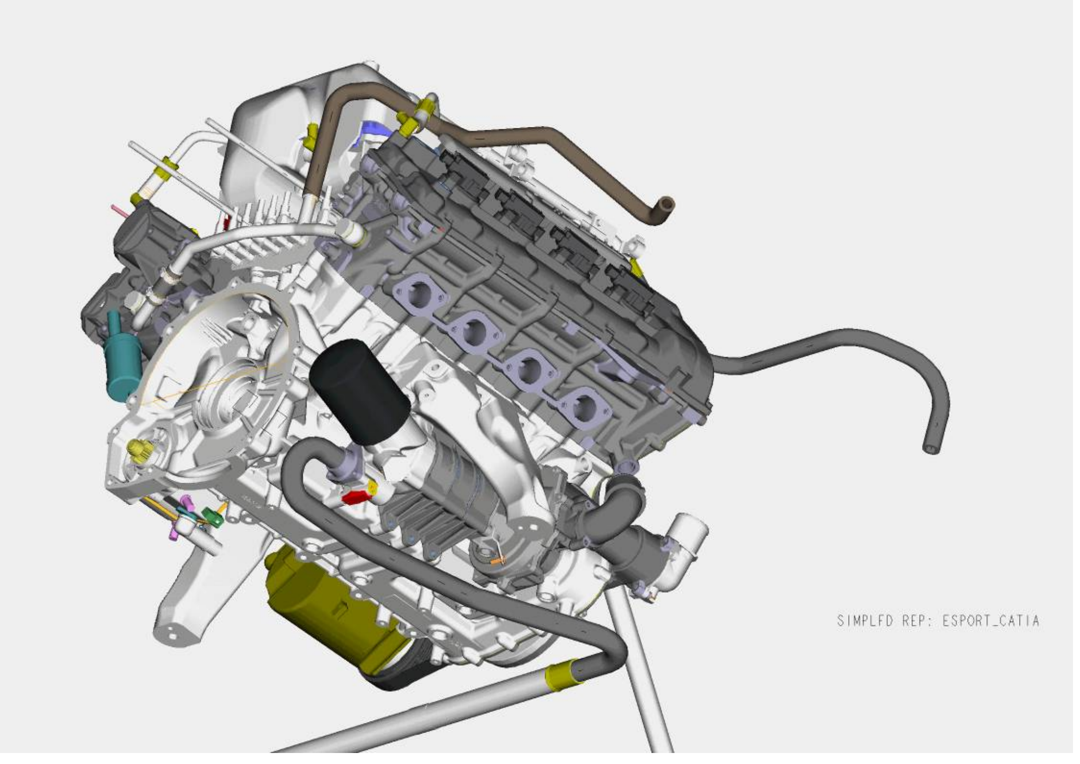
| | |
|---|---|
| Vehicle ID code | M139 |
| Cycle | Otto |
| Cylinder number and position | 8-90° V |
| Number of valves per cylinder | 4 |
| Bore and stroke | 92 x 79.8 mm |
| Total displacement | 4244 $cm^3$ |
| Compression ratio | 11.058 ± 0.2:1 |
| Max power (EEC) | 295 kW – 400 hp |
| Corresponding speed | 7250 rpm |
| Max Torque (EEC) | 442 Nm - 45 Kgm |
| Corresponding RPM | 4750 rpm |
| Valve diameter | |
| Intake | 37.8 mm |
| Exhaust | 31.0 mm |
| Valve upstroke without play | |
| Intake | 10.5 ± 0.05 mm |
| Exhaust | 9.3 ± 0.05 mm |
| Engine timing | |
| Intake | -15°/66°± 1° |
| Exhaust | -41°/ 0°± 1° |
| Crank angle | 90° |
| Engine RPM in idle (95°C) | 800 RPM |
| Normal lubrication pressure | |
| at 100°C/6000 RPM | 5-6 bar |
| Engine control system | Bosch Motronic ME7 |
| Ignition | static ignition |
| Ignition sequence: | 1-8-6-2-7-3-4-5 |
| Ignition coil: | Bosch ZS-K-1X1E |
| Spark plugs | NGK PMR8A |
| Alternator | Denso 12 v - 150 A |
| Battery | FIAM 12V 100Ah - 850A |

## ENGINE PERFORMANCE CURVES

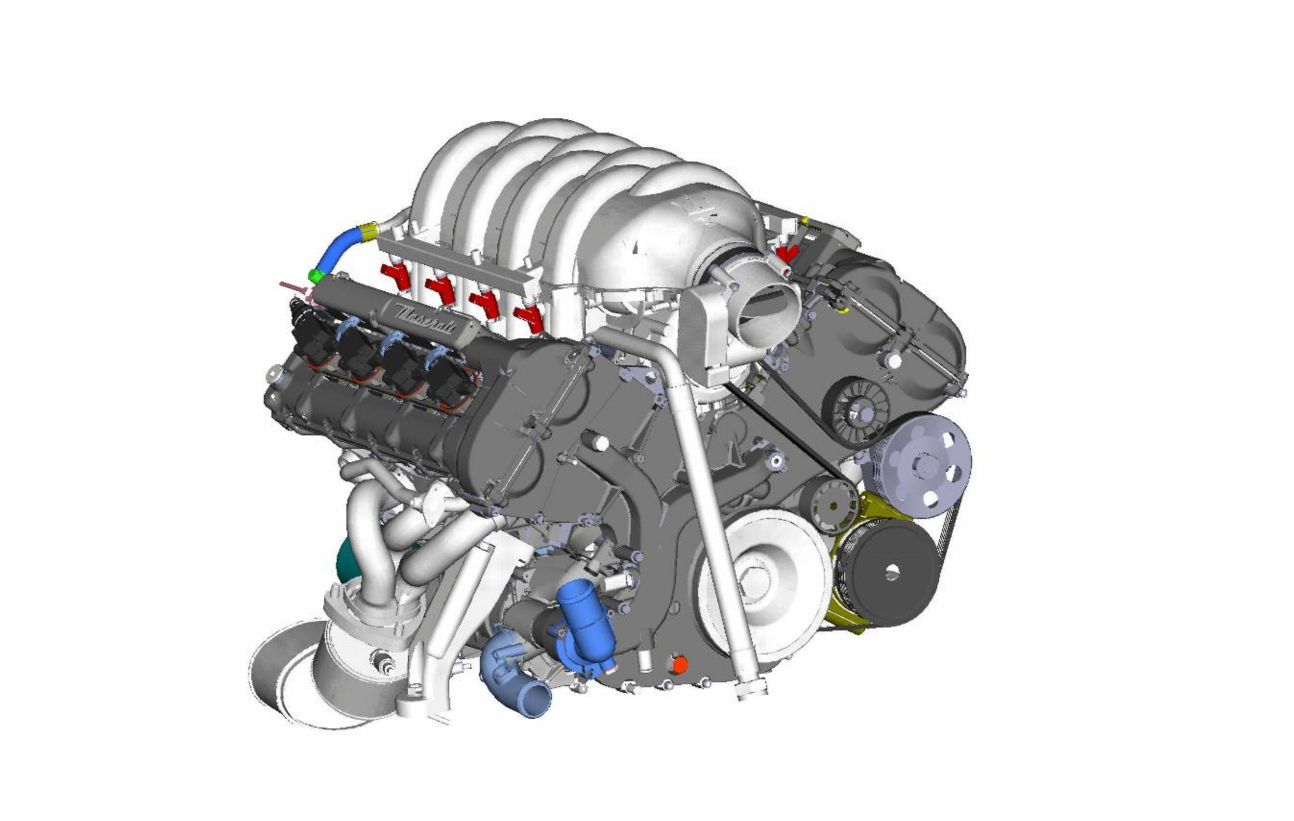


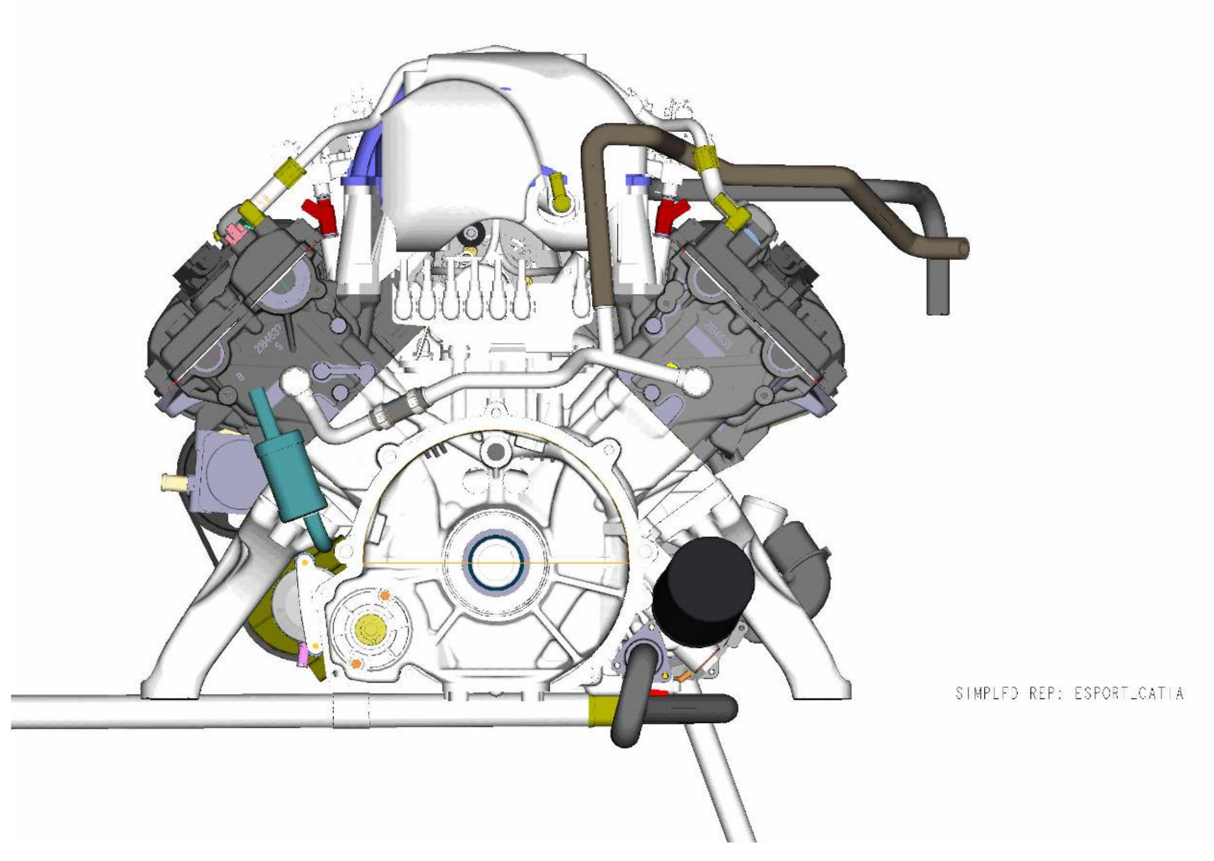
**ENGINE VIEWS (F136)**



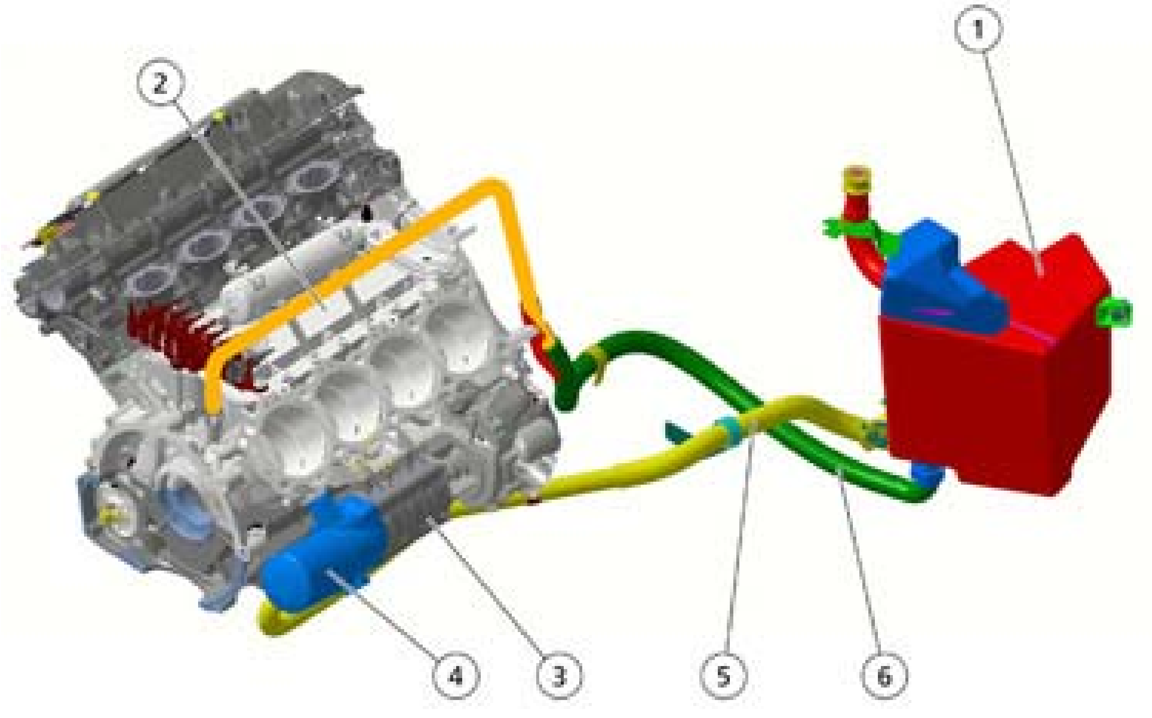


## ENGINE VIEWS (F136S)





**LUBRICATION SYSTEM**




The lubrication system is made up an external oil tank (dry sump) and external, multiple oil pump. The oil pump is driven by the crackshaft my means of a chain the water pump is incorporated in the oil pump and forms a single unit. This construction allows a low engine position in the vehicle chassis and guarantees adequate lubrication, even in case of very high lateral acceleration forces.

1. Engine oil tank
2. Oil/water heat exchanger
3. Water/oil pump
4. Oil filter
5. Line from oil tank to water/oil pump
6. Line from heat exchanger to oil tank

**Pump unit:** this geared unit is composed of three purge pumps and one intake pump.

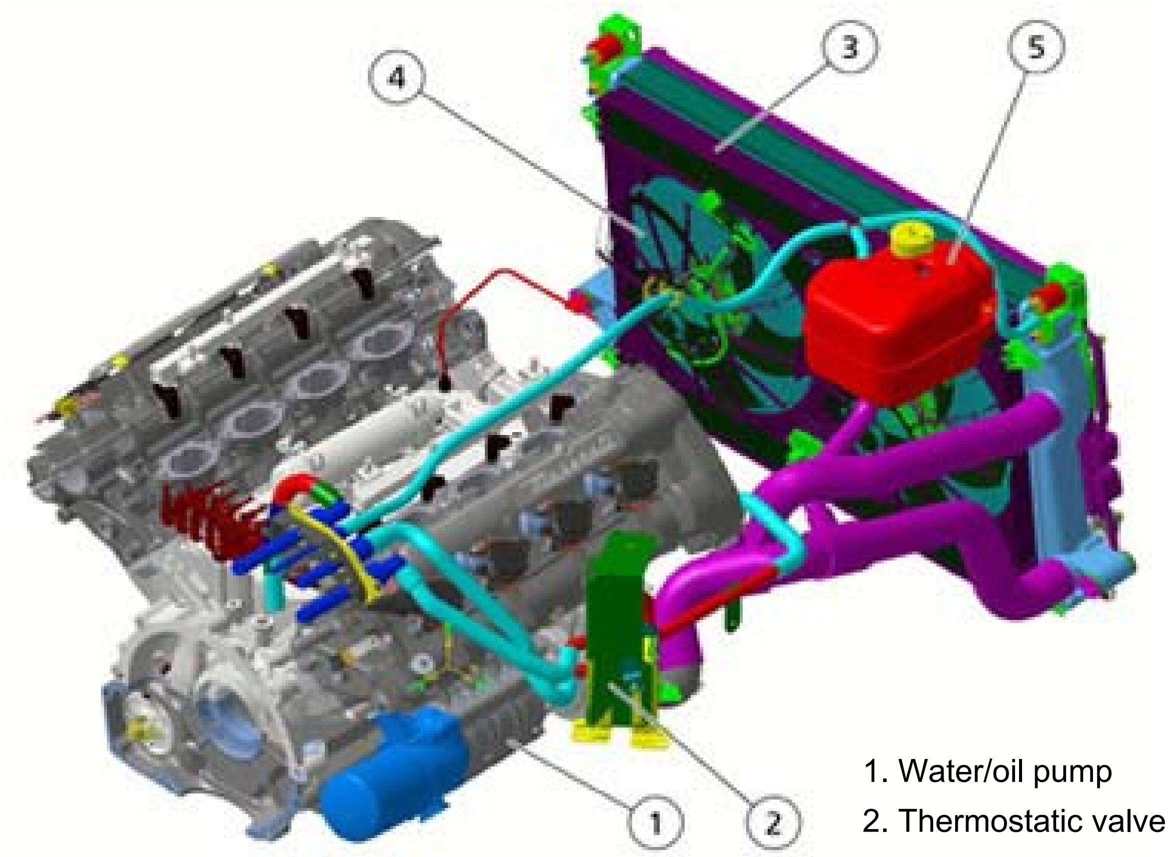
**Cooling system**: the water/oil heat exchanger **(2)** is incorporated into the engine assembly.

**Oil tank**: the engine oil tank **(1)** is made of aluminium sheet and is located on the right-hand side of the engine compartment. It isequipped with dipstick and filler neck.

**Oil level check  procedure:**

- Make sure the vehicle is on a flat surface.
- Start up the engine and wait until it reaches the correct operating temperature (water temperature: 90°C)
- Check the oil level <u>with engine idling</u> by using the dipstick on the filling tap.
- The oil level should reach the MAX. reference on the dipstick. Top up if necessary.

**COOLING SYSTEM**




1. Water/oil pump
2. Thermostatic valve
3. Radiator
4. Electric fans
5. Expansion tank

Circulation of the coolant is activated by a centrifugal pump, which is chain-driven, together with the oil pumps, by the crankshaft.

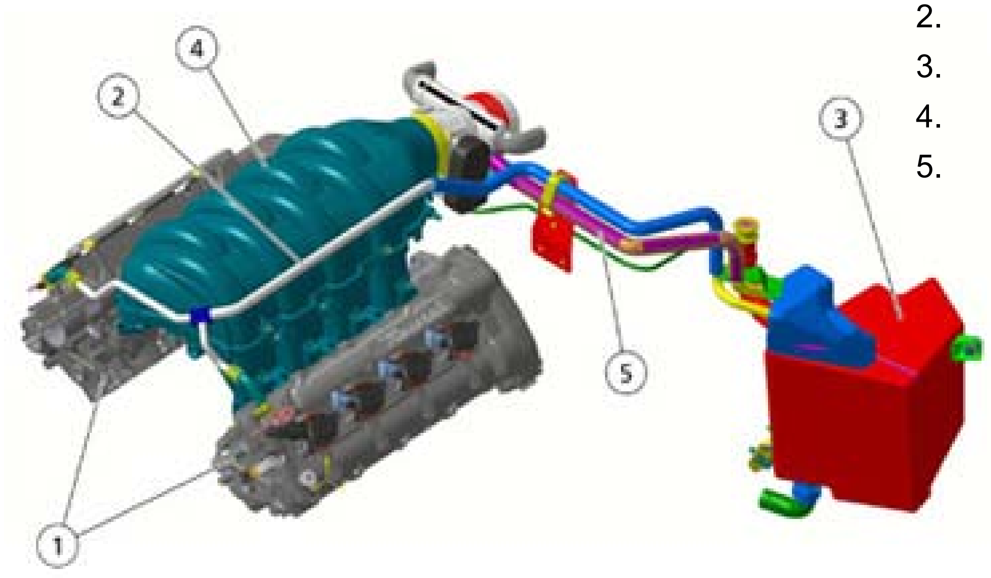
**Pump**
Centrifugal water pump (1) with by-pass built in with the thermostatic valve (2).

**Circuit**
Max. circuit pressure: 6 Bar

**Radiator**
The water radiator (3) is positioned on the front of the engine compartment.
The electric intake fans (4) are located on the hood and are shared by the water radiator, the AC condenser and the power steering oil cooler.

**Expansion tank**
Located on the right-hand side (5)

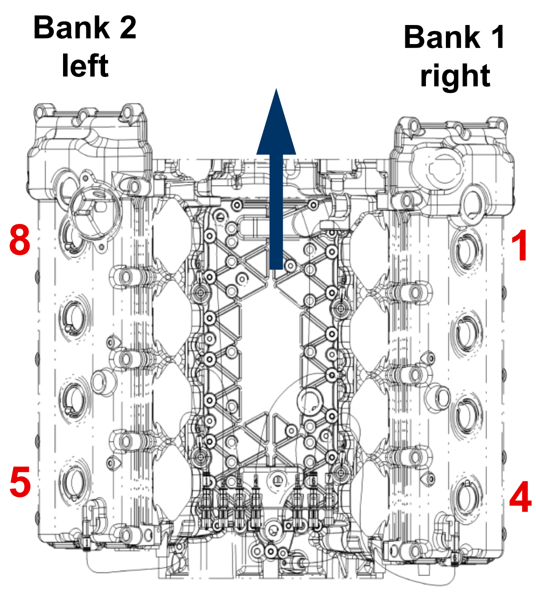
## CRANKCASE VAPOUR RECIRCULATION SYSTEM



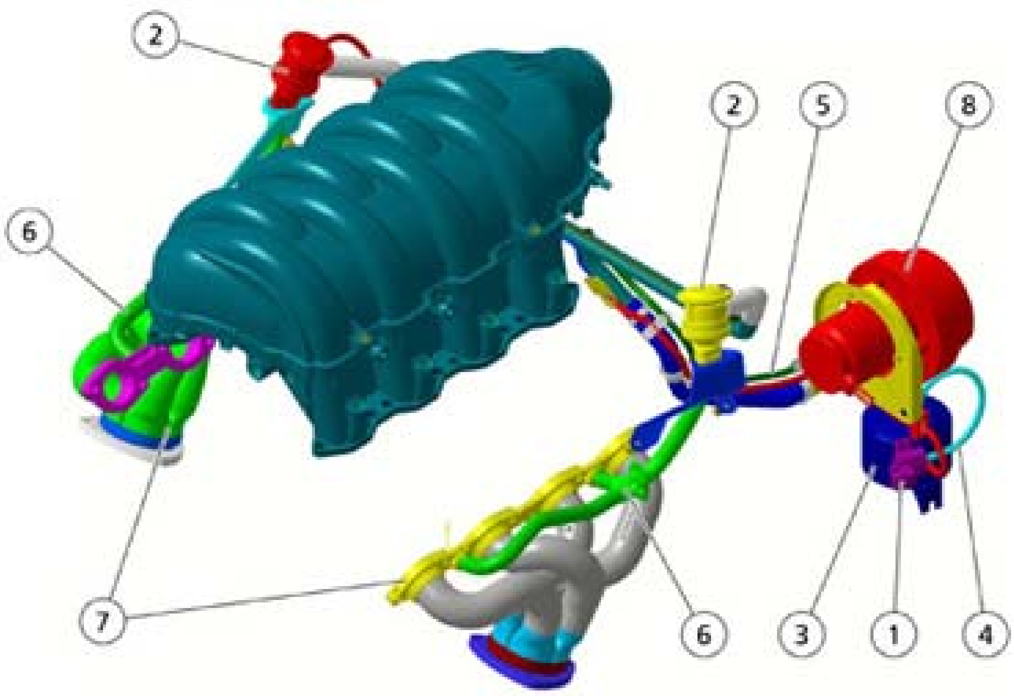

1. Heads
2. Outlet line
3. Oil tank
4. Plenum chamber
5. Line

The device for oil gas and vapour recirculation is of the closed circuit type.
The oil vapours and the gases coming from the heads (1) pass through the breather line (2) and a portion of them condenses and flows back into the oil tank (3) while the other portion is taken in by the plenum chamber (4) via the line (5).

## CYLINDER NUMERATION



**SECONDARY AIR SYSTEM**




1. Solenoid valve
2. Pneumatic valves
3. Vacuum tank
4. Tank-solenoid valve line
5. Pneumatic valves duct
6. Exhaust manifold line
7. Exhaust maniforls
8. Secundary air pump

This system supplies additional air to the exhaust manifolds to allow the catalytic converter to reach their operating temperature quickly.
By means of the solenoid valve **(1)**, the Motronic ECU, drives the opening/closing of the two pneumatic valves **(2)** which actuate the injection of secondary air into the exhaust manifolds **(7)**. The vacuum tank (**3**) which creates the vacuum required to open the pneumatic valves is located in the engine compartment, underneath the secondary air pump. The secondary air pump (**8**), managed by the engine ECU, sends air to the exhaust lines.
The pump and the secondary air solenoid valve are activated, after engine ignition, when the coolant temperature is in the range **-5 °C to - 99°C**.
The function is active for around **80 seconds**, deactivates for around **60 seconds** and then reactivates for a further **10 seconds**. In the latter period the secondary air valve seal is monitored.
The Lambda sensors are disabled for the entire duration of the cycle.

**ENGINE TIMING:**

The engine timing data for for M138 and M139 vehicles are not the same. Refer to the respective timing values for each engine version.

**CAUTION!**

ENGINE VERSION **F136R**

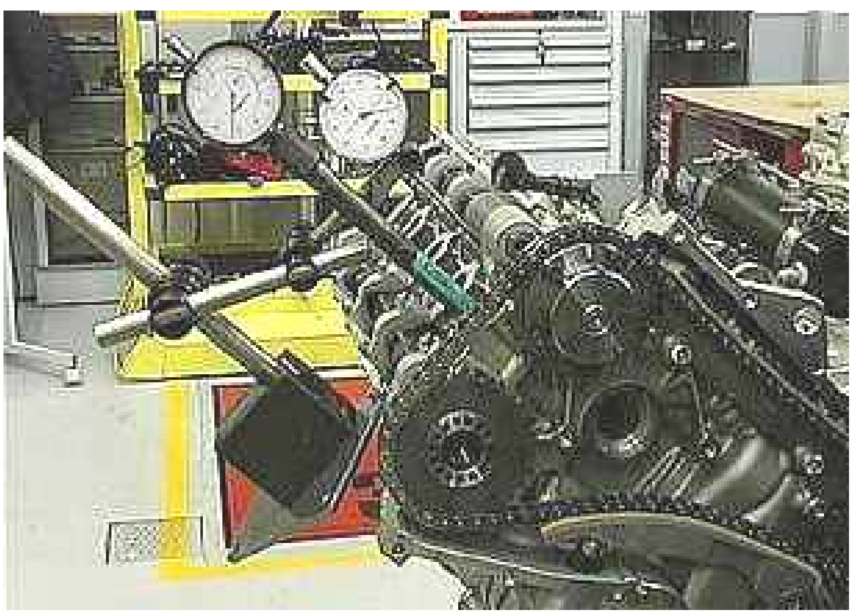
| | |
|---|---|
| Intake | |
| Beginning before TDC | 15°± 1° |
| End after TDC | 66°± 1° |
| Exhaust | |
| Beginning before BDC | 35°± 1° |
| End | 6° ±1° |

ENGINE VERSION **F136S**

| | |
|---|---|
| Intake | |
| Beginning before TDC | 15°± 1° |
| End after TDC | 66°± 1° |
| Exhaust | |
| Beginning before BDC | 41°± 1° |
| End | 0° ±1° |

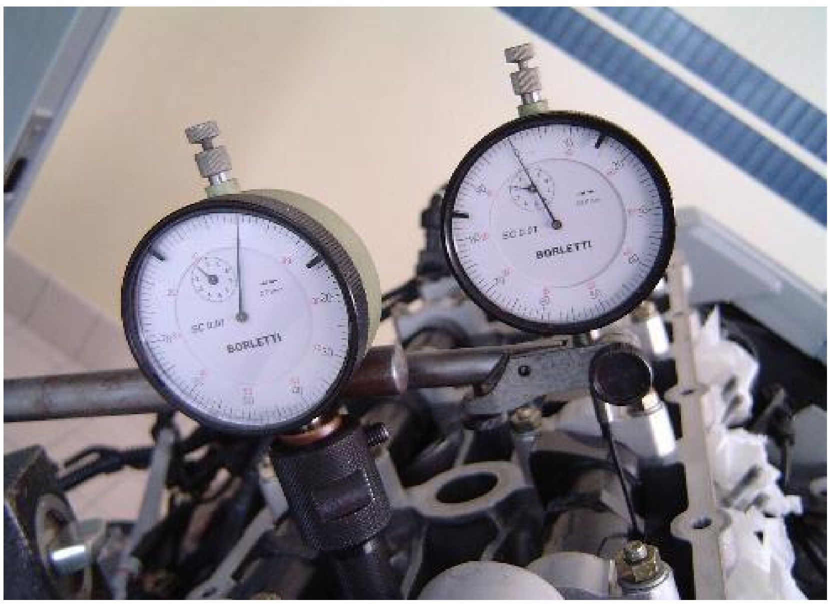
The engine timing procedure is identical for both versions, but the values will, of course, be different. The procedure below refers to F136R engines. The different tactics to adopt for F136S engines are described at the end of this timing procedure.

**INTAKE TIMING ADJUSTMENT PROCEDURE (F136R)**



- Turn the engine anticlockwise and position the first piston at the TDC. Make sure that the dial gauge is on zero.
- Place a support for the magnetic base of the dial gauge holder on the right-hand engine head.

- Position a magnetic base with a long-rod centesimal dial gauge.
- Turn the engine clockwise positioning the intake cam immediately before the opening ramp.
- In this condition, the hydraulic tappet is still in the rest position.
- Position the dial gauge plunger above the tappet of an intake valve. The dial gauge rod must be as perpendicular as possible to the tappet surface.
- Reset the dial gauge that measures the movement of the intake tappet.

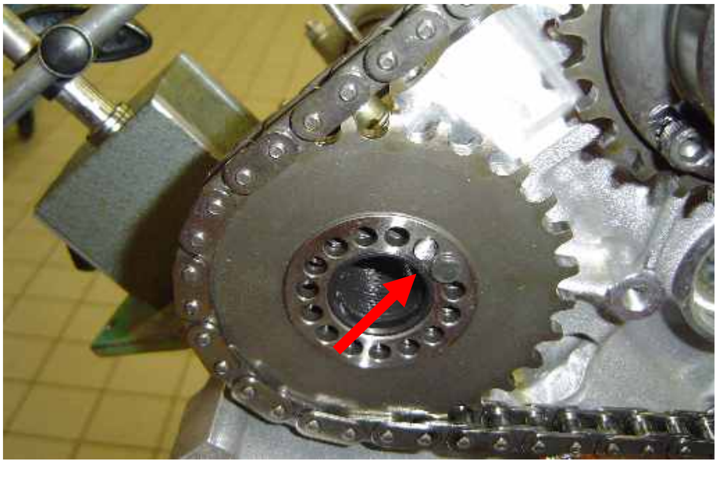



- Again, position at the TDC and check the dial gauge previously reset. In this position (TDC), the intake valves of the first cylinder have already started their travel. Therefore, carefully check the position on the dial gauge positioned on the tappet.
- Turn the crankshaft **15°** beyond the TDC. This corresponds to a piston stroke of 1.75 mm beyond the TDC.
- Check that the tappet downstroke (begun before the TDC) and hence the intake valve upstroke is **0.59±0.08** mm.
- Should the values measured in these conditions be out of tolerance, hold the crankshaft still, loosen the Allen screws on the timing variator and turn the intake camshaft until obtaining the desired intake valve upstroke. For this reason, as described earlier, it is advisable to get ready for the timing procedure by positioning the variator adjustment slots in the centre of the angular adjustment.
- Check the timing again.
- Use a torque wrench to tighten the previously loosened Allen screws that secure the variator to a torque of **15 Nm**, after applying Loctite 242.

**EXHAUST TIMING ADJUSTMENT PROCEDURE (F136R)**

- Turn the engine clockwise and position the first piston at the TDC with the camshafts balanced (exhaust closed and intake open). Make sure that the dial gauge is on zero.
- Position the dial gauge plunger above the tappet of an exhaust valve. The dial gauge rod must be as perpendicular as possible to the tappet surface.
- Reset the dial gauge that measures the movement of the exhaust tappet.
- Turn the crankshaft clockwise until an exhaust valve is closed.
- Check that the closing stroke of the exhaust valve is **1.09±0.08** mm.

- Should the values measured in these conditions be out of tolerance, hold the crankshaft still, move the centering dowel anticlockwise or clockwise (depending on whether you want to delay or anticipate the shaft) until obtaining the desired timing value.
- Insert the fixing dowel into the hole immediately after or before the centering dowel, whichever is easier.



**CAUTION!**

The tightening action of the exhaust gearwheel considerably affects the exhaust timing adjustment. Take this into account when adjusting the exhaust timing to the indicated value.

- Use a torque wrench to tighten the M20x32 mm hex-head screw of the exhaust camshaft (with relevant washer) to a torque of **200 Nm** after applying Loctite 242.
- Check the timing again.

**CAUTION!**

Tighten the M20x32 screw to the indicated torque taking care to lock the exhaust camshaft so that the timing chain is not loaded.

- Carry out the same procedure for the left-hand cylinder bank, positioning the dial gauge holder on cylinder number 8.

## INTAKE TIMING ADJUSTMENT PROCEDURE (F136S)

- Turn the engine anticlockwise and position the first piston at the TDC. Make sure that the dial gauge is on zero.
- Place a support for the magnetic base of the dial gauge holder on the right-hand engine head.
- Position a magnetic base with a long-rod centesimal dial gauge.
- Turn the engine clockwise and position the intake cam immediately before the opening ramp. In this condition, the hydraulic tappet is still in rest position.
- Position the dial gauge plunger above the tappet of an intake valve.
- The dial gauge rod must be as perpendicular as possible to the tappet surface.

- Reset the dial gauge that measures the movement of the intake tappet.

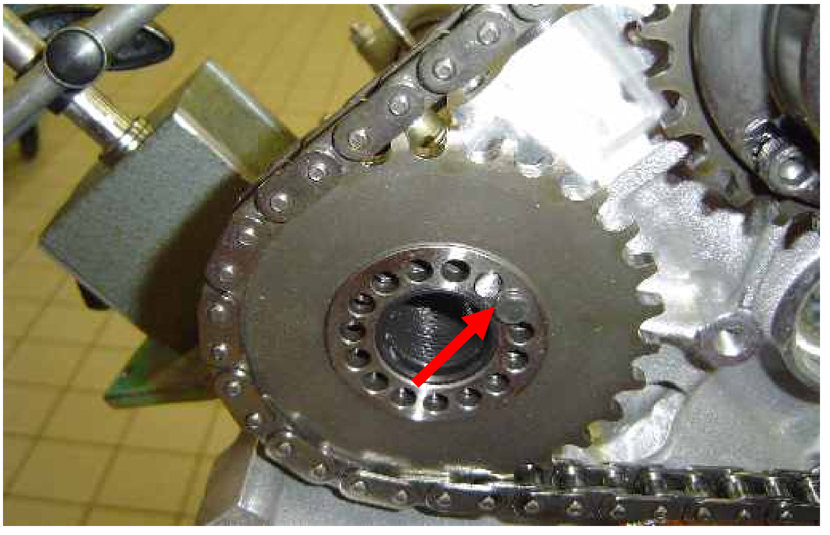
- Again, position at the TDC and check the dial gauge previously reset. In this position (TDC), the intake valves of the first cylinder have already started their travel. Therefore, carefully check the position on the dial gauge positioned on the tappet.
- Turn the crankshaft **15°** beyond the TDC. This corresponds to a piston stroke of 1.75 mm beyond the TDC.
- Check that the downstroke of the tappet (begun before the TDC) and hence the valve upstroke is **0.59±0.08** mm.
- Should the values measured in these conditions be out of tolerance, hold the crankshaft still, loosen the Allen screws of the timing variator and turn the intake camshaft until obtaining the desired intake valve upstroke. For this reason, as described earlier, it is advisable to get ready for the timing procedure by positioning the variator adjustment slots in the centre of the angular adjustment.
- Check the timing again.
- Use a torque wrench to tighten the previously loosened Allen screws that secure the variator to
- a torque of **15 Nm** after applying Loctite 242.

**EXHAUST TIMING ADJUSTMENT PROCEDURE (F136S)**

- Turn the engine clockwise and position the first piston at the TDC with the camshafts balanced (exhaust closed and intake open). Make sure that the dial gauge is on zero.
- Position the dial gauge plunger above the tappet of an exhaust valve. The dial gauge rod must be as perpendicular as possible to the tappet surface.
- Reset the dial gauge that measures the movement of the exhaust tappet.
- Turn the crankshaft clockwise until an exhaust valve is closed.
- Check that the tappet downstroke and hence the exhaust valve upstroke is **0.57±0.08** mm.

- Should the values measured in these conditions be out of tolerance, hold the crankshaft still, move the centring dowel anticlockwise or clockwise (depending on whether you want to delay or anticipate the shaft) until obtaining the desired timing value.

- Insert the fixing dowel into the hole immediately after or before the centering dowel.



**CAUTION!**

The tightening action of the exhaust gearwheel considerably affects the exhaust timing adjustment. Take this into account when adjusting the exhaust timing to the indicated value.

- Use a torque wrench to tighten the M20x32 mm hex-head screw of the exhaust camshaft (with relevant washer) to a torque of **200 Nm** after applying Loctite 242.
- Check the timing again.

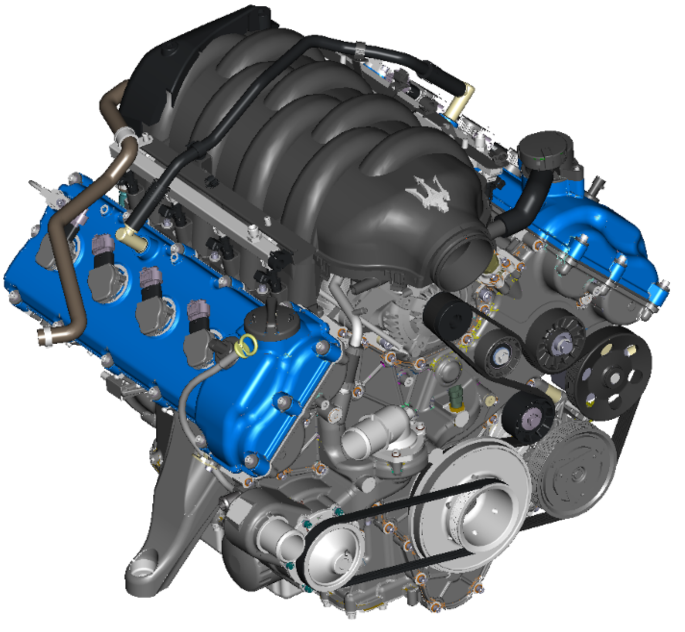
**CAUTION!**

Tighten the M20x32 screw to the indicated torque taking care to lock the exhaust camshaft so that the timing chain is not loaded.

- Carry out the same procedure for the left-hand cylinder bank, positioning the dial gauge holder on cylinder number 8.

# 4200 Wet Sump Engine

**INTRODUCTION**



This new 4.2L wet sump engine (F136UC – F136UD) is derived from the F136S engine but has been deeply re-engineered and characterized by technical contents that substantially differentiate it from the previous version.

The most important technical innovation is the adoption of a wet sump lubrication system. High torque and power values have been maintained and are assured by the well known technical contents of the “Dry sump” engine. They have been optimised and re-engineered for reliability.

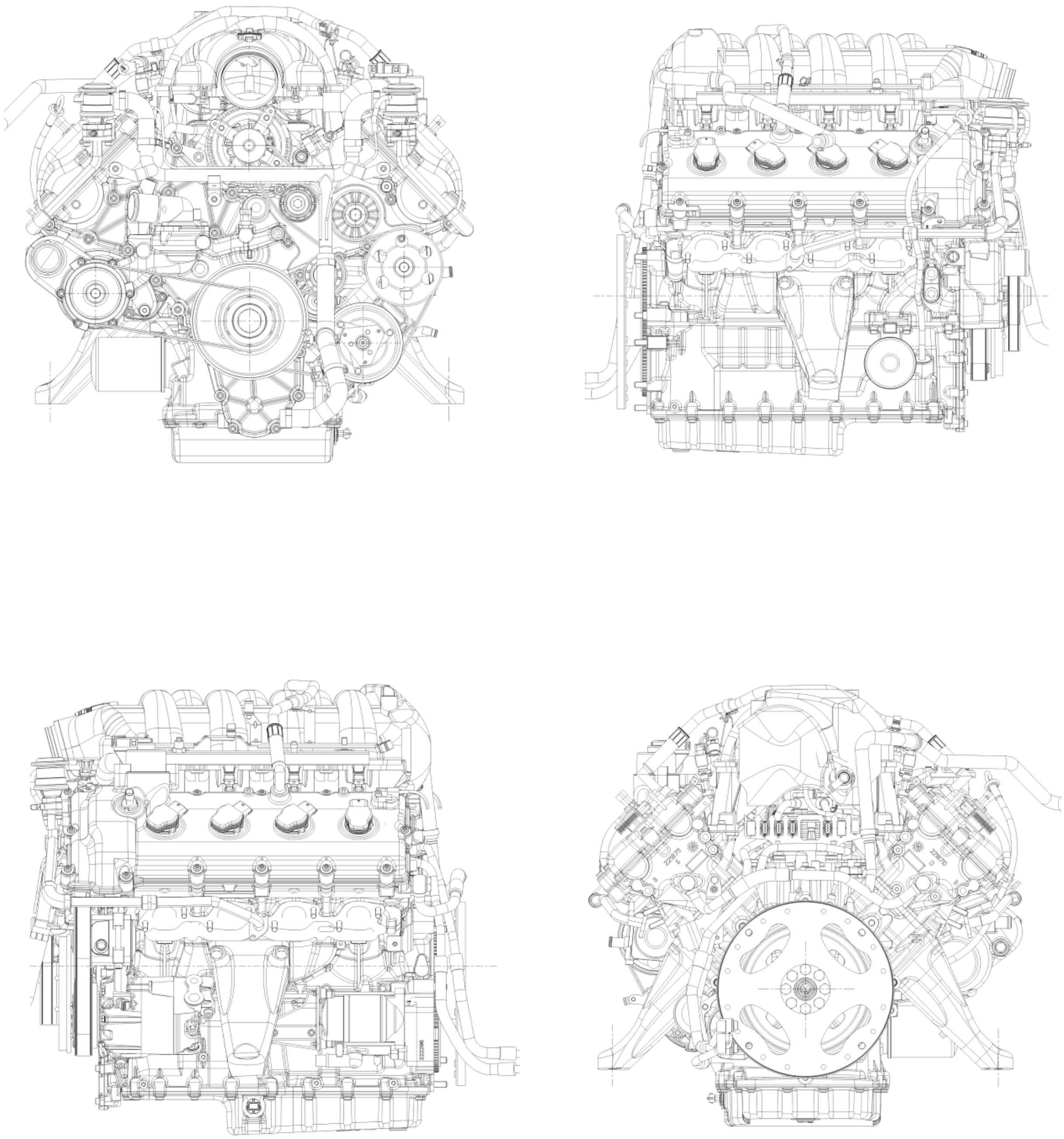
This is a unit that forms part of the new generation of Maserati engines, designed for the debut at the beginning of 2007 on Quattroporte models with automatic gearbox. Little later this new engine also found its way under the bonnet of the all-new GranTurismo model.

Both engine versions (F136UC for Quattroporte Automatic, F136UD for GranTursimo) are technically identical. The only difference lies in the engine control software with a specific engine mapping. This results in a more alert response to accelerator commands and a slightly higher power output for the GranTurismo.

**ENGINE CHARACTERISTICS:**

- Compact and lightweight construction (180kg)
- Short-stroke engine (bore: 92mm, stroke: 79,8mm)
- Cylinder heads in hardened aluminium/silicon alloy with high volumetric and thermodynamic efficiency combustion chamber.
- Crankcase in aluminium alloy and hardened silicon, completely redesigned with cast iron cylinder liners.
- All the conduits (water, oil, secondary air) are made directly in the engine castings to create a highly rigid, space-saving system and provide a strong guarantee of quality during assembly, and hence high reliability.
- Single-cast crankshaft in hardened steel, individually balanced, resting on five main journals
- Wet-sump lubrication system with oil pump integrated in the engine and oil-water exchanger integrated in the upper part of the crankcase.
- Cooling circuits operating by circulation of an antifreeze mixture, and water circulation pump driven by the engine pulley.
- Incorporating the auxillary systems (water pump) with the engine's main castings and the highly rigid design of all the wide-wall elements results in low engine noise levels and high component reliability.
- Plastic intake manifold, with optimised line lengths.
- Stepless variable valve timing system for the intake camshafts. It is activated by means of a low-pressure hydraulic system.
- Four overhead camshafts (two per bank) and four valves per cylinder, driven by hydraulic tappets.
- Timing controlled by chains whose tension is guaranteed by two hydraulic tensioners.
- Bosch Motronic ME7.1.1 integrated ignition/injection system with motor driven throttle

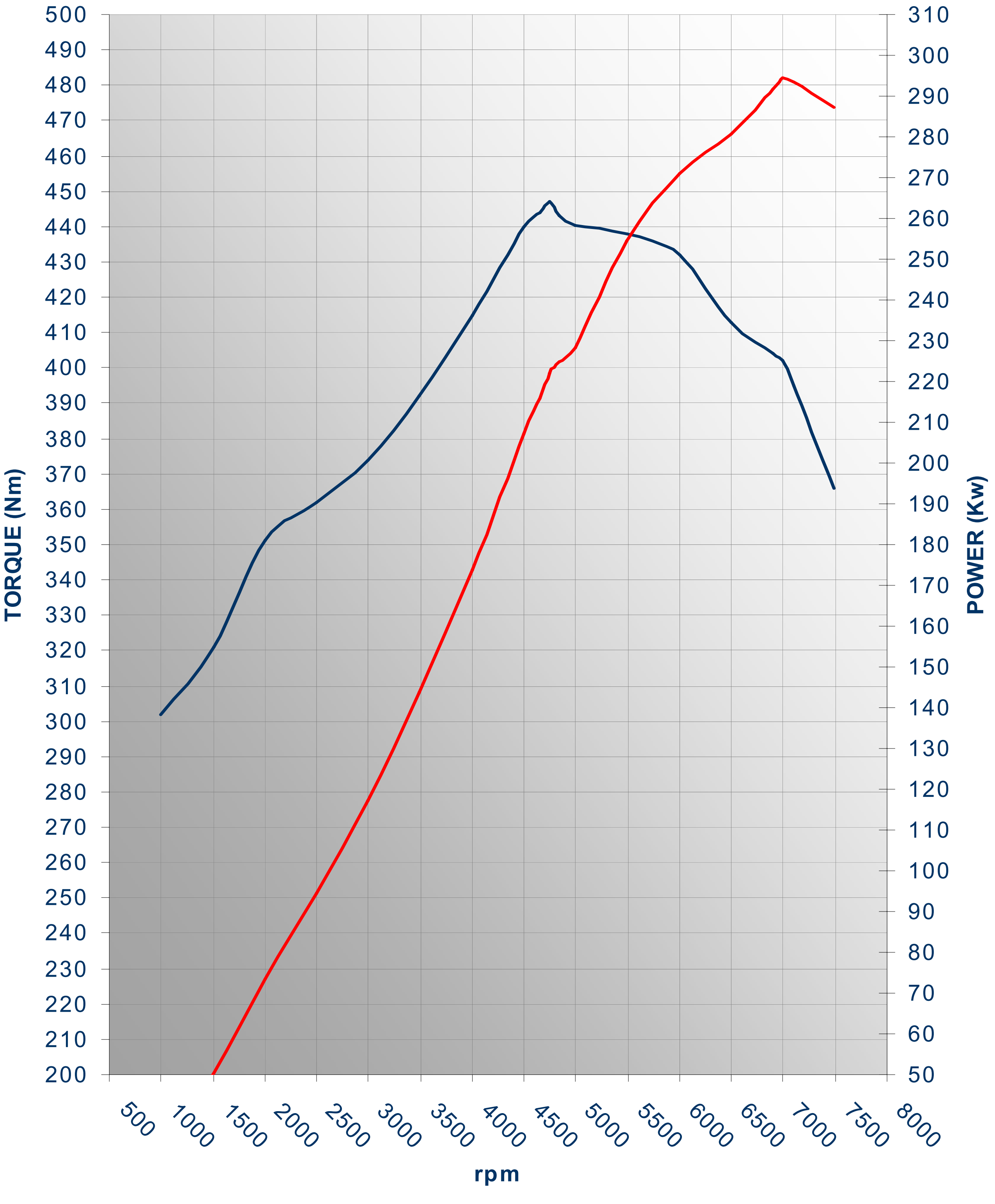
**ENGINE VIEWS**

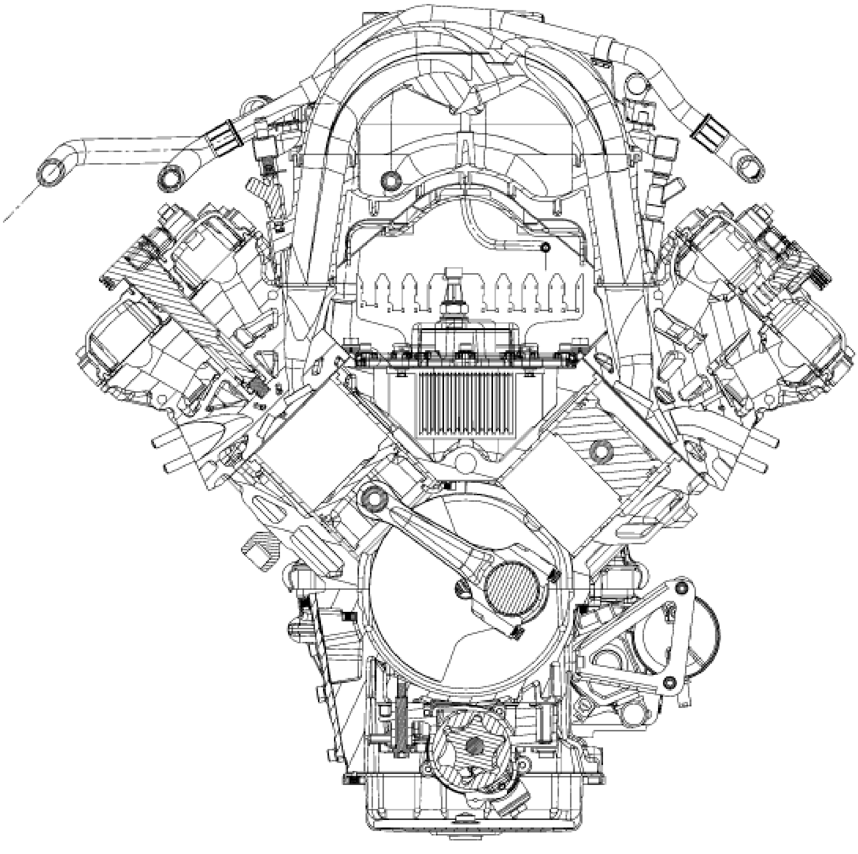


**SPECIFICATIONS:**

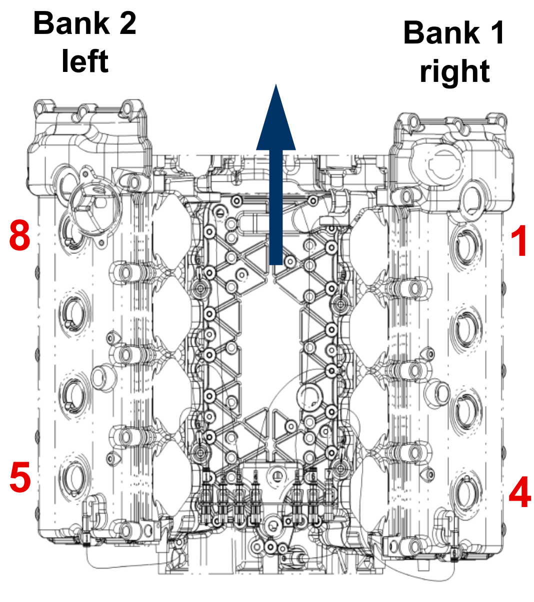
| | |
|---|---|
| Engine type | F136UC - F136UD |
| Cycle | Otto |
| Number and position of cylinders | 8 - V90° |
| Number of valves per cylinder | 4 |
| Bore | 92 mm |
| Stroke | 79,8 mm |
| Capacity per cylinder | 530,479 cc |
| Total capacity | 4243,83 cc |
| Combustion chamber volume | 52,74 cc |
| Compression ratio | 11,058 ± 0,2 :1 |
| Valve tappets | Hydraulic, 35 mm |
| Intake valves | 37,8 mm |
| Exhaust valves | 31,0 mm |
| Intake valve lift | 9,5 mm ± 0,05 mm |
| Exhaust valve lift | 9,3 mm ± 0,03 mm |
| Intake timing variation | 50° |
| Timing variator inactive | - 15° |
| Timing variator fully advanced | 35° |
| Firing order | 1-8-6-2-7-3-4-5 |
| Maximum power F136UC | 295 Kw (400 hp) @ 7000 rpm |
| Maximum power F136UD | 298 Kw (405 hp) @ 7100 rpm |
| Maximum torque F136UC | 460 Nm @ 4250 rpm |
| Maximum torque F136UD | 460 Nm @ 4750 rpm |
| Engine control system | Bosch Motronic ME 7.1.1 |
| Fuel pressure | 3,5 - 3,8 bar |
| Fuel Type | 95 Research Octane Number |
| Ignition type | Static ignition |
| Ignition coils | Eldor |
| Spark plugs | NGK PMR8B |
| Alternator | Nippondenso 12V - 150° |
| Idle speed | 700 rpm (1200 rpm when cold) |
| Maximum engine speed | 7200 rpm |

**ENGINE PERFORMANCE CURVES:**

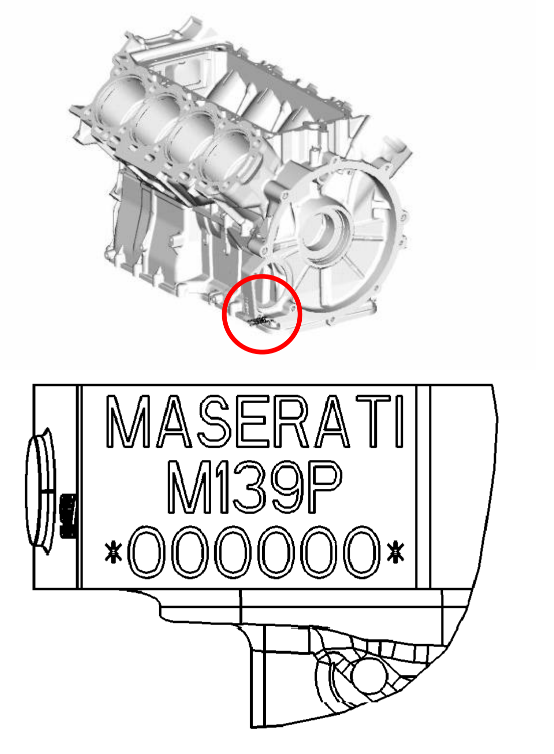




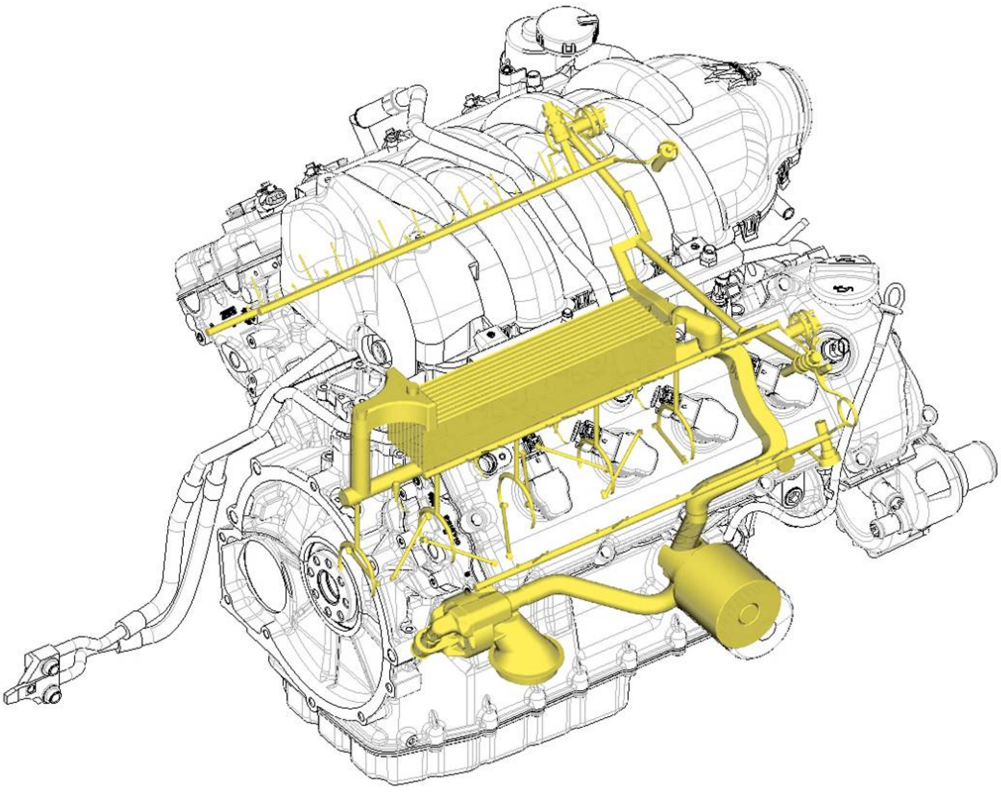
**CYLINDER NUMERATION**



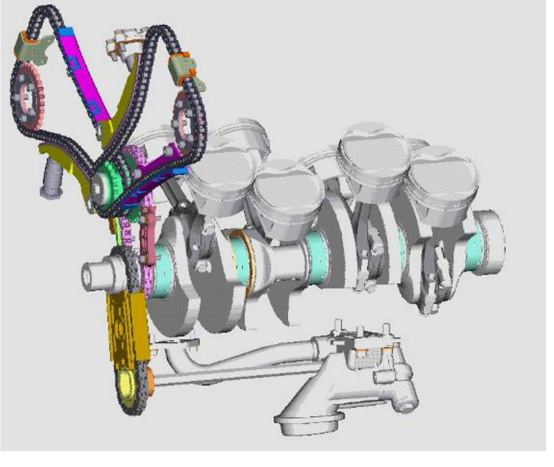

**ENGINE CODE AND NUMBER**

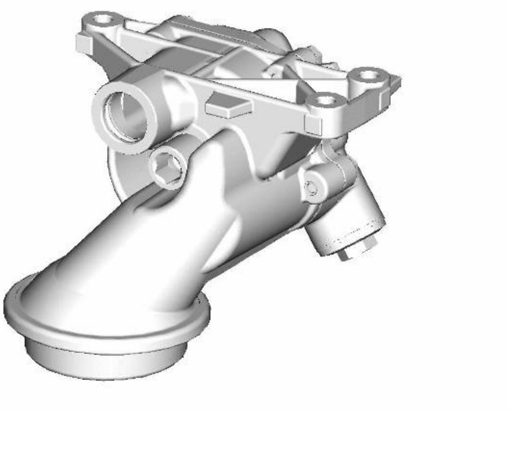


**LUBRICATION SYSTEM**



The lubrication system is of the wet sump type; the engine lubrication oil is collected in a sump, integral with the crankcase, and is circulated by means of a single oil-bath pump. This solution replaces the dry-sump system that equipped the previous engines. This solution is technically much less complex, allowing to improve reliability. Other advantages of the wet sump lubrication system are improved fuel economy and significant noise reduction improving comfort on board.





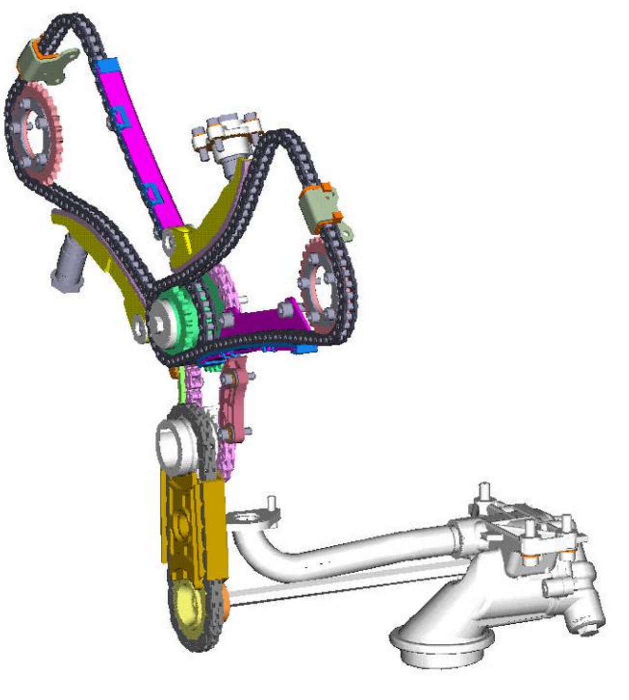
**Oil tank**
The engine oil tank is incorporated in the engine sump.

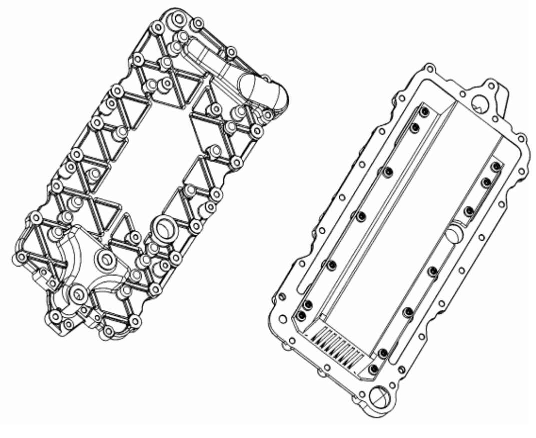
**Nominal lubrication pressure**
4 bar with oil temperature at 100°C at 6000 rpm

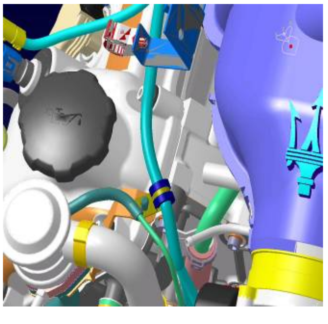
**Amount of oil in sump**
9L (corresponding to max. level)

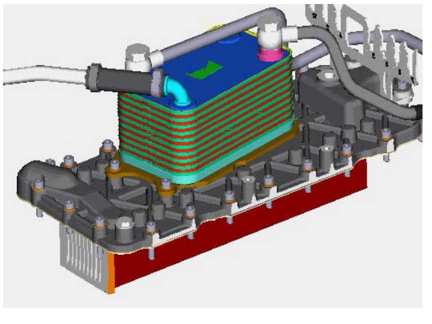
Difference between min and max level on dipstick : 1,5L

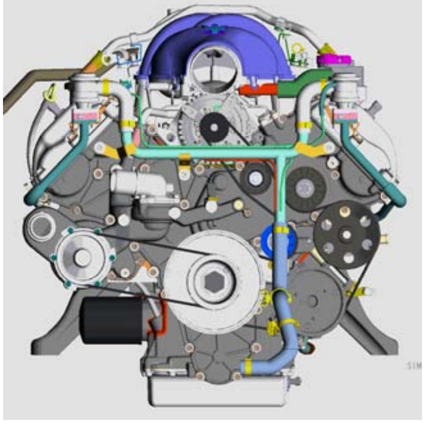
**Cooling of the engine oil**
A water/oil heat exchanger is located inside the V of the engine block.











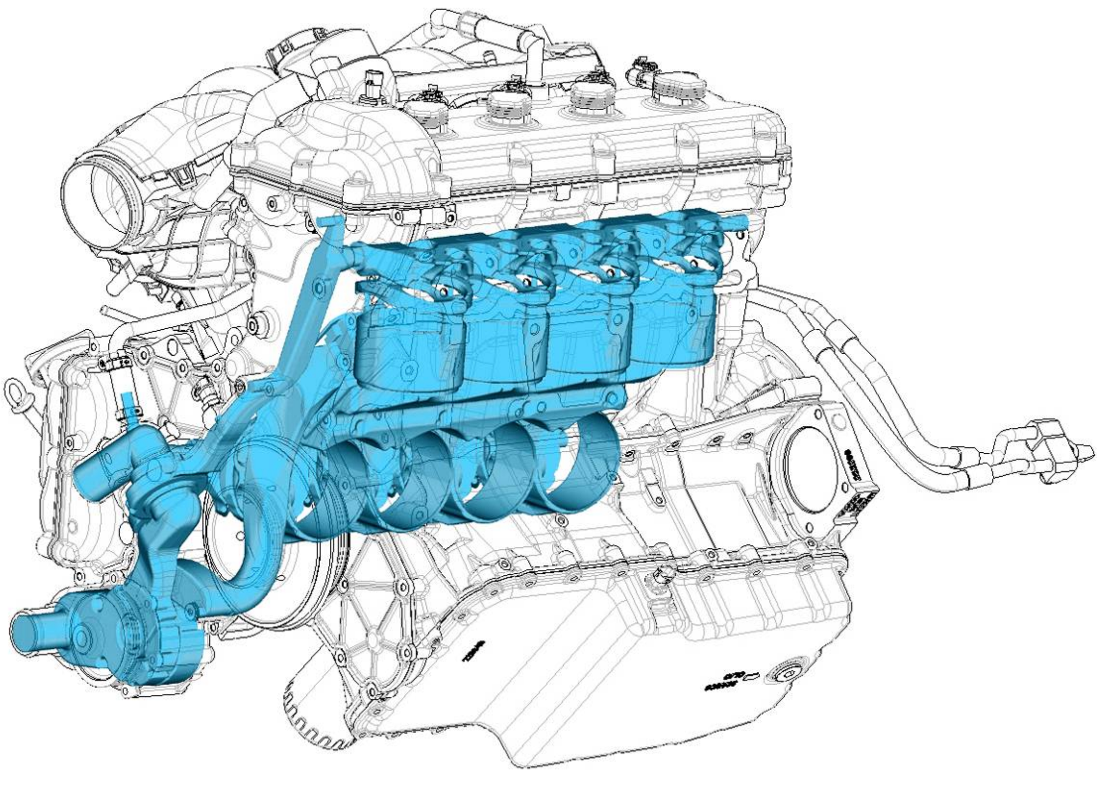
**Oil level check procedure:**

The level must be checked when the engine is warm, following the procedure below:

1. start the vehicle and warm it up until the temperature stabilises;
2. stop the engine, remove the filler cap and wait 5 minutes to allow the oil to flow into the sump;
3. measure the level and top up if necessary. The oil level must be between the **MIN** and **MAX** reference notches on the dipstick.

## COOLING SYSTEM

The engine coolant circulation is enforced by a centrifugal pump which is driven by the engine crankshaft by means of a poly-V belt without tensioner.



**Coolant pump**
Centrifugal water pump is integrated in the front engine cover and incorporates the thermostatic valve.

**Circuit pressure**
Maximum pump exit pressure: 3,4 bar

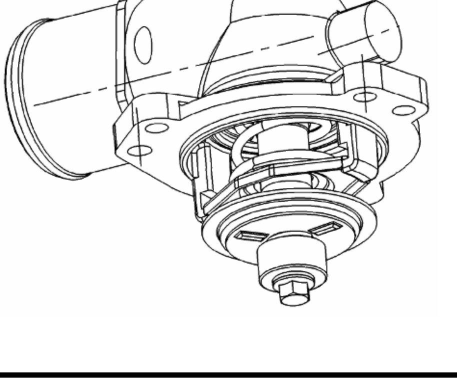
**Coolant expansion tank**
Located at the right hand side of the engine bay.

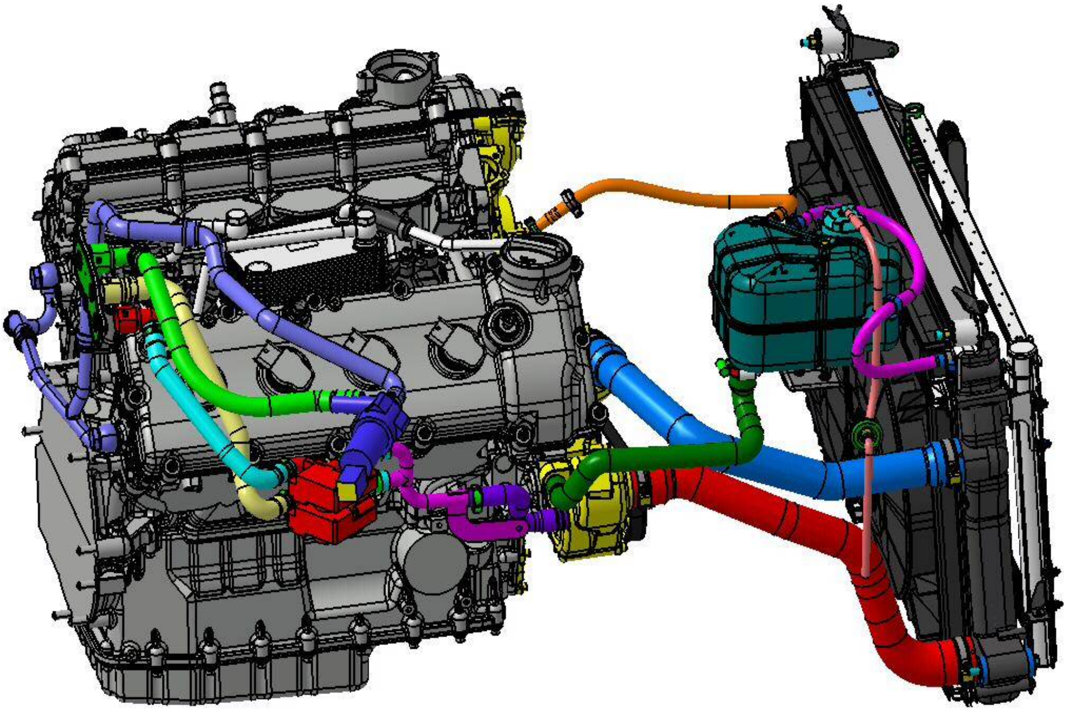
**Thermostatic valve**

Begin of valve opening: 85°C±2

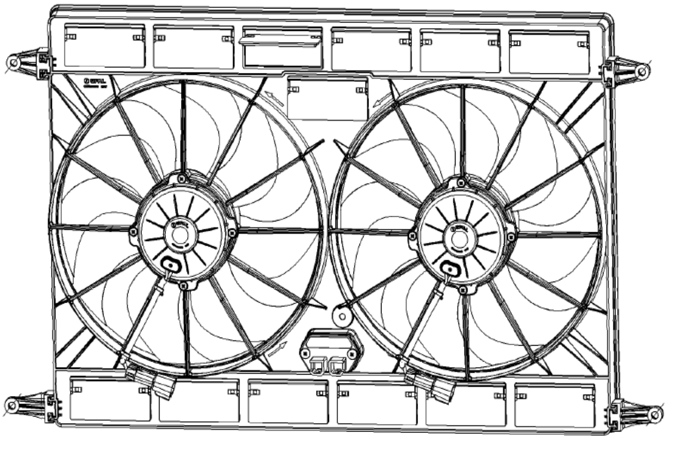
Valve closing: 95°C±2

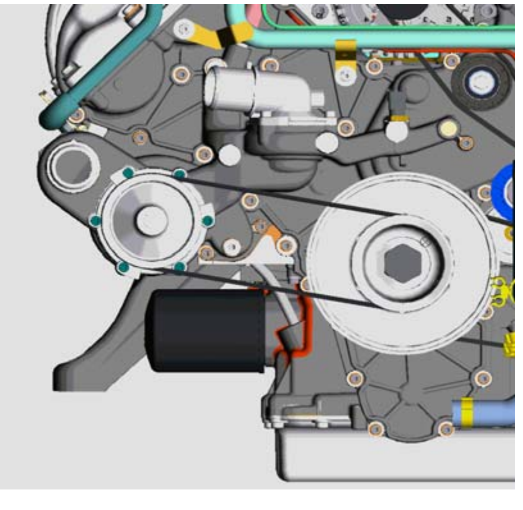
**Maximum operating temperature: 130°C**





**Radiator**
The water radiator is located in the frontal part of the engine compartment, together with the A/C condenser and power steering oil cooler.
Two electric cooling fans are used.

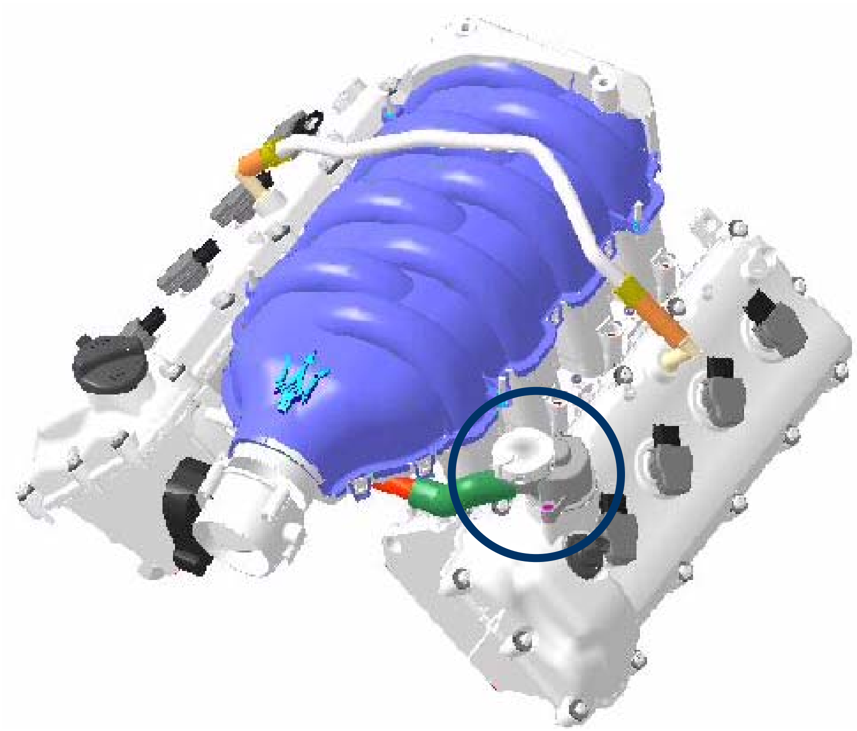




**Caution**

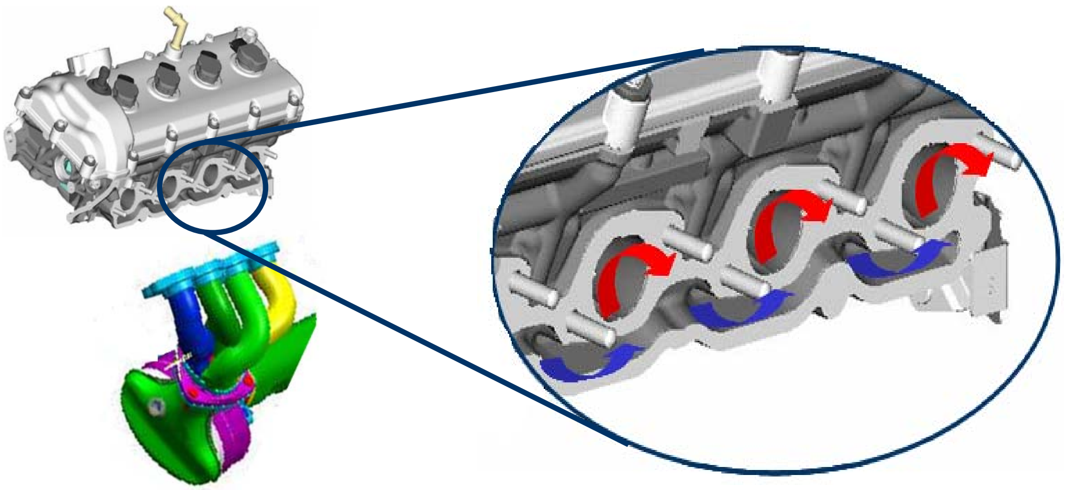
The water pump drive belt is of the stretchy belt type (no tensioner is used). The belt must be replaced every time it is removed. A special tool is used for the installing of the belt.

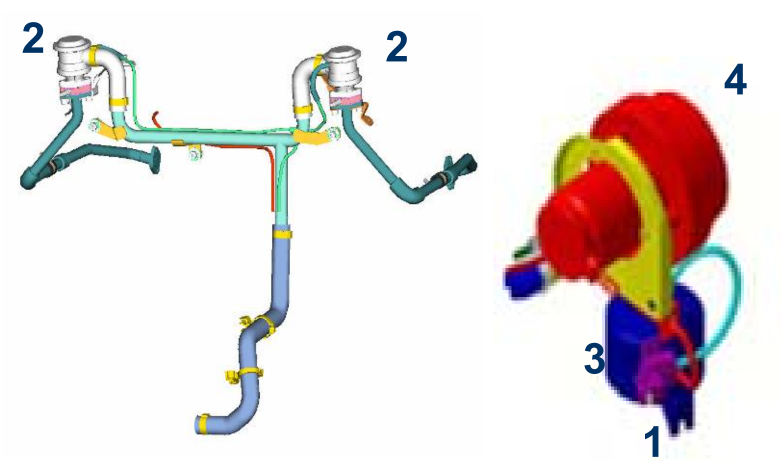
## CRANKCASE VAPOUR RECIRCULATION SYSTEM



The device for oil gas and vapour recirculation is of the closed circuit type. The engine heads are connected by means of a pipe that balances and stabilises the vapours coming from the crankcase. A degasser on the left-hand engine head ensures oil vapour separation allowing recirculation directly in the intake manifold.

**SECONDARY AIR SYSTEM**

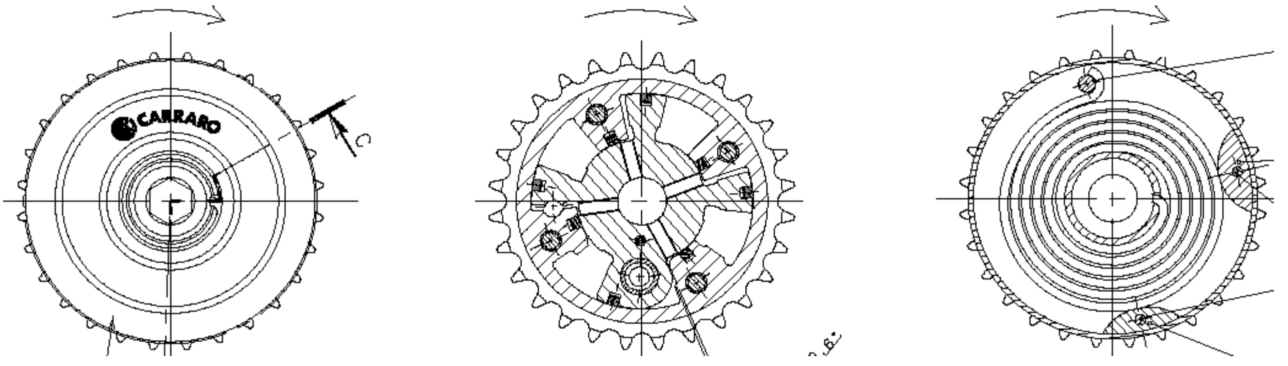





1. Solenoid valve
2. Pneumatic valves
3. Vacuum tank
4. Secondary air pump

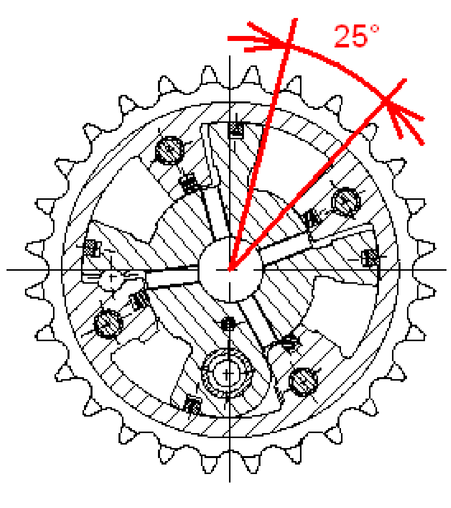
The secondary air system used on the wet sump engine is modified with respect to the dry sump engine. The secondary air is now inserted in the specific ducts in the cylinder heads to improve warming up of the catalityc converters and reduce further emissions.
Through the solenoid valve (1) the Motronic ECU controls opening/closing of the two pneumatic valves (2) that activate injection of secondary air directly into a channel machined into the engine head casting. The flow continues along its path through the communication holes between the channel and the exhaust duct to reach the exhaust manifold. The vacuum tank (3) that accumulates the vacuum necessary to open the pneumatic valves is positioned in the engine compartment underneath the secondary air pump. The secondary air pump (4), controlled by the engine ECU, sends air to the exhaust ducts. The pump and the secondary air solenoid valve are activated, after engine ignition, when the coolant temperature is in the range -7 °C and +40°C. The temperature threshold of 40°C disables the operating of the system. During the system operating cycle, the seal of the secondary air valves is checked. Throughout the cycle, the oxygen sensors are in “open loop” configuration and therefore do not activate the feedback for A/F ratio correction.

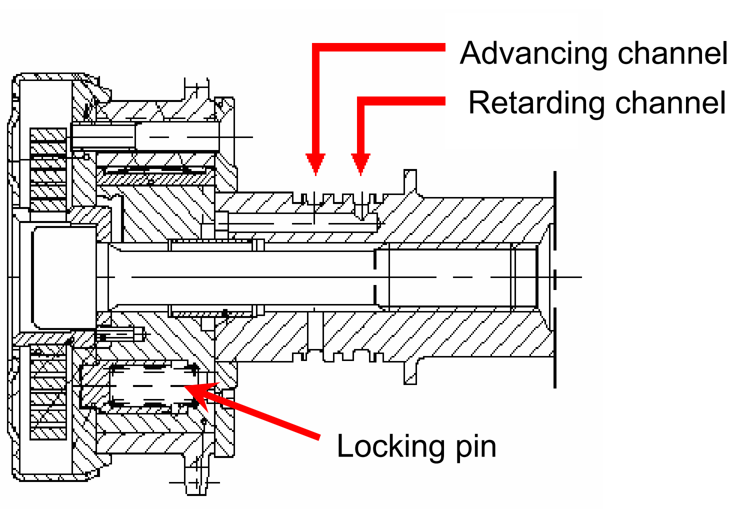
**VARIABLE VALVE TIMING**



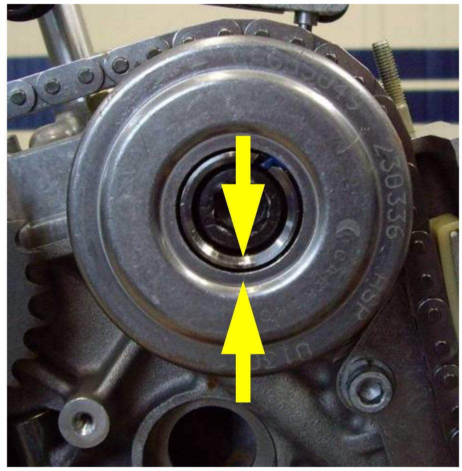

The Variable Valve Timing (VVT) system is modified with respect to the F136 R/S engine. The system uses a hydraulic VVT-actuator on each intake camshaft which is operated by engine oil pressure (low pressure type). The VVT-actuator consists of a external part (stator), which is fixed to the timing gear, and an internal part (rotor), which is fitted on the intake camshaft. The mutual shape of rotor and stator internally create different chambers: four advancing chambers and four retarding chambers. The division of oil pressure in the advancing chambers and retarding chambers determines the position of the VVT-actuator. Inside the VVT-actuator, a clock spring is installed. The applying force of the spring is assisting the oil pressure when moving the rotor in the forward (advancing) direction. This is necessary because of the high valve operating reaction forces, tending to move the rotor in its backward position.

Inside the rotor of the VVT-actuator, a locking pin is installed. When the VVT-actuator is in its rest position, the locking pin is pushed into the stator by the force of a spring. In this condition the VVT-actuator is mechanically locked in its maximum retarded position. When the VVT-actuator is operated, the locking pin is lifted by oil pressure and the rotor is unlocked.

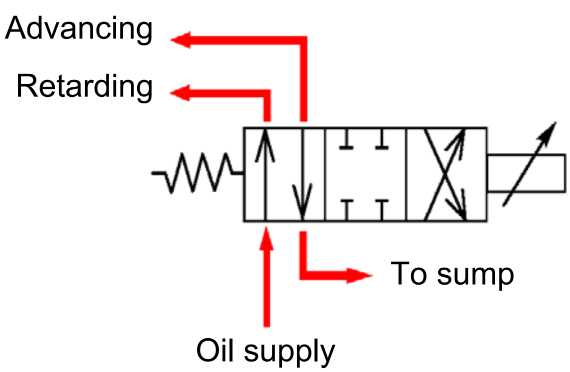


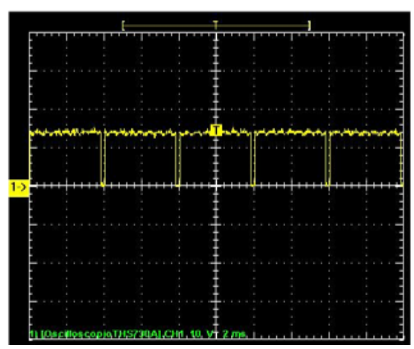



**Note:** when removing/installing the VVT-actuator, always make sure the actuator is locked in its rest position. This can be verified by means of reference marks on the actuator housing (see picture). Engine timing procedure can only be performed correctly when the VVT-actuators are in their rest position.



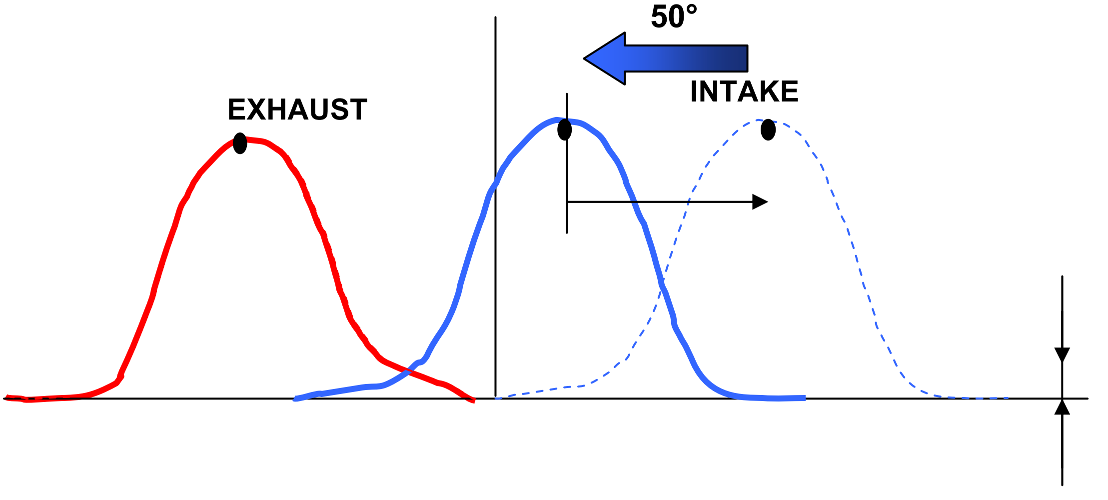
Each VVT-actuator is regulated by a solenoid valve which controls the oil supply towards the advancing chambers and retarding chambers. The solenoid valves are directly controlled by the engine control module (NCM) by means of a pulse width modulation signal (PWM) and on the basis of a pre-programmed map (function of engine load and engine speed). The engine control module constantly monitors the actual position of the VVT-actuators by comparing the signals from the crankshaft position sensor and the camshaft position sensors. When the oil control solenoid valve is in its rest position, the oil supply is connected to the retarding channel, while the advancing side circuit is drained towards the sump.



The timing of the intake camshafts can be modified continuously between maximum retarded and maximum advanced position. The VVT-actuator has an operating range of 25 degrees, corresponding to 50 crankshaft degrees.

- **VVT-actuator in rest position (retarded):** intake valves open at **15° atdc** (corresponding to 0,59 mm valve lift)
- **VVT-actuator fully operated (advanced):**
  intake valves open at **35° btdc** (corresponding to 0,59 mm valve lift)




**Engine idling:** intake timing is retarded. Late opening of the intake valves minimizes valve overlap. This guarantees stable combustion and smooth idling.

**Low and middle revs, medium to high load:** intake timing is advanced. Early opening of the intake valves creates high valve overlap. Exhaust gasses are partially re-burned which lowers combustion temperature and reduces emissions of NOx. Early closing of the intake valves at low revs improves volumetric efficiency.

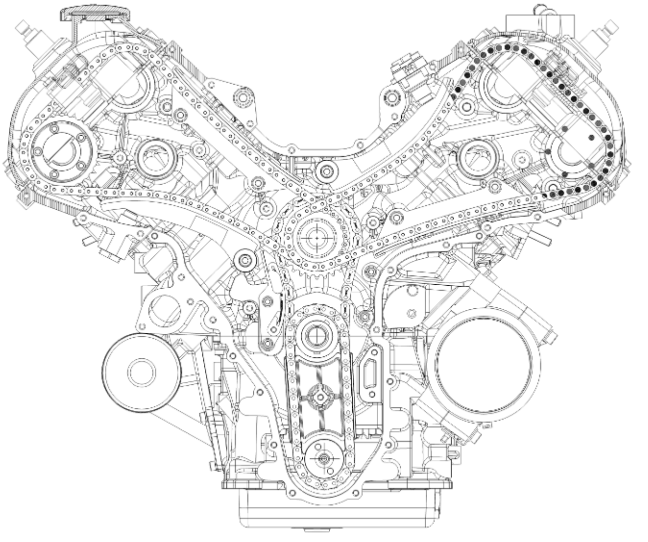
**High revs, full load:** intake timing is retarded. Late closing of the intake valves improves volumetric efficiency as a result of the high inertia of the incoming air.

**Note:** when switching off the engine, the solenoid valve is brought back to the retarded position, this to make sure the VVT-actuator returns to its rest position, against the force of the internal spring.

**ENGINE TIMING:**

**Intake**
Opening after TDC 15°± 1°
Colsing after BDC 66°± 1°
(reference valve lift: 0,59 +-0,08 mm)

**Exhaust**
Opening before BDC 41°± 1°
Closing at TDC 0° ± 1°
(reference valve lift: 0,57 +-0,08 mm)



**Intake timing adjustment:**

- Turn the crankshaft by **15°** beyond the TDC. This corresponds to a piston stroke of 1.75 mm beyond the TDC
- Check that the tappet downstroke (begun before the TDC) and hence the intake valve opening is **0.59±0.08** mm

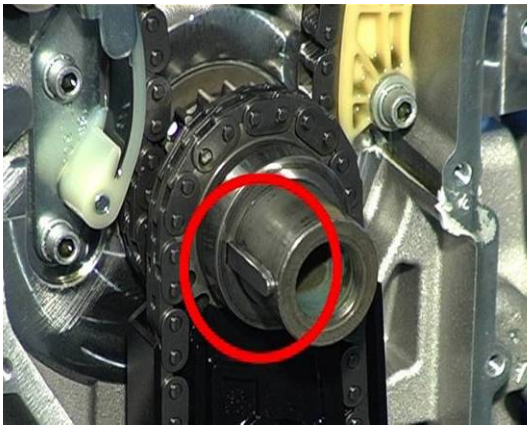
**Exhaust timing adjustment:**

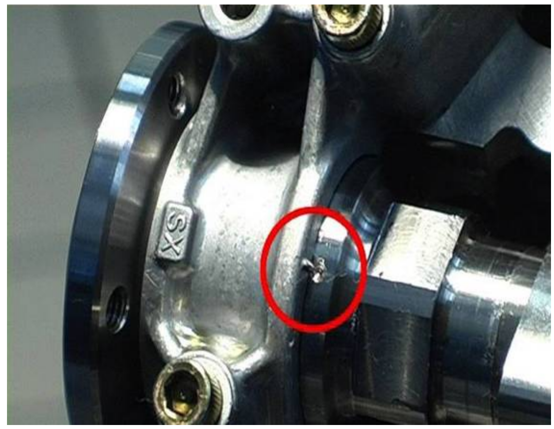
- Turn the engine clockwise and position the first piston at the TDC with the camshafts balanced (exhaust closed and intake open). Make sure that the dial gauge is on zero.
- Position the dial gauge plunger on the tappet of an exhaust valve. The dial gauge rod must be as perpendicular as possible to the tappet surface.
- Reset the dial gauge that measures the movement of the exhaust tappet.
- Turn the crankshaft clockwise until an exhaust valve is closed.
- Check that the tappet downstroke and hence the exhaust valve opening is **0.57±0.08** mm.

**Note:** the given values are with the VVT-actuator in it's rest position, this corresponds with the intake camshaft in the position of maximum retarding, always check if the VVT-actuator is returned in its rest position.

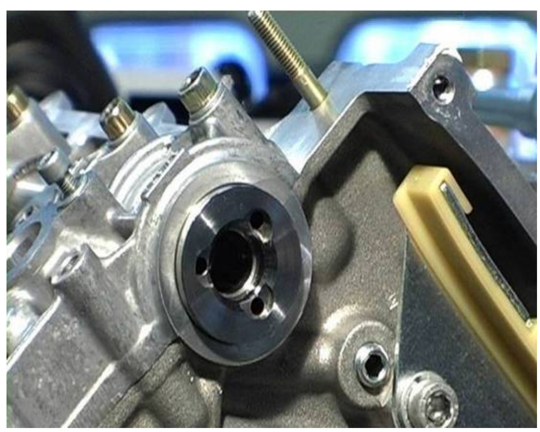
## INTAKE TIMING ADJUSTMENT PROCEDURE

**Note:** The timing adjustment procedure on the next pages uses an engine with complete disassambled timing mechanism as a starting point. Follow the different indicated steps carefully to obtain correct engine timing and to prevent mechanical damage.

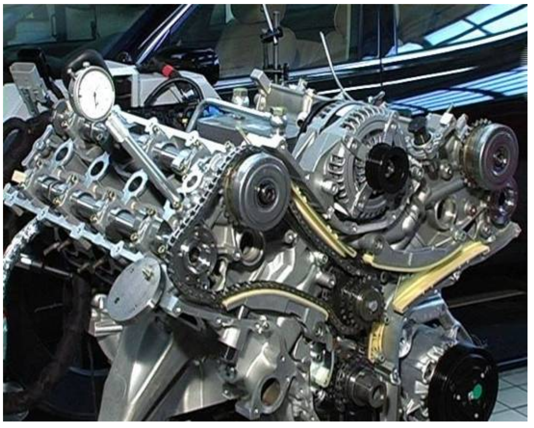
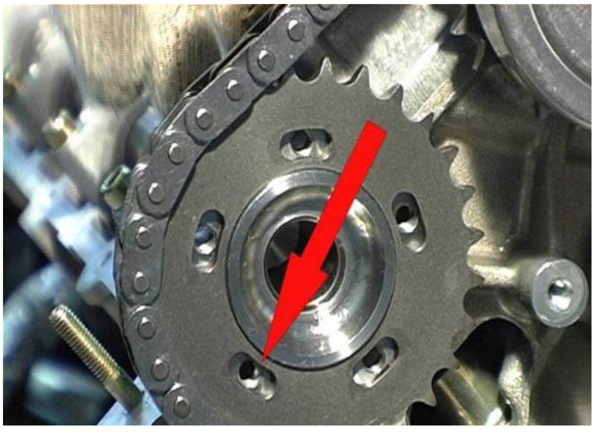




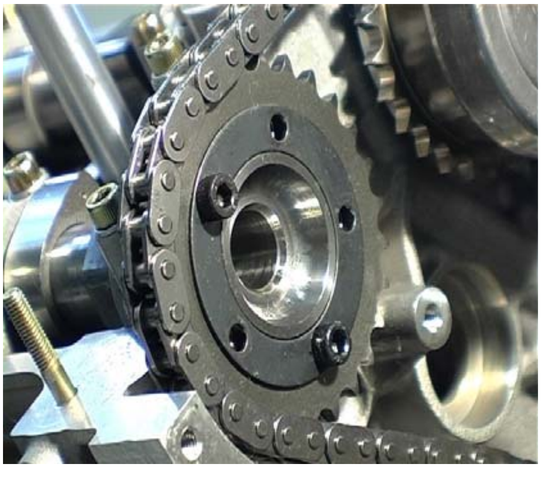
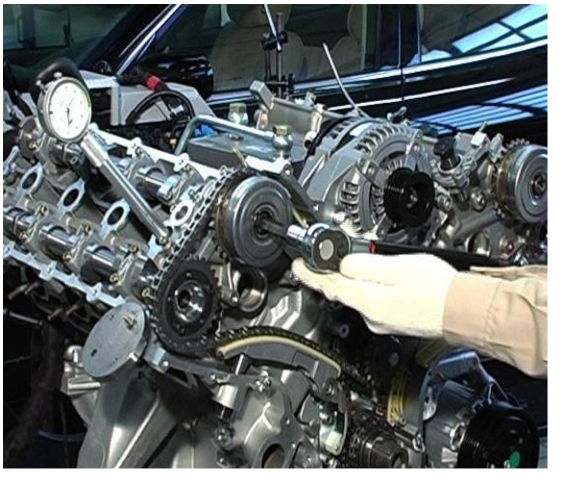
1. Turn the crankshaft until the crankshaft tab is in the 9.00 o’ clock position.
2. Rotate the intake and exhaust camshafts on both banks until the reference marks at the ends of the camshafts match the reference marks on the camshaft caps.
3. Lock the camshafts so they cannot rotate.

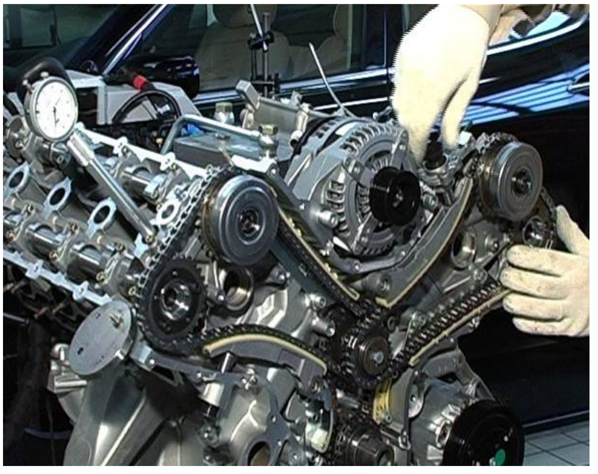
4. Position a centesimal dial gauge and rotate the crankshaft clockwise until reaching TDC.
5. Make sure that the coupling surfaces between timing variators and camshafts are perfectly clean.
6. Before fitting the timing chains, position the timing variators on the camshafts by loosely tightening the fastening bolts by a few millimetres.
   **Note:** each time the timing variator is removed, the fastening bolt should be replaced by a new one!

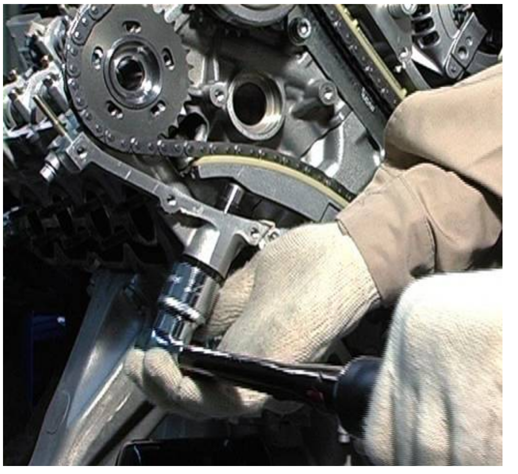



7. Position the camshaft driving chain on the right hand side bank.
8. Position the exhaust side gear by making sure that the corresponding slots are placed in the centre of the adjustment area.
9. Position the right hand side hydraulic chain tensioner.

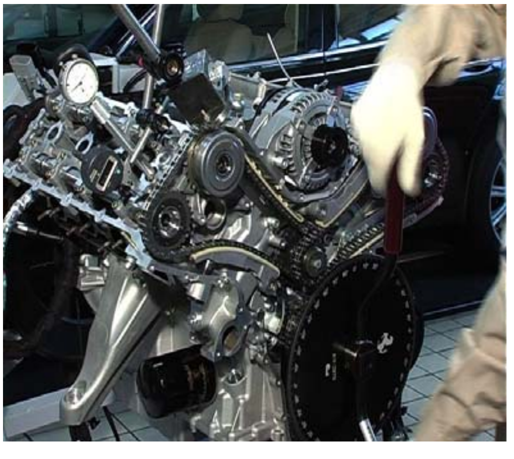



10. Tighten at least two fastening screws of the right hand exhaust gear.
11. Tighten the fastening bolt of the right hand side variator with a torque of **40 Nm**.
12. Position the camshaft driving chain and gears on the left hand side bank by making sure that the corresponding slots of the exhaust side gear are placed in the centre of the adjustment area.





13. Position the left hand side hydraulic chain tensioner.
14. Tighten at least two fastening screws of the left hand exhaust gear.
15. Tighten the fastening bolt of the left hand side variator with a torque of **40 Nm**.
16. Fit the hydraulic chain tensioners by tightening them to **40 Nm** torque by using a torque wrench**.**



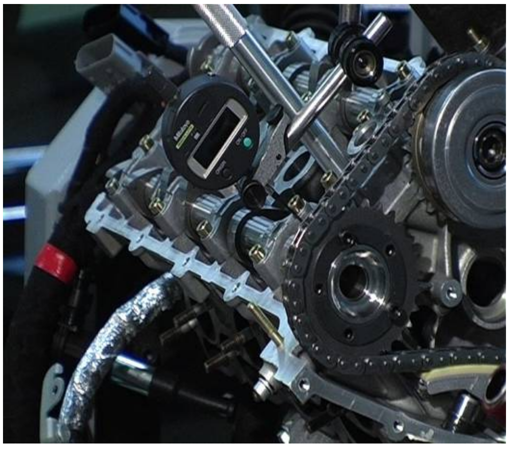

17. Unlock the camshafts.
18. Rotate the engine in clockwise direction by making sure there is no jamming.
19. Position piston No. 1 at TDC and make sure that the corresponding dial gauge is set to zero.
20. Position a magnetic base with its own centesimal dial gauge and long stem. The dial gauge stem must be placed in a position which is as perpendicular as possible with respect to the intake tappet surface.

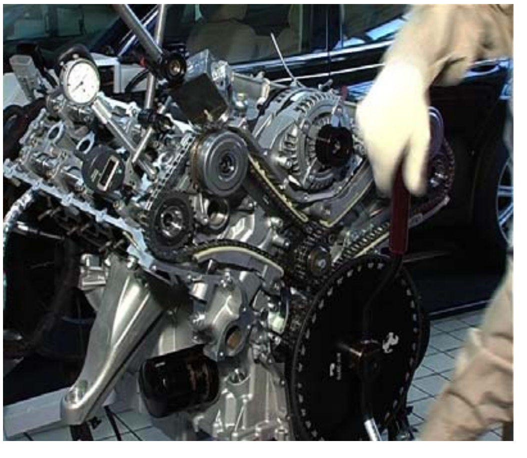

21. Rotate the engine in clockwise direction by positioning the intake cam just before the opening position. The hydraulic tappet is still in the rest position. Reset the dial gauge measuring the shift of the intake tappet in this position.
22. Rotate the crankshaft clockwise until **15°** beyond the TDC; this corresponds to a **1.75 mm** piston stroke.
23. Check if the downstroke of the tappet (which began before the TDC), consequently the opening of the intake valve, is **0.59 ± 0.08** mm.

24. If under such circumstances the measured values do not fall within the tolerance range, make sure that the crankshaft is locked into place and then slacken the timing variator fastening bolt and rotate the intake camshaft until the preset valve upstroke intake value is met.
25. Double check the timing values.
26. Tighten the timing variator fastening bolt to a torque of **50 ± 1.5 Nm** followed by an angle of **+ 85°±1°** by using a torque wrench and goniometer.
27. Double check again the timing values.

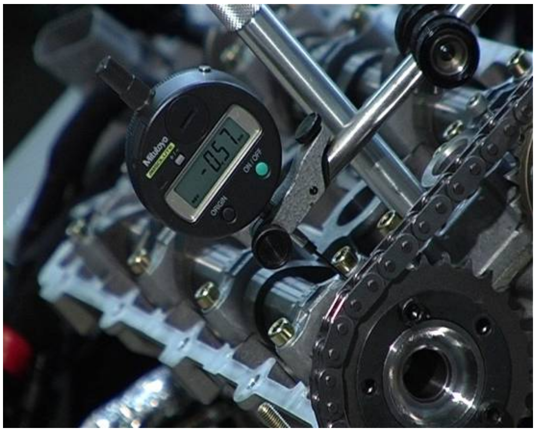
**EXHAUST TIMING ADJUSTMENT PROCEDURE**

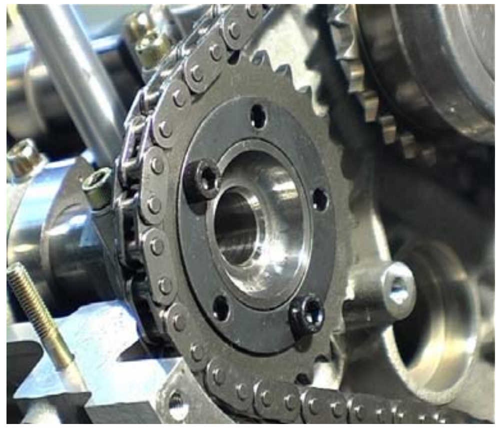
1. Rotate the engine in clockwise direction and position the first piston at TDC with the camshafts in the overlap position.
2. Make sure that the corresponding dial gauge is set to zero.



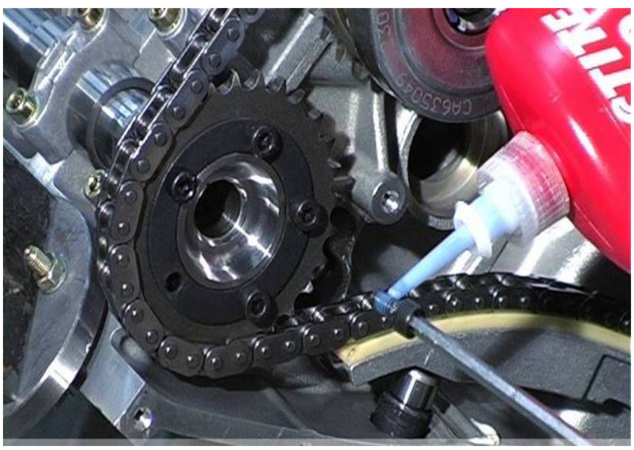


3. Position a magnetic base with its own centesimal dial gauge and long stem. The dial gauge stem has to be placed in a position which is as perpendicular as possible with respect to the exhaust tappet surface.
4. Reset the dial gauge measuring the shift of the exhaust tappet.
5. Rotate the crankshaft in clockwise direction until the exhaust valves are fully closed.





6. Check the tappet downstroke (exhaust valve lift) and make sure that it measures **0.57 ± 0.08** mm.
7. If under such circumstances the measured values do not fall within the tolerance range, rotate the crankshaft and reach the TDC position.
8. While locking the camshaft into place, slacken the M6 screws and carry out the timing procedure by using the adjustment slots.
9. Double check the timing values.



10. Tighten the hexagonal head M6 screw to the prescribed torque of **5Nm** followed by an angle of **50°** after applying some Loctite 242.
11. Double check again the timing values.
12. Carry out the same procedure for the left-hand cylinder bank, positioning the dial gauge holder on cylinder number 8.

# 4700 Wet Sump Engine

**INTRODUCTION**

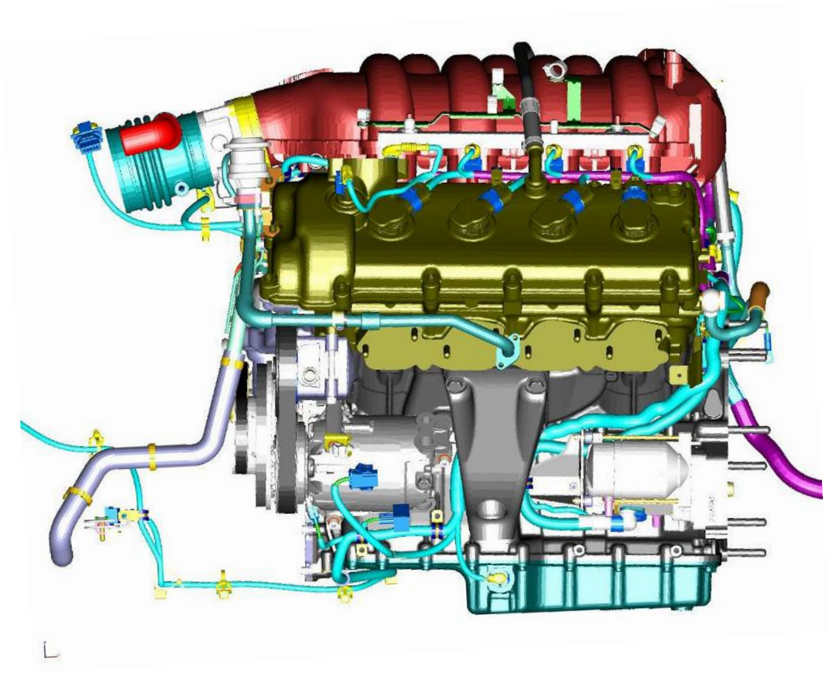
The new 4.7L engine is a technical evolution of the 4.2L engine, and also adopts the wet sump lubrication system for improved fuel economy, noise comfort and reliability.
The increase in capacity from 4.2L to 4.7L has been obtained by an increase of both engine bore and engine stroke. For this purpose various engine components have been redesigned and the cylinder liners, now made from steel, use Nikasil technology.
Nikasil is an electrodeposited nickel matrix silicon carbide coating with oleophilic characteristics. It reduces friction and wear and allows large cylinder bores with very small piston-cylinder liner tolerances. The 4.7L engine was designed to increase both engine power and torque in order to further improve the vehicle's overall performances. They can be distinguished by the red painted valve covers.

The 4.7L engine comes in different versions. The differences between them lies in the intake and exhaust system, the variable valve timing system, specific engine mapping and whether the engine is combined with an automatic or a robotized transmission.

| Engine | Vehicle |
|---|---|
| F136YC | Alfa Romeo 8C |
| F136YE | GranTurismo S MC-shift |
| F136YG | Quattroporte S (MY09) |
| F136YH | Quattroporte Sport GT S (MY09)<br>GranTurismo S Automatic* |

(*): to be launched in 2009

**ENGINE CHARACTERISTICS:**



The 4.7L engine (F136Y) is derived from the 4.2L wet sump engine (F136UC/UD) and has the following characteristics:

**Short engine**

- New crankcase in hardened aluminium/silicion alloy with new Nikasil coated steel cilinder liners (the main dimensions of the crankcase have remained unchanged)
- Bore increased by 2mm to 94 mm
- stroke increased by 4,7 mm to 84,5 mm.
- New single-cast crankshaft in hardened steel, individually balanced, resting on five main bearings.
- New auxiliary drive belt crankshaft pulley with reduced diameter (same as F136S engine) to match higher engine speed.
- Newly designed connecting rods with specific big end bearings
- Newly designed pistons with specific piston rings
- Also the flywheel, lower crankcase, engine timing cover and numerous smaller components are specific for the F136Y engines.

**Cylinder heads / timing mechanism**

The cylinder heads are made in hardened aluminium/ silicon alloy and have high volumetric and thermodynamic efficiency combustion chambers.
The cylinder heads and the engine timing mechanism have the same characteristics as on the F136UC/UD engines. The intake camshaft is however specific with a specific cam design to increase the maximum intake valve lift. (10,5 mm instead of 9,5 mm)

**Lubrication system**

The lubrication system has the same characteristics as on the F136UC/UD engines, with exception of:

- Specific oil jets for piston bottom cooling
- Nominal oil pressure: 4-5 bar @ 6000 rpm (100°C)
- Cancellation of the oil level switch on the F136YC engine
- Installation of an oil temperature sensor on the F136YC engine (located at the rear end of the heat exchanger)

**Cooling system**

The cooling system has the same characteristics as the system on the F136UC/UD engines.

**Crankcase vapour recirculation system**

The crankcase vapour recirculation system has the same characteristics as the system on the F136UC/UD engines

**Secondary air system**

The secondary air system has the same characteristics as the system on the F136UC/UD engines.

**Variable valve timing system**

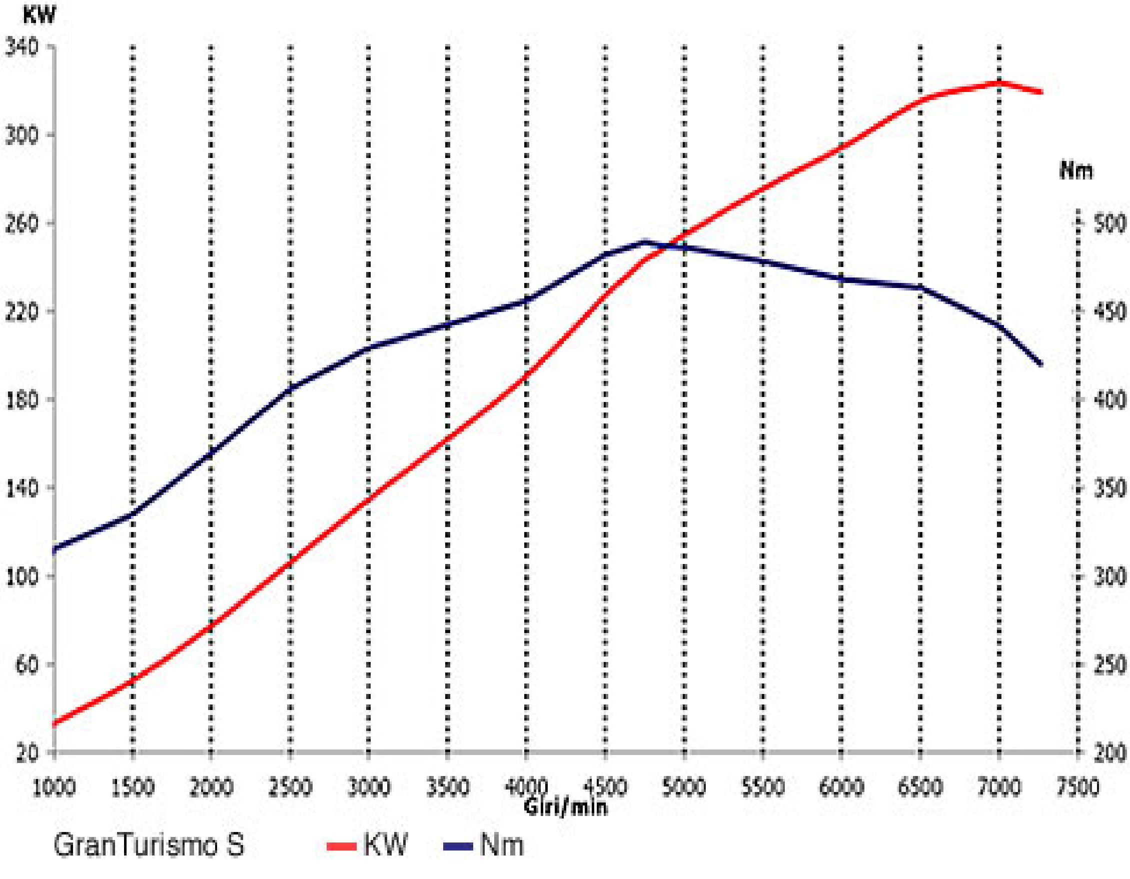
The variable valve timing system of the F136YC and F136YE engines has the same characteristics as the system on the F136UC/UD engines.

The variable valve timing system of the F136YG and F136YH engines has the same characteristics as the system on the F136UC/UD engines, with exception of the application of a new type of VVT-actuator. The VVT-actuator on the F136YG and F136YH engines has an extended adjustment range (60° instead of 50°). The basic intake timing has therefore been retarded with 10° (range: -25° - 35°)

**SPECIFICATIONS:**

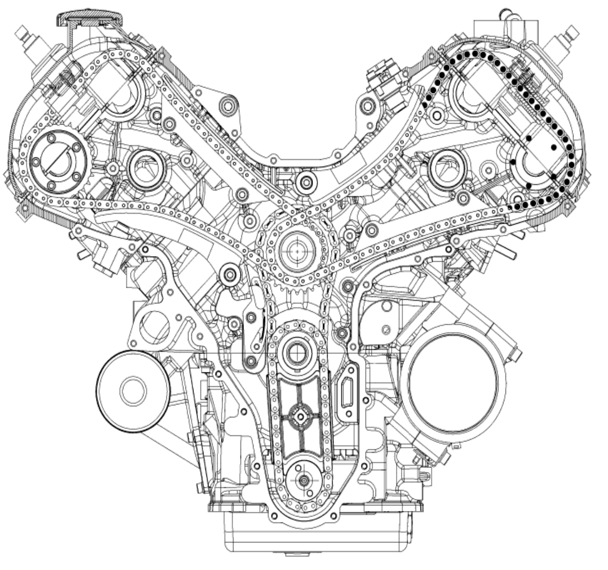
| | |
|---|---|
| Engine type | F136YC - F136YE – F136YG – F136YH |
| Cycle | Otto |
| Number and position of cylinders | 8 - V90° |
| Number of valves per cylinder | 4 |
| Bore | 94 mm |
| Stroke | 84,5 mm |
| Capacity per cylinder | 586,411 cc |
| Total capacity | 4691,29 cc |
| Combustion chamber volume | 57,74 cc |
| Compression ratio | 11,01 :1 (±0,2 :1) |
| Valve tappets | Hydraulic, 35 mm |
| Intake valves | 37,8 mm |
| Exhaust valves | 31,0 mm |
| Intake valve lift | 10,5 mm ± 0,015mm |
| Exhaust valve lift | 9,3 mm ± 0,015mm |
| Intake timing variation | 50° (60° YG & YH) |
| Timing variator inactive | - 15° (-25° YG & YH) |
| Timing variator fully advanced | 35° |
| Firing order | 1-8-6-2-7-3-4-5 |
| Maximum power F136YC | 331 Kw (450 hp) @ 7000 rpm |
| Maximum power F136YE & F136YH | 323 Kw (440 hp) @ 7000 rpm |
| Maximum power F136YG | 316 Kw (430 hp) @ 7000 rpm |
| Maximum torque | 490 Nm @ 4750 rpm |
| Engine control system (YC & YE) | Bosch Motronic ME 7.1.1 |
| Engine control system (YG & YH) | Bosch Motronic ME 9.1.1 |
| Fuel pressure | 3,5 bar |
| Fuel Type | 95 Research Octane Number |
| Ignition type | Static ignition |
| Ignition coils | Eldor |
| Spark plugs | NGK PMR8C-H |
| Alternator | Nippondenso 12V – 150 A |
| Idle speed | 800 rpm (1200 rpm when cold) |
| Maximum engine speed | 7600 rpm |

**ENGINE PERFORMANCE CURVES (F136YE)**



## ENGINE TIMING

The engine timing adjustment procedure of the F136Y engines is similar to the procedure used for the F136UC/UD engine. The timing values however are specific.



**Intake timing adjustment F136YC and F136YE engine:**
Turn the engine to **15°** after Top Dead Center, corresponding with a piston stroke of **1,86 mm**. The intake tappet downstroke should measure **0,60 ± 0,08 mm**

**Intake timing adjustment F136YG and F136YH engine:**
Turn the engine to **25°** after Top Dead Center, corresponding with a piston stroke of **5,09 mm**. The intake tappet downstroke should measure **0,60 ± 0,08 mm**

**Exhaust timing adjustment (all F136Y engines):**
With the cranckshaft in Top Dead Center with the engine in overlap position, the exhaust tappet downstroke should measure **0,60 ± 0,08mm**

**Caution**

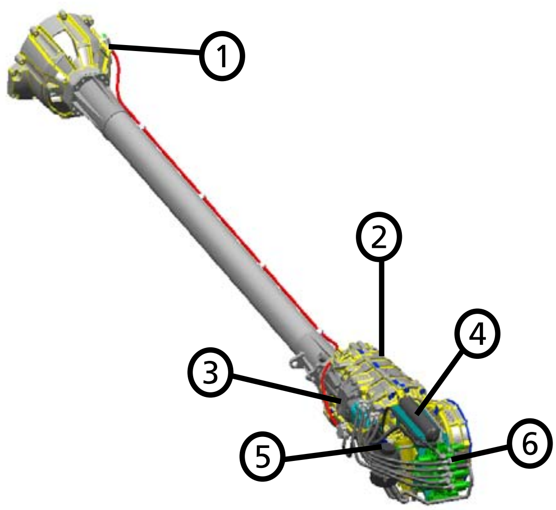
**Note:** the engine timing values are specific for the different evolutions of the wet sump engine family!

**Note (2):** the given values are with the VVT-actuator in it’s rest position, this corresponds with the intake camshaft in the position of maximum retarding. Always check if the VVT-actuator is returned to its rest position.

# Robotized Gearbox

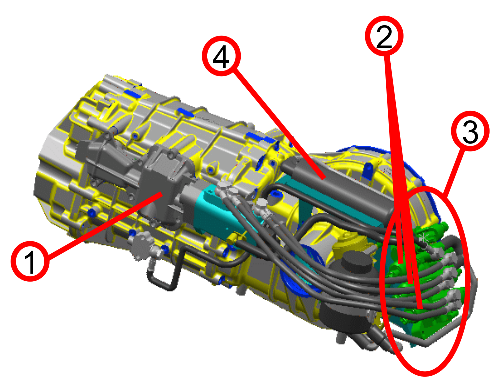
## ROBOTIZED GEARBOX CONTROL SYSTEM

The robotized gearbox control system is composed of an electro-hydraulic servo system which manages the gearchange and clutch operation.
A specific ECU (NCR) controls the complete system by using a strategy which is based on driver inputs and various vehicle parameters. Therefore the NCR interacts with other vehicle systems (NCM, NFR,…) and uses a driver interface (gearshift paddles and control buttons). A specific characteristic of the system is that it can be integrated on a mechanical transmission without requiring any specific modifications.



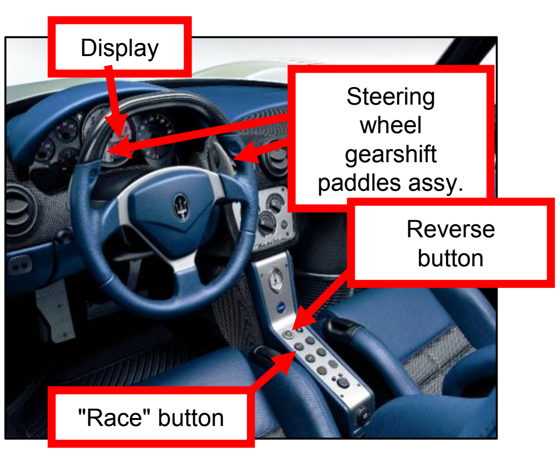

**Robotized gearbox layout**

1. Clutch Pressure Sensor on Clutch Housing (Sofast III onward)
2. Gearbox Unit
3. Hydraulic actuator
4. Accumulator
5. Reservoir
6. Power Unit Assy




**Robotized gearbox layout**

⓾ Hydraulic actuator
⓾ Solenoid valves
⓾ Power unit
⓾ Accumulator




**Driver controls:**

- Display
- Steering wheel gearshift paddles
- Reverse gear selection
- Auto/manual mode selection

## EVOLUTION OF TRANSMISSION CONTROL SYSTEMS

The robotized gearbox control system went through a number of significant modifications that have also involved the introduction and modification of specific components. Various software and hardware evolutions have been applied during the years with the aim to improve driving comfort, reduce gearshift times, reduce clutch wear and simplify service operations.

- **PRE-SOFAST** and **SOFAST** transmission control system (CFC201): this is the first generation of transmission control system as introduced in 2001 on the M138 model. The name SOFAST (soft + fast) was introduced little later when a new control software was applied with the aim to improve operating comfort. Management of gearchanges is not influenced by information concerning vehicle dynamics.

- **SOFAST II** transmission control system (CFC231): a new control unit with new software was introduced to optimise gearchange comfort and reduce noise levels. An improved operating management of the clutch was obtained by the introduction of the Kisspoint self-learning procedure. Management of gearchanges is not influenced by information concerning vehicle dynamics.

- **SOFAST III** transmission control system (CFC301): the introduction of Sofast III involves a new control unit and the introduction of a longitudinal acceleration sensor and a clutch pressure sensor. The longitudinal acceleration information allows a gearchange and clutch management influenced by the vehicle dynamics. The clutch pressure information allows the ECU to calibrate the clutch diaphragm spring characteristic. These modifications resulted in a much improved cluch management.

- **SOFAST III+** transmission control system (CFC301): identical to SOFAST III but with modified clutch and new operating software for further improved cluch management.

- **SOFAST IV** transmission control system (CFC301): new operating software and various hardware modifications are applied. The introduction of the Superfast gearshift operating strategy reduces gearshift times to 100 ms.

**MASERATI M138 Cambiocorsa**

HW CFC 201 (SOFAST) up to assembly 12203

HW CFC 231 (SOFAST II) from assembly 12204

**MASERATI M139 Duoselect, EUROPE version**

HW CFC 231 (SOFAST II) up to assembly 18821

HW CFC 301 (SOFAST III) from assembly 18822

HW CFC 301 (SOFAST III+) from assembly 21925

**MASERATI M139 Duoselect, US version**

HW CFC 301 (SOFAST III) up to assembly 21925

HW CFC 301 (SOFAST III+) from assembly 21926

**MASERATI M145 MC-Shift**

HW CFC 301 (SOFAST IV)

**MASERATI M144**

HW CFC 201 (SOFAST)

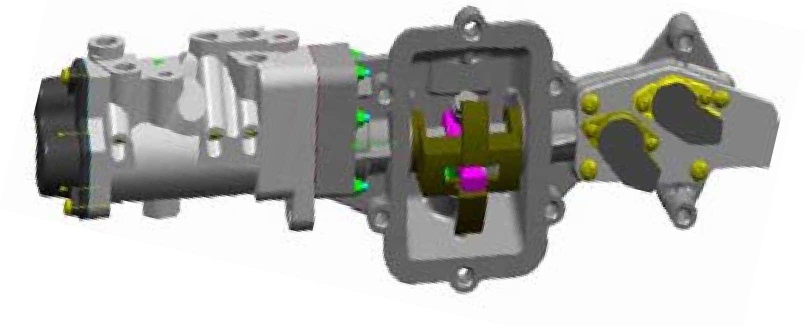
**ALFA ROMEO 8C Competizione & 8C Spider**

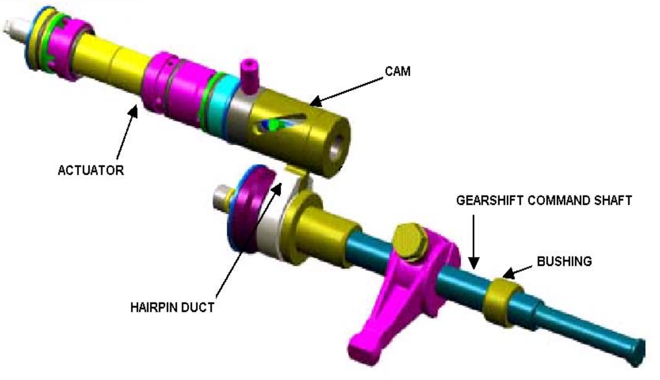
HW CFC 301 (SOFAST III+)

## COMPONENT DESCRIPTION

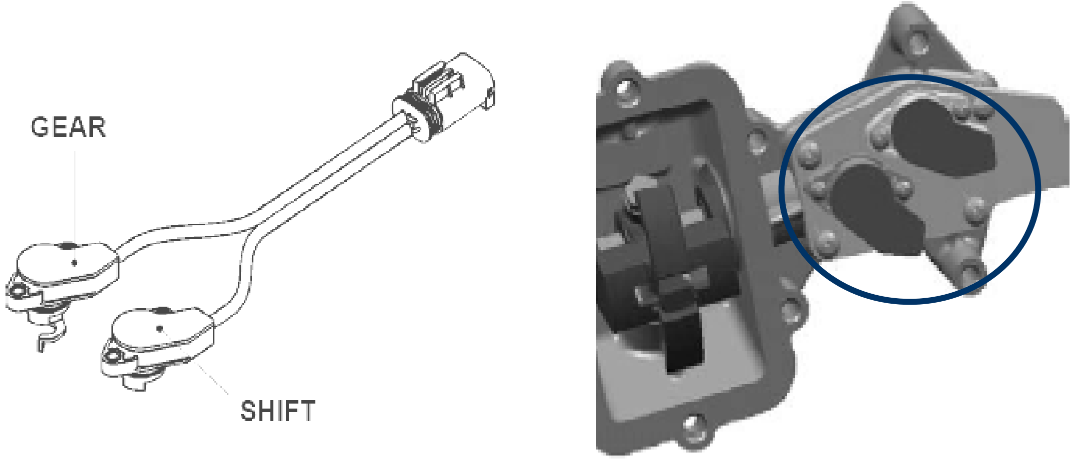
### Hydraulic actuator

The function of this subsystem is that of directly activating the gearshift forks in order to drive the gear engagement and selection movements.





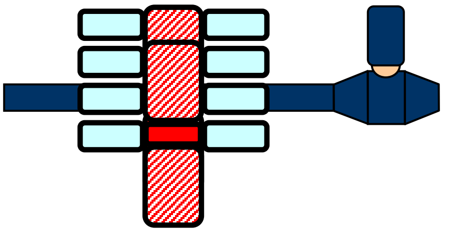

The hydraulic actuator is equipped with two sensors designed to monitor the actual position of the gear engagement finger. One sensor monitors the selection stroke while the other checks the gear engagement stroke. Both sensors are of the contactless type (Hall effect). The integrated electronic circuit in the sensor converts the output signal of the Hall ceramic element into an 0-5V DC signal. A failure of the sensors will enable a safety strategy that prevents engine starting.




**Actuator unit position detection Hall effect type contactless sensors**

**SELECTION**

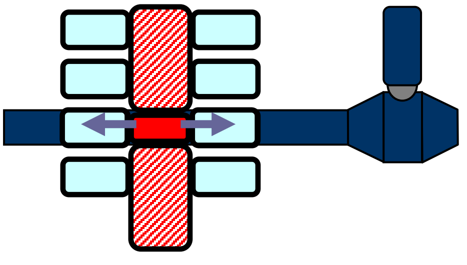
The hydraulic actuator converts the hydraulic pressure supplied by the gear selection solenoid valves (EV3, EV4, EV5) into a rotary movement of the gearshift command shaft. The gearshift command shaft has 4 possible positions separated by 15° angles.



| Gear | EV3 | EV4 | EV5 |
|---|---|---|---|
| 1 - 2 | ON | OFF | ON |
| 3 - 4 | ON | ON | ON |
| 5 - 6 | OFF | ON | ON |
| REV | ON | OFF | OFF |

**ENGAGEMENT**

The hydraulic actuator converts the hydraulic pressure deriving from both the gear engagement solenoid valves (**EV1** for odd number gears and **EV2** for even number gears) into travel of the gearhift finger to three possible positions: Even number gears and reverse gear / Neutral / Odd number gears.

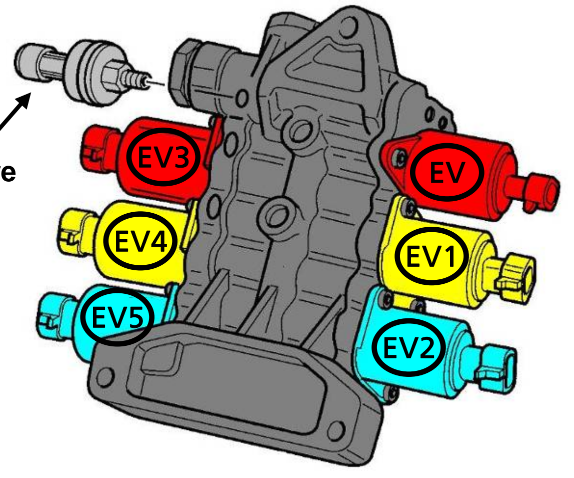


| Gear | EV1 | EV2 |
|---|---|---|
| 2- 4- 6- R | OFF | ON |
| Neutral | ON | ON |
| 1- 3- 5 | ON | OFF |

## Power Unit

The Power Unit is heart of the system. The function of this subsystem is that of managing the actuation of the hydraulic actuator and the clutch release bearing. Therefore it provides hydraulic energy by using various solenoid valves. The power unit contains the following components:

- 6 solenoid valves
- Pressure sensor
- Check valve
- Pressure relief valve
- Bypass screw

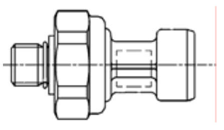



**Pressure sensor:**

Working range: 0 - 80 bar

Power supply: 5V DC.

Output signal: 0.5 - 4.5 V DC.



**Solenoid valves:**

**EV:** Clutch solenoid valve (PFV)

**EV 1-2:** Gear engagement solenoid valves (PPV)

**EV 3-4-5:** Gear selection solenoid valves (PFV)

## Check valve

The check valve is located downstream from the electric pump inside the Power Unit and serves to prevent the oil from flowing backwards. The presence of the check valve makes it possible to maintain hydraulic pressure in the Power Unit when the electric pump is not running so that operating pressure is immediately available when the ignition switched to ON.


1. **Pressure relief valve**
2. **Bypass screw**

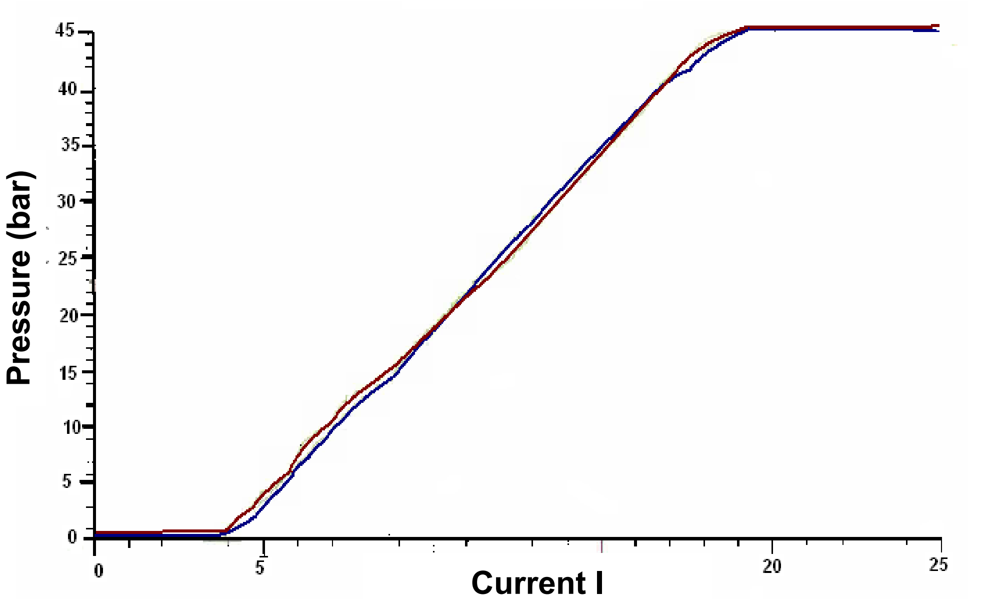
## Pressure relief valve

The pressure relief valve prevents damage to F1 system components potentially resulting from excess oil pressure in the event of anomalous operation of the oil pump. The pressure relief valve opens at approximately 90 bar and dumps the oil to the low pressure side of the circuit.

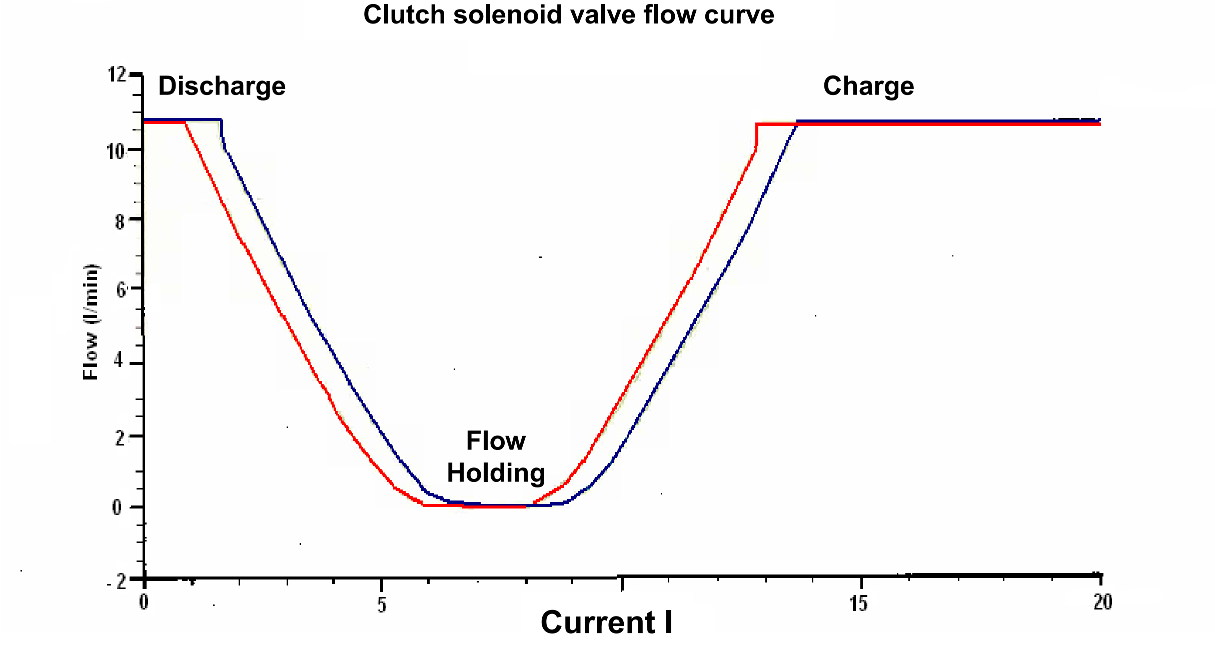
## Bypass screw

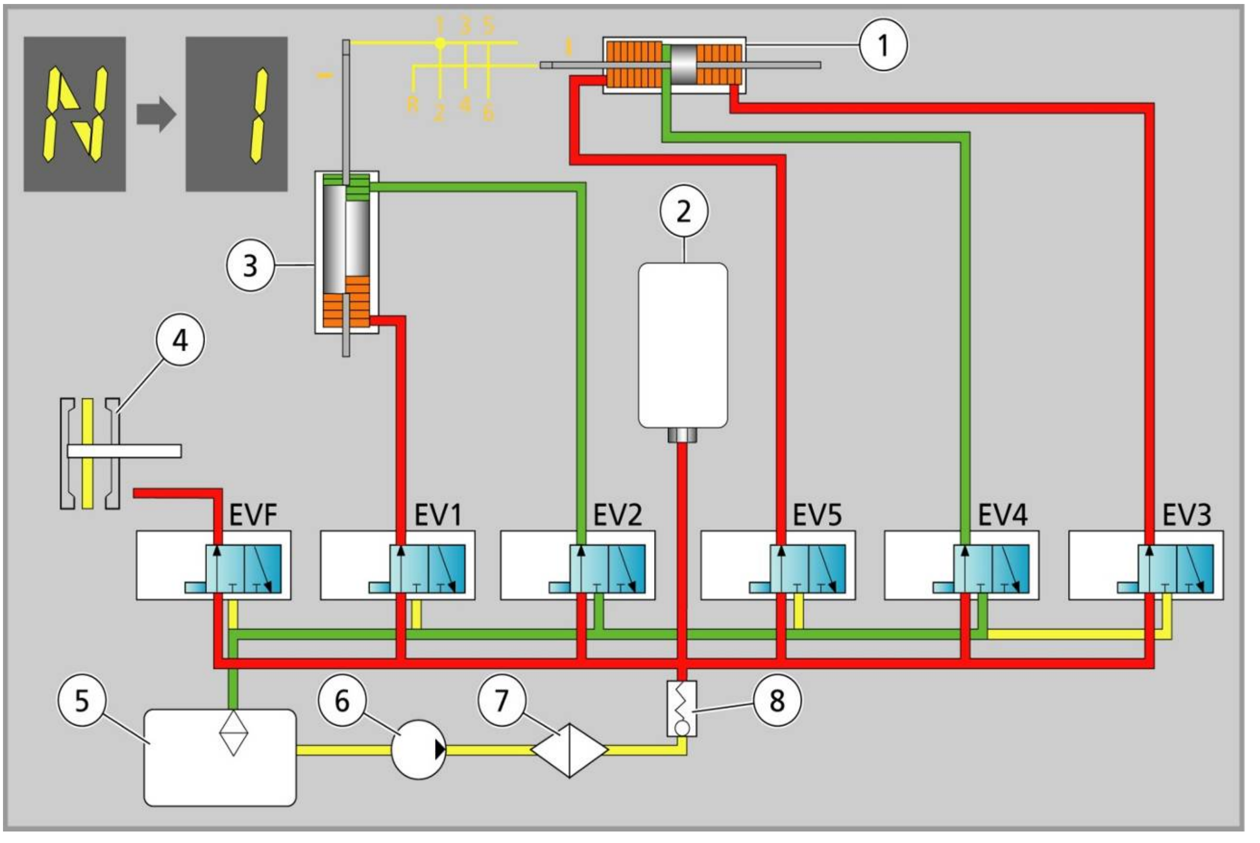
The bypass screw makes it possible to connect the high pressure circuit to the low pressure circuit to relieve system hydraulic pressure. This operation is required, for example, when renewing hydraulic system components.

**Proportional Pressure Valve (PPV):**
The two gear engagement solenoid valves (EV1, EV2) responsible for meshing and disengaging the gears, are of the proportional pressure type (PPV). The solenoid valves are controlled by a PWM signal and they modulate hydraulic pressure in accordance with the input current




**Proportional Flow Valve (PFV):**
The 3 gear selection solenoid valves (EV3, EV4, EV5) and the clutch solenoid valve (EV) are of the proportional flow type (PFV). The clutch solenoid valve is controlled by a PWM signal and modulates hydraulic pressure in accordance with the input current. The three selection solenoid valves are used as On/Off type valves.





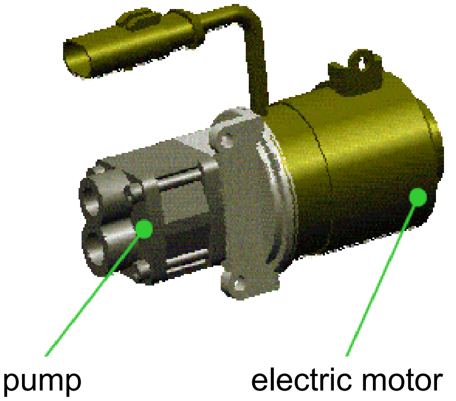

| | | | | | |
|---|---|---|---|---|---|
| 1. | **Selection actuator** | 5. | **Oil reservoir** | | **Pressure** |
| 2. | **Hydraulic accumulator** | 6. | **Electric pump** | | **Return** |
| 3. | **Engagement actuator** | 7. | **Filter** | | **Neutral** |
| 4. | **Clutch** | 8. | **Check valve** | | |

**Electric pump**

The electric pump brings the oil from the hydraulic reservoir to the operational pressure for the power unit.

The pump is driven by an electric DC motor and is managed by an ON/OFF control strategy (the pump does not run continuously). The pump is activated when hydraulic pressure drops below 40 bar and is switched off when the pressure reaches 50 bar.

When the driver's side door is opened and the ignition key is not inserted, the transmission control module (NCR) runs the pump briefly to build up hydraulic pressure before starting the engine.




In case of replacement of the electric pump, the pump must be replaced together with its activation relay!

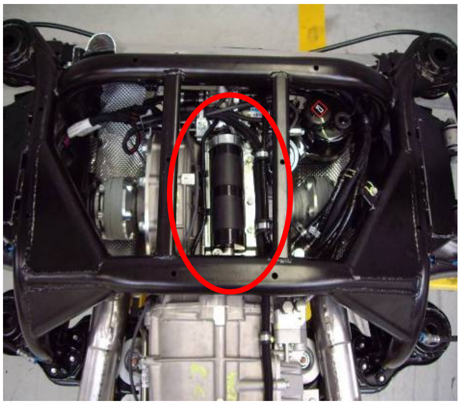
**Sofast 4:**

For the Sofast 4 system (GranTurismo S) with Superfast shift strategy, a higher operating pressure is obtained when the superfast shift mode is active (range 50 - 70 bar). Therefore, a new, more powerful electric pump is used. Further, an air conveyor is installed to provide fresh air to the pump for heat removal.

The temperature of the electric pump motor is monitored by the NCR by means of a mathematical model. In base of certain temperature thresholds, specific recovery strategies can be activated to prevent overheating of the pump.

**Pressure accumulator**

The system is equipped with a piston type pressure accumulator located on top of the gearbox. The function of this device is to accumulate hydraulic pressure during the electric pump running time and deliver high pressure oil to the power unit when the pump is stopped.



**Solenoid valves internal leakage**

Leakage past the spool of the control valve, which is estimated by the NCR and can be read out by the diagnostic system, constitutes a valuable diagnostic aid in the event of an electrohydraulic system fault. The value shown is periodically acquired by the NCR in a self-learning procedure.

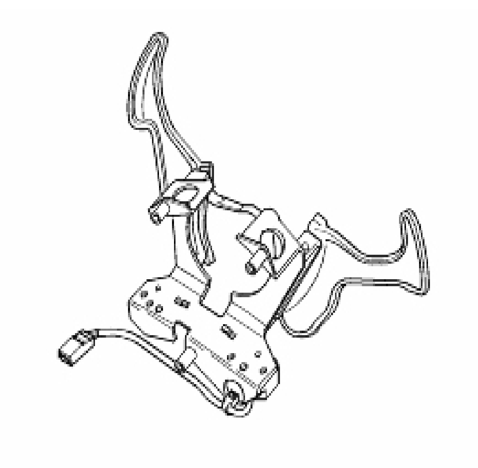
Solenoid valve internal leakage in excess of 30 cc/min, combined with problems of engagement and/or selection, offers an excellent point of reference to understand the nature of the problem. In this case the solenoid valve must be renewed.
In the case of hydraulic problems use the following procedure in order to isolate the offending component:

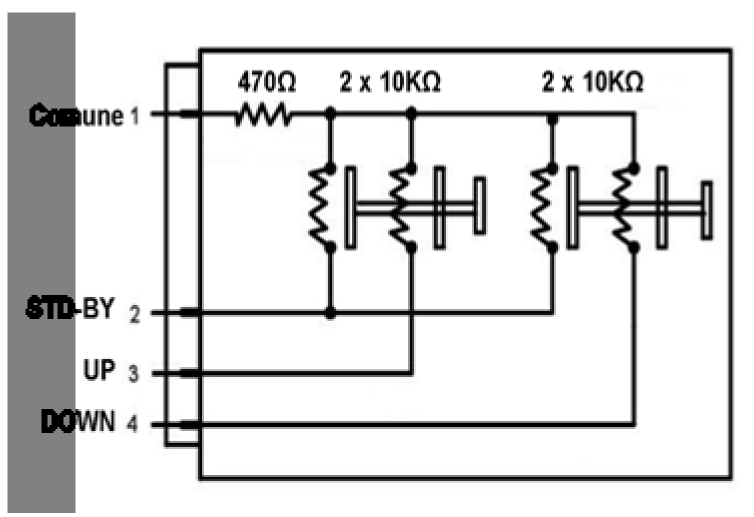
**Key ON, Engine Off:** the interval time between two pump activations must be no less than 2 minutes. This makes it possible to check the solenoid valves - accumulator - electric pump assy.

**Key On, Engine running:** the interval time between two pump activations must be no less than 60 seconds. This makes it possible to check the clutch solenoid valve and, by acquiring the pump restart times, the condition of the accumulator.

The conditions of the electric pump can be assessed by acquisition of its activation time: an activation ramp with an increasingly gradual slope and activation time in excess of 5 seconds are clear symptoms of deterioration of the pump.

**Up / down paddles**
Selection of gear engagement by means of steering wheel paddles

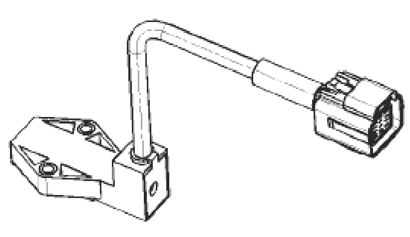


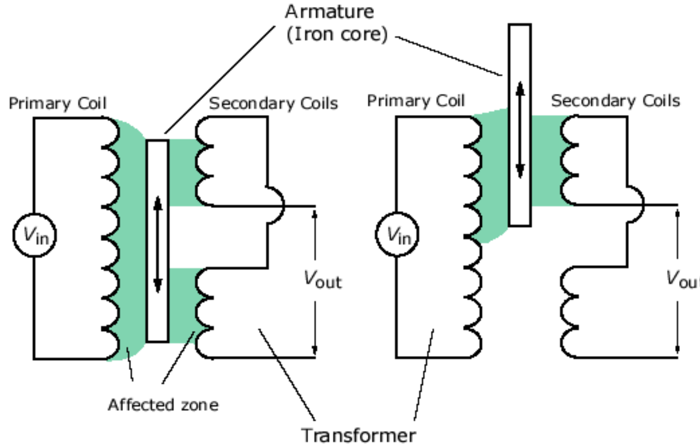



The NCR checks the activation status of the paddles by means of voltage values generated by activation of the gearshift paddles.

## Clutch position sensor

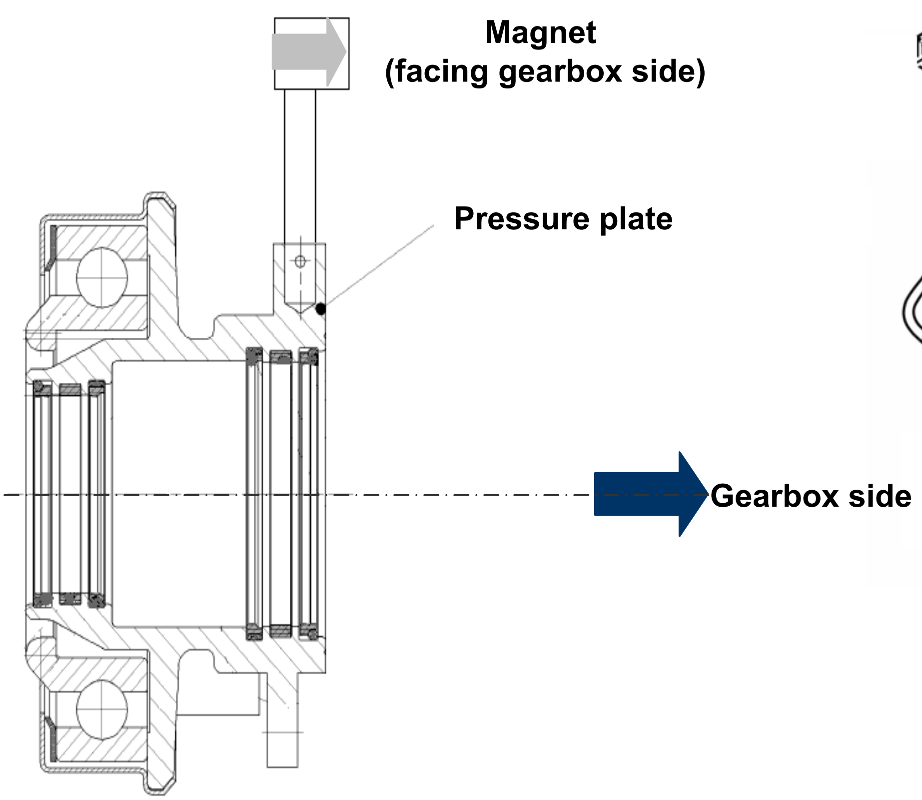
A contactless type sensor is used to measure in real time the position of the clutch release bearing. This sensor uses LVDT (Linear Variable Differential Transformer) technology. The movement of a magnet, fitted on the release bearing, will affect the voltage induced in the coils integrated in the sensor element.
**Note:** failure of the clutch position sensor may lead non-starting of the engine.

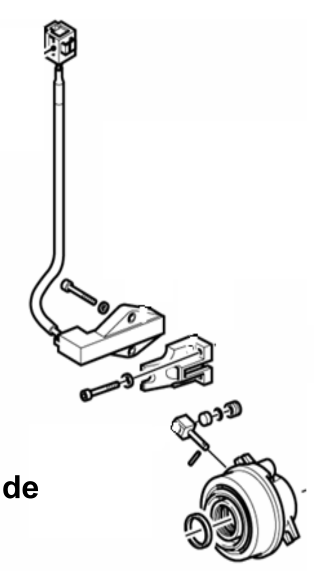





## Clutch Actuator

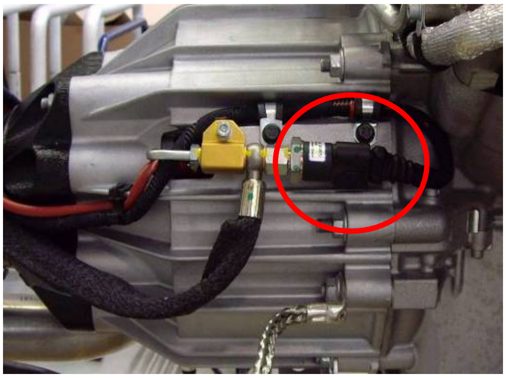
The clutch actuator is responsible for activating the clutch thrust bearing; the actuator is composed of a hydraulically operated circular ring. Attention must be payed to the correct direction of installation of the position sensor magnet with reference to the clutch thrust bearing position.

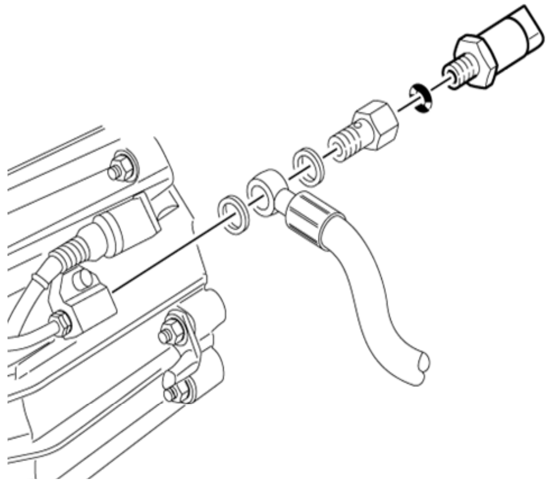


### Hydraulic pressure sensor on clutch housing (Sofast III onward)

An analogue pressure sensor measures the hydraulic pressure in the clutch actuator, which is in direct relation to the application force of the diaphragm spring. By this way the exact clutch characteristic can be identified. This component is installed starting from sofast III.



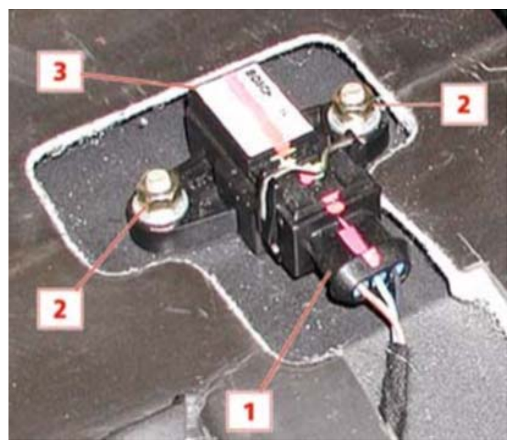


| | |
|---|---|
| Measuring range: | 0 - 80 bar |
| Response voltage: | 0.5 - 4.5V |

### Longitudinal acceleration sensor (Sofast III)

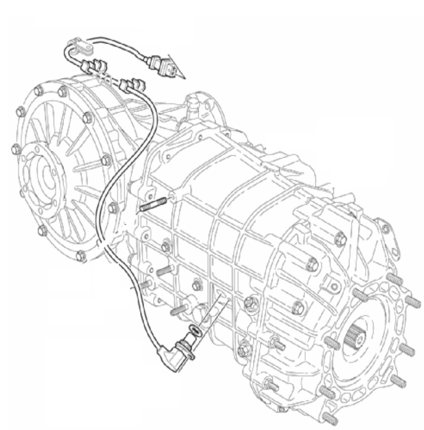
A longitudinal acceleration sensor was introduced on the Sofast III system to allow to calculate the road gradient (flat surface, uphill, downhill). This information is used by the NCR to adapt the clutch activation during driving away and the gearshift strategy in automatic driving mode in base of the road gradient.

Starting from assembly **24275**, the sensor has been dropped and longitudinal acceleration ionformation is received from the ABS / ESP system (NFR) over the C-CAN line.




### Gearbox input shaft speed sensor

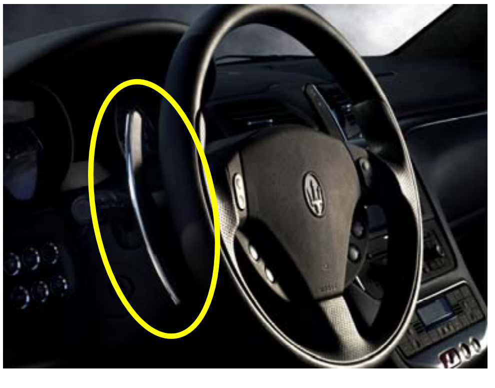
The rotation speed of the gearbox primary shaft is monitored by a magnetic induction type speed sensor located on the right-hand side of the gearbox.



**Sofast 4:**

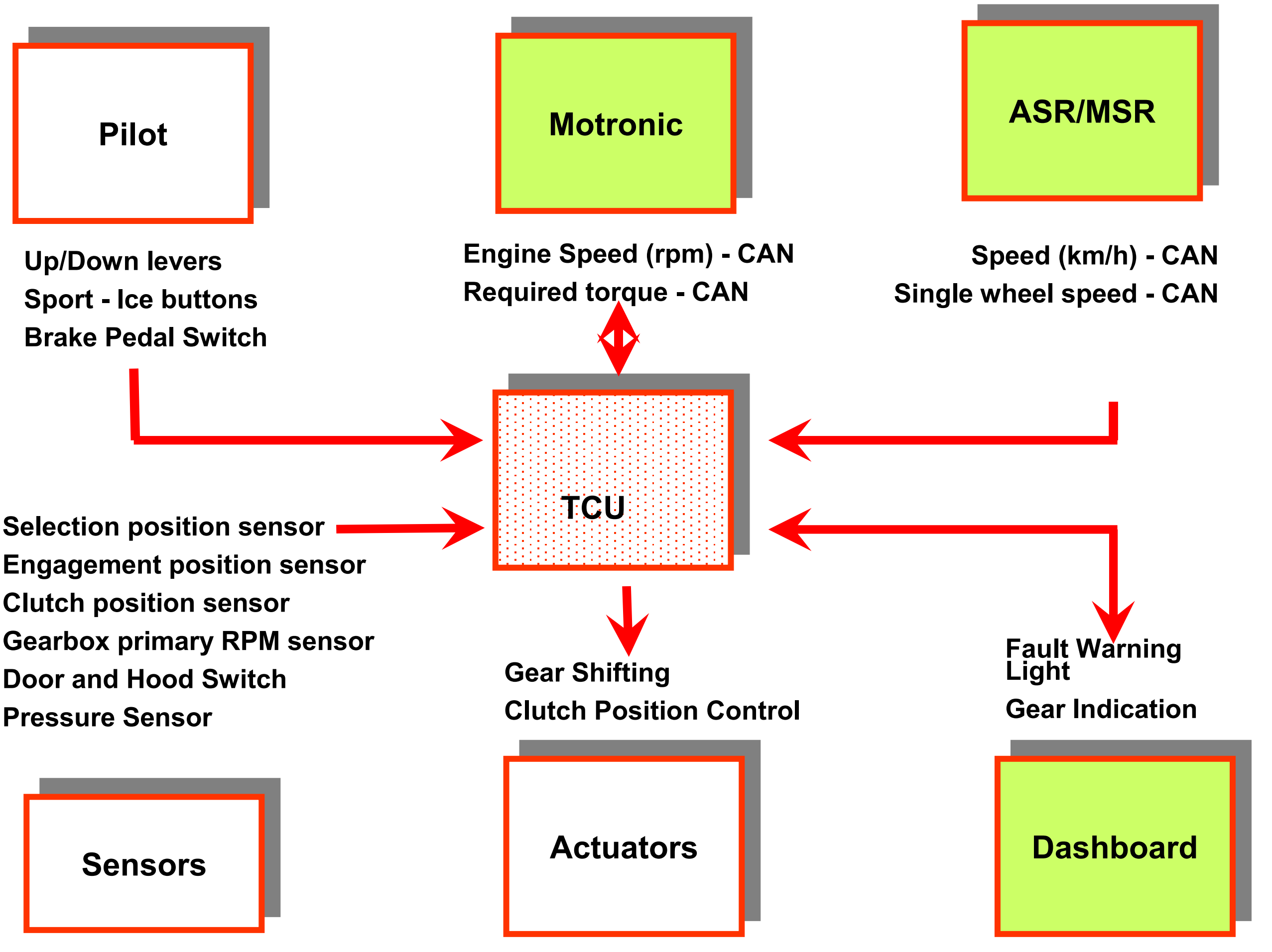
For the GranTurismo S model (Sofast 4), the following hardware modifications have been made:

- Reinforced gearbox housing (new differential lid)
- Reinforced, three-pad gearshift forks made of a new material
- New clutch “Ribbed finger” (PIS value still 4,2mm – 327 bit)
- New clutch housing with double support bearing
- New electric pump with increased capacity and air conveyor
- Clutch position sensor with improved thermal isolation for wiring
- New hydraulic circuit oil: Shell Donax TX (0,5L)
- High pressure leads without restrictors: on previous generations, restrictors were fitted in the high pressure leads to reduce operating noise. For Sofast 4 they have been removed to allow the increase of gearshift times.
- Direct connection between NCR (pin 80 CFC301) and NCM (pin 81 Motronic ME7.1.1) for engine cut-off in Superfast shift mode: When Superfast shift mode is active, the fuel cut-off command during gearshift to the engine control system is not given over the C-CAN line but by a direct connection by an “active low” signal. This allows a faster command and improved synchronisation between gearbox control and engine control during gearshift phase.
  **Note:** in case of failure of the line (interruption, short circuit) a specific error code will be stored (DTC P1761) and the Superfast shift mode will be disabled.
- Activation of reverse lights via CAN: pin 41 of the CFC301 unit is no longer used to operate the reverse lights relay. Instead, it operates the LED behind the Reverse button on the control panel located on the central console.
- Improved driver interface with longer gearshift paddles at the steering wheel and a new control panel to select the driving direction (1st gear or Reverse).




The various modifications result in a modified pin-out for the CFC301 ECU with respect to Sofast III and Sofast III+

## OPERATING PRINCIPLE CHART




### Input signals

The transmission control module (NCR) uses the following input signals for operation of the gearbox and clutch:

### Analogue input signals:

- Shift up selector
- Shift down selector
- Vehicle speed signal
- "Ice" switch signal (low grip)
- "Auto" switch signal
- "Reverse" switch signal
- Brake pedal switch
- Driver's door switch
- "KEY ON" signal

### Input signals from different sensors:

- Shift actuator position sensor
- Selection actuator position sensor
- Clutch actuator position sensor
- Clutch pressure sensor (Sofast III onward)
- Primary shaft speed sensor
- Oil pressure sensor power unit

### CAN input signals:

- Engine speed signal
- Engine torque signal
- "Sport" activation signal (from NFR)
- Hood switch signal
- Brake pedal switch signal

## CLUTCH OPERATION MANAGEMENT

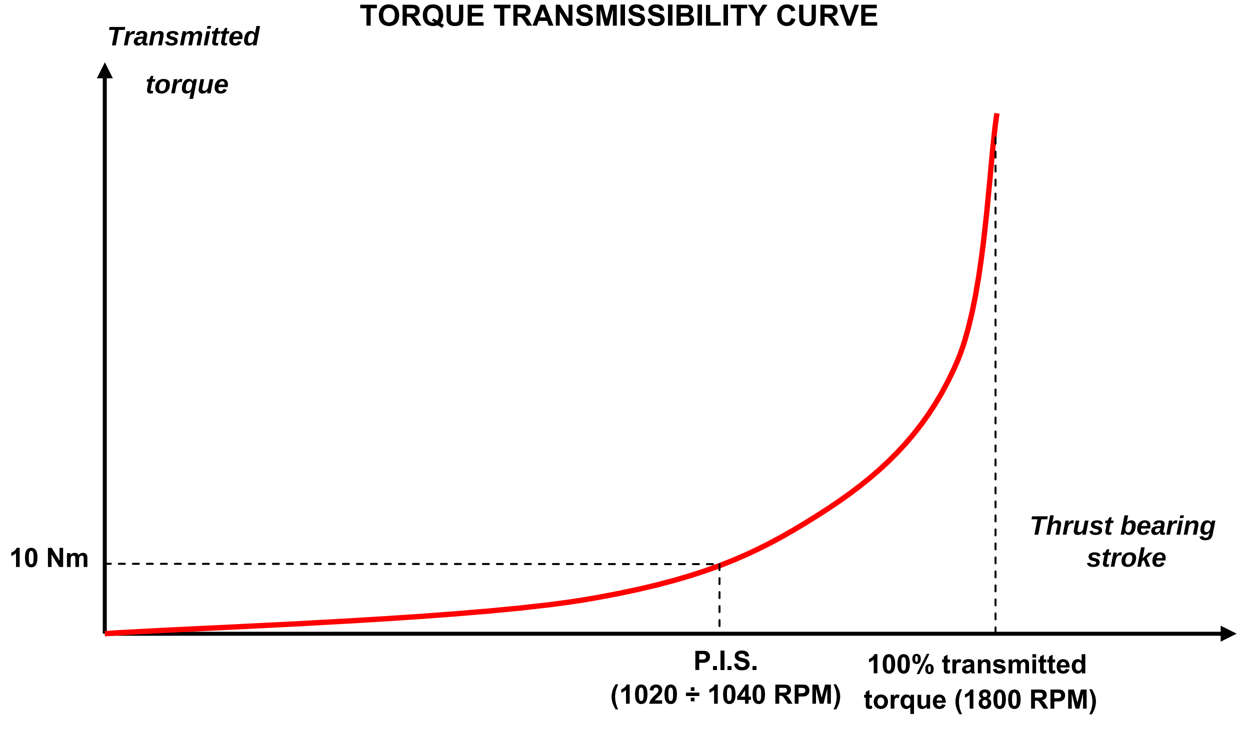
Clutch operation management, and all strategies related thereto, is based on control of the clutch position calculated in real time.
The clutch control strategies are based on absolute references:

- clutch position
- transmissible torque

Calculation and control of the torque transmissibility curve depends on two positions:

1. KISS POINT (PIS position)
2. CLOSED CLUTCH POSITION

The kiss point – also referred to as the PIS (Punto Incipiente Slittamento or slip beginning point) – is a parameter that defines the nominal value of the clutch engagement point in the gearbox control module (NCR). The kiss point is the actual thrust bearing position at the moment of clutch engaging, expressed in millimetres and in relation to the closed clutch position. The kiss point depends on various factors such as the clutch disc surface condition and clutch temperature. It does not depend on clutch wear

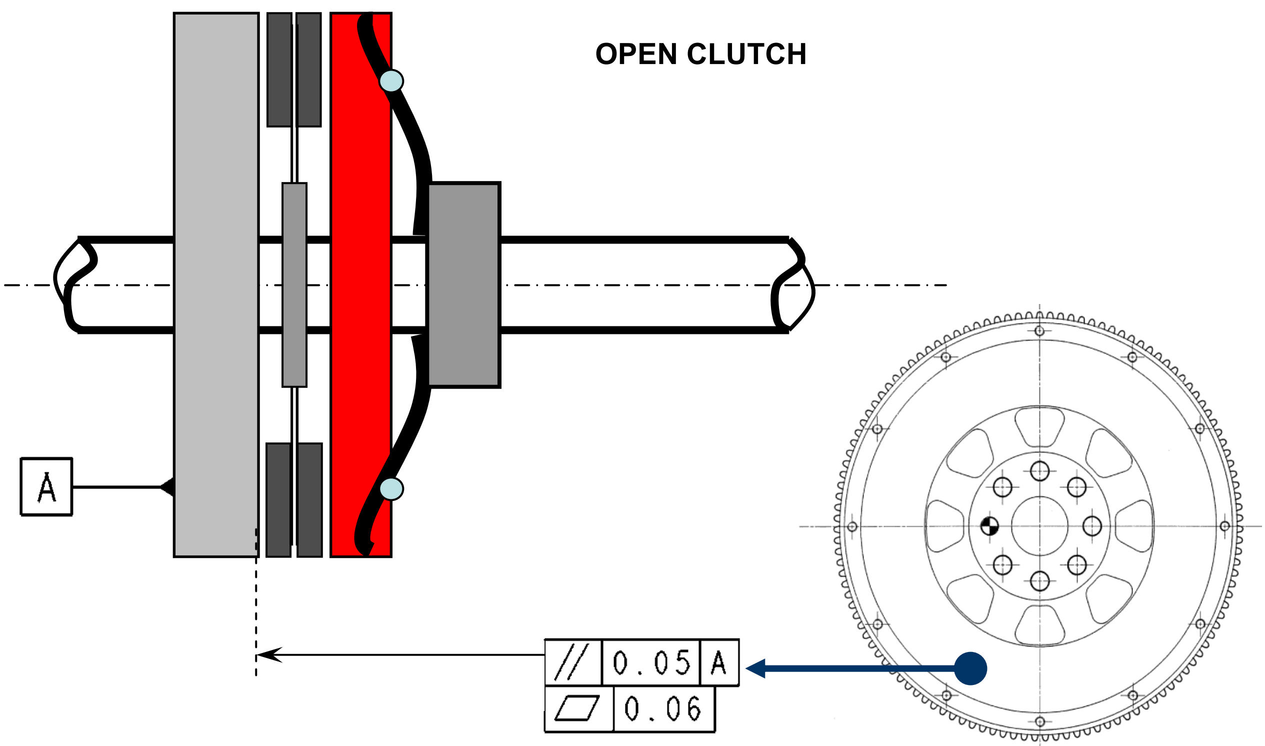


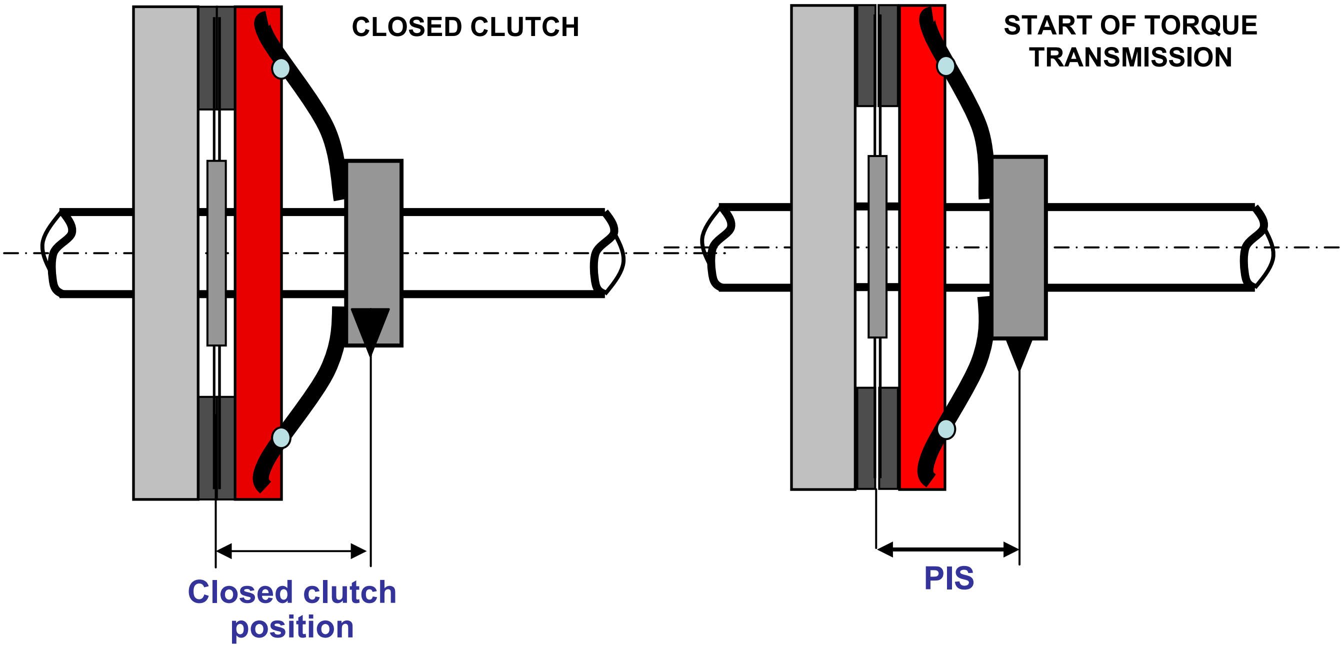

The kiss point is reached at between 1020 - 1040 RPM. The clutch “closes” and therefore full torque transmission is attained at 1800 RPM. When driving at below 1800 RPM and especially when travelling uphill, the temperature of the clutch disc tends to rise due to the clutch not being fully closed causing clutch slip. This results in disc wear and drastically reduces the lifespan of the clutch.

The kiss point can be set into the NCR module by means of a calibration procedure with the SD3 diagnostic tester. This procedure should be carried out after replacement of the clutch or the transmission control module. Since the temperature is an important factor for the determination of the kiss point, the calibration procedure should only be carried out at the correct clutch operating temperature. Correct calibration of the actual kiss point is crucial for correct clutch performance.

| MODELLO | PRODUZIONE | SoFast | TCU | MIN | BASE | MAX |
|---|---|---|---|---|---|---|
| Spyder / Coupè | MY02 | NO (Ante SoFast) | CFC201 | 4,8 | 5,1 | 5,4 |
| | MY03 | SoFast 1 | CFC201 | 4,8 | 5,1 | 5,4 |
| | MY04 | SoFast 1 | CFC201 | 4,8 | 5,1 | 5,4 |
| | MY05 | SoFast 2 | CFC231 | 4,8 | 5,1 | 5,4 |
| | MY06 | SoFast 2 | CFC231 | 4,8 | 5,1 | 5,4 |
| Quattroporte Duoselect | MY05 EU | SoFast 2 | CFC231 | 4,8 | 5,1 | 5,4 |
| | MY05 US | SoFast 3 | CFC301 | 3,9 | 4,2 | 4,4 |
| | MU05 EU | SoFast 3 | CFC301 | 3,9 | 4,2 | 4,4 |
| | MY06 | SoFast 3 + | CFC301 | 3,9 | 4,2 | 4,4 |

**The closed clutch position:** this is a value in mm which defines the thrust bearing position when the clutch is fully closed. This value depends on the clutch wear and is auto-calibrated after each gearshift.

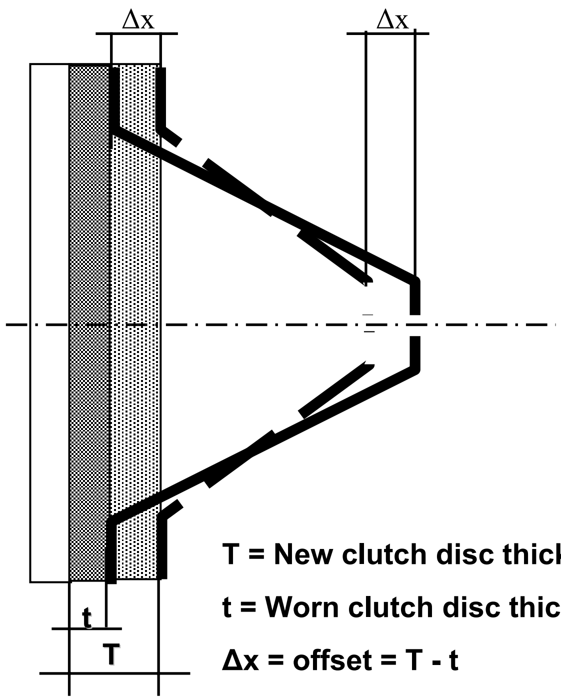





**PIS value = CC position – PIS position**

**Calculation of wear:**

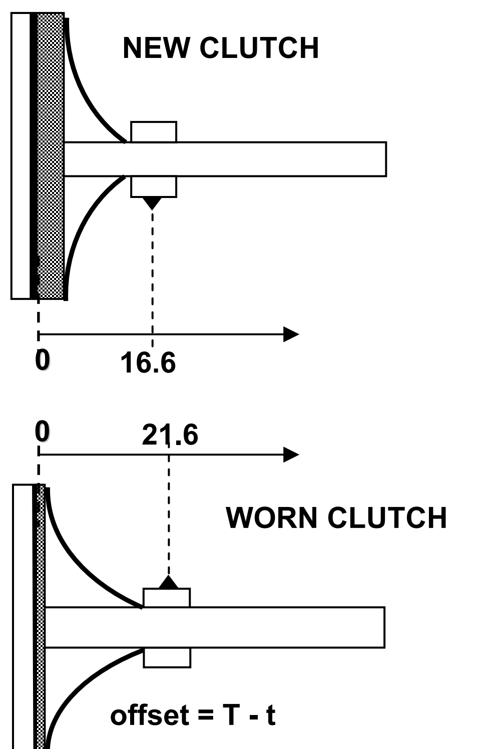
$$\frac{\text{Autocalibrated closed clutch value} - \text{NEW closed clutch value}}{\text{Clutch thickness (5.6 mm)}} \times 100 = \text{\% Wear on clutch}$$




**T = New clutch disc thickness**

**t = Worn clutch disc thickness**

**Δx = offset = T - t**




**offset = T - t**

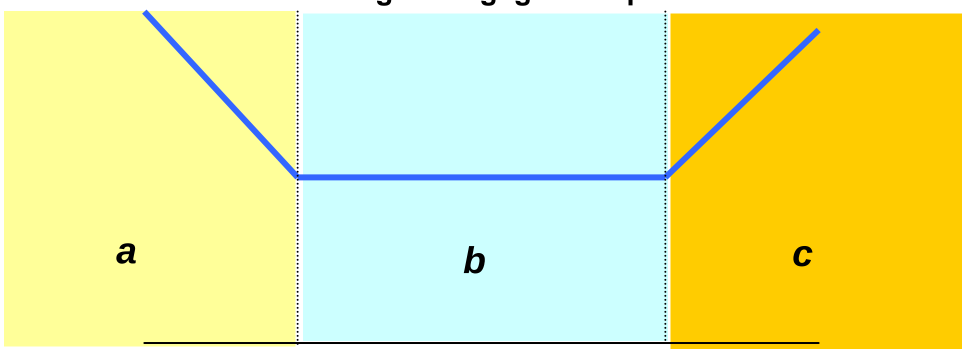
**= 21.6 - 16.6 = 5 mm**

**The kiss point does not depend on clutch wear**

## CLUTCH POSITION CONTROL

Real-time clutch open/close control by means of the position sensor, is calculated using the PIS value and the closed clutch position. During gearshifts, the NCR transmission control module becomes MASTER, while the NCM becomes SLAVE and sets a target torque value. Once the target torque value is reached, the NCM module reverts to the MASTER condition.

**The three gear engagement phases**




***a = Torque Reduction***

***The target torque is decided by the TCU (master)***

***b = RPM Control***

***The target torque is managed by the TCU (master)*** (120 ms)

***c = Torque Transmission***

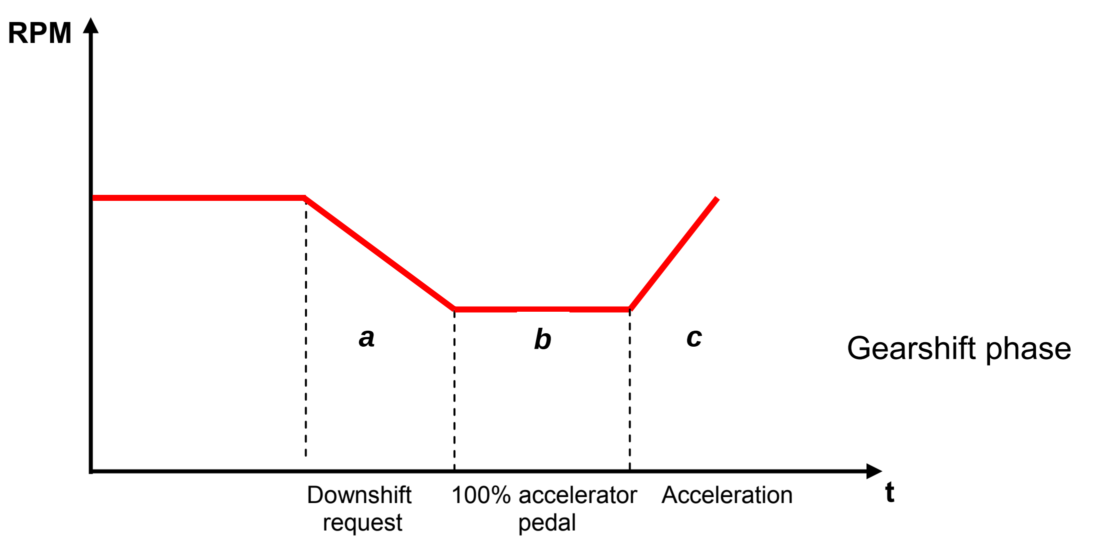
***The TCU is now slave and MOTRONIC decides on the target torque value***

Flow control by means of $\mathbf{I_0}$ **CURRENT** management. Phase **b** control involves management of the EVF that controls the hydraulic flow, in function of in the controlling current. All Maserati electro-actuated control systems up to sofast II use this type of parameter, which must be calibrated in the event of malfunction or maintenance on the Power Unit.

Calibration is carried out as follows:

- Engine running with the gearbox in neutral for approx. 5 min.
- Engine running with the gearbox in 1$^{st}$ gear and foot on the brake for approx. 5 min.

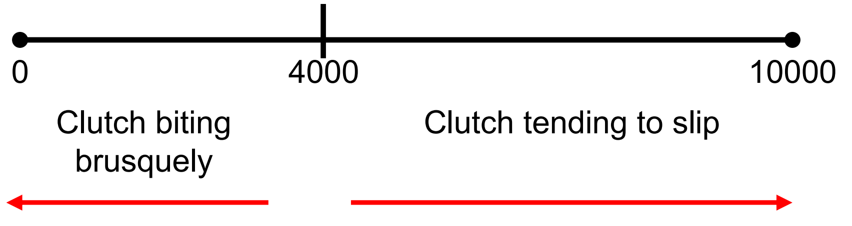
SOFAST III onward systems execute this procedure using the “DEIS” function.



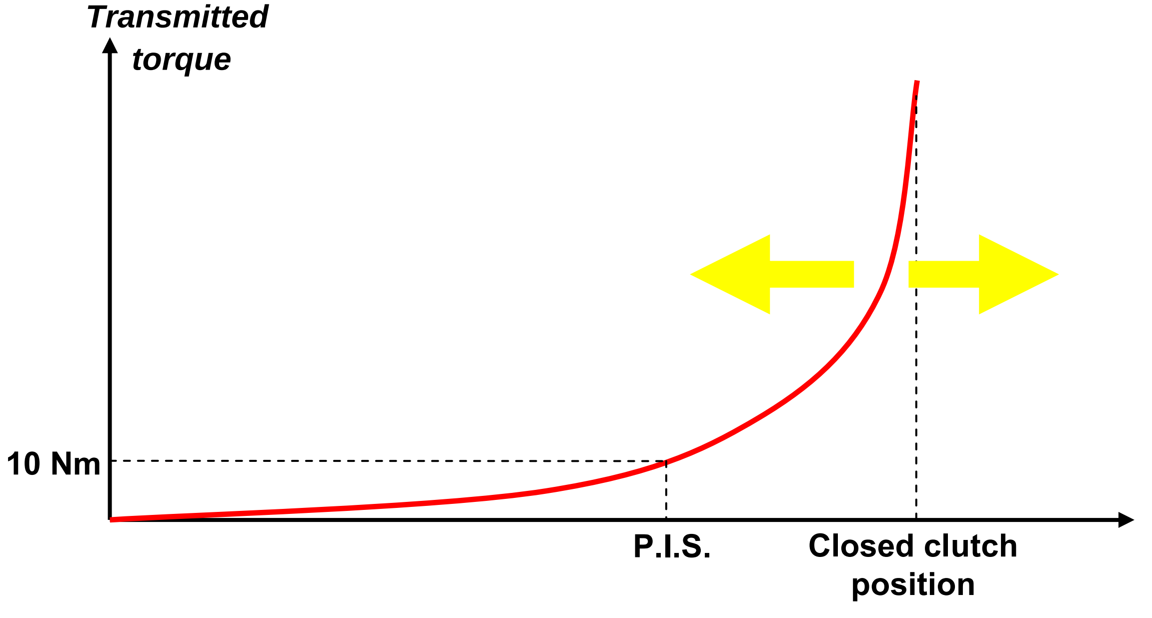
**CLUTCH WEAR INDEX (Sofast II onward)**

The clutch wear index (also referred to as “clutch wear degree” or “clutch degradation index”) is a self-learned parameter which is used by the NCR to adjust the clutch management in function of the degradation of the torque transmissibility capacity of the clutch.

The clutch wear index can be found in the SD3 parameter menu and provides usefull information about degradation of the transmissibility of the clutch. The wear index is self-learnt by the NCR each time the clutch is in the closing phase.

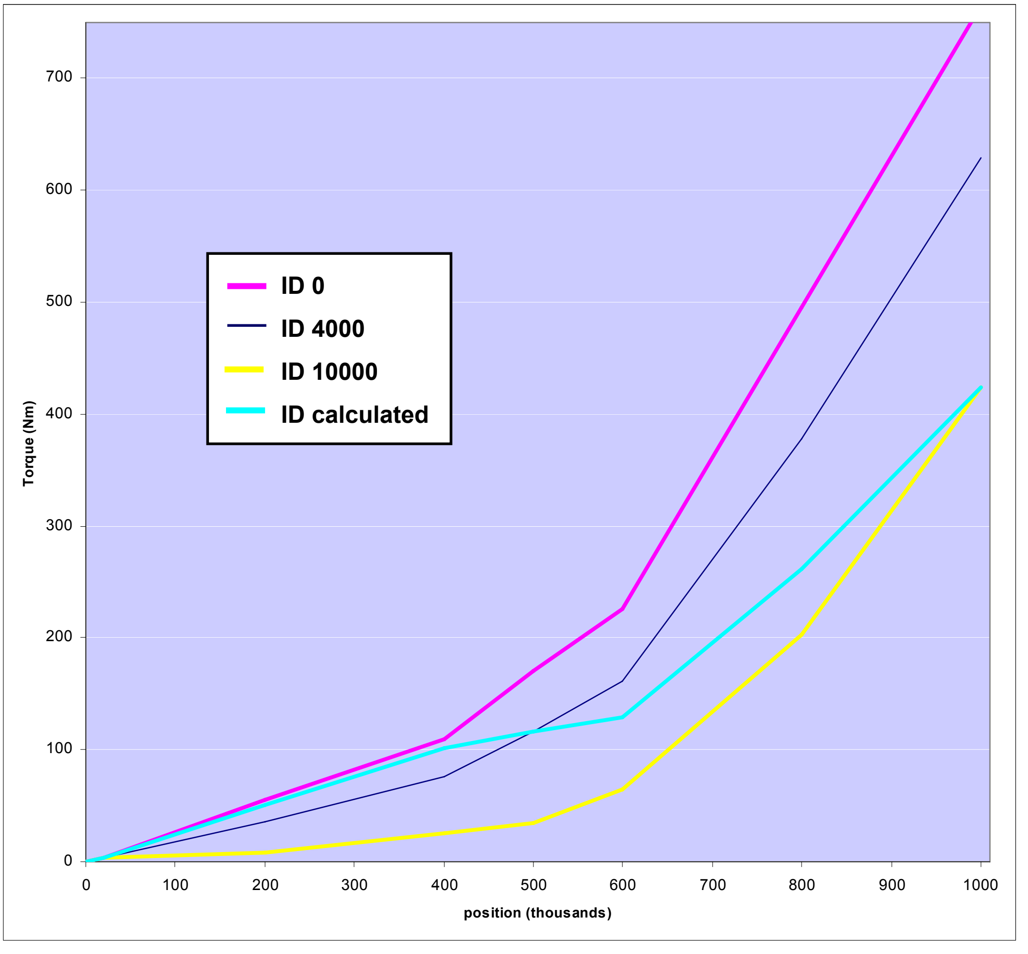



The clutch wear index is a value between 0 (100% torque transfer) and 10000 (no torque transfer, constant slipping of the clutch). The default value is 4000. A clutch that is operating correctly will have a wear index of around 3000/4000. If the clutch has not been replaced and the wear index is high, after performing the resetting and subsequent Kiss point procedures, the value of the parameter should fall.




On Sofast II and Sofast III systems, the clutch wear index is used by the NCR to “move up” the torque transmissibility curve which is used as a reference for clutch control. A clutch wear index of higher than 4000, will move the curve to the right, a lower to the left.

For Sofast III+, the calculation of the clutch wear index has been refined. The clutch wear index is no longer one single value, but 5 different points which together will define a new torque transmissibility curve.

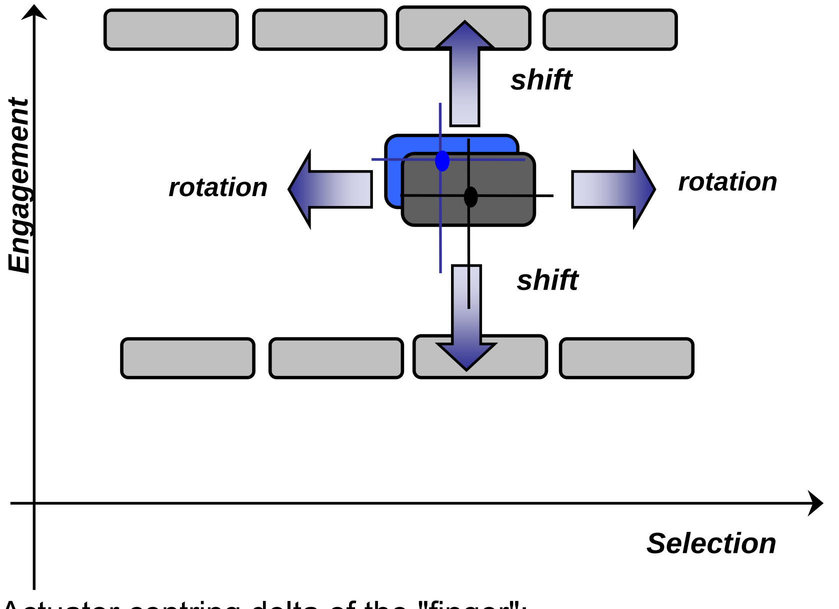



**Note:** the clutch wear index must be reset (= bring back to the default value of 4000) after replacement of the clutch and before performing the Kisspoint procedure.

**Note (2):** from Sofast III+ onward, the clutch wear index is no longer present in the parameter environment of the SD3 tester unit. The reset command (in the Active diagnoses menu) is still present and will reset all 5 values.

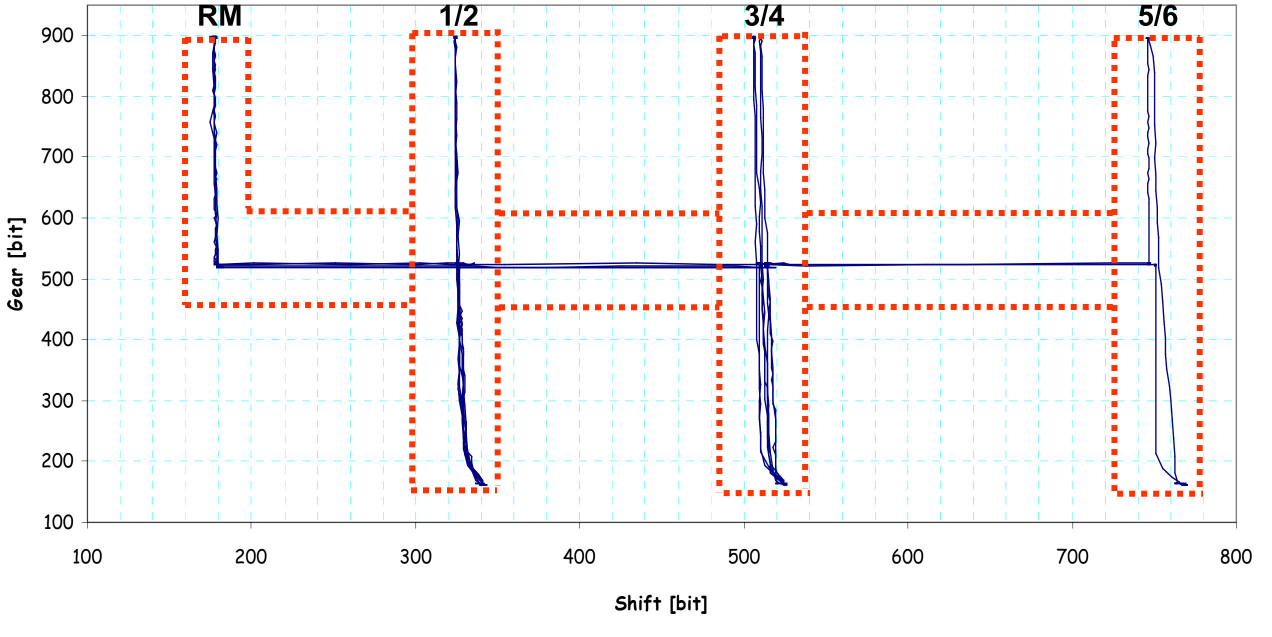
## GEAR ENGAGEMENT STRATEGY

The gear engagement and selection values are self-learnt and stored in the NCR by means of two position sensors which must be within strictly defined ranges. By means of this procedure, the NCR builds a grid and checks 2 engagement and 2 selection thresholds (MIN and MAX). The calculation grid spreadsheet can be used to check the correct centring and movement of the actuator. It is advisable to execute a calculation grid when the vehicle is new and after each maintenance operation on the gearbox, and to keep documentation archived for future reference.




Actuator centring delta of the "finger":

***Min 0º - nom +/- 1.5º - max +/- 3.0º***
***(0 bit - +/- 15 bits - +/- 30 bits)***
***(10 bit = 1°)***



**SERVICE OPERATIONS ON THE ROBOTIZED GEARBOX SYSTEM**

Depending on the type of operation performed on robotized gearbox system components managed by the NCR module, it is necessary to perform the following operations, which are divided into the relative areas of intervention.

**SELF CALIBRATION OF DEIS PARAMETERS (Sofast III onward):**

The DEIS parameter calibration function is a self-learning function which relates to a number of clutch operation functions, e.g. self-learning of the clutch solenoid valve and clutch diaphragm spring.
By means of the DEIS self-learning procedure, the transmission control module (NCR) uses a specific algorithm to calculate the spring characteristic of the clutch diaphragm.
This function can be activated by the SD3 diagnostic tester and should be carried out after replacement of clutch-related components or the transmission control module (NCR).
To activate the function, connect the SD3 tester and select the single ECU menu to enter the transmission control module (NCR). Then select the active diagnostics menu where the DEIS self-learning function can be found.
The procedure has a duration of between 3 minutes 30 seconds and 9 minutes. In case the procedure has not been completed entirely, it is been considered as failed and has to be repeated.
After the procedure has been concluded positively, turn off the ignition key and wait for 25 seconds. This time is needed for the module to memorize the different parameters.
If the procedure has a negative result, try to find the cause by checking the correct operating of the clutch.
Also check if the hydraulic circuit has been correctly bled. Repeat the procedure.

The aim of the DEIS procedure is to obtain a fine-tuned control of 2 parameters:

1. **Clutch position**
2. **Clutch solenoid valve pressure**

The procedure comprises the following steps:

1. autocalibration of closed centre current for the clutch solenoid valve I0
2. autocalibration of optimal Dither current
3. autocalibaration of the dead band of the clutch solenoid valve
4. autocalibration of the current/capacity of the clutch valve
5. autocalibration of the clutch Belleville spring

(*)DEIS: Dipartimento di Elettronica, Informatica e Sistematica (Department of Electronics, Computer Sciences and Systems), University of Bologna, which has collaborated with Maserati on the development of the procedure carrying its name.

**RESET CLUTCH WEAR INDEX (Sofast II onward):**

The clutch wear index provides information about degradation of the torque transmissibility of the clutch. The clutch wear index is a self-learned parameter which will influence the management of the clutch and which is specific for each clutch. Therefore the clutch wear index must be reset after replacement of the clutch and before carrying out the Kiss Point procedure.
The reset command for the clutch wear index can be found in the Active diagnosis menu of the SD3 tester.

**Note:** with recent diagnostic software, the clutch wear index reset is integrated in the Kisspoint procedure.

**CLUTCH CONFIGURATION:**

The “clutch configuration”, which is a command in the “Active diagnostic” menu of SD3, is used to store the actual “closed clutch position”, as measured by the clutch position sensor in real time, as the “closed clutch position of new clutch”. Therefore, this operation must only be performed after the installing of a new clutch. The clutch configuration is crucial for the correct calculation of the clutch wear %.
**Note:** it is advised to perform the clutch configuration after a brief bedding in of the new clutch.
**Note (2):** with recent diagnostic software, the clutch configuration is integrated in the Kisspoint procedure.

**KISS POINT ADJUSTMENT PROCEDURE (Pre-Sofast and Sofast):**

For cars fitted with transmission control systems prior to Sofast II (Pre-Sofast and Sofast) the Kisspoint value must be entered manualy with the diagnostic tester (SD2). The Kiss point base value depends on the vehicle type and Model Year. After entering the base value, the value can be adjusted after an assessment of the clutch in order to obtain an optimal clutch behaviour.

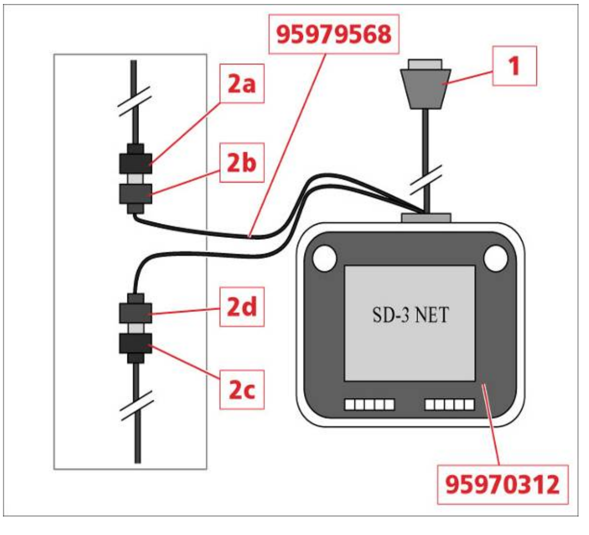
**KISS POINT SELF LEARNING PROCEDURE (Sofast II onward):**

On vehicles fitted with Sofast II or later, the ideal Kiss point can be found by means of a self-learning procedure which is activated by the diagnostic tester.
Before starting the kiss point procedure, it is first necessary to **bed in the clutch:**

- For the first few miles, follow the guidelines below in order to allow the clutch to bed in sufficiently:
- avoid using sport mode
- change gear at a maximum of 4000 rpm and a maximum of 50% pedal
- avoid releasing the clutch sharply
- avoid prolonged use of the clutch (traffic jams, maneuvers)
- make frequent gear changes while driving

Keep the engine idling for 5 minutes to calibrate the solenoid valves while hot. With the vehicle in motion, engage 1-2-1 in sequence, and keep the engine idling in first and the brake pedal pressed for 1 minute. Repeat the sequence three times to allow correct estimation of clutch solenoid valve internal leakage.

- Stop the engine, make certain that the ignition switch is in the OFF position
- Connect SD3 (**95970312**) to the EOBD diagnosis connector **(1).**
- Connect the C-Can connector **(2a)** to the SD3 cable (**95979568**)
- Connect the C-Can connector **(2c)** with the SD3 cable (**95979568**) **(2d).**



First reset the CLUTCH DEGRADATION INDEX in the NCR active diagnosis environment.

ATTENTION!
Before adjusting the gear engage/select actuator, make the following checks:

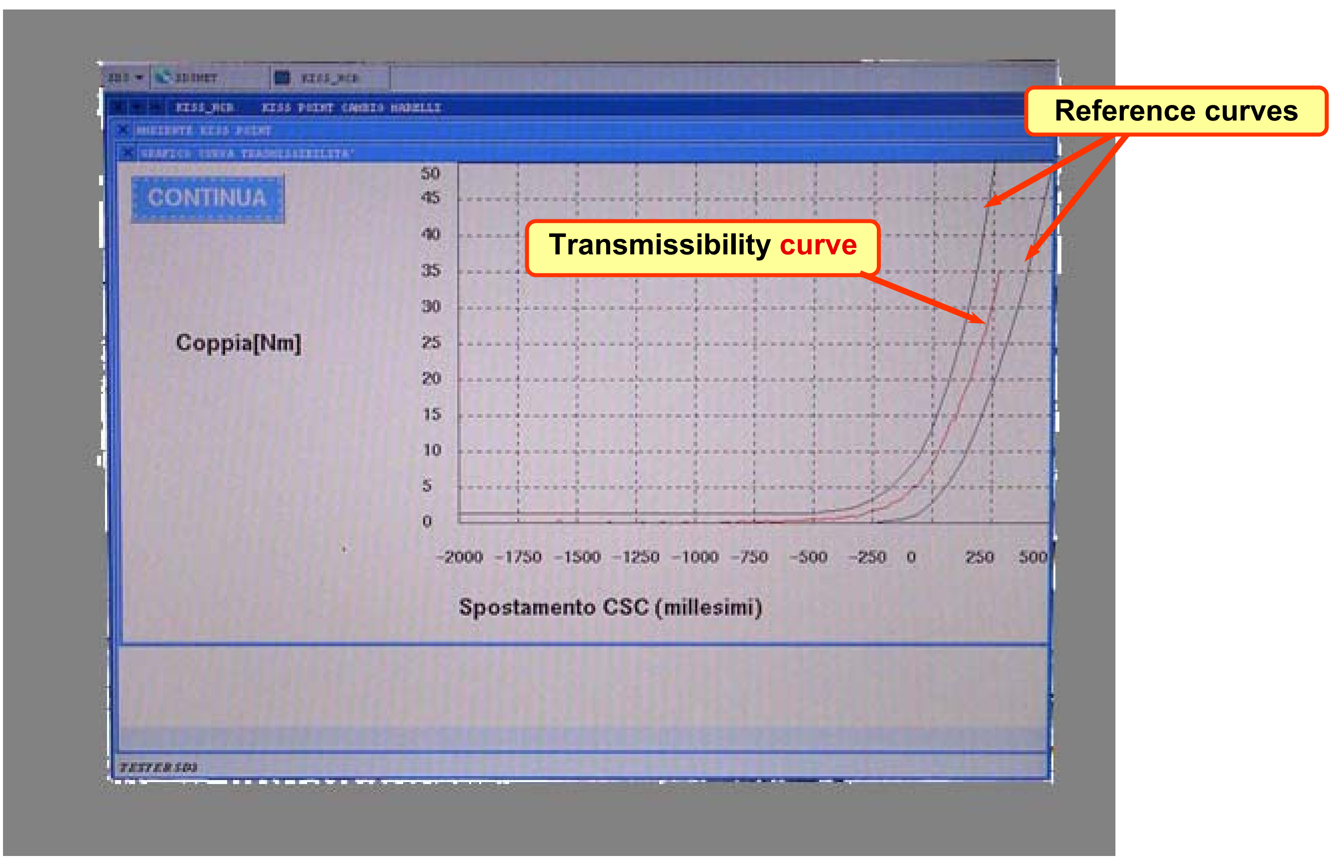
- If the car has been parked for more than 8 hours, drive it for 15 minutes in Free Drive, changing gear repeatedly.
- If the car has been parked for more than 30 minutes after the bedding-in phase, make 10 consecutive breakaways up to an engine speed of 1500 rpm.
- If the car has been parked for less than 30 minutes after the bedding-in phase, make 5 consecutive breakaways up to an engine speed of 1500 rpm.

Switch on the SD3 and select the **KISS-POINT NCR** application from the list of diagnosis programs. Select the **KISS POINT ENVIRONMENT** function from the M138 software list. The subsequent phases are guided by the chosen diagnosis system.
Enter the serial number of the car:


**Note:** for Sofast 4 (GranTurismo S), the Kiss point procedure can be performed by connecting the diagnostic tester to the vehicle EOBD connector (by using the Switch Matrix cable). It is therefore not necessary to use the C-CAN connector cable.

Use the TAB key to select "**CONTINUOUS**", then press "**ENTER**" to confirm. The system will display a warning message for the operator, reminding him what conditions the car must meet in order for the calibration procedure to be executed correctly.
If the car meets the necessary conditions to proceed, press "ENTER".
Put the gearbox in neutral, turn the ignition switch to the OFF position, wait for about 15 seconds, then start the engine and select "ENTER" on SD3.
Select “**START PROCEDURE**”.

The next screen tells the operator to keep the accelerator pedal pressed for the full duration of data acquisition.
The system will automatically run 10 clutch open/close cycles, with the gearbox in neutral, during which the SD3 will acquire the necessary data for calculating the kiss point correctly.
Wait for the "end of data acquisition procedure" message to appear on the display and for the instrument panel node to give an audible alert signal.
The SD3 display will show the "TRANSMISSIBILITY" graph, i.e. the torque value as a function of clutch position (red) and the two reference curves (black), which indicate the tolerance range within which the torque ransmissibility curve must be positioned.



The system will automatically check that the torque transmissibility curve falls within the two tolerance curves.
Depending on the result of processing, there can be two different outcomes:

- The data are correct, and the system will thus continue with the next phases of data acquisition.
- The data are incorrect, the procedure is canceled and an error message is displayed, showing how to correct the error.

At the end of each sequence of data acquisition and processing, the following parameters will be displayed:

- Number of breakways
- Kiss point value (bit,mm)
- Value of dispersal of points (bit)

If completed correctly, the procedure will be repeated twice more.
On completion of the three phases, the average kiss point value will be calculated, and this value will be saved by the gearbox control unit.
The SD3 display will show the message "KISS POINT SAVED CORRECTLY".

**SELF LEARNING OF ACCELERATION SENSOR OFFSET (Sofast III onward):**

After replacement or disconnection/reconnection of the accelerometer or replacement of the transmission control module (NCR), it is necessary to run the accelerometer autocalibration procedure.
Therefore the vehicle must be positionned on a level surface, with the tyres at their correct pressure and with correct wheel alignment.
The procedure can be found in the “Active diagnosis” menu of the SD3 tester.
This procedure should take about 30 seconds, with a checking time of 40 seconds. Once this time is up, if the procedure has not finished, it has failed.
If the procedure has been completed successfully, and no further adjustments are necessary, turn the ignition key to “**OFF**” and wait for at least 25 seconds. Minimum time for allowing the control unit to save the parameters read.

**Note:** for vehicles without dedicated longitudinal acceleration sensor (assembly 24275 onward), the longitudinal acceleration data is received from the ABS/ESP unit by the CAN line. Also in this case the sensor self-learning procedure must be performed in the same way, as the CAN received data is a raw value.

**SELF-LEARNING OF THE GEARCHANGE GRID:**

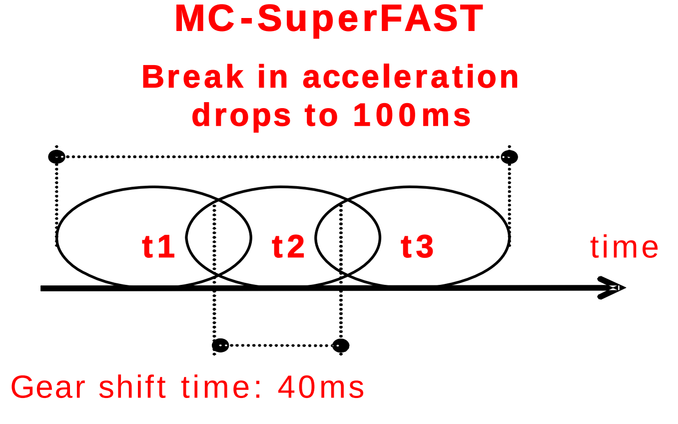
The Self-learning of the gearchange grid (simply indicated by "self learning") is activated by means of an instruction from the tester with the car stationary and the ignition switched to On. This operation teaches the ECU the areas of engagement and selection for the gearbox with which it is associated. On completion of the procedure, the system automatically checks whether learning has taken place correctly. Make sure that the battery is charged, the handbrake is released and the car is moving slightly (by pushing) in the event that self-learning is blocked due to sticking when engaging gears.

**Note:** In case the self learning does not end successfully, check if the hydraulic actuator bleeding has been correctly performed.

**Note (2):** Self learning values are stored inside the NCR at the successive "Key Off".

**SELF LEARNING OF THE SUPERFAST SHIFT (Sofast 4 onward):**

Where the self learning of the gearchange grid has for purpose to calibrate the travel of the gear selection and gear engagement movement, the Superfast shift self learning has been created to optimize the synchronization of the various gearshift related actions.



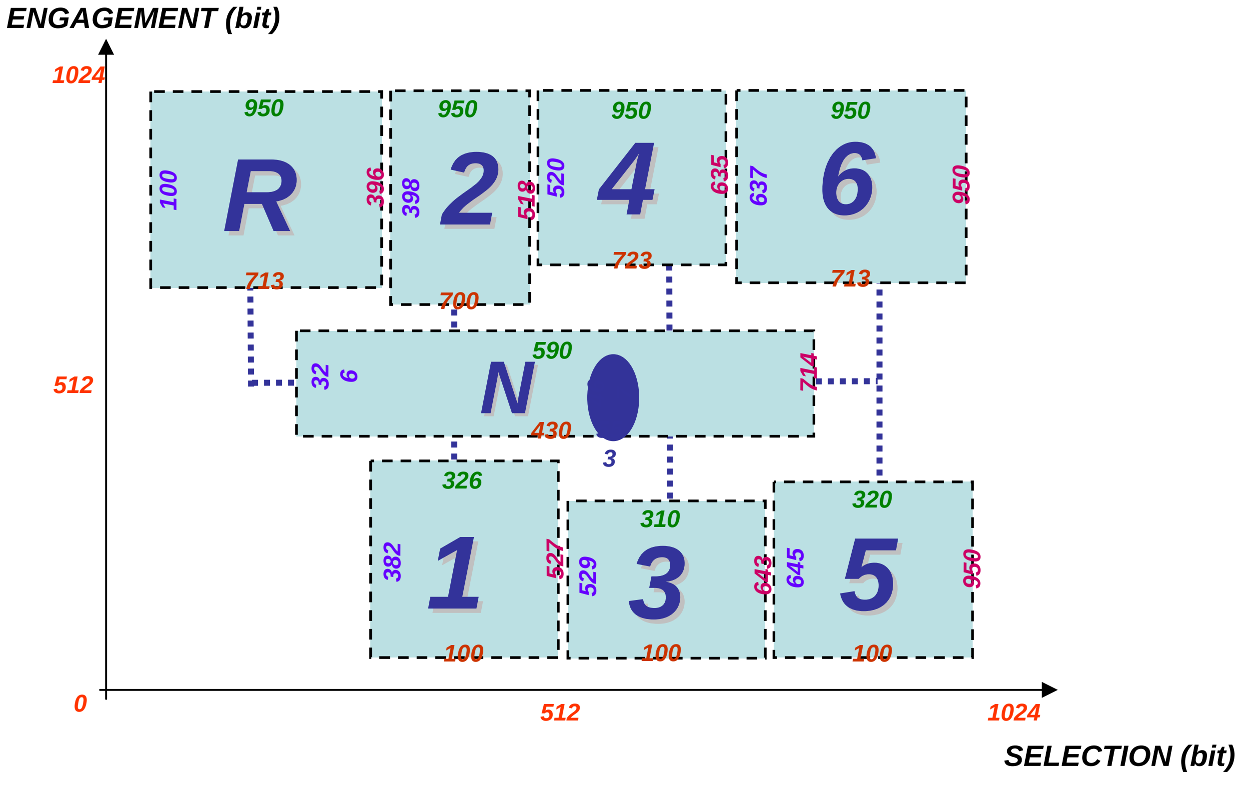

To obtain the shortest possible total gearshift time, it is of upmost importance that the different phases of a complete gearchange operation (power cut-off and clutch opening, gear disengagement, gear selection, gear engagement, clutch closing and power restore) are perfectly synchronised. During the Superfast shift self-learning procedure, the NCR will calibrate the duration of the solenoid valve activation and the actual gearshift for every gear.

This procedure can be activated with the diagnostic tester and needs to follow after completion of the self-learning of the gearchange grid.

**Note:** in case the Superfast shift self learning procedure has not been performed, a specific DTC will be stored by the NCR (P1768) and the Superfast gearshift mode will be disabled.

**CALCULATION OF THE GEARBOX GRID:**

The gearchange grid, as recorded by the NCR by means of the selection and engagement position sensors, is presented in a field of 1024 x 1024 bits.
The grid is made up by the secure engagement thresholds (min / max) and secure selection thresholds (min / max) for all gears + neutral. These thresholds are calibrated during the self-learning of the gearchange grid.




The threshold values listed can be found in the parameter environment in SD3. All these values subsequently simply transferred to a spreadsheet to illustrate what they represent on the vehicle.
The thresholds will define the field of each gear + neutral.
Subsequently, the actual finger position (engagement + selection) for each gear + neutral must be entered in the spreadsheet. Therefore each gear mus be selected after which the actual position can be read out with SD3 (parameter environment).

Once the engagement and selection values have been transcribed by means of the spreadsheet, we can generate the gearbox grid to check for correct centering of the actuator. This operation is useful if gear engagement problems persist after the self-learning process has been completed correctly. To check that the finger is properly centered and nowhere near “limit conditions”, we check the gear engagement grid.

**Engagement:**

| | |
|---|---|
| MINIMUM SECURE ENGAGEMENT THRESHOLD - NEUTRAL | **430** |
| MINIMUM SECURE ENGAGEMENT THRESHOLD - FIRST | **100** |
| MINIMUM SECURE ENGAGEMENT THRESHOLD - SECOND | **700** |
| MINIMUM SECURE ENGAGEMENT THRESHOLD - THIRD | **100** |
| MINIMUM SECURE ENGAGEMENT THRESHOLD - FOURTH | **723** |
| MINIMUM SECURE ENGAGEMENT THRESHOLD - FIFTH | **100** |
| MINIMUM SECURE ENGAGEMENT THRESHOLD - SIXTH | **713** |
| MINIMUM SECURE ENGAGEMENT THRESHOLD - REVERSE | **713** |

| | |
|---|---|
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - NEUTRAL | **590** |
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - FIRST | **326** |
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - SECOND | **950** |
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - THIRD | **310** |
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - FOURTH | **950** |
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - FIFTH | **320** |
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - SIXTH | **950** |
| MAXIMUM SECURE ENGAGEMENT THRESHOLD - REVERSE | **950** |

**These values are purely guideline and cannot be used for comparison purposes during diagnosis**

The SECURE ENGAGEMENT thresholds indicate the MINIMUM/MAXIMUM value of the engagement stroke expressed in bits, below which diagnosis is activated, with the result that secure engagement of the gear is not recognized (gear indicator flashing further to retry).

**Selection:**

| | |
|---|---|
| MINIMUM SELECTION THRESHOLD - NEUTRAL | **326** |
| MINIMUM SELECTION THRESHOLD - FIRST | **382** |
| MINIMUM SELECTION THRESHOLD - SECOND | **398** |
| MINIMUM SELECTION THRESHOLD - THIRD | **529** |
| MINIMUM SELECTION THRESHOLD - FOURTH | **520** |
| MINIMUM SELECTION THRESHOLD - FIFTH | **645** |
| MINIMUM SELECTION THRESHOLD - SIXTH | **637** |
| MINIMUM SELECTION THRESHOLD - REVERSE | **100** |

| | |
|---|---|
| MAXIMUM SELECTION THRESHOLD - NEUTRAL | **714** |
| MAXIMUM SELECTION THRESHOLD - FIRST | **527** |
| MAXIMUM SELECTION THRESHOLD - SECOND | **518** |
| MAXIMUM SELECTION THRESHOLD - THIRD | **643** |
| MAXIMUM SELECTION THRESHOLD - FOURTH | **635** |
| MAXIMUM SELECTION THRESHOLD - FIFTH | **950** |
| MAXIMUM SELECTION THRESHOLD - SIXTH | **950** |
| MAXIMUM SELECTION THRESHOLD - REVERSE | **396** |

**These values are purely guideline and cannot be used for comparison purposes during diagnosis**

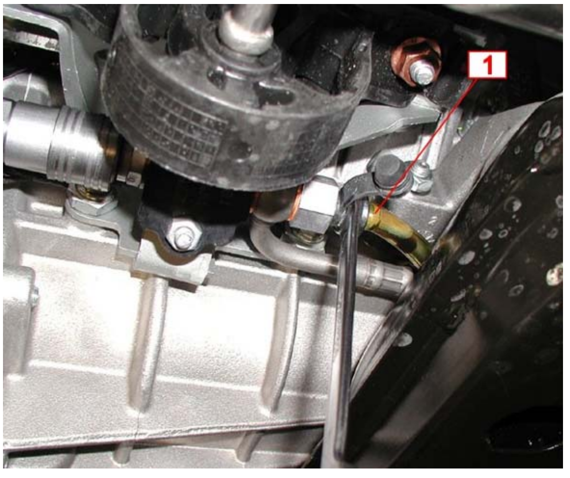
Outside of these thresholds, diagnosis of the recognition of the selected position is activated (gear indicator flashing further to retry).

The selection thresholds defined by the MIN/MAX values (expressed in bits) in the following gearshift ranges:

**1st – 2nd**
**2nd – 3rd**
**3rd – 4th**
**4th – 5th**
**5th – 6th**
**REVERSE**

**CLUTCH ACTUATOR BLEEDING:**

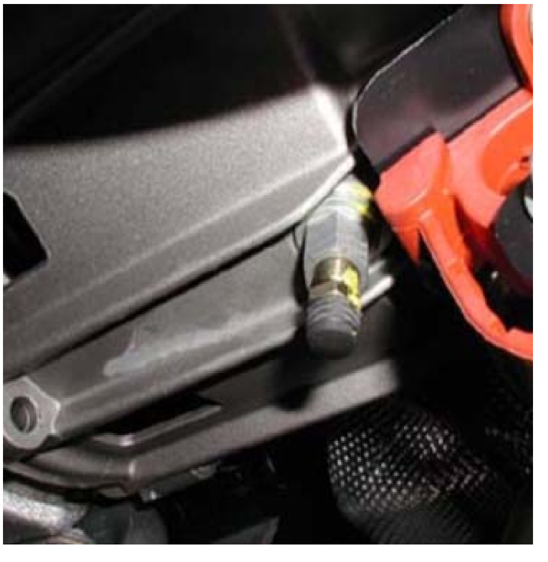
The procedure becomes necessary if air bubbles need to be eliminated or following disassembly of a component of the hydraulic clutch circuit. Bleeding is done by using the bleed screw on the clutch housing.




The procedure involves bleeding the system first through the bleed screw located next to the connection block with the clutch housing and subsequently through its counterpart on the side (up to assembly 14804) or underneath the clutch housing.

The clutch bleed valve is located on the clutch housing. There are two different versions:

up to assembly 14803



Assembly 14804 onward

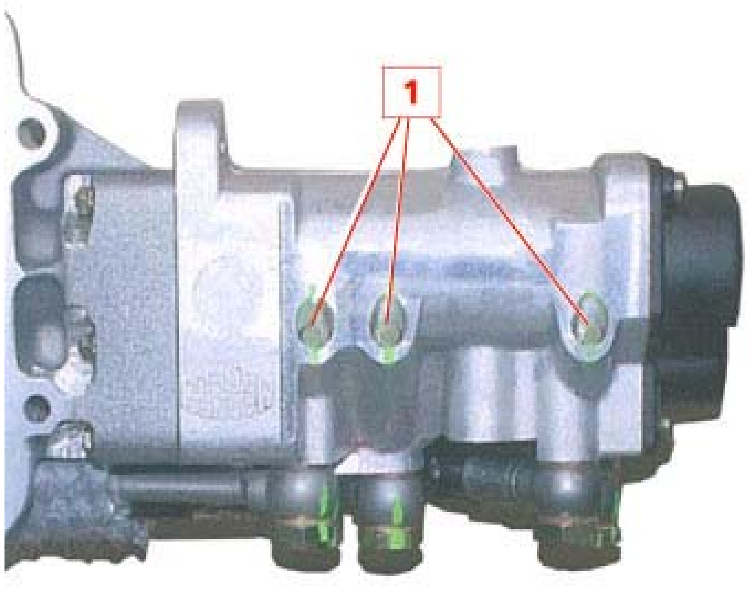
With the SD3, start the clutch bleeding procedure while adding oil continuously into the electro-actuated gearbox oil reservoir, in such a way that there can be no infiltration of air.
The bleeding procedure ends when the oil coming out of the bleed screw no longer contains any air.
Use the SD3 to run the gearbox through a sequence of gear changes to check that the pump is working correctly.
At the end of the cycle, check the level of the oil in the reservoir. Top up if necessary.

**HYDRAULIC ACTUATOR BLEEDING:**

To access the actuator bleed screws, it is necessary to remove the actuator, while leaving it connected to the electrical and hydraulic system.
Remove the actuator and support it correctly so as to ensure safe working conditions.

**Important:**
During bleeding, support the actuator in such a way that the sensor cables are not too taut and the hoses are not bent to excessively tight angles. Keep your hands away from the actuator while bleeding is in progress.

- Connect the SD3 diagnosis tester to the diagnosis socket.
- From the main menu, go to “**Active diagnosis**".
- Check and top up the oil in the reservoir if necessary.
- Loosen the three actuator bleed screws **(1)** by two complete turns.




On completion of the procedure, execute self-learning of the engagement and selection thresholds by choosing the “self-learning" function from the “Active diagnosis" menu.

## SERVICING OPERATIONS FOR CARS EQUIPPED WITH A GEARBOX MANAGEMENT SYSTEM PRIOR TO SOFAST II

**MASERATI M138**

HW CFC 201 (SOFAST) up to assembly 12203

**MASERATI M144**

HW CFC 201(SOFAST)

| Action | Required servicing operation for **PRE - SOFAST II** |
|---|---|
| Clutch replacement * | Clutch bleeding procedure<br>(clutch balancing for M138)<br>Kiss point adjustment |
| Gearbox replacement | Self-learning |
| Hydraulic actuator replacement | Hydraulic actuator bleeding<br>Self-learning |
| Replacement of solenoid valves EV1-2-3-4-5 | Gearbox actuator bleeding<br>Self-learning |
| Replacement of clutch solenoid valve EVF | Clutch actuator bleeding |
| Pump replacement | Hydraulic actuator bleeding |
| NCR replacement | Remote loading of software<br>Reading of closed clutch value from new on the replaced NCR and setting the value on the new NCR<br>Self-learning<br>Kiss point adjustment |

* Clutch replacement for **pre-SOFAST** cars: in this case the CLOSED CLUTCH VALUE FROM NEW is fundamental. Before saving/confirming, it is imperative to allow the clutch to bed in briefly by running in the disc.

## SERVICING OPERATIONS FOR CARS EQUIPPED WITH SOFAST II GEARBOX MANAGEMENT SYSTEM

**MASERATI M138**

HW CFC 231 (SOFAST II) from assembly 12204

**MASERATI M139 EUROPE version**

HW CFC 231 (SOFAST II) up to assembly 18821

| Action | Required servicing operation for **SOFAST II** |
|---|---|
| Clutch replacement | Clutch bleeding procedure<br>Kiss Point (includes resetting the clutch degradation index and configuring the clutch) |
| Gearbox replacement | Self-learning<br>Check gear change grid |
| Hydraulic actuator replacement | Hydraulic actuator bleeding<br>Self-learning |
| Replacement of solenoid valves EV1-2-3-4-5 | Gearbox actuator bleeding<br>Self-learning |
| Replacement of clutch solenoid valve EVF | Clutch actuator bleeding<br>Kiss Point (includes resetting the clutch degradation index and configuring the clutch) |
| Pump replacement | Hydraulic actuator bleeding |
| NCR replacement | Remote loading of software<br>Reading of closed clutch value from new on the replaced NCR and setting the value on the new NCR<br>Self-learning<br>Kiss point |

## SERVICING OPERATIONS FOR CARS EQUIPPED WITH SOFAST III AND SOFAST III+ GEARBOX MANAGEMENT SYSTEMS

**MASERATI M139 EUROPE version**

HW CFC 301(SOFAST III) from assembly 18822

HW CFC 301(SOFAST III+) from assembly 21925

**MASERATI M139 US version**

HW CFC 301 (SOFAST III) up to assembly 21925

HW CFC 301 (SOFAST III+) from assembly 21926

| Action | Required servicing operation for <u>SOFAST III and SOFAST III+</u> |
|---|---|
| Clutch replacement | Clutch bleeding procedure<br>Calibration of DEIS parameters<br>Kiss Point (includes resetting the clutch degradation index and configuring the clutch) |
| Gearbox replacement | Self-learning |
| Hydraulic actuator replacement | Hydraulic actuator bleeding<br>Self-learning |
| Replacement of solenoid valves EV1-2-3-4-5 | Gearbox actuator bleeding<br>Self-learning |
| Replacement of clutch solenoid valve EVF | Clutch actuator bleeding<br>Calibration of DEIS parameters<br>Kiss Point (includes resetting the clutch degradation index and configuring the clutch) |
| Pump replacement | Hydraulic actuator bleeding |
| NCR replacement | Remote loading of software<br>Calibration of DEIS parameters<br>Self-learning<br>Reading of closed clutch value from new on the replaced NCR and setting the value on the new NCR<br>Autocalibration of acceleration sensor offset<br>Kiss point |
| Acceleration sensor replacement or ABS unit replacement | Autocalibration of acceleration sensor offset |

## SERVICING OPERATIONS FOR CARS EQUIPPED WITH SOFAST 4 GEARBOX MANAGEMENT SYSTEM

**MASERATI M145 All markets**

HW CFC 301 (hardware ECU is identical to SOFAST III)

| Action | Required servicing operation for SOFAST IV |
|---|---|
| Clutch replacement | Clutch bleeding procedure<br>Calibration of DEIS parameters<br>Kiss point (includes resetting the clutch degradation index and configuring the clutch) |
| Gearbox replacement | Self-learning<br>SuperFast Shift self-learning |
| Hydraulic actuator replacement | Hydraulic actuator bleeding<br>Self-learning<br>SuperFast Shift self-learning |
| Replacement of solenoid valves EV1-2-3-4-5 | Gearbox actuator bleeding<br>Self-learning<br>SuperFast Shift self-learning |
| Replacement of clutch solenoid valve EVF | Clutch actuator bleeding<br>Calibration of DEIS parameters<br>Kiss Point (includes resetting the clutch degradation index and configuring the clutch) |
| Pump replacement | Hydraulic actuator bleeding |
| NCR replacement | Remote loading of software<br>Calibration of DEIS parameters<br>Self-learning<br>SuperFast Shift self-learning<br>Reading of closed clutch value from new on the replaced NCR and setting of this value on the new NCR<br>Autocalibration of acceleration sensor offset<br>Kiss point |
| Acceleration sensor replacement or ABS unit replacement | Autocalibration of acceleration sensor offset |

**Note:** In any event, it is advisable to perform the self-learning procedures (DEIS; Self-Learning, SuperFast Shift, Accelerometer) during each servicing operation.

# ZF Automatic 6-speed gearbox

**Introduction**

A completely new automatic six speed gearbox (ZF 6HP26) was introduced for the Maserati Quattroporte with automatic transmission, presented in January 2007. Also the Maserati GranTurismo uses the same gearbox for the automatic transmission version.

The Gearbox is built by ZF and has been developed in cooperation with Maserati and Bosch (electronic control) to offer the best possible compromise between driving dynamics, fuel economy and comfort. The gearbox contains 6 electro-hydraulically controlled gears and a torque converter with lock-up clutch and anti-slip function.

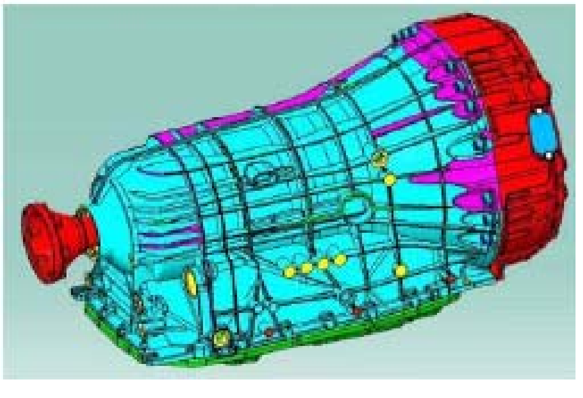
The automatic gearbox has a self-adaptive control system that adjusts the type of gearshift strategy, selecting the gear most suited to the driving conditions and driving style. The driver can choose from four different driving modes: Auto Normal, Auto Sport (selectable by pressing the SPORT button), Low-grip /Auto ICE (selectable by pressing the ICE button) and Manual (selectable by shifting the gearshift lever from "D" to the left).

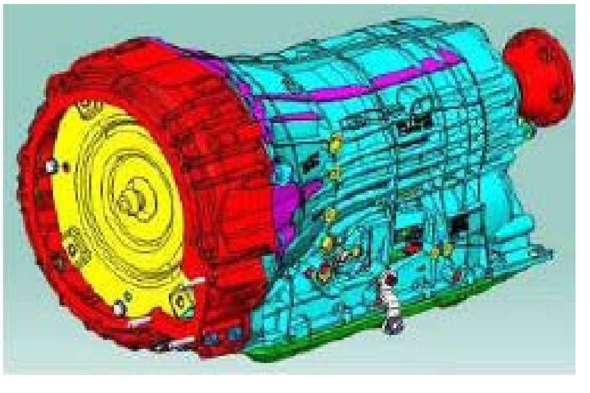
For the Auto Normal and Auto Sport driving modes there are two different types of gearshifting, automatically selected by the gearbox/engine control system based on the driving style (detected through the accelerator pedal and the intensity of lateral and longitudinal acceleration) and the gradient of the road.

**Electronic control:**

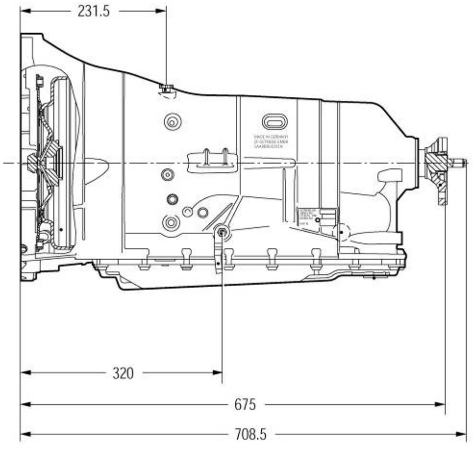
The electronic control of the gearbox is the “MECHATRONIC” type, meaning that both the hydraulic and the electronic control unit are integrated in a single unit inside the gearbox.

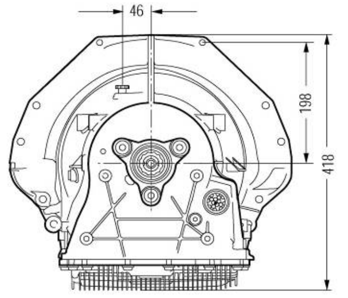
This ECU provides dynamic gear ratio selection and has a sequential gear selection program. The adaptive shift strategy memory can be reset by performing the Cycle function with SD3 diagnostic tester. By doing this the gearshift strategy will return to its default settings.

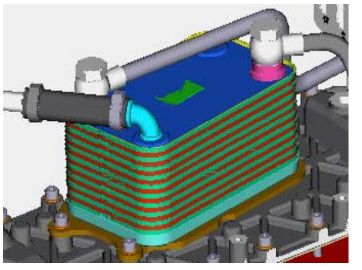




## Technical specifications



| | |
|---|---|
| **Maximum torque**: | max 600 Nm |
| **Torque converter:** | Hydrodynamic converter with regulated clutch |
| **Cooling system:** | Oil/water exchanger positioned underneath the engine intake manifold |
| **Gearbox oil:** | Shell M1375.4 ATF (no oil change or refilling required) |

**Oil quantity:**

- **Gearbox without converter and oil radiator:** 5.8 l
- **Torque converter**: 3.7 L
- **Oil radiator with relative pipes:** 0,525 L

**Total weight:** 142 kg (including oil and gearbox oil radiator)

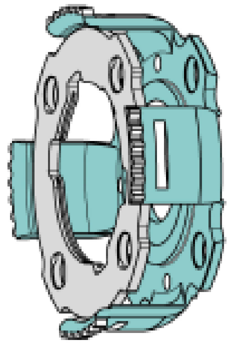
**Gear ratios:**

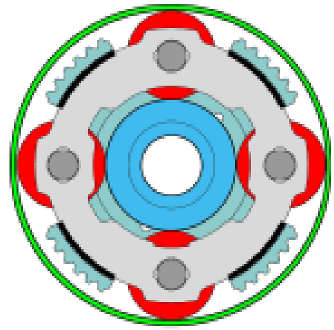
| | | | |
|---|---|---|---|
| **1°:** | 4.171 | **Reverse:** | 3.403 |
| **2°:** | 2.340 | | |
| **3°:** | 1.521 | | |
| **4°:** | 1.143 | | |
| **5°:** | 0.867 | | |
| **6°:** | 0.691 | | |

**Parts available for servicing:**

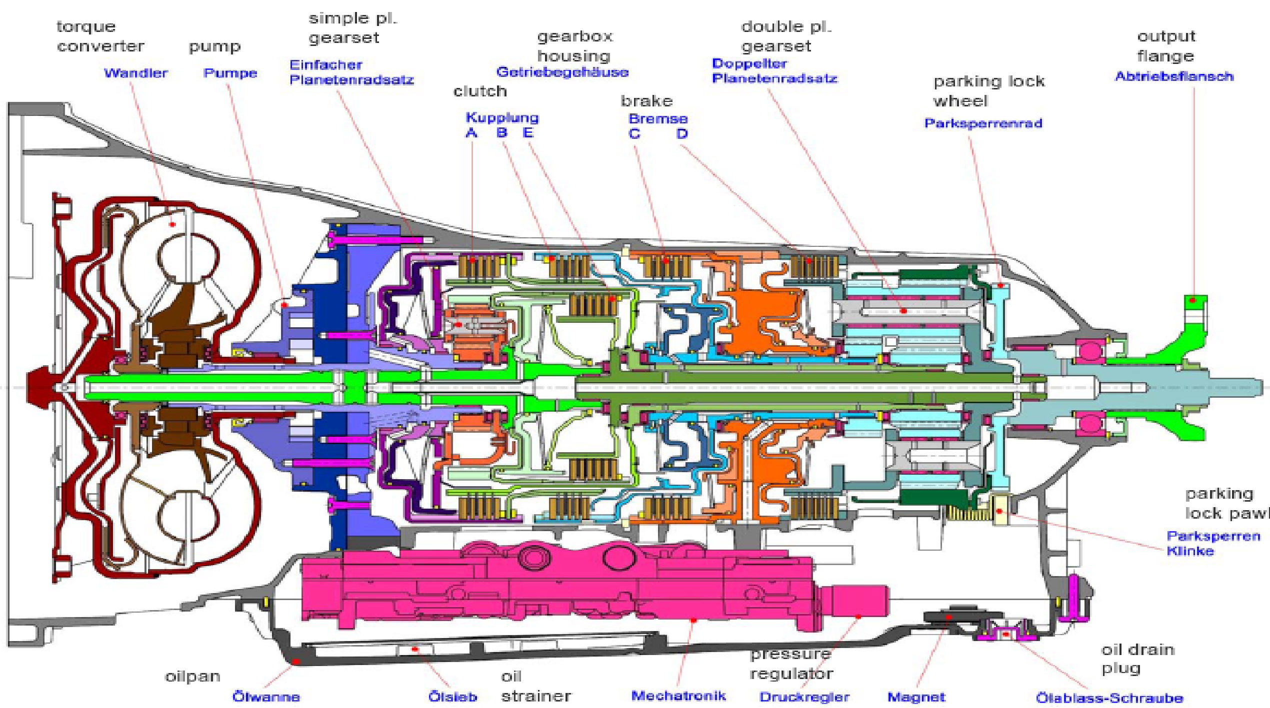
- Torque converter (complete unit)
- Mechatronic (complete unit)
- Oil sump
- Oil sump sealing
- Oil filter
- Rubber oil sleeves (4 pieces)
- Rubber oil supply sealing Mechatronic
- Input shaft oil sealing
- Output shaft oil sealing
- Output shaft flange and locking nut
- Oil sealing behind output shaft flange locking nut

**Gearbox mechanical**





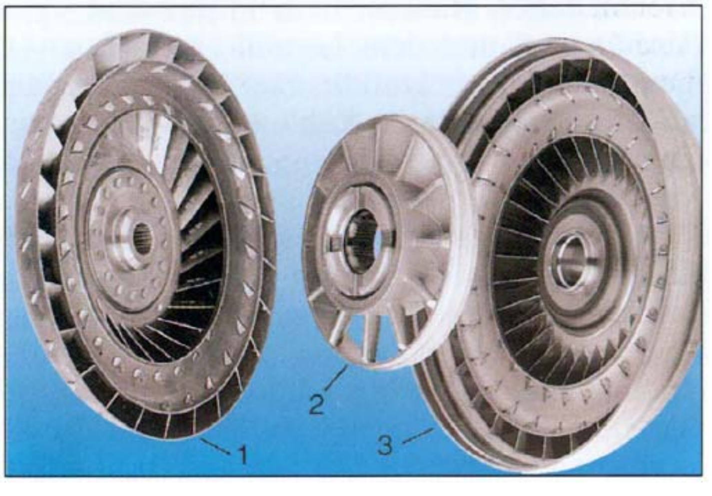
The mechanical transmission devices are made up of planetary gears. The components are driven by an electro-hydraulic system which incorporates the hydraulic and electronic control units in a singe control unit (Mechatronic) fitted on the gearbox.
Engine power reaches the transmission by means of a hydrodynamic torque converter with integrated lock-up type clutch (WK).
The 6 forward gears and the reverse gear are obtained by means of a double planetary gear (Ravigneaux) and a front-mounted simple planetary gear. The integrated operating modes of the planetary gears are patented (Lepelletier). The individual gear ratios are obtained by deviating the incoming torque flow through the various planetary gear components and by braking others.  For this purpose various couplings and brakes are used.




**Tightening torque of output flange locking nut: 60Nm**

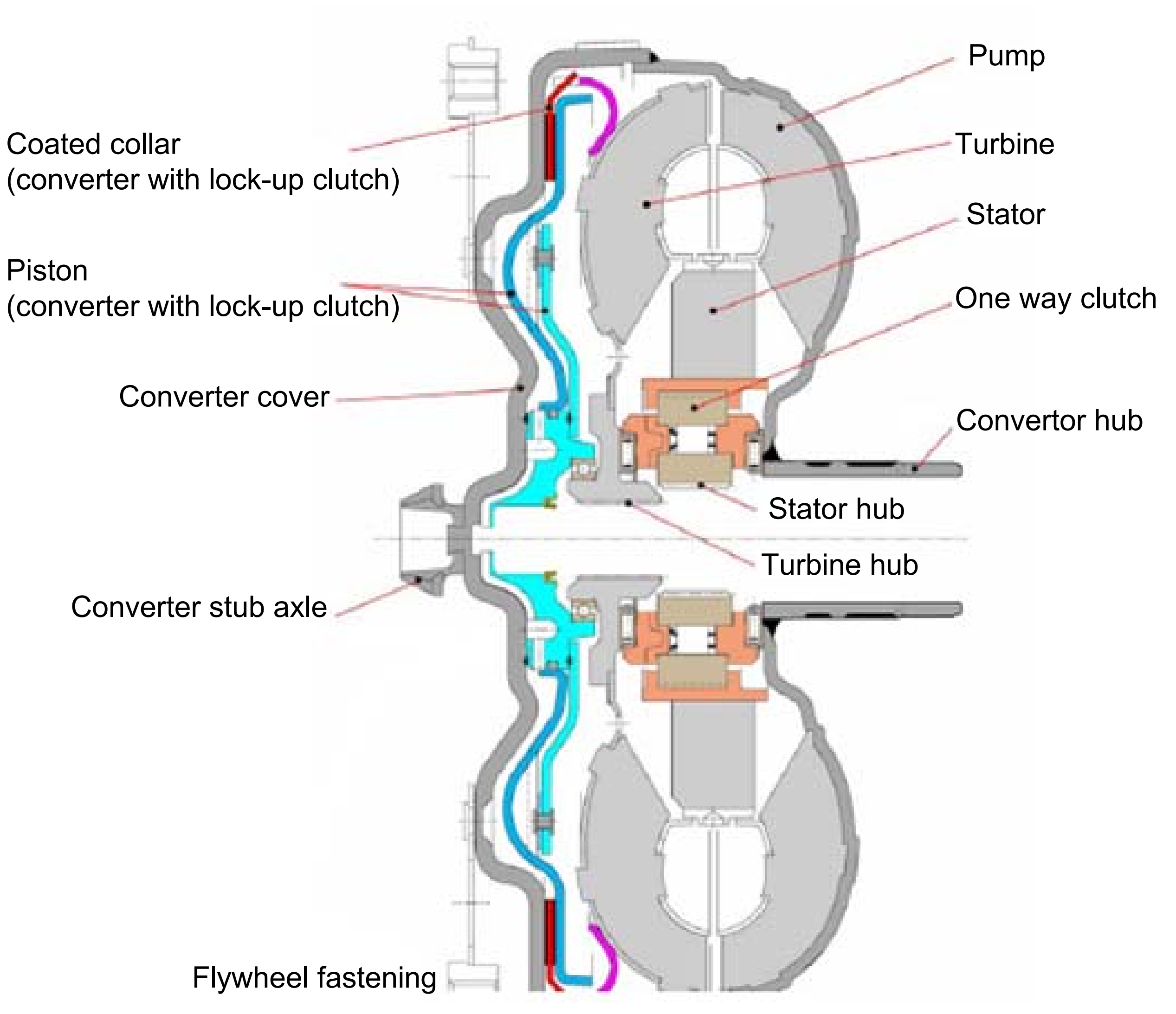
**Gear disengagement control logic**
A further innovation is the option of automatic disengagement when the vehicle is stationary. This means that the gearbox is disconnected from the kinematic mechanisms when it is in standby (clutch A open). This results in a further reduction of fuel consumption.
With the engine idling, the vehicle stationary and the gearshift lever in "D", the torque converter transmits a specific torque value that slightly moves the vehicle forward if the brake pedal is not applied. If the brake pedal is applied, the converter is forced to dissipate the power by slowing down the engine RPM, which must be compensated by increasing the minimum torque (by further opening the throttle) until obtaining the correct idling RPM. This results in higher fuel consumption and greater force required on the pedal (for example, to hold the vehicle stationary when stopping at traffic lights or stop signs) which clearly negatively affects driving comfort and handling. Disengagement therefore occurs if a gear is engaged when the vehicle is stationary, depending on different parameters monitored by the gearbox node.

**Torque converter**



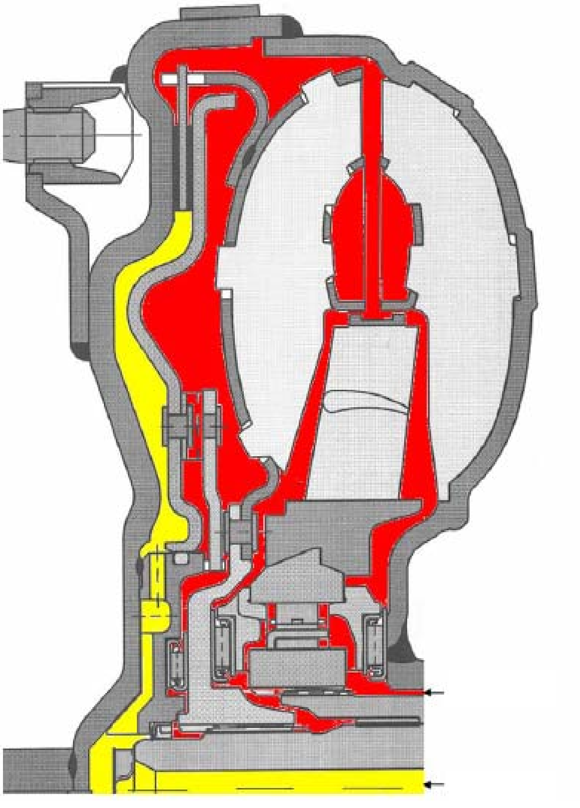

1. **Turbine**
2. **Stator**
3. **Pump**

The torque converter is composed of a toroidal-shaped chamber containing two elements: a centrifugal pump connected to the crankshaft and a hydraulic or turbine motor positioned in front of the pump and connected to the gearbox input shaft. The two parts face but do not touch each other and the chamber is filled with low-viscosity oil. The pump is basically a wheel with radially arranged blades. When turning, it pushes the fluid towards the outside by effect of the centrifugal force. The fluid also acquires angular momentum. The motor is likewise composed of a bladed wheel. The liquid that the pump pushes to the outside of the device is forced to return to the centre through the turbine blades, driving it so that it rotates.

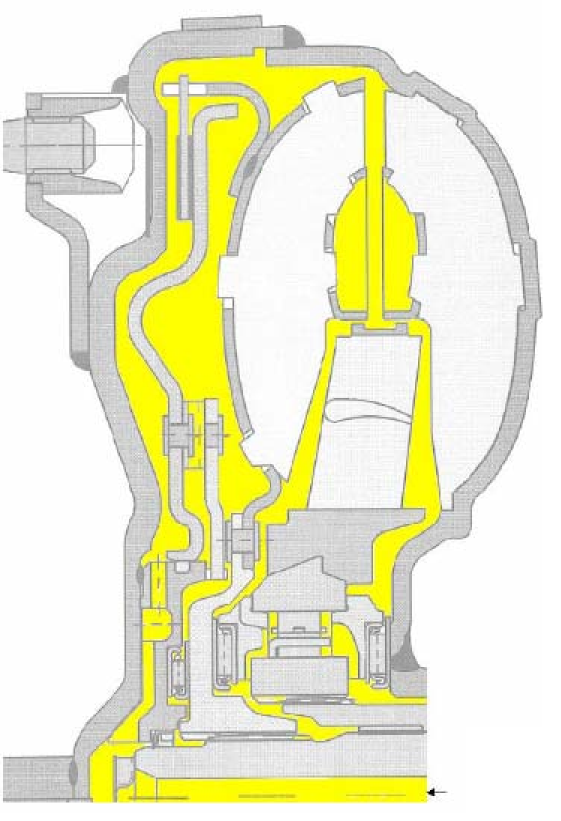



Once the fluid has returned to the centre, it is again ejected by the turbine thus completing the cycle. Even if the motor section is off, the spiral movement of the fluid produces a twisting moment at the output. The torque converter has, by nature, a *slipping feature* which causes a loss of energy in the form of heat dispersed by the fluid. To improve energy efficiency, modern converters are equipped with an integrated clutch system which mechanically joins the pump and the motor when the onboard computer detects a constant cruising speed. The torque converter (“Trilok" converter) is composed of a pump wheel or impeller, a turbine and a flow reaction component (stator) which multiplies the torque delivered.Another important element for converter operation is the oil used for torque delivery.

**Lock-up clutch**



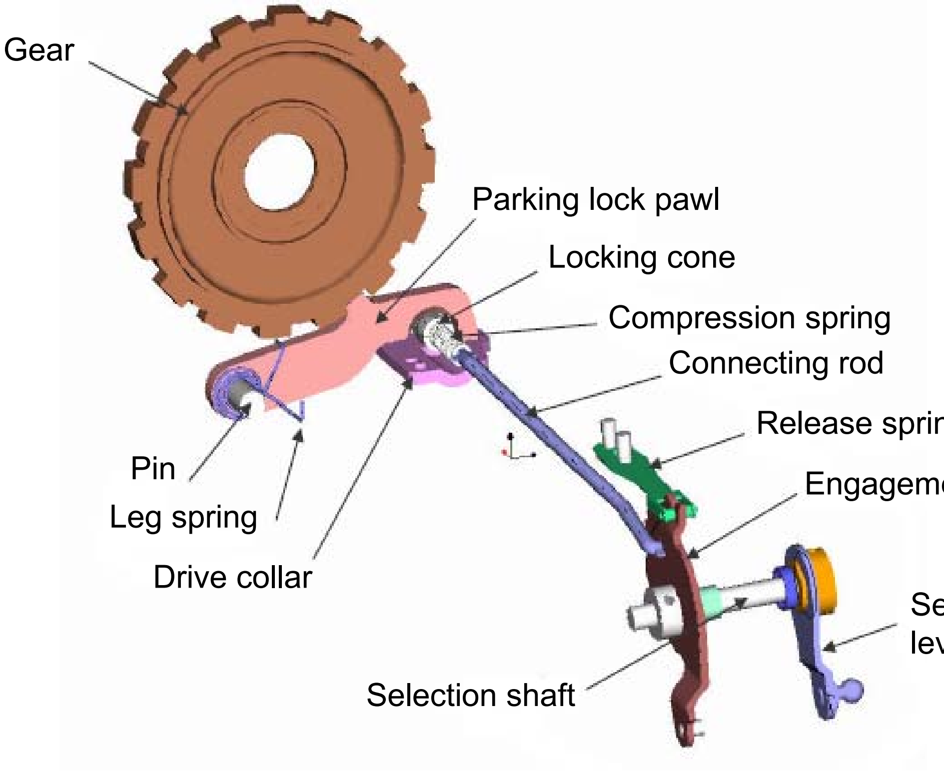
**Clutch closed**



**Clutch open**

A torque converter lock-up clutch (WK) is a device that makes it possible to eliminate the slipping typical of the torque converter and contributes to optimise fuel consumption.
The torque converter with lock-up clutch has a controlled activation and release system. During the adjustment stage, there is a minimal difference between the RPM of the pump and that of the turbine. This has allowed us to reduce the vibrations transmitted by the engine before they reach the transmission: this process can be further boosted by the torsion vibration damper. This principle provides smoother gearshifting and noise reduction.
The lock-up clutch can be activated in any gear, but only in conditions of constant driving speed. The lock-up clutch will be disengaged during acceleration or braking.

**Parking Lock mechanism**

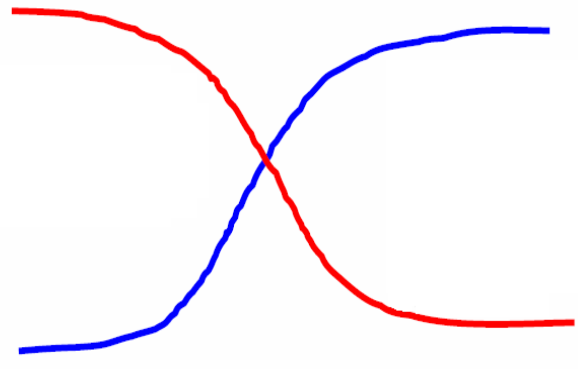



The parking lock mechanism is a device that stops the vehicle from moving. It is activated by a spring when the vehicle is stationary. A pawl wedges into the parking lock gear teeth, thus preventing the transmission output shaft from rotating. Rear axle torque lock is obtained by means of the output shaft.
Warning: only put the selector lever in the Park position when the vehicle is stationary.

### Gear engagement

The coupling elements are used for gearshifting under load without cutting the power flow.

The clutches A, B and E deliver the engine power to the planetary gears. The brakes C and D buck the movement of other transmission devices in order to obtain the required resistance.

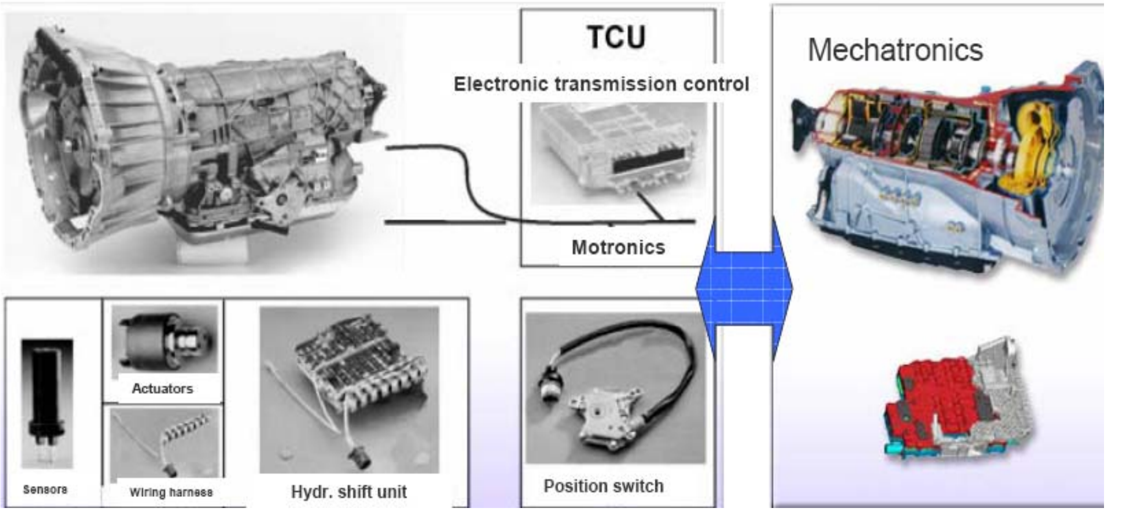


As engagement components, in addition to the torque converter with lock-up clutch (WK), there are three rotary multidisc clutches (A, B and E) and two fixed multidisc brakes (C and D).

| Gear | Clutch | | | Brake | | Gear |
|---|---|---|---|---|---|---|
| | A, | B | E | C | D | |
| 1 | * | | | | * | 4,171 |
| 2 | * | | | * | | 2.34 |
| 3 | * | * | | | | 1,521 |
| 4 | * | | * | | | 1,143 |
| 5 | | * | * | | | 0,867 |
| 6 | | | * | * | | 0,691 |
| R | | * | | | * | -3,403 |

| 6HP26 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pos/gear | Solenoid valve logic | | | | | | | | Clutch logic | | | | | |
| | Solenoid valve | | Pressure - electronic pressure control valve | | | | | | Clutch | | | | Brake | |
| | 1 | | 1 | 2 | 3 | 4 | 5 | 6 | A | B | E | WK | C | D |
| Parking | | | | | | x | x | | | | | | | • |
| reverse | | | | x | | x | x | | | • | | | | • |
| neutral | | | | | | x | x | | | | | | | • |
| 1st gear | | | x | | | x | x | x | • | | | • | | • |
| 2nd gear | | | x | | x | | x | x | • | | | • | • | |
| 3rd gear | | | x | x | | | x | x | • | • | | • | | |
| 4th gear | x | | x | | | x | x | x | • | | • | • | | |
| 5th gear | x | | | x | | x | x | x | | • | • | • | | |
| 6th gear | x | | | | x | x | x | x | | | • | • | • | |
| | Selection valve 1 | | Clutch A | Clutch B | Brake C | Brake D Clutch E | Main pressure | Clutch control on gear logic | Planetary holder, single planetary gear | Central gear 1, double planetary gear | Satellite holder, double planetary gear | Clutch control on converter | Central gear 1, double planetary gear | Satellite holder, double planetary gear |

**Mechatronic**




The Mechatronic module is composed of a hydraulic selection control unit and an electronic control unit. The hydraulic, electrical and electronic components are incorporated in a single unit. The Mechatronic module is positioned near the gearbox oil sump. The main advantages of this module are: fewer electrical connections (which are subject to faults) and automatic calibration of the hardware by the software.
This involves: very accurate tolerances, improved gearshift response, enhanced driving comfort, gearshift quality optimisation, improved reliability thanks to the fewer electrical connections and interfaces.

**Electrostatic discharge**
For any operations on the Mechatronic module, take the appropriate precautions in terms of safety, especially to prevent electrostatic discharge (ESD).
The human body, if electrically charged but not properly earthed, becomes an electrostatic “cloud” and may cause damage to the electronic components. It is therefore extremely important to take appropriate precautions, like conductive shoes and ESD protective gloves. To prevent any damage from electrostatic discharge, appropriate precautions must always be taken in the following cases:

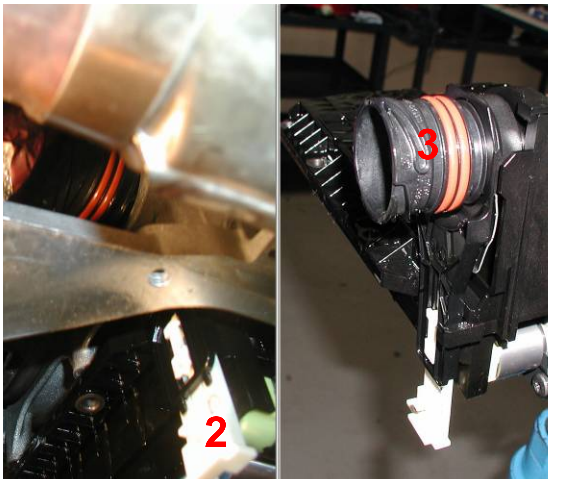
- When receiving goods
- In the inspection area of the goods received
- In the workshops, and in the spare parts warehouse even if staying there for only short periods of time
- In the shipping/delivery area
- In the maritime transport or shipping area
- During handling, fitting and removal of the Mechatronic module

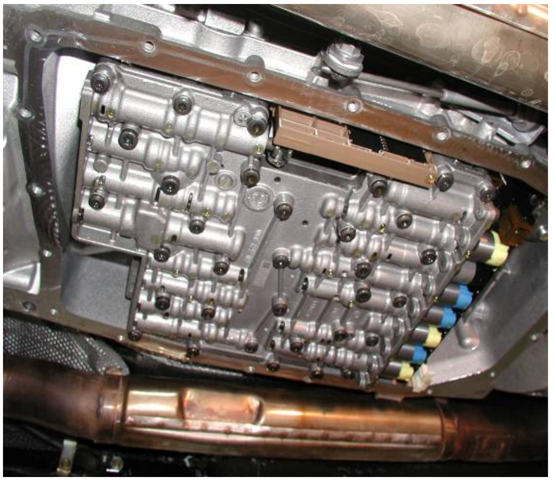
Keep the packaging material and the ESD protective film so that they can be used when returning the parts removed from the transmission.

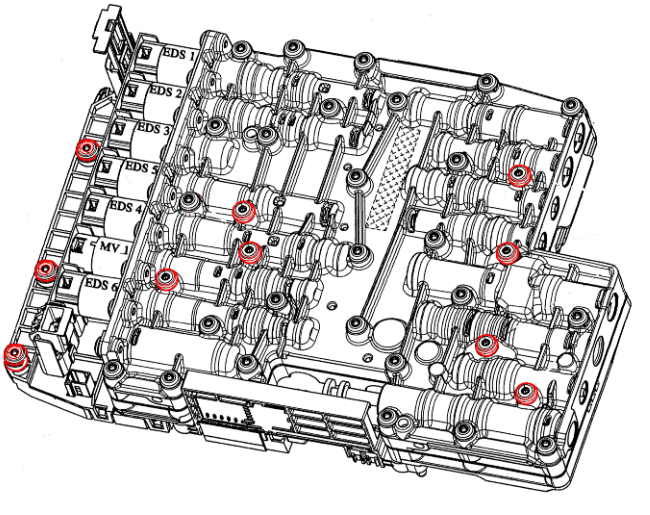
### Mechatronic unit removal

In order to remove the mechatronic module, carry out the following steps:

- Drain the automatic gearbox oil
- Disconnect the wiring harnass connector from the adapter (1)
- Undo the 21 Torx screws that secure the oil sump on the gearbox and then remove the oil sump and the sealing strip.
- Pull down the adapter locking lever (2).
- Remove the connector adapter (3) which is pressure-fitted with two O-rings by pulling it out.
- Undo the 10 torx screws which attach the Mechatronic unit to the gearbox housing to remove the Mechatronic.

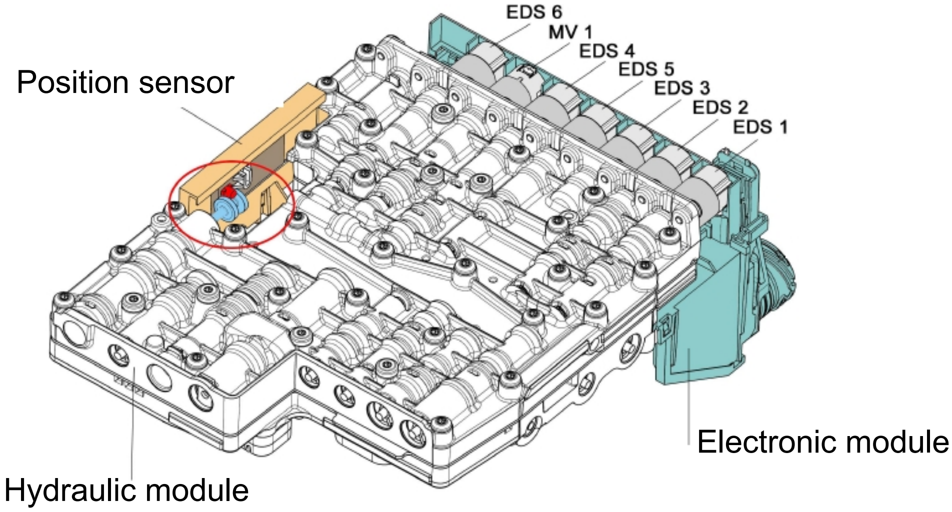



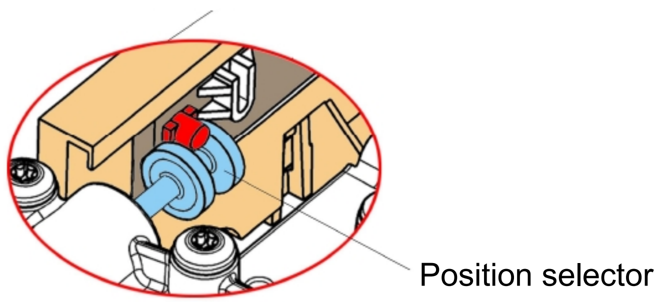



**CAUTION!**

**To remove the mechatronic, undo only the screws marked in red**

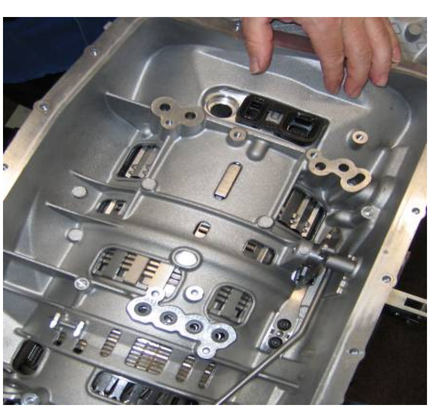
**Mechatronic unit refitment**

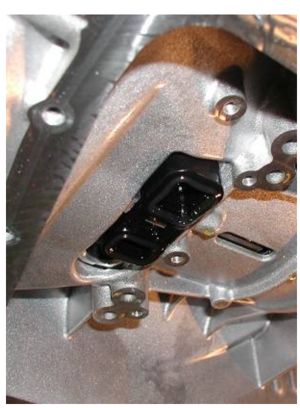



**CAUTION!**

When the Mechatronic module is been refitted, be extremely careful that you correctly fit the gear position selector whit respect to the position sensor.

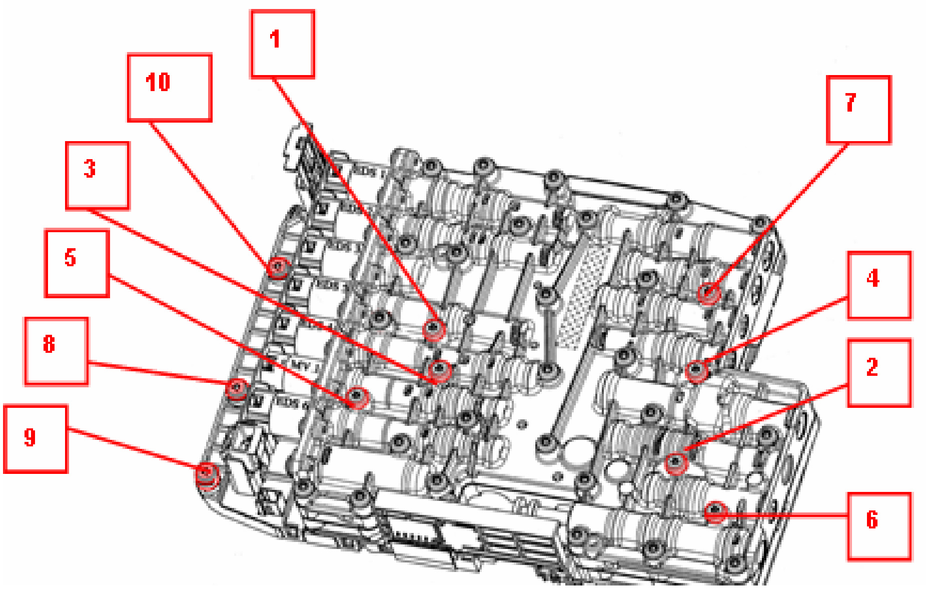




**CAUTION!**

Before fitting the Mechatronic module, check that the oil delivery duct is properly positioned.

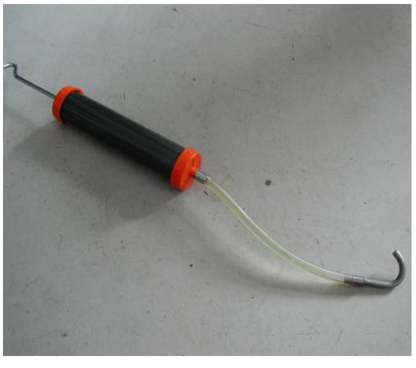
When refitting, follow the removal procedures in reverse order and tighten the Mechatronic control unit screws to a torque of **8.0 ± 0.8 Nm** following the sequence shown in the figure below.




**Gearbox oil topping up and level check procedure**

- Position the vehicle as level as possible on the car hoist.
- It is essential that the gearbox oil temperature is between 50°C and 60°C
- It is advisable to check the level when the oil temperature is 55°C
- Connect the SD3 tester and access “SERIAL DIAGNOSTICS”
- Subsequently Select "INDIVIDUAL ECU DIAGNOSTICS”
- Then select the vehicle and the ECU involved.
- Wait for the ECU and serial number to be loaded.
- Select “PARAMETER ENVIRONMENT” and then “GENERAL PARAMETERS 1”.
- Then access the vehicle data and read the “TRANSMISSION OIL TEMPERATURE” value.
- Starting the checking procedure:
- Check the oil temperature : If the temperature is above 60°C, wait until it cools down.
- If the temperature is below 50°C, move the gearshift lever to REVERSE and then to DRIVE, holding it in each position for at least 3 seconds.
- Always keep the wheels locked.
- Check the temperature with the SD3 tester; if it has risen to about 55°C, turn off the engine and then search for the gearbox ECU errors and delete them.

- Start the engine and let it run in idle, then unscrew the oil filler cap (1).
- The sump is filled “to the brim” with oil, therefore if oil spills out when the cap is unscrewed, no top-up is necessary.
- WITH THE ENGINE OFF: position the tool in the filling hole on the sump and pump in oil until it starts spilling out.
- WITH THE ENGINE IDLING: continue filling with gearbox oil until it starts spilling out
- Keeping the engine running, connect the SD3 tester and access “SERIAL DIAGNOSTICS”
- Subsequently Select "INDIVIDUAL ECU DIAGNOSTICS”
- Then select the vehicle and the ECU involved.
- Wait for the ECU and serial number to be loaded.
- Select “PARAMETER ENVIRONMENT” and then “GENERAL PARAMETERS 1”.
- Then access the vehicle data and read the “TRANSMISSION OIL TEMPERATURE” value.
- Check that the gearbox oil temperature is between 50°C and 55°C.
- Continue filling with oil until it starts spilling out.
- Tighten the oil filler cap (1) to a torque of **60 Nm**.

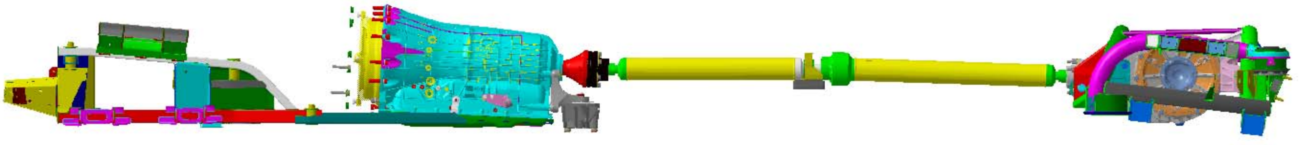


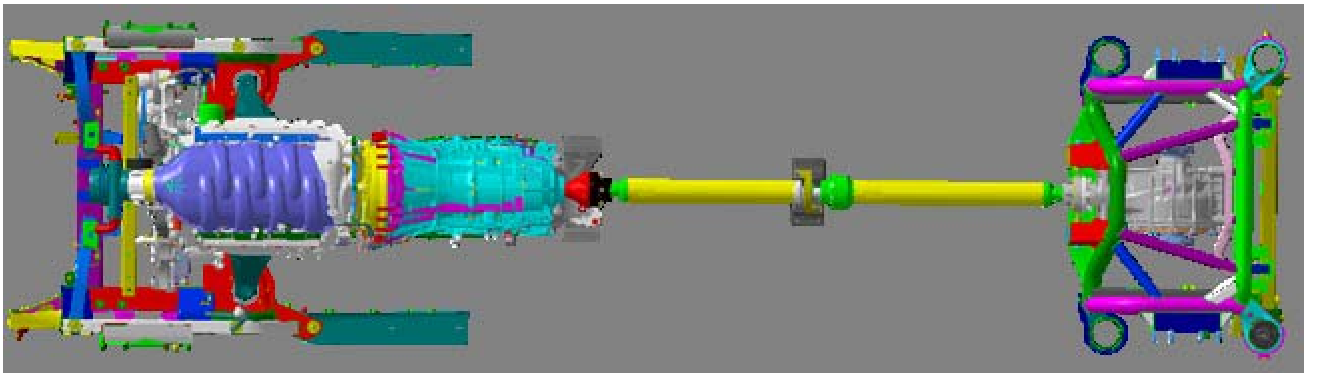

CAUTION!

**EXCLUSIVELY USE OIL TYPE SHELL M1375.4 ATF**

# Modular Transmission Shaft

For vehicles fitted with the ZF automatic transmission, a new modular transmission shaft is applied. The shaft needs to be balanced after removing one or more components of the transmission system. This is done using tool DSE1, by applying balancing weights on the differential coupling flange.



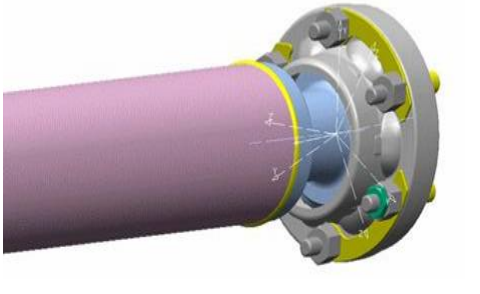


The modular transmission shaft was chosen for technical reasons, due to the different alignment of the engine axis with respect to the rear differential axis, which makes the homokinetical motion transmission impossible.

### Modular Transmission shaft balancing procedure

The balancing kit contains a set of nuts of known weight with which the balancing weight calculated by the instrument must be approximated. As these nuts will be fitted on the retaining bolts of the transmission shaft coupling flanges, the bolts need to be clearly identified so that the fitting positions indicated by the instrument are respected. Actually, unlike wheel balancing, where the balancing weight can be fitted in any position along the perimeter of the wheel rim, in this case there are six fixed positions on the rear of the shaft fastening flange.

The instrument thus divides the result into weights equivalent to the theoretical balancing weight. These weights must be approximated with the available nuts, obtaining an overall effect equivalent to that of one balancing weight.



To perform the test, you need to use the following instruments together with the SD3 diagnostic tester: DSE1 or DSE2

The kit contains two B&K 4508 accelerometers, but only one of the two shall be used for the balancing procedure. The cables required to connect to the DSE1/DSE2 instrument are also provided in the kit.


DSE2 instrument

B&K 4508 accelerometers

RPM sensor

Prepare the SD3 tester connecting it to the DSE1/DSE2 instrument and the DC/DC converter, as described below.


1. SD3 connection
2. SD3 connection
3. CAN connector
4. V BATT connector
5. SD3 CBL 07
6. Power supply
7. DC/DC converter (To be used only in case the EOBD connection is not used)
8. DSE1/DSE2 instrument
9. Grey connector cable RS232 – DSE1/2
10. Black connector cable SD3 – DC/DC converter

**Preparing the vehicle**

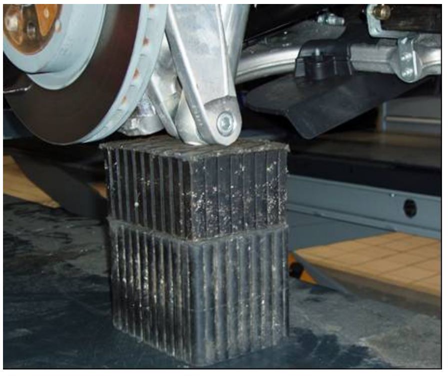
Position the vehicle on a hoist.

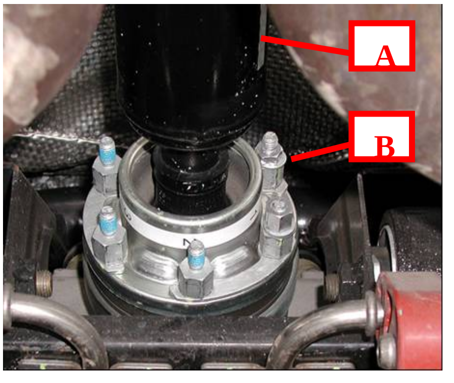
Remove the two rear wheels and position the vehicle on mounts which must be approx. 18 – 20 cm high.

These mounts must hold the vehicle level and compensate for the absence of the wheels. Provisionally use the rubber bushings positioned underneath the hub carrier. Specific mounts of predefined height are being tested, and these will rest in a less delicate area to also facilitate levelling the vehicle. Cut some stickers 0.5 cm wide and 4 cm long out of a reflective adhesive sheet of paper.

Apply the sticker (A) on the transmission shaft. The sticker must be positioned in correspondence to the flange stud bolt marked with number 1 (B).

*If present, remove all the balancing weights applied on the flange stud bolts before starting the balancing procedure.*






**Positioning the RPM sensor**

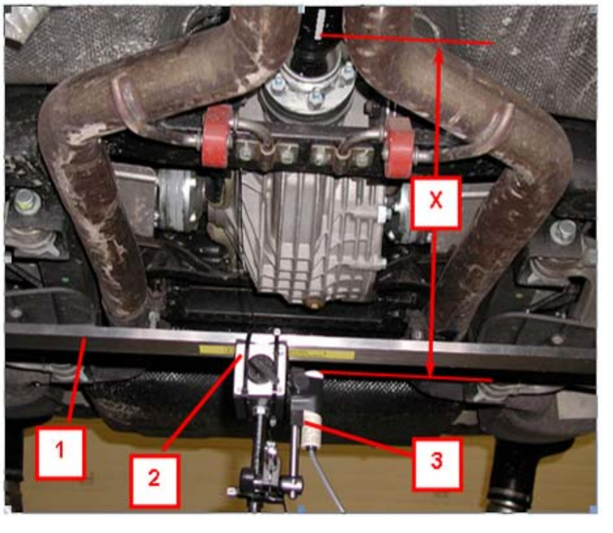
Position the RPM sensor (3) so that it is fully perpendicular to the ground and in line with the transmission shaft (X), at a distance of approximately 50 cm from the shaft.

To do this, you can, for example:

Fit a mount (1) equipped with a base (2) to support the speed sensor (3). The material is not provided in the kit and must therefore be purchased locally.

Securely fasten the sensor on the relative mount and position it as described above.

CAUTION! Once positioned, the sensor must not be moved for the entire duration of the balancing procedure so as not to alter the reference point for the instrument.



**Positioning the accelerometer**

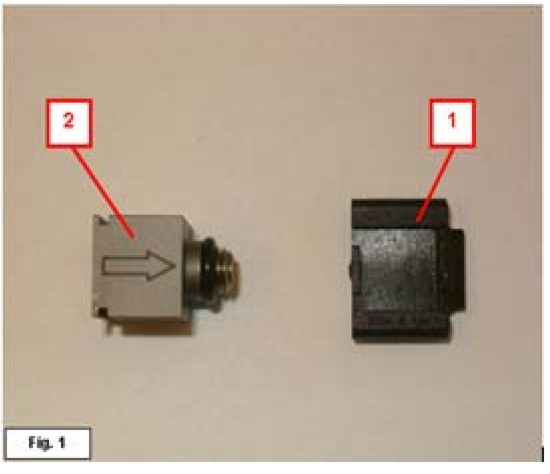
The B&K 4508 accelerometer must be fitted underneath the differential near the transmission shaft (Fig. 2)

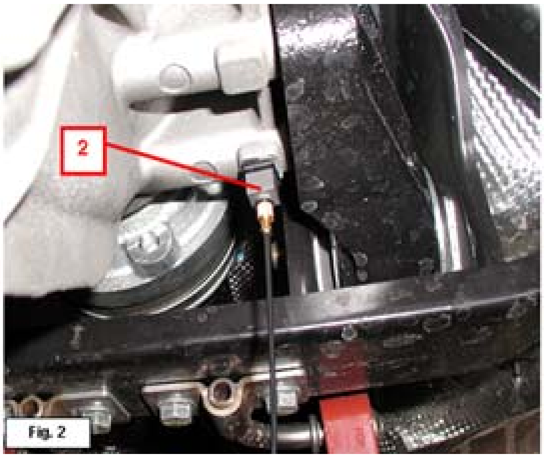
Using HEPTANE, remove any residues of glue or grease from the flat surface on the differential where the accelerometer holder will be positioned.

Apply epoxy glue in the centre of the flat surface of the accelerometer holder (1).

Position the accelerometer holder (1) on the differential and hold it down for about 20 seconds, so that it adheres properly.

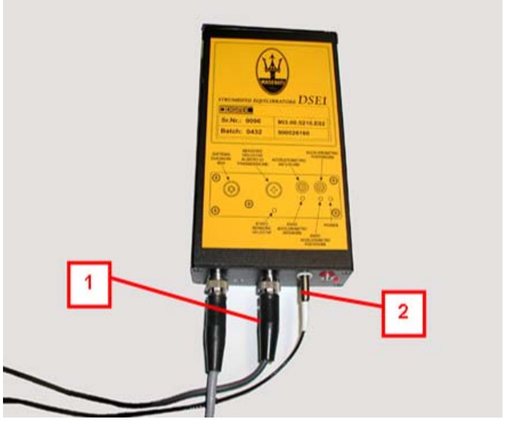
Fit the accelerometer (2) on its holder (1).




**Connecting the DSE1/DSE2 components:**

Connect the speed sensor (1) cable and the accelerometer (2) cable to the DSE1/DSE2.



**Balancing cycle with SD3. (Phase I)**

Start the SD3 tester, access the "**SERIAL DIAGNOSTICS" environment and then "INDIVIDUAL ECU DIAGNOSTICS".**

Select "**TOOLS" and then "ALL".**

Select the item relating to transmission shaft balancing for the vehicle M139EV07.

A page will be displayed showing the following options.

**DISPLAY DATA**

**ACTIVATE BALANCING**

**SET TEST WEIGHTS**

**UPDATE CARD**

**EXIT**

Select "**UPDATE CARD".**

A page will appear showing the software version installed on SD3 and on DSE1/DSE2. If the software version of DSE1/DSE2 does not coincide with the version installed on SD3, update it by selecting "**YES". If this is not the case, select "NO" and return to the home page.**

Select "**ACTIVATE BALANCING".**

With the help of a second operator seated in the vehicle, start the engine, check that the EPB (Electronic Parking Brake) is disengaged and manually deactivate the MSP function.

Select "**SEQUENTIAL MANUAL" gearbox operation.**

**Balancing cycle with SD3. (Phase II)**

The shaft balancing procedure is divided into three phases:

**INITIAL RUN**

**TRIAL RUN**

**FINAL RUN**

**All three phases are guided "step-by-step" by the SD3 program.** We recommended that you carefully follow the instructions displayed on the SD3.

**INITIAL RUN**

The INITIAL RUN phase is a data acquisition phase performed by the tester. The tester measures the shaft unbalance and stores the data as a basis for comparison of the subsequent measurements

For data acquisition, the transmission shaft must run at a speed between **2850 – 3150 RPM (equivalent to 2800 engine RPM read on the instrument panel when 5th gear is selected) and must be kept at this speed throughout the data acquisition phase.**

To easily reach the required RPM, set "**SEQUENTIAL MANUAL" operation to progressively arrive at engaging 5th gear.**

Hold the accelerator pedal depressed until reaching the required RPM values, keep them constant throughout the data acquisition phase and wait for the result.

**Initial Run OK**

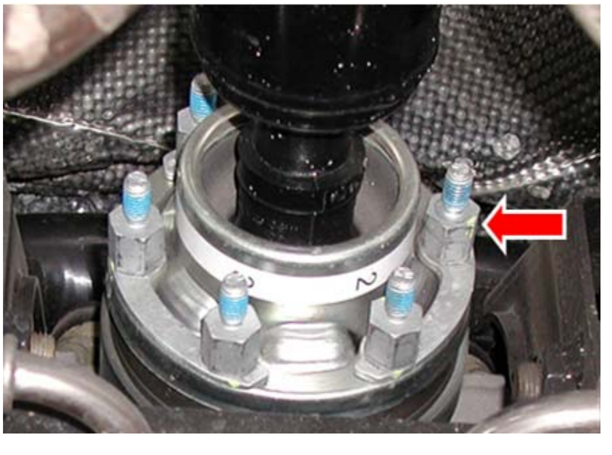
If the data acquisition phase is successfully completed, it means that the tester has been calibrated using an unbalance value that does not exceed the maximum value set in the tester.

Subsequently, you automatically go **to the TRIAL RUN** phase.

**Initial Run NOT OK**

If the data acquisition phase is not completed successfully, it means that the tester has measured an unbalance value that exceeds the maximum value set in the tester.

The system **will automatically prompt you to position a rebalancing weight of** 4.5 grams on the flange stud bolt **marked with number 1 (Position 1).**



Repeat the INITIAL RUN phase.

If the unbalance value is still not compensated, the system will automatically prompt you to move the rebalancing weight from Position 1 to Position 2 and to repeat the INITIAL RUN phase. This process will be repeated (going through the various positions from 1 to 6) until the correct position for the rebalancing weight is found.

Once the correct position for the rebalancing weight has been found, you will automatically go to the TRIAL RUN phase

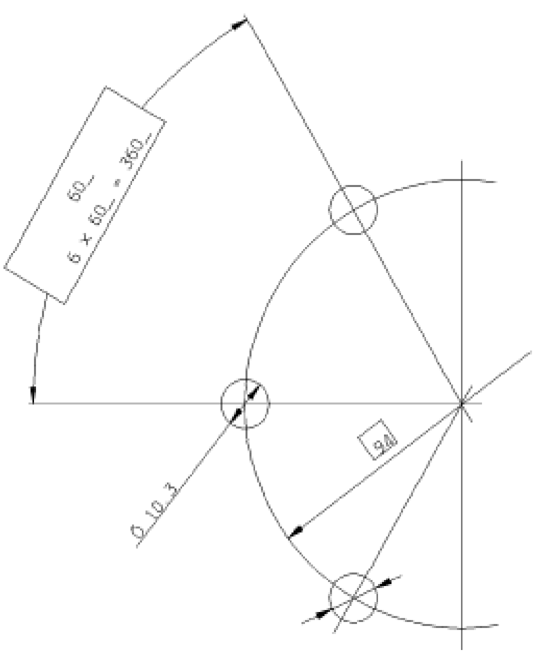
**CAUTION.** If the correct position for the rebalancing weight is not found, remove the rebalancing weight of 4.5 grams and repeat the cycle using a weight of 7.5 grams.

Once the correct position for the rebalancing weight has been found, you will **automatically** go to the TRIAL RUN phase

**CAUTION.** If the correct position for the rebalancing weight is not found even when using the weight of 7.5 grams, carefully check all the components connected to the transmission shaft (rear differential, axle shafts etc.).

When you have inspected all the mechanical components, repeat the entire cycle with the rebalancing weight of 4.5 grams (7.5 grams if necessary).

**If the procedures fails again, contact the Maserati Technical Service Department**.




**CAUTION!**

Should the adhesive tape bearing the corresponding number for each stud bolt not be present, it is important to assign the correct numbering: affix the number **1** in correspondence to a stud bolt and then the other numbers with clockwise orientation.

**TRIAL RUN**

This is the phase where the tester reads the various positions to correct the unbalance.

The TRIAL RUN phase consists of two different actions, depending on whether or not the INITIAL RUN is completed successfully the first time it is performed.

a) INITIAL RUN OK on first attempt. The system **automatically** prompts you to position a reference weight of 4.5 grams in **Position 1**.

b) INITIAL RUN **NOT** OK on first attempt. The system **automatically** prompts you to position a reference weight of 4.5 grams **in the position where the rebalancing weight is present**.

Start the TRIAL RUN procedure from the SD3.

**CAUTION.** In condition **(a)** described above, the reference weight of 4.5 grams in Position 1 might cause an excessive unbalance not readable by the tester. In this case, the tester will **automatically** prompt you to position the same reference weight in **Position 4**. Repeat the TRIAL RUN phase with the weight in Position 4.

The TRIAL RUN procedure ends with a page displaying a table:

A: Ideal value (information only)

B: Number of the flange stud bolt where you have to position the first correction weight (whose value in grams is indicated in the next column)

C: Number of the flange stud bolt where you have to position the second correction weight (whose value in grams is indicated in the next column)

| | |
|---|---|
| **A** | "Value in grams" |
| **B** | "Value in grams" |
| **C** | "Value in grams" |

**Remove the reference weight of 4.5 grams previously positioned.**

Apply the correction weights as described in the table.

Click on NEXT to go to the "FINAL RUN" phase.

**FINAL RUN**

This is the phase where the tester reads and assigns the weights for unbalance correction. Continue the procedure and follow the on-screen instructions. Continue applying the correction weights as described in the tables that will be displayed.

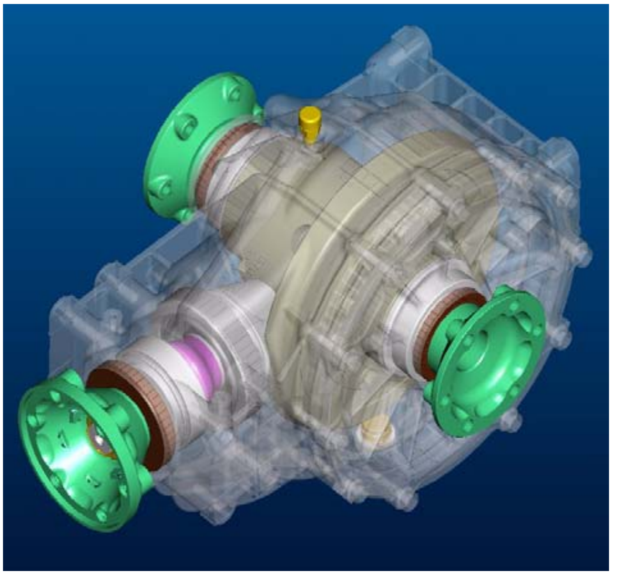
**Continue until the tester indicates an IDEAL VALUE in the table lower than or equal to 2.1 grams** Having reached the correct value, click on "EXIT" and confirm to print the test.

**IMPORTANT**

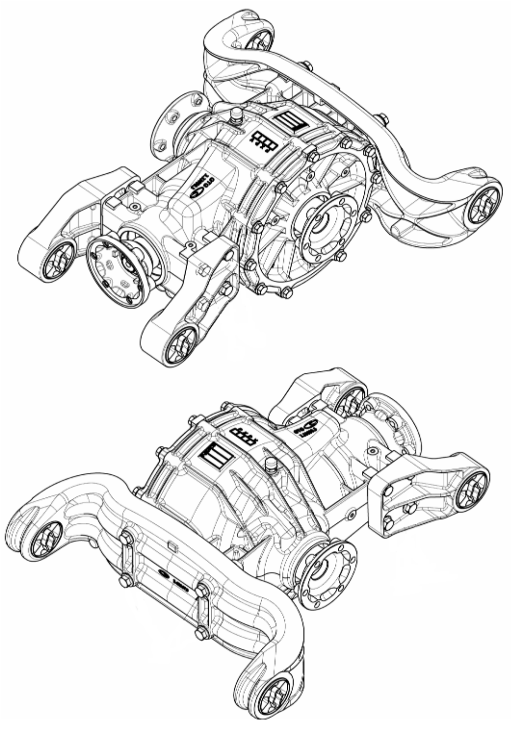
**The procedure does not end automatically but only by selecting "EXIT".**

The procedure is complete when the transmission shaft is balanced.

# Graziano Differential



## Graziano Differential



The limited slip differential built by Graziano is used in the Quattroporte and GranTurismo in combination with the ZF automatic transmission (M139GQ and M145BL)

The rear differential compensates for the different wheel movements.

The configuration of this differential provides for:

- 25% locking during acceleration
- 45% locking during deceleration

It is fastened to the chassis by means of specific cast iron mounts

### TECHNICAL SPECIFICATIONS

Self-locking differential , Limited Slip type

Oil type: Shell Spirax S 75W140

Quantity: 1litre

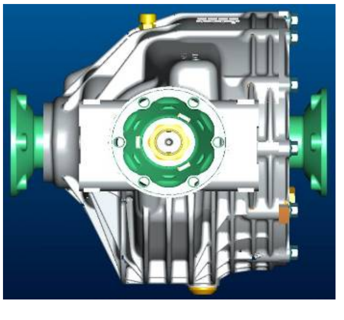
Bevel gear pair: spiral with involute gear tooth profile

Final drive ratio for GranTurismo: 15/56

Final drive ratio for Quattroporte: 13/46

Support bearings: tapered rollers

Pinion axial clearance restored by means of a collapsible spacer



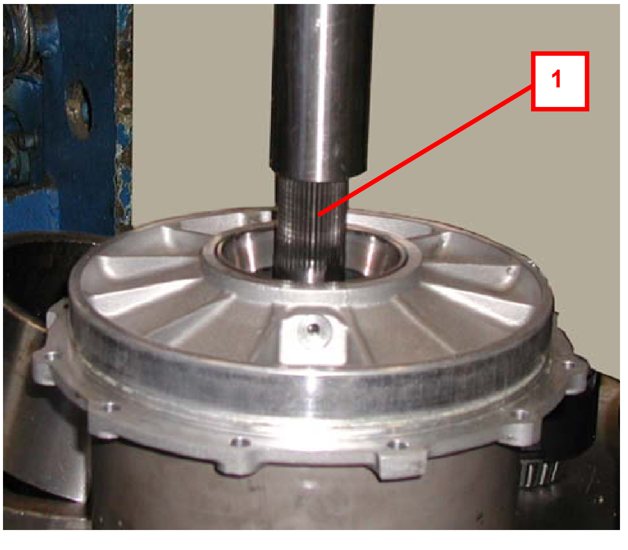
**Checking the clearance between the crest and the tooth of the pinion and crown wheel:**

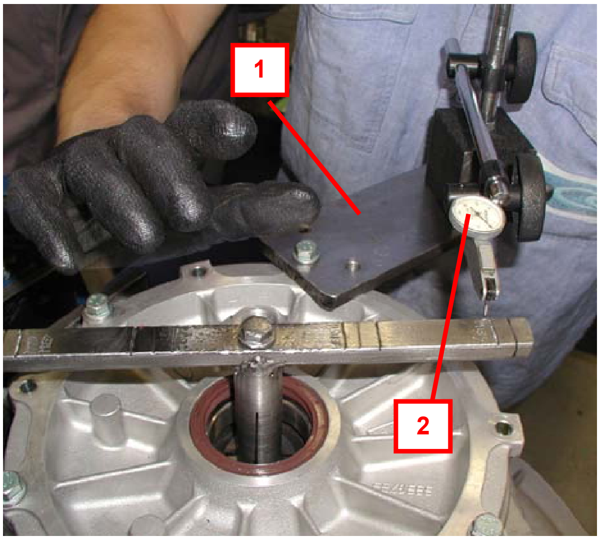
Undo the retaining screws of the differential housing cover.

Remove the axle shaft coupling flange and the relative bearing. Then turn over the cover and remove the snap ring from the inside.

Place the cover in a press and, using a punch of suitable dimensions, remove the differential flange shaft. Fit the differential cover and temporarily secure it with three or four screws, then fit a base **(1)** onto it, which must be screwed onto one of the cover fittings.

Position a dial gauge with a magnetic mount **(2) on the base (1).**



The plunger of the dial gauge must be positioned on the crown wheel diameter marking (Æ 224mm), shown on the specific tool.

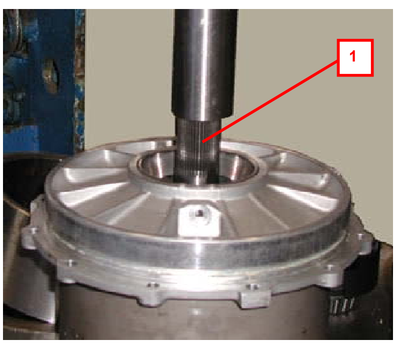
Check that the clearance between the pinion and the crown wheel is between **0.08 and 0.10 mm**.

If the value falls within the specified values, complete the assembly stages.

Remove the magnetic mount, the dial gauge and the differential cover.

Place the cover in a press and, using a punch of suitable dimensions, fit the differential flange shaft.

Fit the snap ring.




Refit the cover and tighten the differential housing cover retaining screws to a torque of **28.5 – 31.5 Nm**.

**Replacing the flange O-ring on the transmission shaft side and checking the end float of the pinion**

Before removing the fastening ring nut, check the residual rolling torque using a torque wrench with dial indicator on the flange nut. The inspection must be performed when the differential

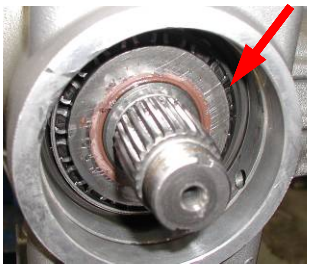
is removed or when the axle shafts are disconnected and without oil. With the differential crown wheel removed and without oil, the rolling torque must be equal to **1Nm ± 0,5 Nm.**

With the complete differential, without oil and with the axle shafts disconnected, the rolling torque must be **3Nm ± 1Nm.** This torque must be checked once again after the flange has been tightened. Using a suitable punch, remove the two flattened parts of the flange retaining nut


**CAUTION!**

**The flange retaining nut must be replaced each time it is removed**

Apply a tool on the flange to lock its rotation, unscrew the nut and remove it. Remove the oil seal from its seat. Clean the O-ring residues off the flange striking surface. Then fit a new O-ring and a new oil seal using a dedicated tool.




Fit the base screwed onto the differential housing. Position a magnetic mount fitted with plunger in correspondence to the pinion surface


**CAUTION!**

There must be **NO** end float of the pinion. The end float is eliminated by tightening the flange nut on the transmission shaft side. There is no specific tightening torque. It is recommended to apply a pre-torque and then check the end float value.

Fit the flange, apply LOCTITE 270 and screw on a new retaining nut.

Apply a tool on the flange to lock its rotation.

Using a specific bushing, screw on the retaining nut.

**IMPORTANT:**

The nut tightening torque is related to the end float read by the dial gauge on the pinion and by the residual rolling torque.

Pre-tighten the new ring nut that secures the flange. Tighten increasing the torque value torque by **5÷10 Nm** at a time, after having duly checked the end float and rolling torque.

With the differential crown wheel removed and without oil, the rolling torque must be **1Nm±0.5**;

With the complete differential, without oil and with the axle shafts disconnected, the rolling torque must be 3**Nm ± 1Nm.**

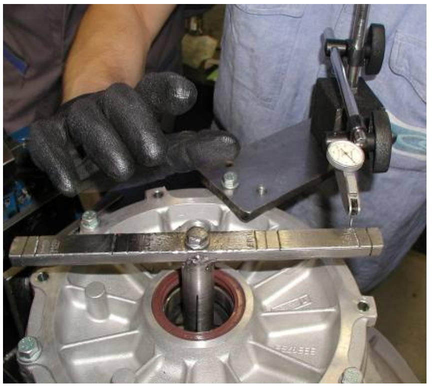
When the end float is equal to zero and after checking the rolling torque, stop the tightening procedure and flatten the ring nut that secures the flange.

**CAUTION!**

If you have to replace the flange O-ring on the transmission shaft side (if the differential is on the bench) it is advisable to also check the clearance between the crest and the tooth of the pinion and crown wheel.

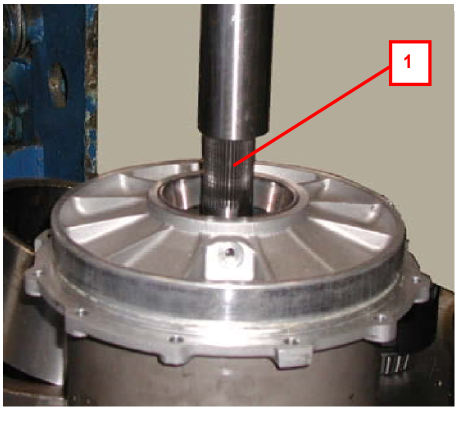
Undo the retaining screws of the differential housing cover. Remove the axle shaft coupling flange and the relative bearing. Then remove the entire crown wheel of the self-locking unit.

After fitting the differential assembly, it is advisable to check that the clearance between the pinion and the crown wheel has not changed and that the measurement falls within the indicated values: **0.08 – 0.10 mm for the 13/46 final drive (Quattroporte) and 0.08 – 0.11 mm for the 15/56 final drive (GranTurismo**)



Remove the magnetic mount, the dial gauge and the differential cover.

Place the cover in a press and, using a punch of suitable dimensions, fit the differential flange shaft. Fit the snap ring.




Subsequently, refit the cover and tighten the differential box cover retaining screws to a torque of **28.5 – 31.5 Nm**.

**Nominal tightening torques for engine/gearbox assembly-transmission coupling:**

| PART | THREAD | MATERIAL | TIGHTENING TORQUE |
|---|---|---|---|
| Flanged T.E. screw fastening Flexplate to converter | M10X1.5 mm | Steel Cl 10.9 | 56 Nm |
| T.C.E.I screw fastening converter cover to gearbox | M10X1.5 mm | Steel Cl 10.9 | 49 Nm |
| Hex. nut with edge fastening converter cover to engine | M10X1.25 mm | Steel Cl 10.9 | 60 Nm |
| T.E. screw fastening starter motor | M8 | Steel Cl 8.8 | 25 Nm |
| T.C.E.I screw fastening mounting bracket to gearbox | M10X1.5 mm | Steel Cl 10.9 | 56 Nm |
| Hex. nut with edge fastening rubber bushing to gearbox mount. bracket | M12x1.75 mm | Steel Cl 10.9 | 120 Nm |
| T.E. screw fastening rubber bushing to cross member | M10X1.25 mm | Steel Cl 10.9 | 50 Nm |
| Hex. nut fastening rubber bushing to cross member | M10X1.25 mm | Steel Cl 8.8 | 50 Nm |
| T.C.E.I screw fastening oil pipes | M8 | Steel Cl 8.8 | 24 Nm |
| Screw fastening transmission shaft to gearbox | M10X1.5 mm | Steel Cl 12.9 | 30 Nm + 90° |
| Stud bolt fastening transmission shaft to differential | M10X1.5 mm | Steel Cl 12.9 | 30 Nm + 90° |
| T.C.E.I screw fastening transmission shaft central mount | M8 | Steel Cl 8.8 | 24 Nm |
| T.E. screw fastening rubber bushings to rear frame | M14x1.5 mm | Steel Cl 8.8 | 120 Nm |
| T.C.E.I screw fastening gearbox mount. cross member to frame | M8 | Steel Cl 8.8 | 23 Nm |
| T.C.E.I screw fastening transmission shaft mount. cross member to frame | M8 | Steel Cl 8.8 | 23 Nm |

# 4
# Electric and Electronic Systems

## PRESENT SITUATION OF MULTIPLEXED ARCHITECTURES IN THE GROUP

**Electronic architecture for small cars:**

**VENICE** (VEhicle Network with Integrated Control Electronics)

- Mod. 188 ***(Fiat Punto)***

**Electronic architecture for medium cars:**

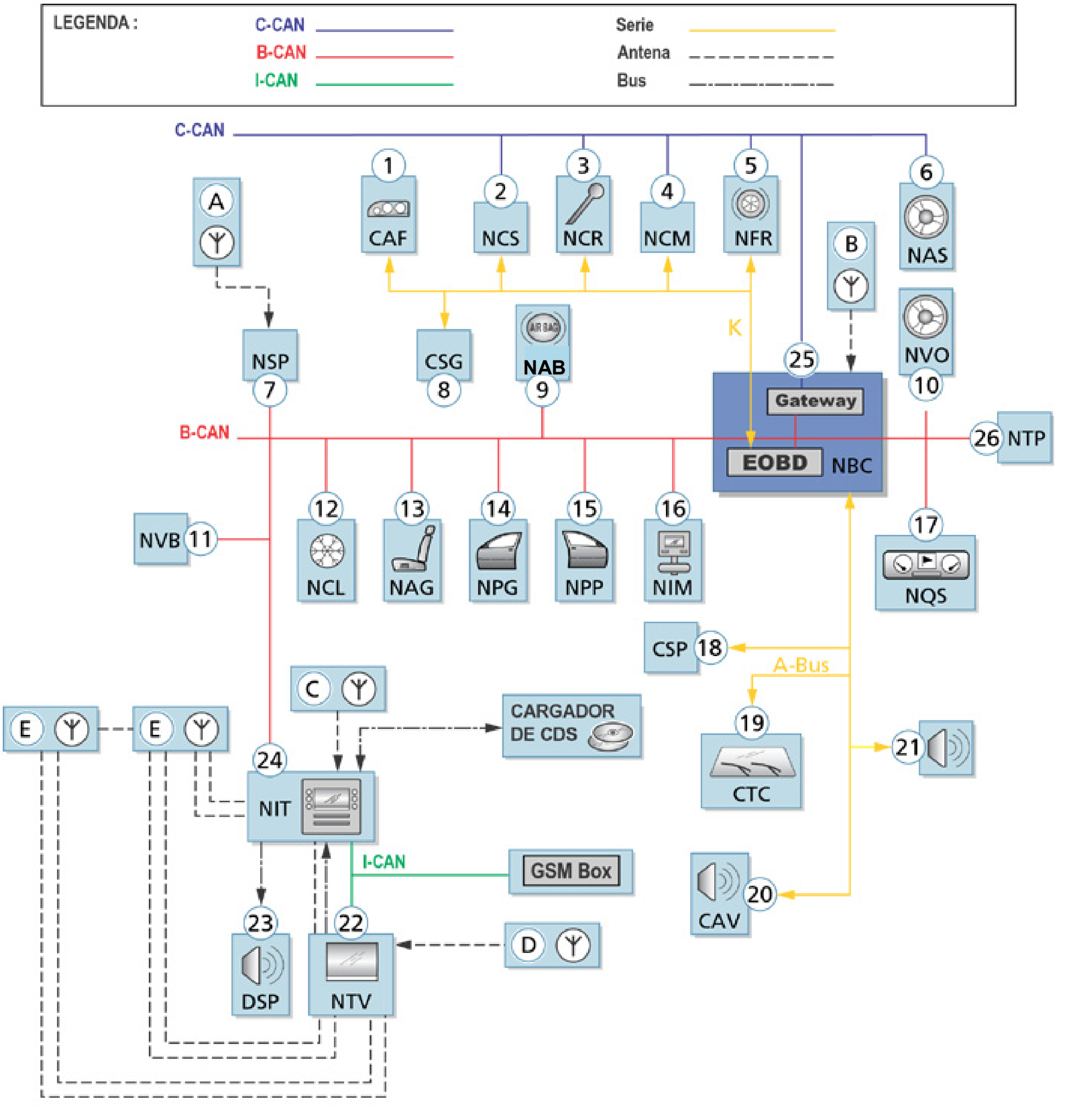
**VENICE PLUS** or **miniFLORENCE**

- Mod. 937 ***(Alfa 147)***
- Mod. 192 ***(Fiat Stilo)***

**Electronic architecture for luxury cars:**

**FLORENCE** (Fiat Luxury car ORiented Network Control Electronics)

- Mod. 841 ***(Lancia Thesis)***
- Maserati M139 & M145



## THE FLORENCE CAN ARCHITECTURE

The Florence architecture permits the exchange of information between the various ECU's through different levels of telecommunication networks. The networks are the following:

- ⇨ C-CAN Network
- ⇨ I-CAN Network (M139 only, used for TV and data communication )
- ⇨ B-CAN Network
- ⇨ K Network (serial-line for diagnostics of the C-CAN nodes)
- ⇨ A-BUS Network
- ⇨ W-BUS Network(serial-line connecting the Body Computer and the Bosch Motronic for recovery of the immobilizer)

The complete structure of the FLORENCE network is illustrated by the following figure that represent the ***Maserati Quattroporte***, and it comprises three different levels of network for CAN communication:

- The C-CAN Network for the dynamical control of the vehicle's powertrain (high speed network)
- The B-CAN Network for the comfort functions of the vehicle's bodywork (low speed network)
- The I-CAN Network (Maserati Quattroporte only) for the data communication and the TV - the infotainment system

The C-CAN e B-CAN networks are interconnected through a gateway for the transfer of common information located inside the ***Body Computer Node (NBC).***

The abbreviations of the names of the nodes in the two vehicles are presented in the table.

**A-BUS:**

The A-BUS is a serial line with a MULTIMASTER management system working with a velocity of 4800 baud. It is utilised to exchange information between the control units and to perform the diagnostics, and is a terminal to terminal communication. The transmitting and receiving ECU's are always identified. Please note that even if the communication is terminal to terminal, the ECU's connected to the line might be more than two. In the case of a conflict between two ECU's in simultaneous transmission, there is a well defined priority table which gives each control unit the permission to regain access to the bus.

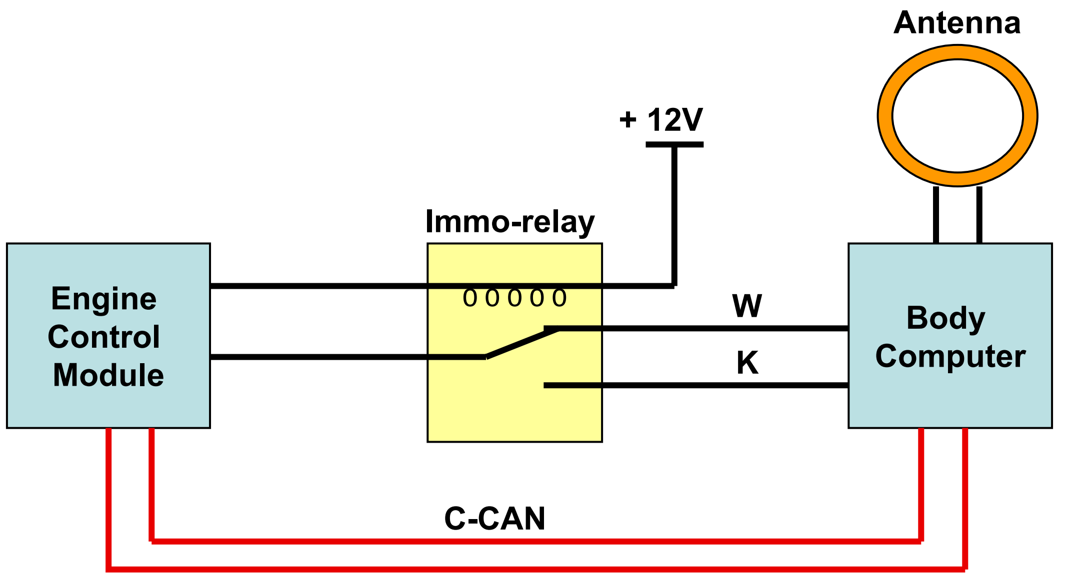
The control units connected through the A-BUS on the FLORENCE network are:

- ***CSP (Rain and Twilight Sensor ECU)***
- ***CAV (Motion Alarm ECU)***
- ***CTC (Windscreen Wipers ECU)***
- ***CSA (Alarm System Siren ECU)***

**THE BODY COMPUTER IS THE HEART OF THE SYSTEM:**

- Interface function for all of the networks
- Gateway between the B-CAN and the C-CAN networks
- Master of the Network Management
- Master of the A-BUS Network
- Slave in the W-BUS Network
- Master of the K-line
- Diagnostic interface (EOBD connector)
- Interface towards the CPL (dashboard control unit for the piloting of functions)
- Diagnostics on the CAN-line for the B-CAN Network
- IMMOBILIZER unit incorporated

## IMMOBILIZER

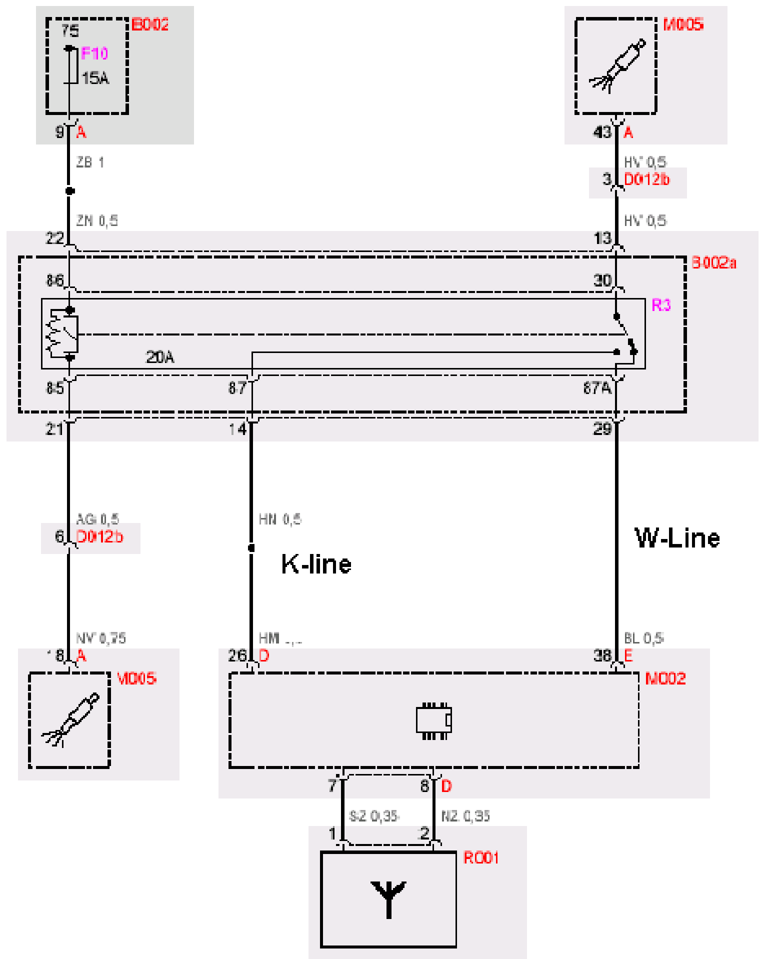



- The above diagram represents the immobilizer system as used on vehicles using the Florence architecture (M139 and M145) and fitted with Motronic ME7.1.1 system.
- After reading the key code from the ignition key, the body computer asks confirmation of the key code to the engine control unit over the C-CAN line.
- The W-line (ISO 9141) is used as a back up safety line for the immobilizer system.
- At ignition On, the body computer performs a check of the integrity of the W-line.
- Shortly after, the engine control unit activates the immobilizer relay to connect to the K-line (ISO 9141), enabling by this way the possibility for diagnostics read out.

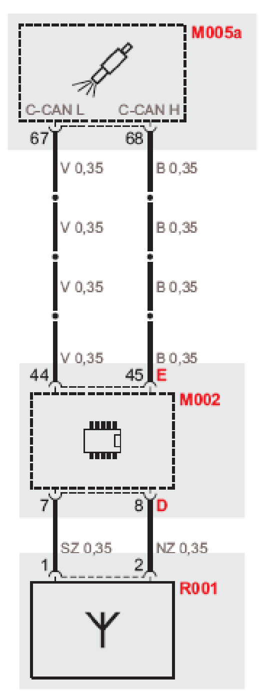
On the M138 model, which has no C-CAN line, the W-line is the main communication medium for the immobilizer function.

On vehicles using the Motronic ME9 engine control system, the K-line to the engine control unit and the W-line have been dropped. Immobilizer function is using C-CAN only for communication between the body computer and the engine control unit. Consequently the immobilizer relay has been dropped also.

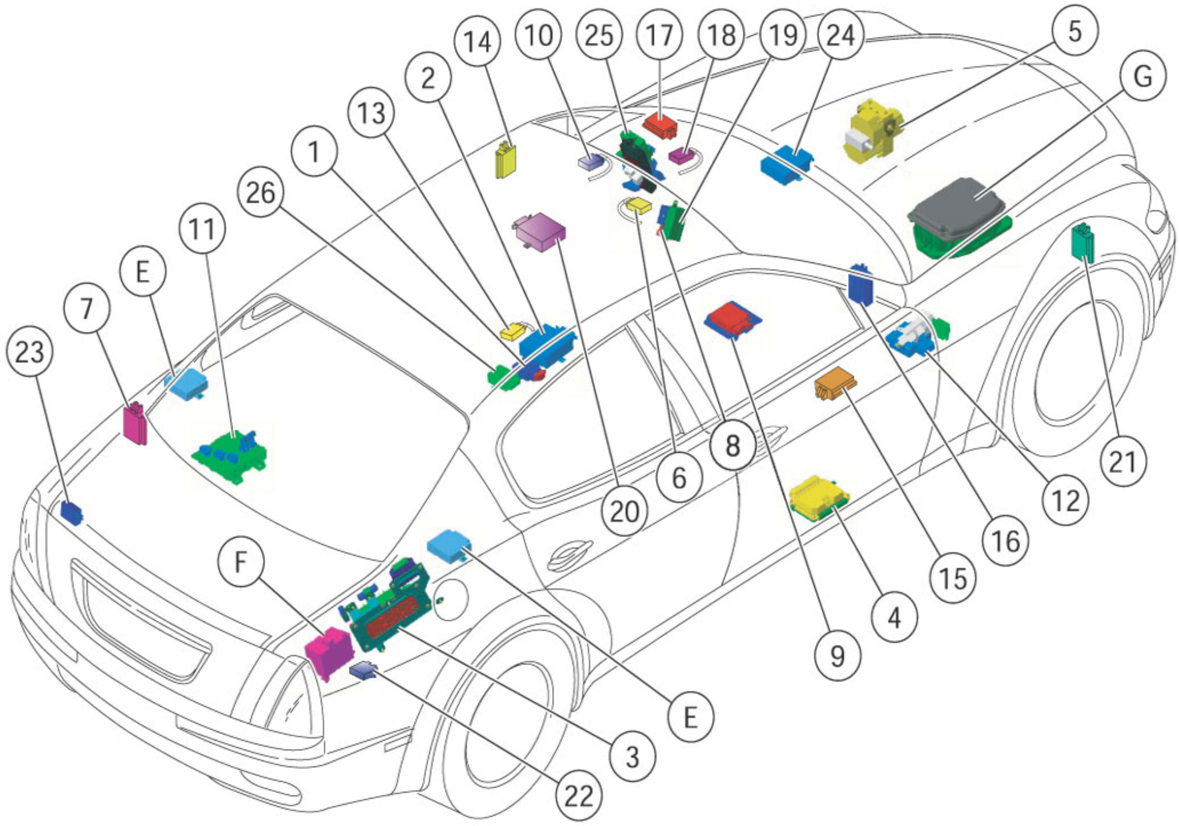
## IMMOBILIZER




## Immobilizer ME9:

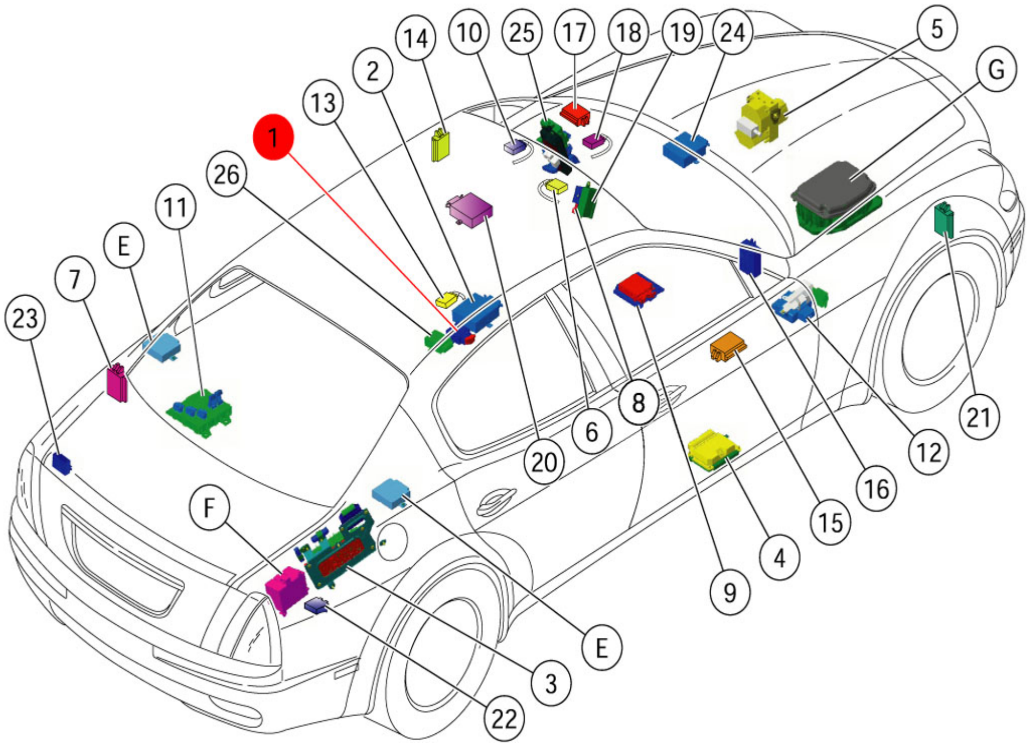


**POSITION OF ECUs AND NODES**




| | | |
|---|---|---|
| 1. | CAF | Headlights set-up ECU |
| 2. | NCS | Suspension control node |
| 3. | NCR | Automatic gearbox node |
| 4. | NCM | Engine control node |
| 5. | NFR | Brake system node |
| 6. | NAS | Steering angle node |
| 7. | NSP | Parking sensors node |
| 8. | CSG | Power steering ECU |
| 9. | NAB | Airbag node |
| 10. | NVO | STEERING WHEEL NODE |
| 11. | NVB | Luggage compartment node |
| 12. | NCL | Air conditioning and heating system node |
| 13. | NAG | Drive set-up node |
| 14. | NPG | Driver's door node |
| 15. | NPP | Passenger's door node |
| 16. | NIM | Inside roof node |
| 17. | NQS | Instrument panel node |
| 18. | CSP | Rain/ twilight sensor ECU |
| 19. | CTC | Windscreen wiper ECU |
| 20. | CAV | Motion-sensing alarm ECU |
| 21. | CSA | Alarm system siren ECU |
| 22. | NTV | TV node |
| 23. | DSP | Hi-fi system amplifier |
| 24. | NIT | IT node |
| 25. | NBC | Body Computer Node |
| 26. | NTP | Tyre Pressure Node |

**HEADLIGHT SET-UP ECU (CAF)**

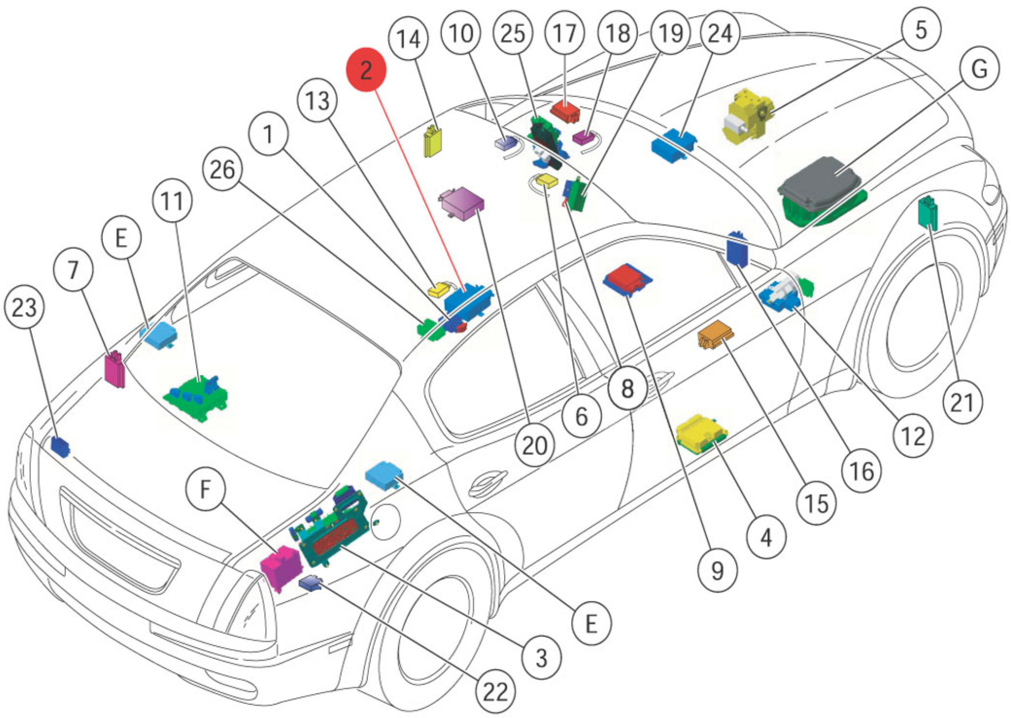



The Headlight Set-up ECU (CAF) interconnects with the front wiring.

It manages the following functions:

- CAF failure warning light control (directly to the control panel)
- It receives a signal from the front axle potentiometer, and a signal from the rear axle potentiometer,
- Positive signal for headlights enable from CPL
- It receives a vehicle speed signal from the brake system node (NFR)
- Right and left-hand adjuster actuator (vertically only)

**SUSPENSION CONTROL NODE (NCS)**



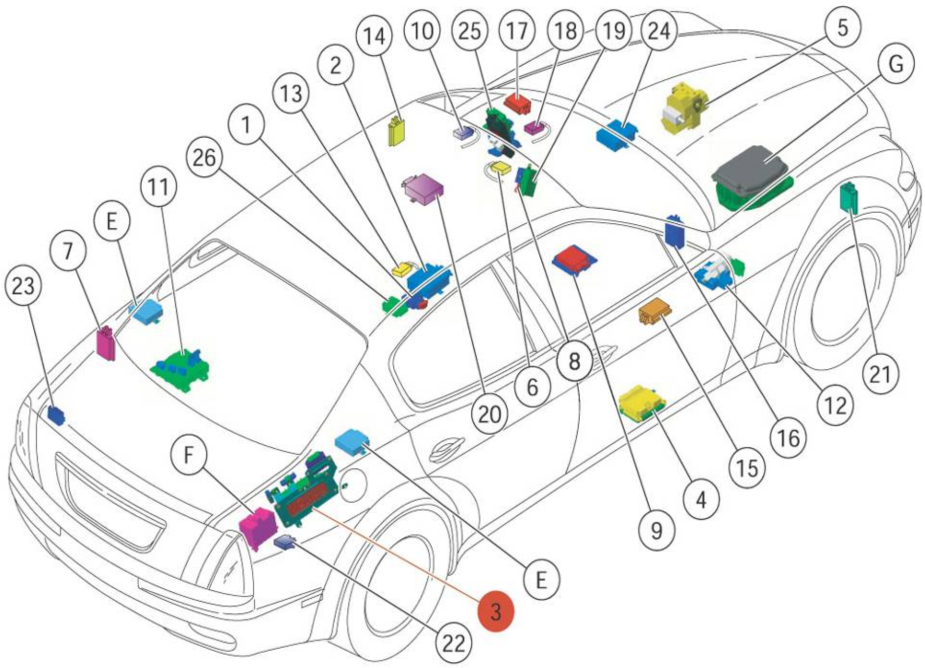

The suspension control node manages information on the following networks:

- C-CAN (information, data),
- K LINE (diagnostics)

It manages the following functions:

- Accelerometer on front RH and LH shock absorber fitting.
- Accelerometer on front RH and LH wheel
- Accelerometer on rear cross member
- Via C-CAN, it reads the vehicle speed, the steering angle and other information
- It manages the shock absorbers' solenoid valves (operated when power supply is connected)

## ROBOTIZED GEARBOX NODE (NCR)



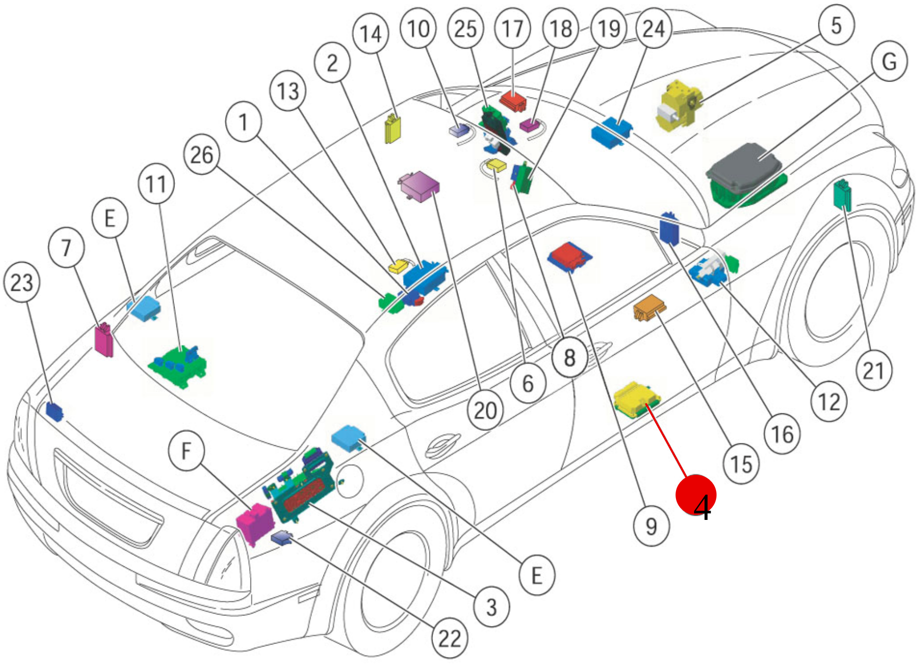

The robotized gearbox node manages information on the following networks:

- C-CAN (information, data)
- K LINE (diagnoses)

It manages the following functions:

- Selection solenoid valves
- Engagement solenoid valves
- Clutch solenoid valve
- Relay for pump (new type)
- Clutch position sensor
- Engagement position sensor
- Selection position sensor
- Reverse lights relay
- Tachometer input signal from engine control node (NCM)
- It acquires the M/A Shift, Ice (Low grip) commands

## ENGINE CONTROL NODE (NCM)




The engine control node (NCM) is connected to the following networks:

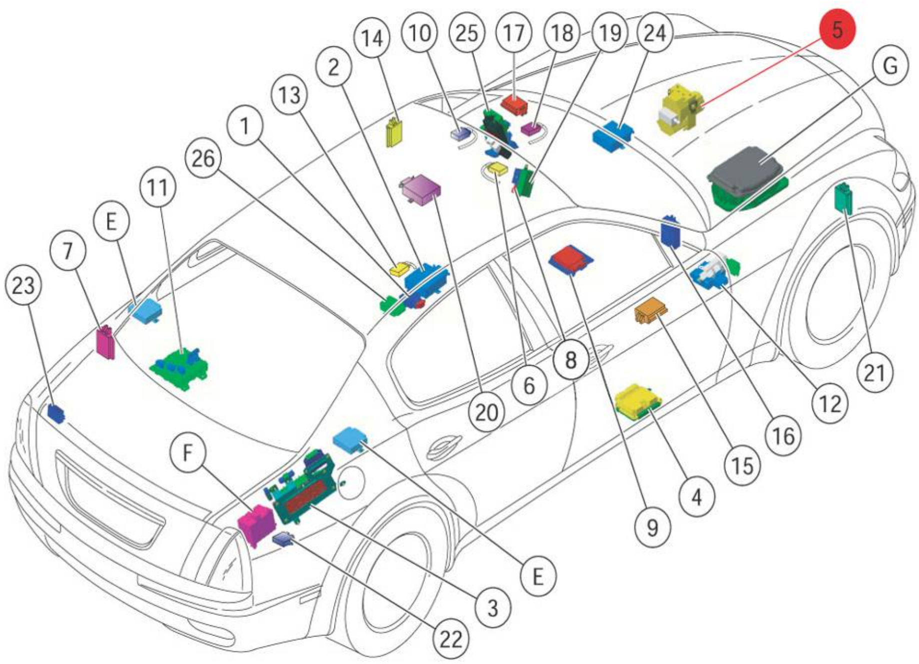
- C-CAN for data transfer with other vehicle systems (Motronic ME9: also for diagnostics)
- K-line for diagnostics (only for Motronic ME7)

It manages the following systems and components:

- Complete engine control system (injection, ignition, throttle, intake timing variation)
- Secondary air system
- Catalytic converter protection strategy
- Cooling fans
- A/C compressor activation
- Immobilizer function
- Engine oil pressure and level warning lights
- MIL activation
- Fuel pump, EVAP system, DMTL system

**Note:** on vehicles fitted with the Motronic ME9 system, the NCM is fitted in a new location in the engine compartment.

**BRAKE SYSTEM NODE (NFR)**




The interface with the brake system manages information on the following networks.

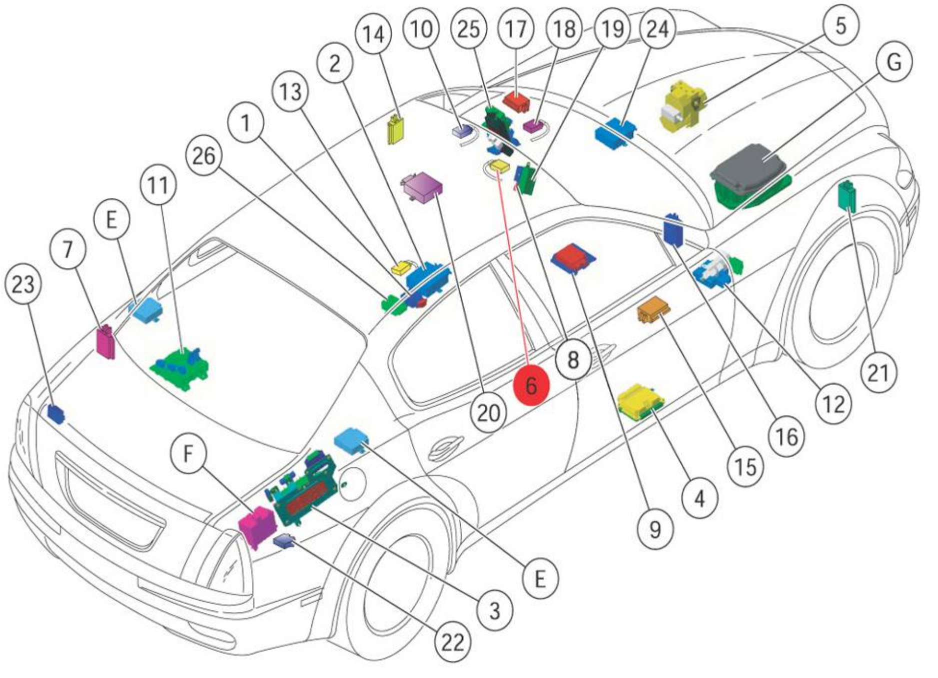
- C-CAN (information, data)
- K LINE (diagnoses)

The brake system node is connected to the front wiring

It manages the following functions:

- Yaw sensor
- Wheel speed sensors
- System pressure sensor
- MSP Off button
- Hardware signal for vehicle speed
- It receives the steering angle signal from the steering angle node (NAS)

**STEERING ANGLE SENSOR NODE (NAS)**

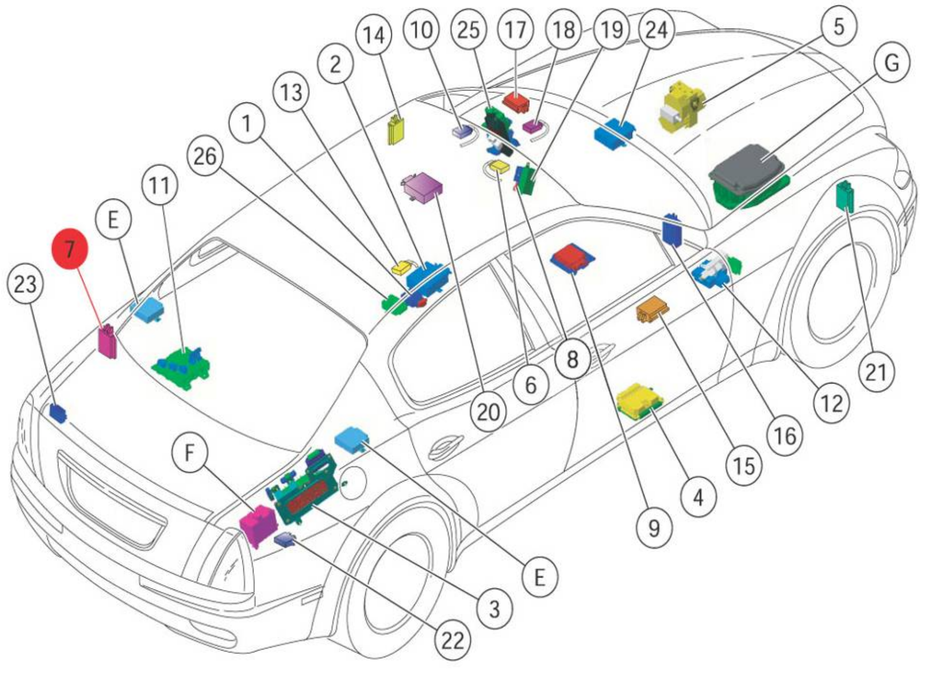



The Steering Angle Sensor Node performs the following functions:

- It receives and transmits information via C-CAN line
- It interconnects with the front wiring to send information to the brake system node (NFR)
- It sends a signal to the suspension control system:

N.B: in the event of repairs/operations on the steering system, the sensor must be calibrated.

**PARKING SENSOR NODE (NSP)**




The Parking Sensor Node performs the following functions:

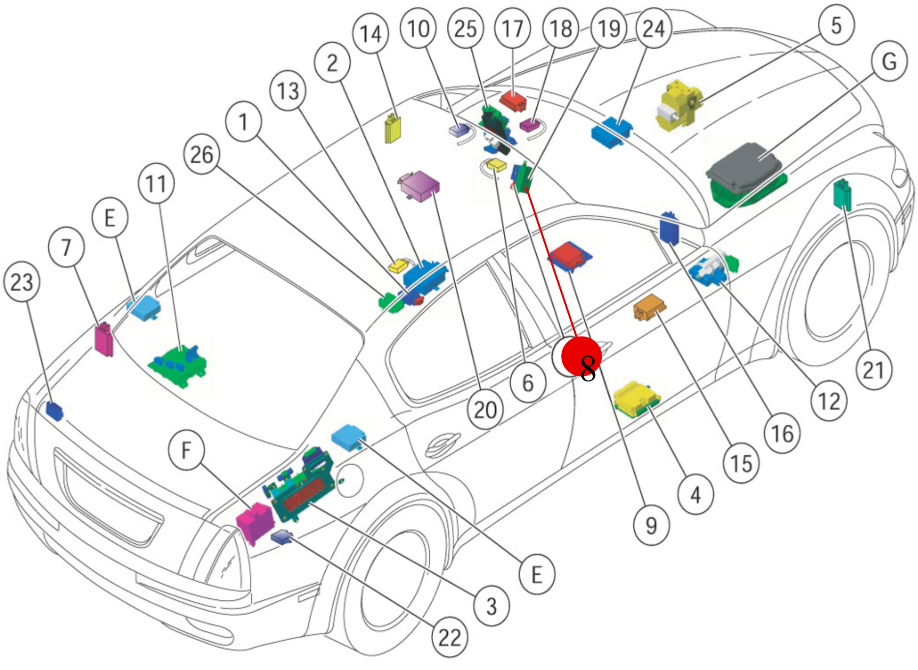
- It receives and transmits information via B-CAN line (e.g.: data, commands) and diagnoses
- It interconnects with the front, rear and rear bumper wiring.

It manages the following functions:

- Front and rear buzzer signal
- Front sensors enable button
- Trailer attachment set-up
- Warning light on NSP button
- Front sensors

N.B: The ECU differs depending on whether the vehicle is fitted with front and rear parking sensors or just rear sensors.

**POWER STEERING ECU (CSG)**



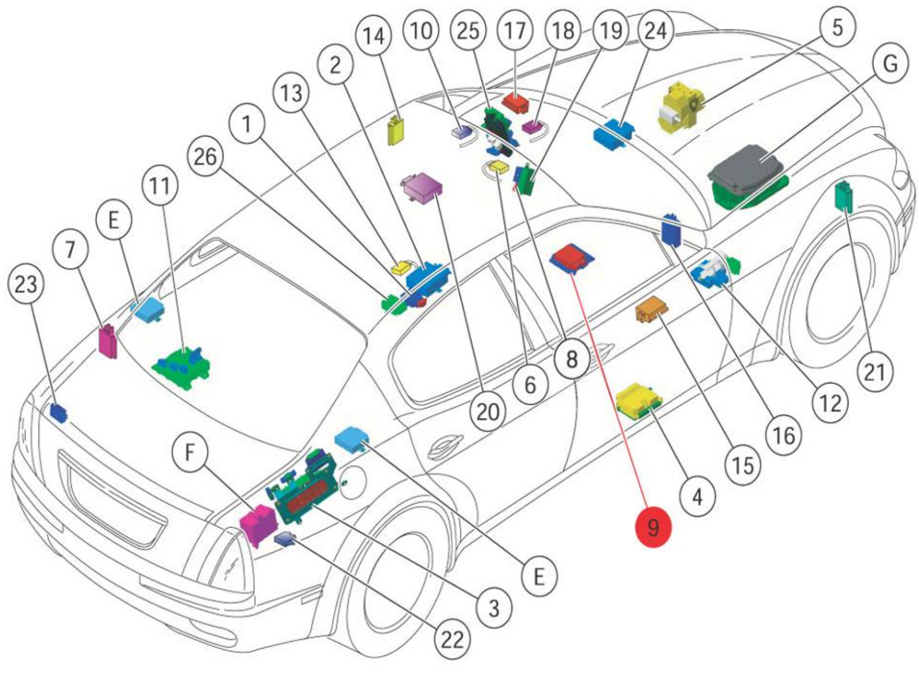

The CSG interconnects with the front wiring and manages information via the following network:

- K LINE for diagnostics

It manages the following functions:

- Negative control signal for failure warning light
- It operates the solenoid valve (when powered)
- It receives a vehicle speed signal from the brake system node (NFR)

**AIRBAG NODE (NAB)**




The airbag system interface is set up for connection via B-CAN line.

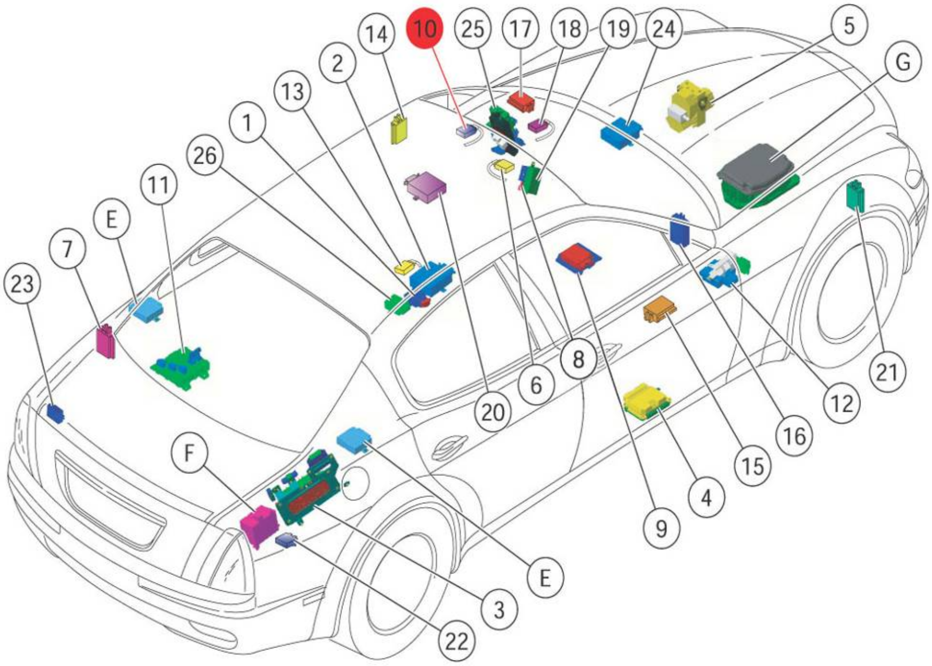
The Airbag Node performs the following functions:

- It receives and transmits information via B-CAN line
- It interconnects with the dashboard wiring (blue connector) and the passenger compartment wiring (brown connector)

It manages the following functions:

- Passenger airbag cut-out (not USA version)
- Front passenger's side airbag
- Front driver’s side airbag
- Rear and front pretensioners
- Front satellite signal (crash zone sensors)
- Side Bags
- Head Bags
- Signal from seat belts fastened sensor (Buckle switches)
- Side satellite signal

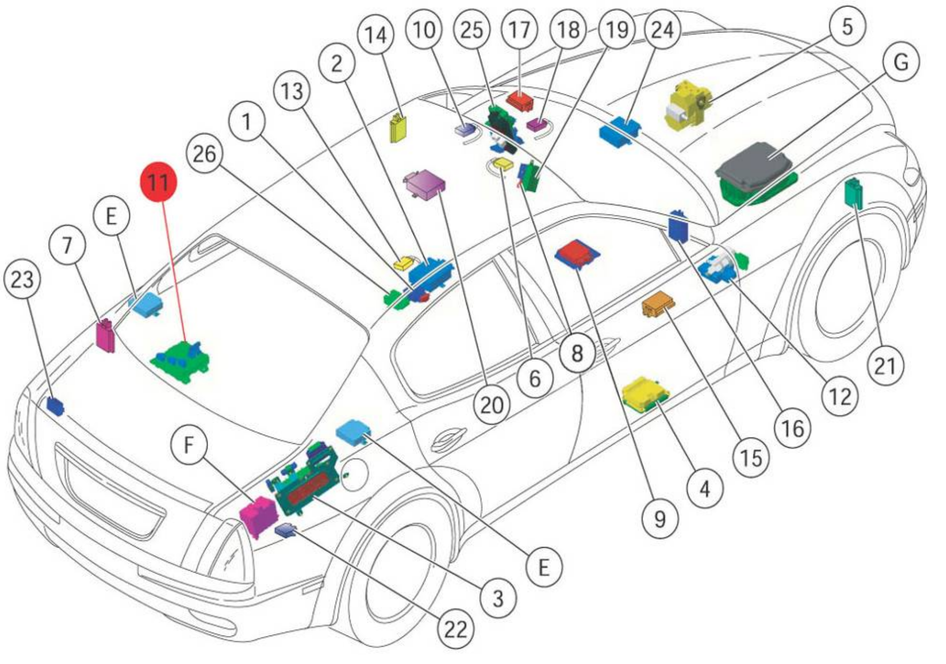
**STEERING WHEEL NODE (NVO)**




The Steering Wheel Node performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: commands)
- It interconnects with the dashboard wiring by means of the clock spring
- It manages the controls on the  steering wheel
- It does not have a diagnosis function

**LUGGAGE COMPARTMENT NODE (NVB)**



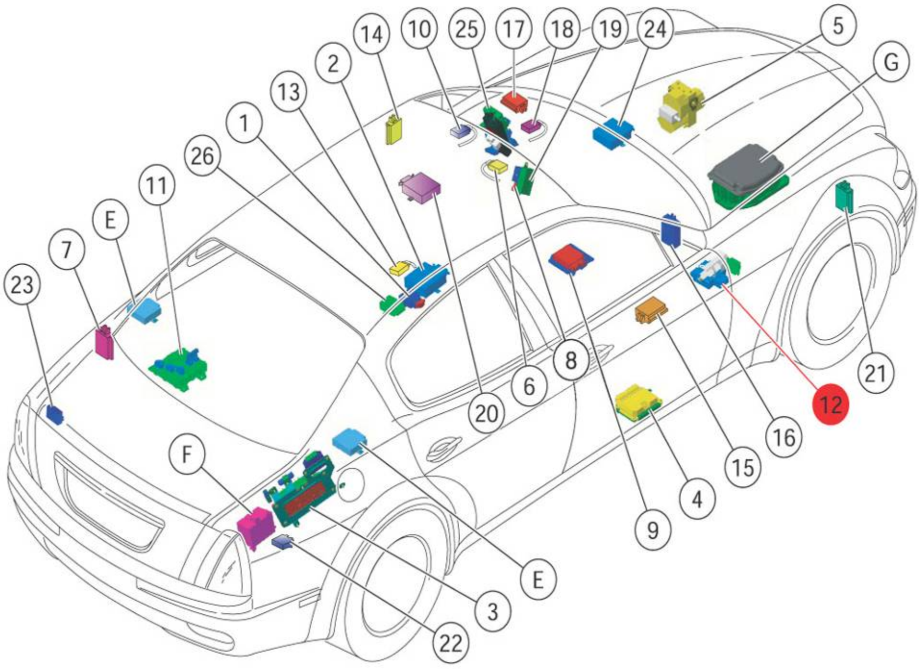

The Luggage Compartment Node performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: diagnosis, warning lights, commands, data)
- It interconnects with the rear wiring

It manages the following functions:

- All the rear door devices
- Positive control signal for rear headrest lowering electromagnets.
- Luggage compartment opening/closing
- Luggage compartment lighting
- Rear windows sunshade lowering control
- It receives the signal from the inertia switch

**HEATING, VENTILATION AND AIR CONDITIONING NODE (NCL)**




The air conditioning and heating system interfaces with the rest of the vehicle by means of specific sectioning.

It has pre-assembled wiring (specific serial line for actuator management)

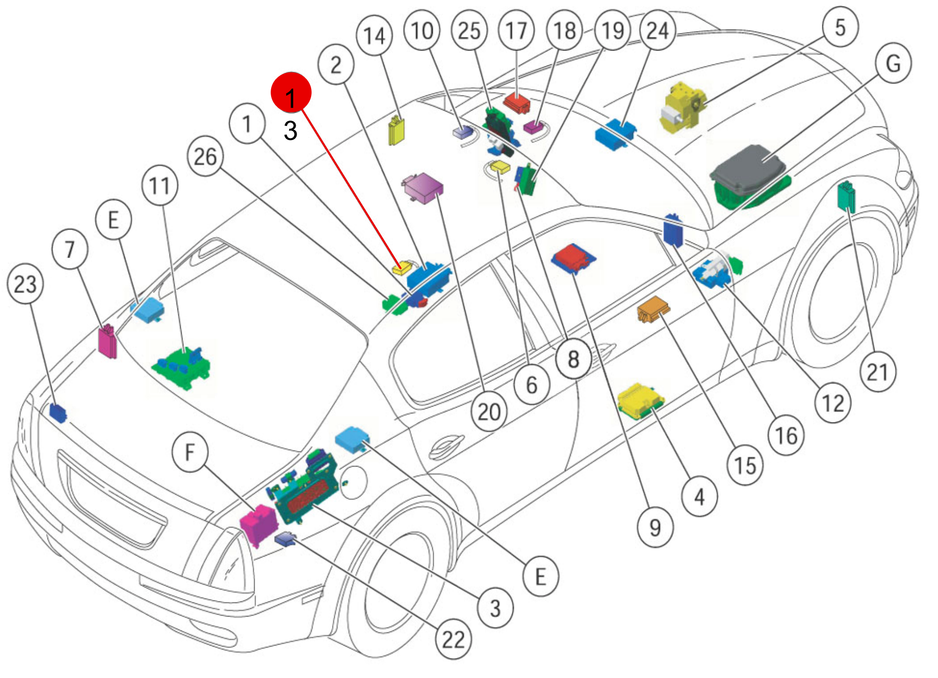
It is connected to the B-CAN line

It monitors and manages the air conditioning and heating system and the passenger compartment ventilation system.

It manages the following functions:

- Anti-pollution sensor
- Demisting sensor
- Sunlight sensor
- Actuators
- Ventilation

**DRIVE SET-UP NODE (NAG)**



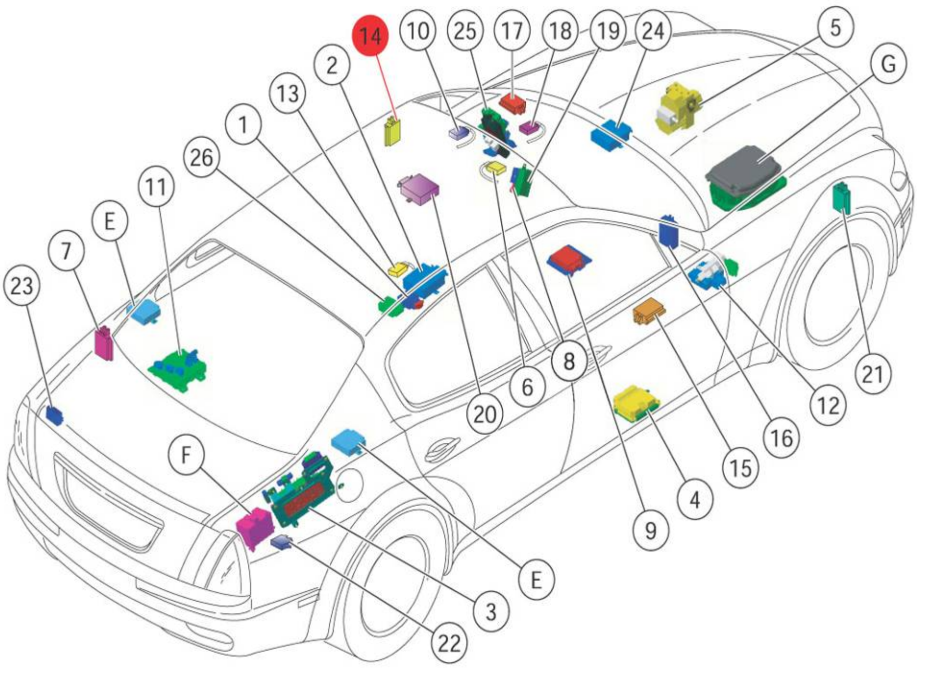

This node is located underneath the driver’s seat.

It receives and transmits information via B-CAN line (e.g.: diagnoses/commands)

It manages the following functions:

- Seat and steering column movement
- Memorisation of the seat / steering column / external rear view mirror positions
- Memorisation of the external rear view mirror positions on the passenger’s side in reverse gear
- Easy entry / exit function (enabled / disabled with the NIT)
- Seat heating (opt.)

## DRIVER'S DOOR NODE (NPG)

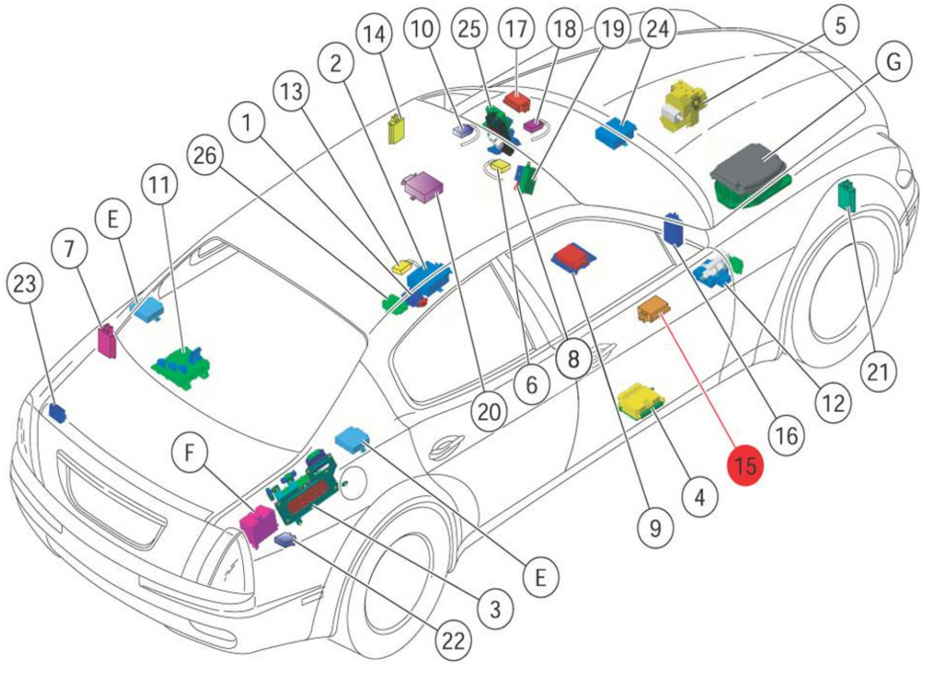



The Driver's Door Node is an ECU incorporated into the controls.

The Driver's Door Node performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: diagnoses, warning lights, commands, data)
- It integrates the four doors' power window controls and the rear windows' inhibit control
- It interconnects with the wiring on the front door on the driver's side
- It acquires the outside temperature signal
- It acquires the door lock control signal on the dashboard
- It acquires the mirror control signals
- It manages the power window and the anti-trapping mechanism on the driver's side
- External rear view mirror movement on driver's side
- Lock / unlock driver's side door
- It manages the step lights under the door and the mirrors and the courtesy lights at the driver's feet

**PASSENGER'S DOOR NODE (NPP)**

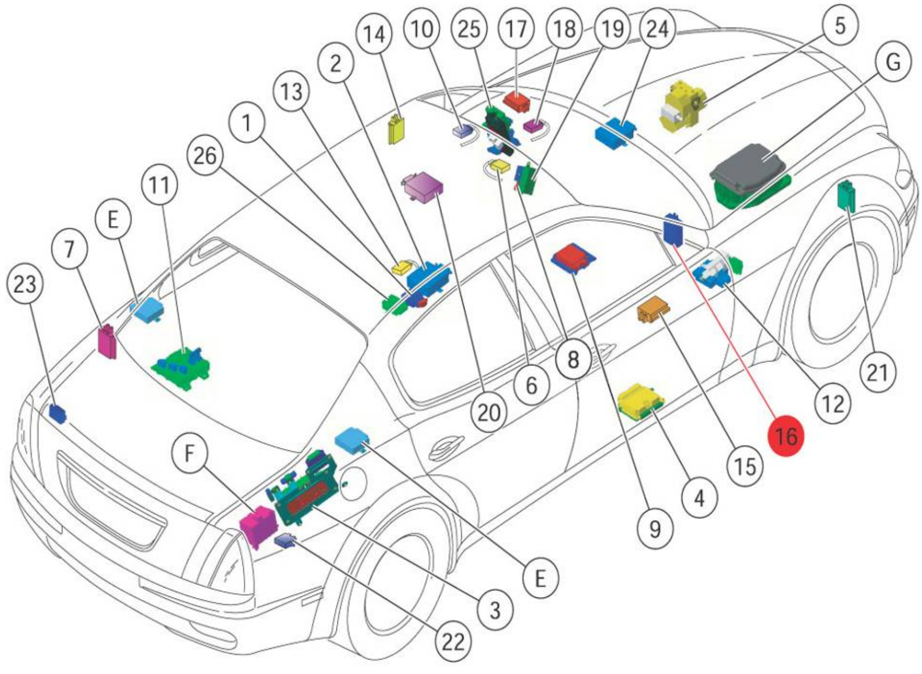



The Passenger's Door Node is an ECU integrated with the power window control.

The Passenger's Door Node performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: diagnoses, warning lights, commands, data)
- It incorporates the front power window control on the passenger's side
- It interconnects with the wiring on the front door on the passenger's side
- It acquires the door unlock control signal on the dashboard
- It manages the power window and finger-trap prevention device on the passenger side
- External rear view mirror movement on passenger's side
- Lock / unlock passenger's side door
- It manages the step lights under the door and the mirrors and the courtesy lights at the passenger's feet

**IMPERIAL NODE (NIM)**



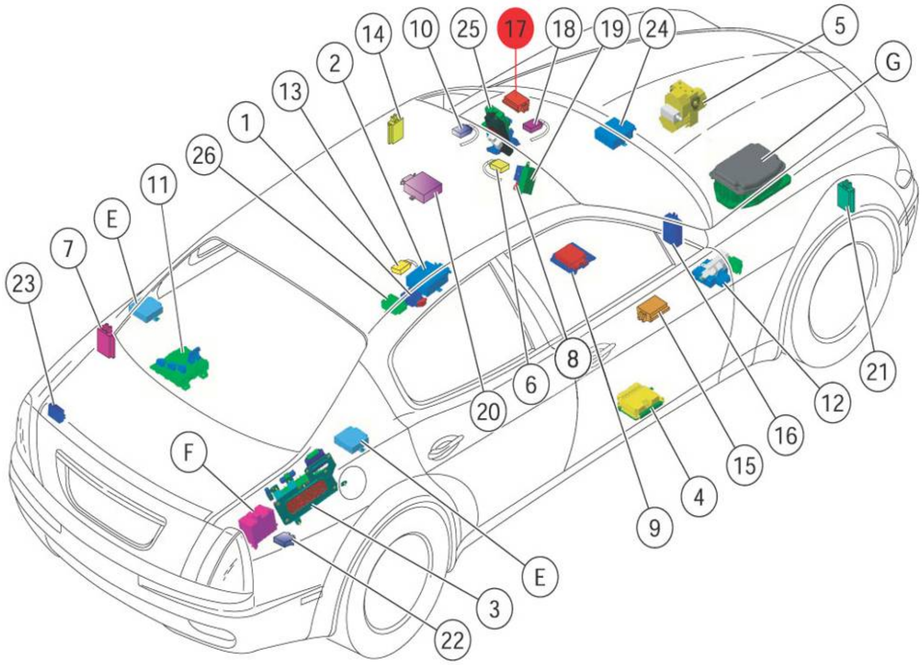

The Imperial Node performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: diagnoses, warning lights, commands, data)

It manages the following functions:

- Gearbox fluid level input
- Front ceiling light
- Tyre Pressure Calibration (opt.)
- Glove compartment opening
- It manages the repetition of the ‘passenger airbag Off’ warning light located on the ceiling light
- Serial line to analogue clock.

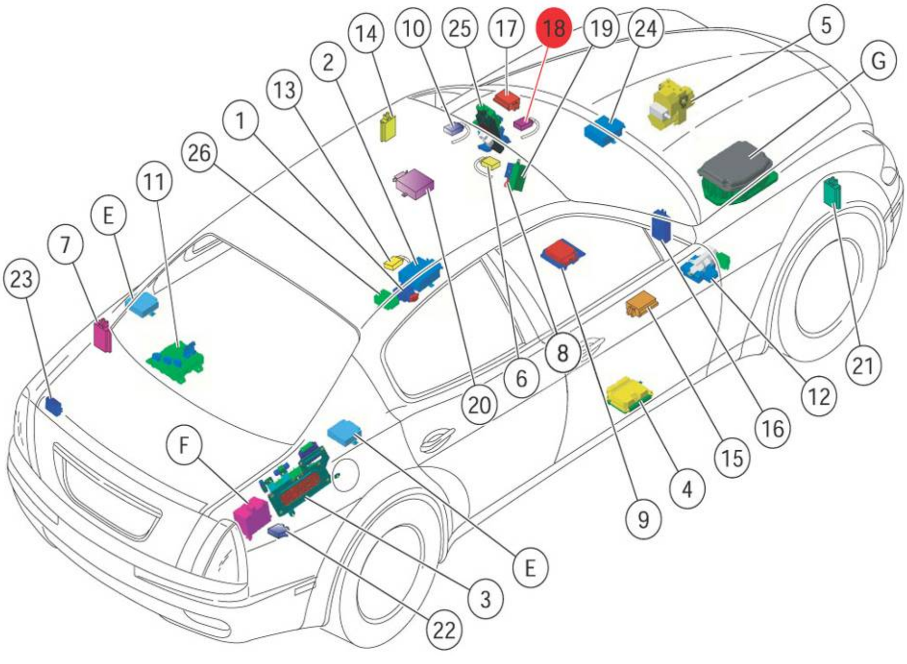
**INSTRUMENT PANEL NODE (NQS)**




The Instrument Panel Node is an electronic microprocessor which performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: diagnoses, warning lights, commands, data)
- It interconnects with the dashboard wiring
- It manages all the information displayed on the control panel.

**RAIN/TWILIGHT SENSOR ECU (CSP)**



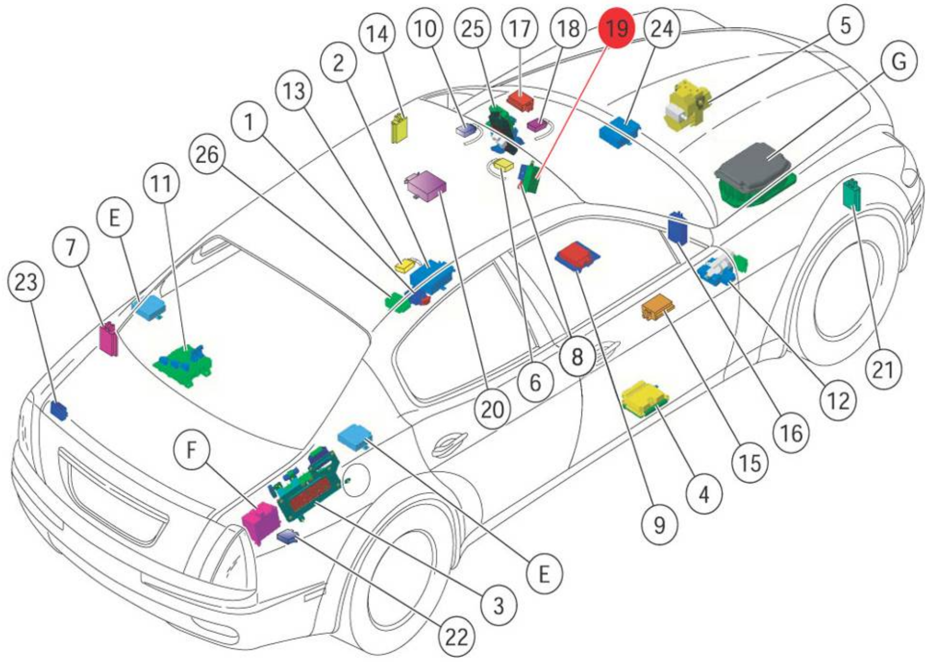

The rain and twilight sensor ECU interfaces with the CAN line, with the windscreen wiper ECU (CTC) and with the body computer node (NBC) (for the twilight sensor)

It manages the following functions:

- Serial A-BUS line to rain/twilight sensor
- +15 for twilight/rain sensor ECU

N.B: The sensor is fitted on the windscreen.

## WINDSCREEN WIPER ECU (CTC)

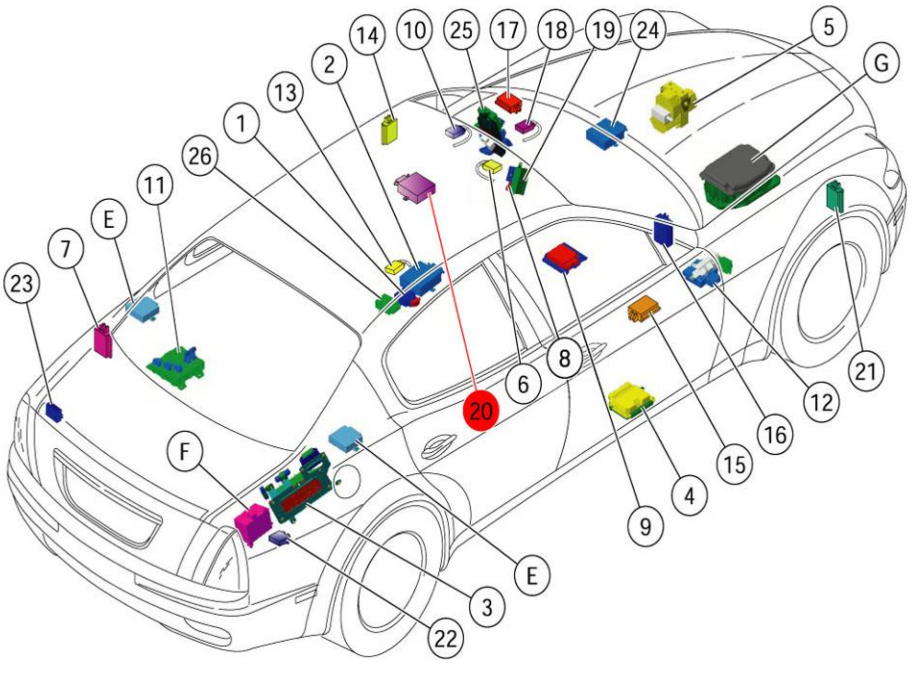



The Windscreen wiper ECU is an electronic and electromechanical control unit which operates the windscreen wiper motor according to the information received via the A-Bus from the rain sensor and the steering column stalk commands (wired directly)

The CTC interface performs the following functions:

- It receives and transmits information via serial line (rain sensor signal, windscreen wipers activated)
- It interconnects with the front wiring
- 1st and 2nd speed control signal from steering column stalk
- Rain sensor sensing range controlled from steering column stalk
- Windscreen washer pump control signal from steering column stalk
- Power supply for windscreen wipers ECU
- Power supply for windscreen wipers

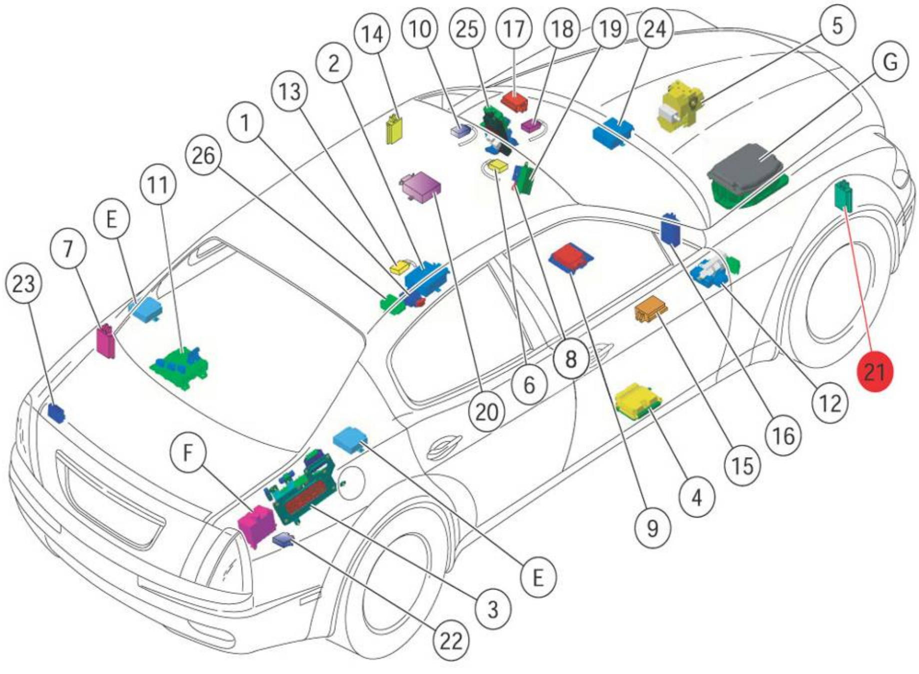
**MOTION-SENSING ALARM ECU (CAV)**




The CAV is an electronic component supplied with the front ceiling light which is connected to the serial A-bus line by means of the inside roof panel wiring.

It incorporates the motion-sensing anti-inclination sensors and it manages the motion-sensors' deactivation buttons

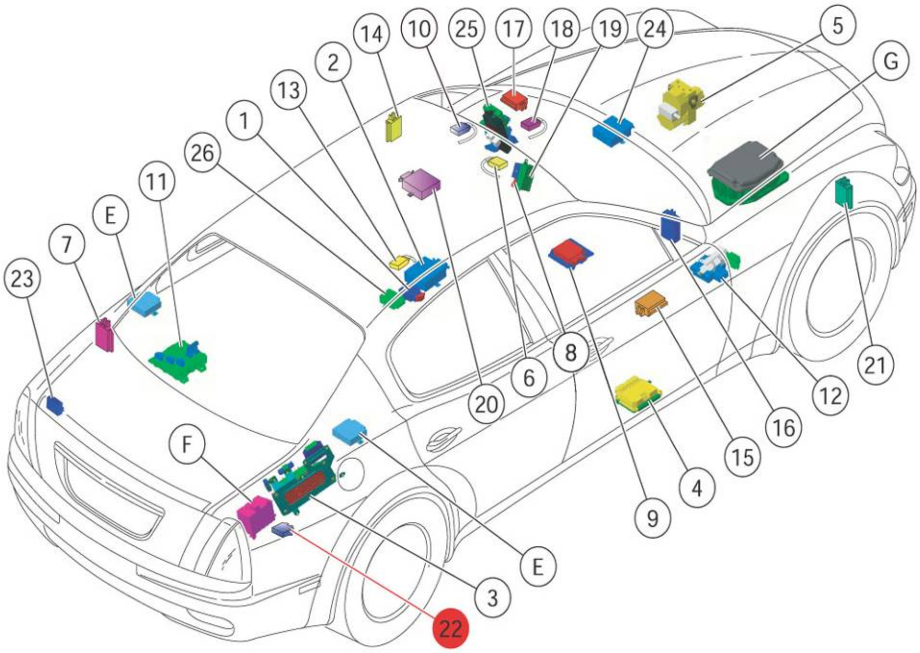
**ALARM SYSTEM SIREN ECU (CSA)**




The Alarm System Siren ECU performs the following functions:

- It receives/ transmits information regarding diagnosis and attempt theft to the body computer node  (NBC) via serial A-BUS line.
- It interconnects with the front wiring

**TV NODE (NTV)**

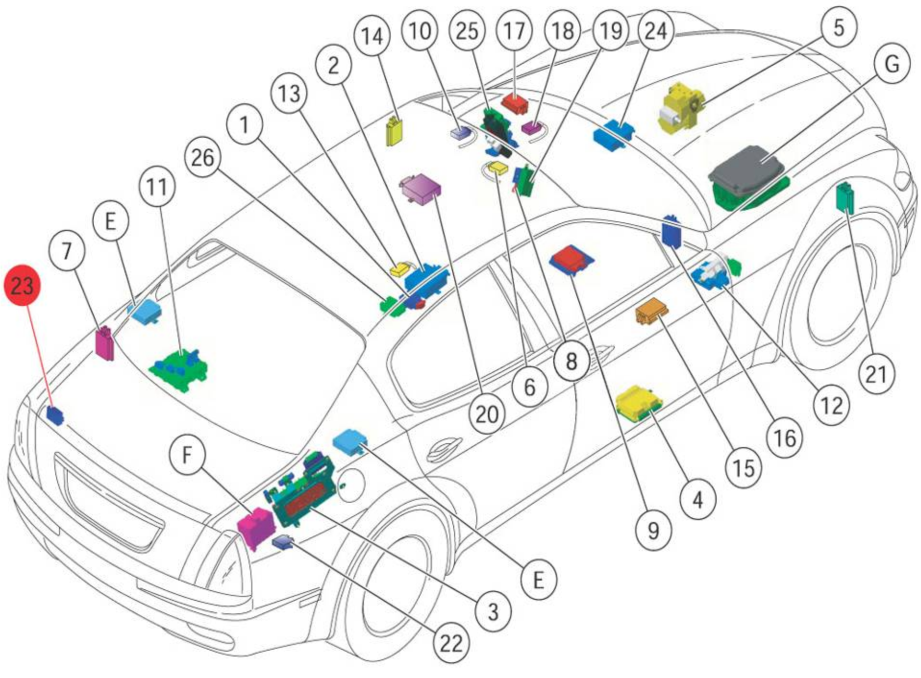



The module consist of a Diversity Television receiver with aerials incorporated into the rear window

It interfaces with the user by means of the NIT via I-CAN

It interfaces with the television wiring harnass.

**HI-FI AMPLIFIER SYSTEM (DSP)**

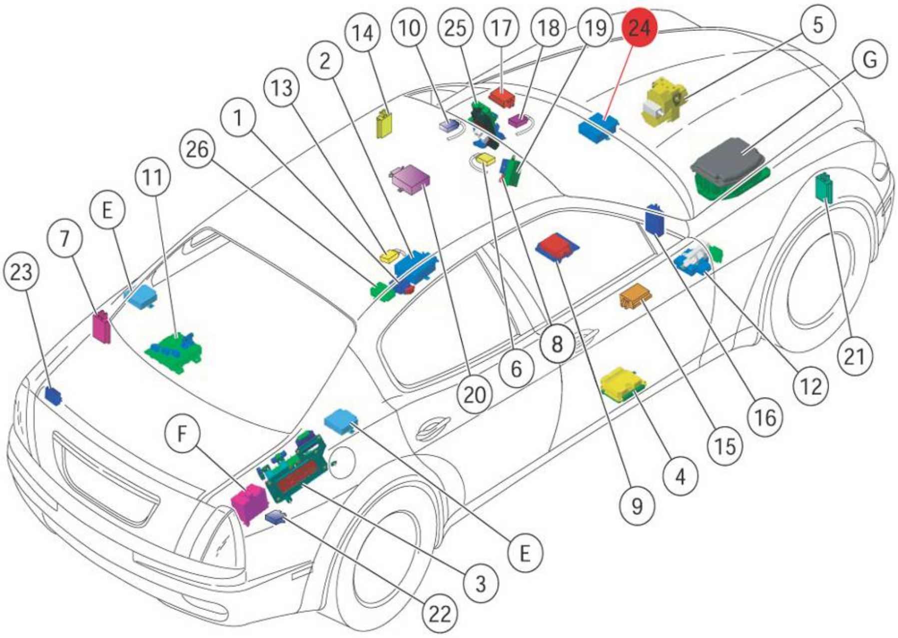



The hi-fi system amplifier interconnects with the rear wiring.

It manages the following functions:

- Signal for front and rear woofer.
- Rear LH and RH speaker
- Central speaker
- Secondary amplifiers activation.

**IT NODE (NIT)**



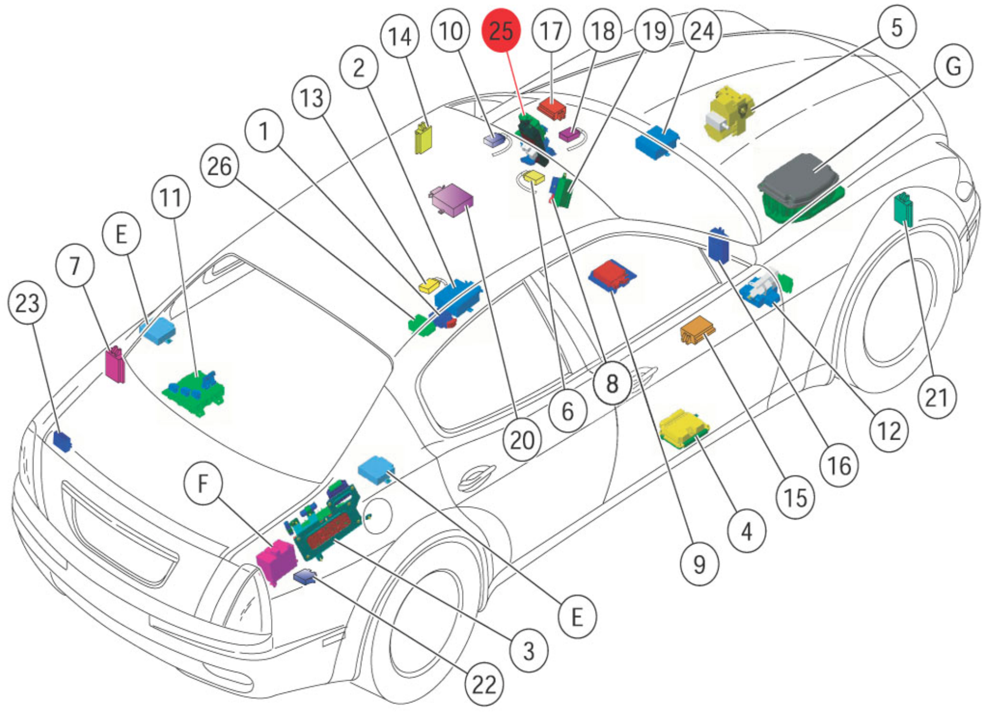

The IT Info Node is an ECU located in the centre of the dashboard which integrates informative, IT, audio/ video and air conditioning and heating system programming functions. The NIT has a multifunction display and a series of controls for interaction connected to the main electronic unit.

The IT Node - NIT- performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: diagnosis, data)
- It incorporates the menu interaction controls
- It manages a high definition colour display for varied information and navigation or the TV
- It interconnects with the dashboard wiring for the connection to the vehicle's electric system
- It interconnects with the IT wiring for the point-to-point connection with the TV tuner, CD changer
- It interfaces with the GPS, GSM and radio aerials by means of coaxial cables
- Vehicle setup

N.B: The telephone module (opt.) is fitted separately underneath the Silver Box.

## BODY COMPUTER NODE (NBC)




The Body Computer Node (fitted in the dashboard underbody on the steering wheel side) is composed of an electronic section and a electromechanical section (CPL) which are interconnected and constitute a single set (Dashboard Node). Both the electronic and the electromechanical sections perform interconnecting functions with the system and have fixed connectors for the link to the front, rear and dashboard wiring.

The electromechanical section contains the fuses and the remote control switches while the electronic section contains an EOBD fixed connector (J1962-compliant) capable of carrying out diagnoses of the Engine Control Node and the systems not connected on the line B-CAN via the K LINE and diagnoses of the nodes connected to the B-CAN line via this latter.

**The Body Computer sets up a two-way gateway between the C-CAN/ B-CAN networks.**

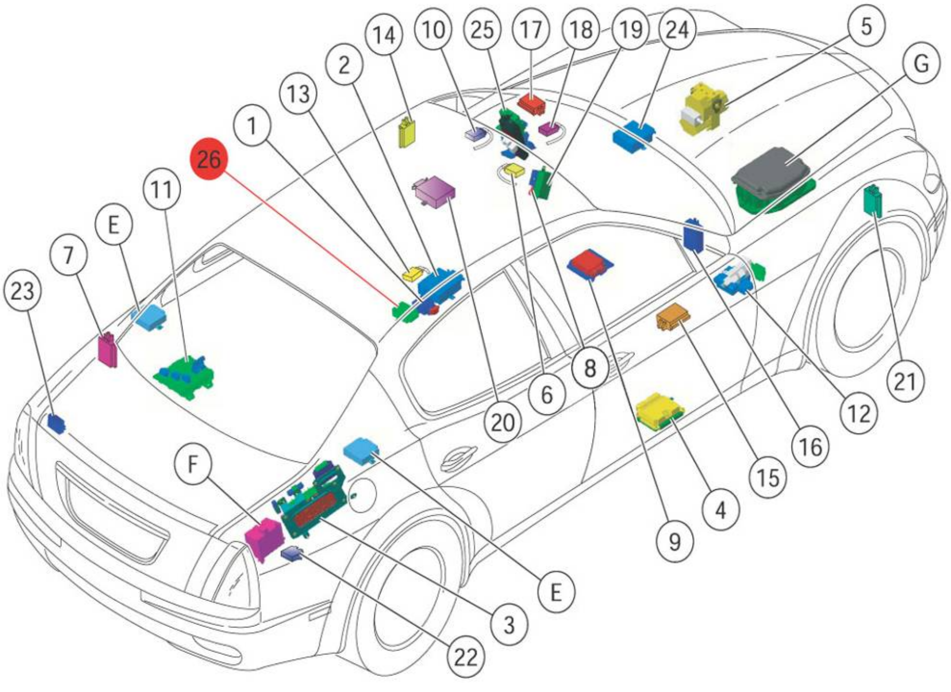
The connectors for the links with the front and rear wiring (and with the EOBD) are accessible from the front (fuses side) while those for the links with the dashboard wiring are located on the opposite side.

**BODY COMPUTER NODE (NBC)**

The electronic section of the Body Computer Node performs the following functions:

- It receives and transmits information on the B-CAN (e.g.: diagnosis, warning lights , commands, data) and C-CAN lines (e.g. warning lights, control signals, data)
- It receives and transmits information on the two-way A-BUS serial line for the alarms, windscreen wipers, twilight sensor
- It interconnects with the front and rear dashboard wiring
- It enables the diagnosis interfacing (J1962-compliant joint)
- It is connected to the CPL to measure the power supplies/ read signals and to operate the remote control switches
- It manages the Immobilizer / remote control / alarm (in the event of disconnection of the CAN line), recovery is enabled via the W line to the engine control node
- Configuration of vehicle’s electronic systems (stored at line end)
- Vehicle access (door lock/unlock)
- Internal / external lights management
- Headlight washers
- SPORT button management

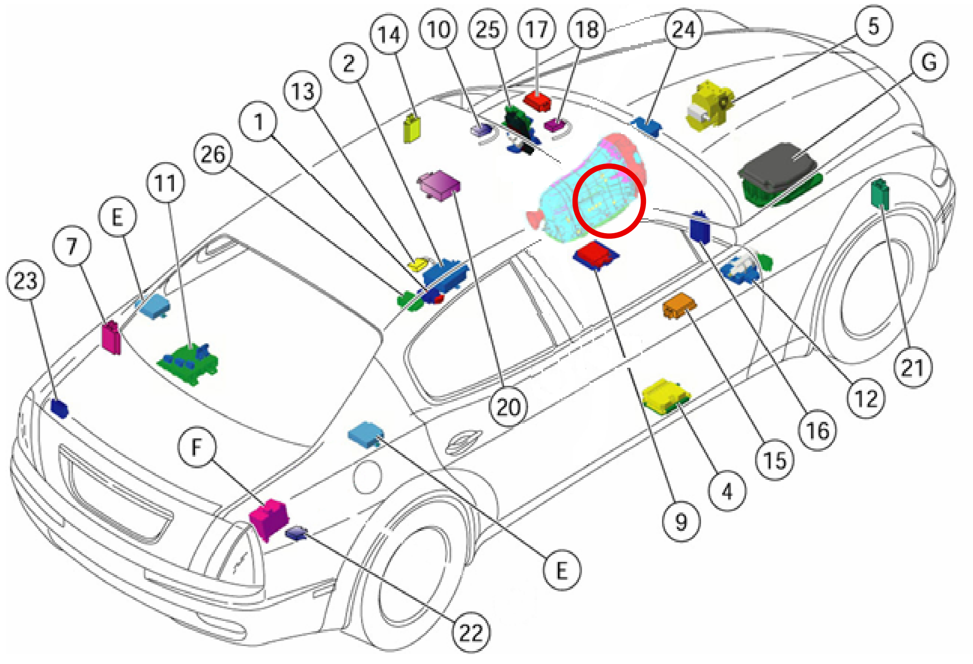
**TYRE PRESSURE NODE (NTP)**




The NTP manages the tyre temperature and pressure  information.

It acquires the tyre condition data  and the calibration request via B-CAN

**AUTOMATIC GEARBOX NODE (NCA)**




The automatic gearbox node positioned inside the gearbox (lower part) controls the information through the following networks:

- C-CAN (data transfer with other vehicle systems and diagnostics)

It controls the following functions:

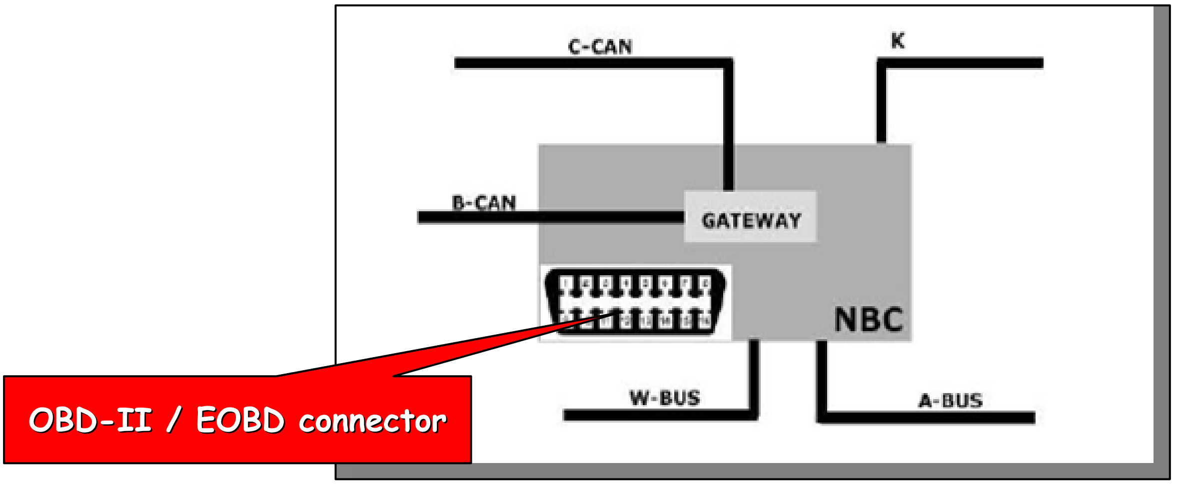
- Tachometric input signal and engine torque from Engine control node (NCM)
- Receives the commands from the gearshift lever by means of an integrated position sensor.
- It receives information from the various driver commands from the Body Computer over the B-can line.

# 5
# Diagnostics

## DIAGNOSTICS

### OBD-II / EOBD connector

The 16-pin diagnostic connector is standardised in accordance with OBD-II / EOBD standards (for Europe: from EURO 3 onward). The first Maserati with the 16-pin OBD-II / EOBD connector was the 3200GT of 1998. For vehicles with Florence electronic architecture (M139 and M145), the ODB-II / EOBD connector is located on the Body Computer. The diagnostic connector is the interface between the tester (SD3) and the various communication networks.




### Quattroporte OBD-II / EOBD connector pinout:

| | | | Connettore 16 v. 150 per collegamento diagnosi 1/01534/87-91343/42 (EOBD) | |
|---|---|---|---|---|
| E04KK | 1 | 150 | B-CAN_L privata per sensore di peso (collegamento con AV16) | X |
| E04KK | 2 | 150 | C-CAN H (solo per sviluppo) | - |
| E04KK | 3 | 150 | B-CAN_H privata per sensore di peso (collegamento con PD12) | X |
| E04KK | 4 | 150 | Massa di potenza per apparecchiatura di diagnosi (collegamento con PF9) | X |
| E04KK | 5 | 150 | Massa di segnale per apparecchiatura di diagnosi (collegamento con PF8) | X |
| E04KK | 6 | 150 | B-CAN B per diagnosi | X |
| E04KK | 7 | 150 | Linea K per diagnosi NCM/ NCR (collegamento con AV20) | X |
| E04KK | 8 | 150 | Non disponibile | - |
| E04KK | 9 | 150 | Linea K per zona plancia – CSG, CAF (collegamento con PD11) | X |
| E04KK | 10 | 150 | C-CAN L (solo per sviluppo) | - |
| E04KK | 11 | 150 | Non disponibile | - |
| E04KK | 12 | 150 | Linea K per zona anteriore, NFR, NCS (collegamento con AZ35) | X |
| E04KK | 13 | 150 | Linea K per NTV (collegamento con LN18) | X |
| E04KK | 14 | 150 | B-CAN A per diagnosi | X |
| E04KK | 15 | 150 | Non disponibile | - |
| E04KK | 16 | 150 | +30 presa diagnosi EOBD da F-39 (collegamento con CY17) | X |

## DIAGNOSTICS

### Quattroporte MY07 Automatic and Gran Turismo OBD-II / EOBD connector pinout

In compliance with ISO / SAE standards, for all cars from MY08 onward, Scan Tool must be available on the CAN line. For the Quattroporte from MY07 and Automatic, and for the GranTurismo, a new pinout assignment for the OBD-II / EOBD connector has been introduced. This makes it necessary to use a new "Switch Matrix" diagnostic cable.

| PIN | Funzione | M139 GQ | M139 FQ | Collegamenti interni |
|---|---|---|---|---|
| | **Connettore 16 v. 150 per collegamento diagnosi 1/01534/87-91343/42 (EOBD)** | | | |
| 1 | B-C.A.N. High (oppure B) a bassa velocità per diagnosi | X | X | AZ36-KK01-PF06-PD24-CY05 |
| 2 | Reserved ( Bus + SAE J1850) | - | - | |
| 3 | Reserved | - | - | KK03-PD12 |
| 4 | Massa di potenza per apparecchiatura di diagnosi | X | X | AZ30-KK04-KK05-PF08-PF09-PD10-PG36-PD19-LN03-AZ27 |
| 5 | Massa di segnale per apparecchiatura di diagnosi | X | X | AZ30-KK04-KK05-PF08-PF09-PD10-PG36-PD19-LN03-AZ27 |
| 6 | C-CAN High per diagnosi | X | X | KK06-AZ45-AZ49 |
| 7 | Linea K per diagnosi NCM/ NCR (collegamento con AV26) | X | X | AV26-KK07 |
| 8 | Reserved | N.C. | N.C. | |
| 9 | B-C.A.N. Low (oppure A) a bassa velocità per diagnosi | X | X | KK09-AZ35-PF05-CY07-PD25 |
| 10 | Reserved (Bus – SAE J1850) | - | - | AZ44-AZ48-KK10 |
| 11 | Reserved | N.C. | N.C. | |
| 12 | Linea K per zona anteriore, NAC, NFR, NCS, CSG, CAF (collegamento con AZ47) | X | X | AZ47-KK12 |
| 13 | Linea K per NTV (collegamento con LN24) | X | X | KK13-LN24 |
| 14 | C-CAN Low per diagnosi | X | X | KK14-AZ44-AZ48 |
| 15 | Linea L per diagnosi NOT USED | N.C. | N.C. | |
| 16 | +30 presa diagnosi EOBD da F-39 (collegamento con CY17) | X | X | CY17-PD26-KK16-LP51-AV17-AZ46 |

All diagnostics for cars with Florence architecture are performed with the SD3 tester!

Maserati Academy – March 2009