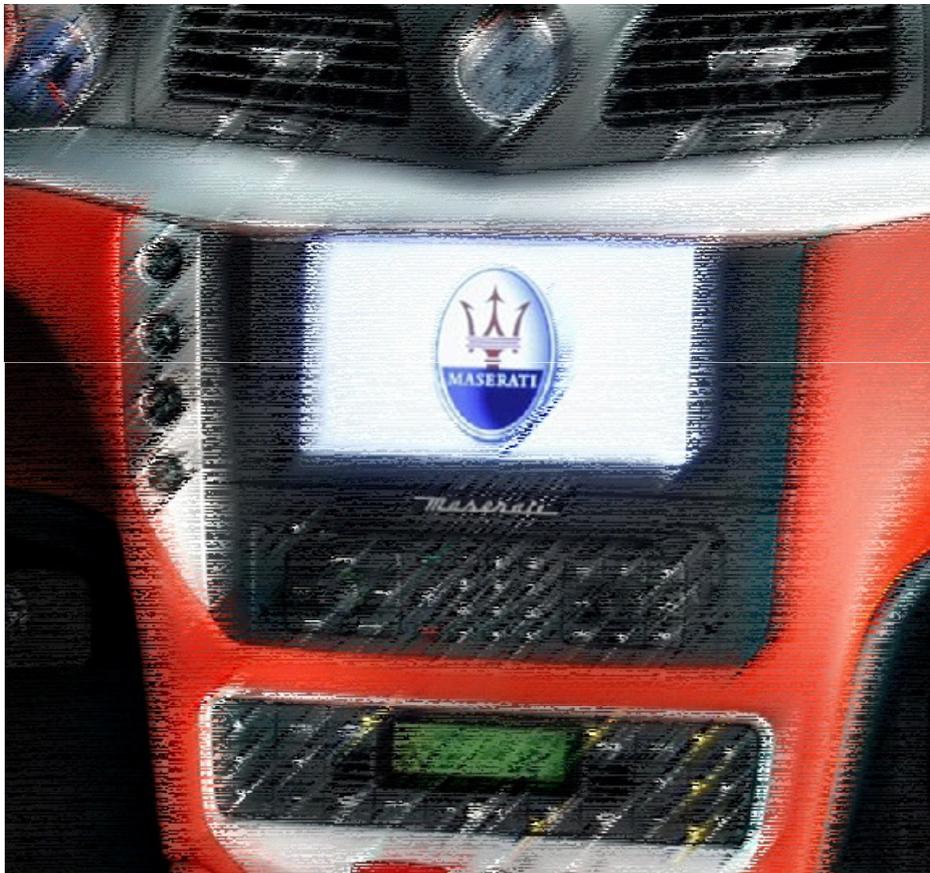




Advanced Electronics 3

Comfort and Body systems



October 2010 Edition

Training Documentation for Maserati Service Network

Advanced Electronics 3

Introduction

This document, “Advanced Electronics 3”, comes as a natural sequel to the Advanced Electronics 2 course.

The following nodes will be examined: NIT, NTV, DSP, NCL, NAB, NQS, NSP, NPG, NPP, NVB, NIM, NAG, CAV-CSA and CSP-CTC.

The goal of this document is to provide a detailed description of the vehicle systems listed above, used in the Maserati Quattroporte, GranTurismo and GranCabrio. Different aspects will be dealt with, such as operating principles, electrical system characteristics and diagnostics. All this, together with the practical exercises of the training course, are aimed at providing the Maserati service technician with the necessary knowledge and confidence to perform repair and service operations on these systems.



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Infotelematic Systems

Overview

The last few years, modern motor vehicles have benefitted hugely from new and advanced technologies which were initially developed for applications outside of the automotive world.

But what we know about integrated vehicle systems like ABS, airbags, and electronic control units in general is all invisible “to the eye”, except for the various types and levels of infotelematic devices that have overwhelmingly appeared on recent vehicles.

With the exception of the portable devices, which as yet are not integrated in the vehicle system, those fitted as standard today fully interface with the telematic network and make the vehicles a real travelling laboratory.

The infotelematic nodes, wrongly thought to be only navigations, actually integrate radio, GSM telephone, CD/MP3 reader, voice commands and CD player control functions, as well as the classic trip computer and onboard computer functions. All this can be viewed on a 7” colour display.

Telecommunications and information technology TELEMATICS

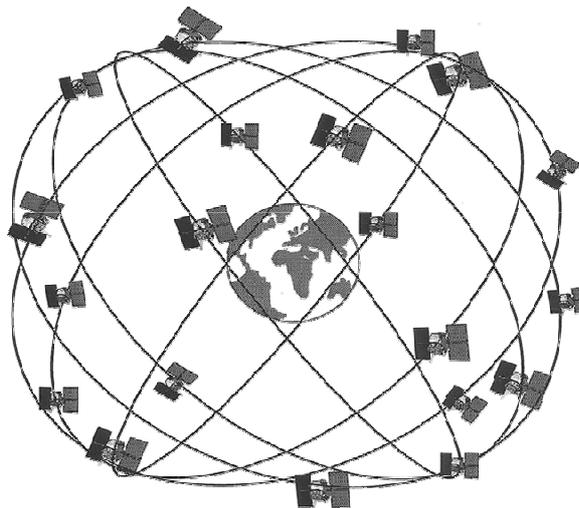


GPS system

INTRODUCTION

The Global Positioning System (GPS) launched by the USA in the seventies and completed in 1993, was designed mainly for military purposes to respond to the need of the American Ministry of Defence to keep track of their military means on the land and sea, in order to locate their position at any moment and to allow fast support or rescue operations when required.

GPS is a position identification system that uses 24 artificial satellites divided into six groups of four, which revolve around the earth at an altitude of about 20,200 km 360° in orbits having a distance of 60° from each other ($6 \times 60^\circ = 360^\circ$) and forming an angle of 55° with respect to the equatorial plane.



21 of these satellites are active while three act as reserve, i.e. are ready to start functioning when any one of the 21 ceases to operate.

This series of artificial satellites has an average lifetime of approximately ten years.

GPS allows us to calculate:

- Time
- Longitude
- Latitude
- Altitude
- Distance
- Speed
- Degrees

OPERATING PRINCIPLE

The GPS system was actually created as a satellite version to perfect the existing LORAN (LONG RANGE Navigation) system born in the USA in the '40s, which allows you to identify your position along the major sea and air traffic routes and uses a large number of terrestrial master and slave stations.

The GPS system allows you to identify your position on the earth's surface and also the height you're flying at when you're in a plane, and is today active at any point on earth from the equator to the poles and at any remote point in a desert or large city. You need to have a GPS receiver with you, which intercepts the microwave signal generated by the satellites in orbit as they pass above us. Given the number of satellites, their individual orbit and their period of revolution around the earth, we may say that at any time there are on average eight satellites above us.



DEGREE OF ACCURACY

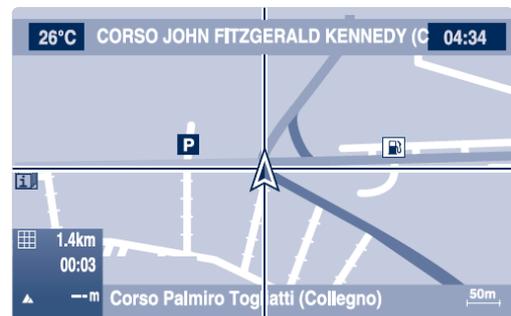
GPS satellites generate two different numerical signals, referred to as L1 and L2, at modulated frequencies of approximately 1.5 and 1.2 GHz respectively. The first signal is used for rough location (type civil) and the second for more precise location (military type).

The first signal allows you to identify your position with an accuracy of 300 cm, while the second one with an accuracy of 50 cm. The first signal is transmitted unscrambled, whereas the second is transmitted via a secret code and is only accessible by the American Ministry of Defence, that uses this code only for its own security and does not disclose it to prevent it from being used against the United States of America by criminals or enemy countries.

Each satellite transmits both high-frequency signals to the earth, which are received by a specific receiver. GPS receivers only function outdoors and cannot therefore be used inside an apartment or underground, as they need to have an open sky above them to be able to receive the satellite signal.

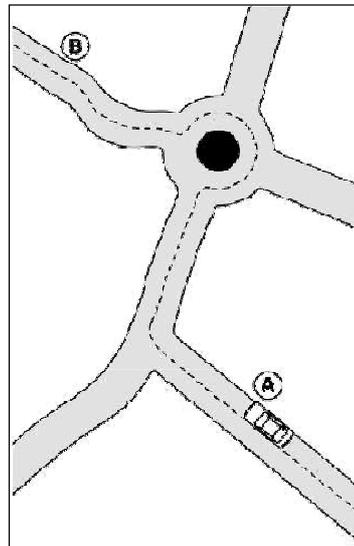
GPS RECEIVER

GPS receivers automatically tune in to the above satellite frequencies and, after a data search and processing time of only a few minutes, are capable of determining their geographical position on the earth surface in terms of latitude and longitude, by pinpointing the distance to at least 4 satellites. The best receivers, especially those fitted on vehicles, are capable of showing their position on a complete geographical map of a single country, e.g. Italy, which may be zoomed in until turning into a real topographic map, where main streets and their names are shown, as in the example figure below.



The navigation microprocessor positions the vehicle on an electronic map that uses GPS (its position). A yaw percentage sensor confirms the cardinal and relative point (compass point). If you enter a destination in a navigation, the navigation microprocessor calculates the route and travel from point A to B. The vehicle moves precisely on the electronic map using the vehicle speed signal received in real time from the ABS unit.

While the vehicle is moving its position is continuously updated by means of the GPS signal, therefore the actual value and the value calculated by the navigation microprocessor are monitored to check whether the vehicle is still on the route.



The satellites - equipped with ultra high-precision atomic clocks are synchronised by the American station at Colorado Springs each time the satellites pass over it - continuously transmit numerical data including their own X, Y and Z coordinates and the exact instant of transmission.

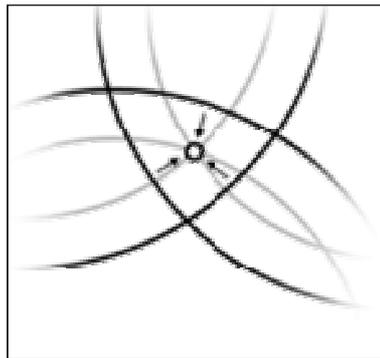
The receiver on earth processes this data comparing it with its local time – also the receiver is equipped with a precision quartz clock, even if not a high-precision one – and knowing the velocity of the electromagnetic waves, calculates its distance from each of the satellites from which it is receiving the signal.

Knowing the distance of only one satellite is not enough for the receiver to determine its position, as neither the azimuth nor the zenith position of the satellite is known, and likewise it is not enough to know the distance between two satellites. Actually, the intersection of two spheres of known radius, i.e. the calculated distances, generates a circle and not a point.

The intersection of three spheres of known radius determines two points, one of which however is normally unacceptable as it is at very high altitude and moves at very high speed.

Only the intersection of four spheres of known radius allows us to identify an exact position in space with certainty, which explains why the receiver needs some time, even if only minutes, to process the data, since at least four satellites need to pass over it, as well as the time to make numerous calculations.

The data of the fourth satellite is used to make the position of the receiver unambiguous.



GLONASS SYSTEM

GLONASS (GLObalnaya NAVigatsionnaya Sputnikovaya System, also GLObal NAVigation Satellite System) is a satellite position identification system produced by the USSR around the same period as the American GPS and has very similar features, the only difference lies in the fact that it is not encrypted but fully uncoded.

This system is equipped with 24 satellites, but divided into three orbits spaced 120° apart at an altitude slightly higher than the GPS satellites; moreover, the frequency is determined based on a variable factor and the time does not correspond to that of Colorado Springs. Despite the substantial technical differences between the two systems, some of the best GPS receivers can receive signals from either system and achieve an overall accuracy similar to that of the American coded military system, i.e. almost half a metre.

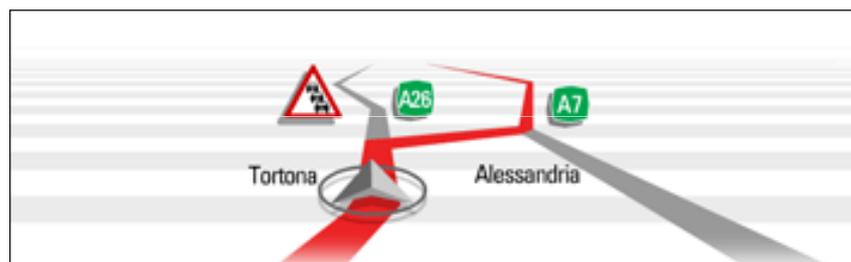


TMC

OPERATING PRINCIPLE

TMC, the acronym for Traffic Message Channel, is a service that allows you to receive traffic information directly on your navigation. This acronym is often used alongside the more well-known RDS (Radio Data System), as the TMC traffic information is generally transmitted by an FM radio station using the RDS data channel which allows the car radio to be automatically tuned, indicating the name of the station. Just think that the RDS system, which uses coding with a high information content, would allow not only providing the TMC traffic service but also sending signals to improve reception of the position from the GPS satellites (GPS differential signal).

Already back in the late nineties, making use of the FM RDS channel, traffic messages could be received on some radios (mainly sold in northern European countries) that were capable of scrolling the traffic messages transmitted on the audio channel on the display and later, using a synthesized voice, read them out.



In recent years, with the large diffusion of satellite navigation systems, the traffic information service has become a decisive feature for the choice of one or another model. navigation manufacturers therefore had no choice but to make the device capable of receiving this information and the RDS-TMC system was chosen as the best candidate to offer a world standard.

This consolidated and reliable technology today allows us to publish information to satellite navigation systems – installed in vehicles or on handheld devices - provided they can receive the TMC signals (via a specific antenna) and show on the digital maps what is happening on the route and change the trip in relation to the traffic conditions.

In order to receive the TMC service, an agreement between the navigation supplier and the service provider is necessary, the device must be enabled to receive the TMC signal, and the TMC channel of the navigation must be tuned to a radio frequency which provides TMC information (for example: RTL 102.5 MHz for Italy). This does not have any impact on the car radio, which can be tuned to another station or even be off.

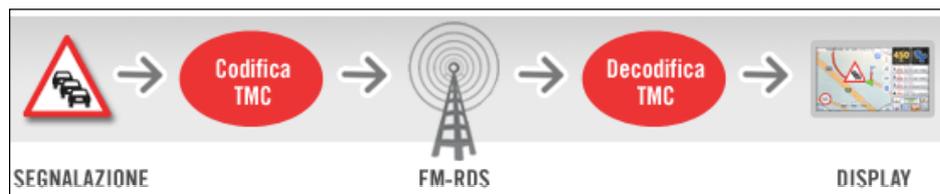
TECHNOLOGY

The information is transmitted on FM frequency via the RDS channel and using the TMC protocol that defines the encoding rules.

Each piece of traffic news is sent as an independent message. The messages are made up of an event code, a localisation code and some additional information, such as the expiry time of the traffic news. The messages are coded according to the Alert C standard and may be encrypted according to the specifications defined in the TMC protocol.

The receiving system decodes the messages and shows the traffic news on the map using the TMC protocol and the localization tables already integrated in the maps of the main suppliers. In addition, the message may be shown in text form translated into the user's language.

If the function is enabled, the navigation will change the set route to avoid the trouble spot indicated.



TMC – Coverage (example: Italy)

The TMC.IT service is provided by Infoblu on the RTL 102.5 frequencies. Coverage depends on the FM radio signal, which in the case of RTL 102.5, provides approximately 80% coverage for Italy. The service provides information on the traffic conditions and other factors that may have an impact on your journey (weather conditions, accidents, road closures, etc.). The information is provided directly by the traffic control centres of the road operators, enriched with automatic monitoring systems.

TMC - Diffusion

The TMC service is more and more widely used. Whereas America generally utilizes satellite transmission, in Europe transmission is via radio through the RDS system, which allows us to send digital data over an FM channel.

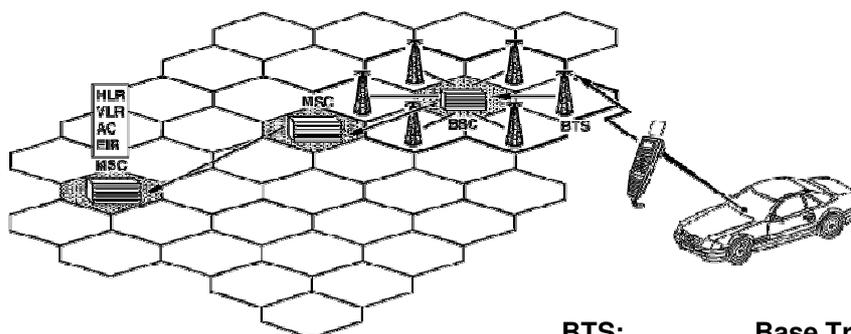
In Italy, as well as the TMC.IT service provided by Infoblu on the RTL 102.5 frequencies, the TMC service provided by CCISS on the RAI frequencies is available, receivable by all users but with coverage limited mainly to northern Italy.



GSM

The Global System for Mobile Communication (GSM) is a terrestrial communication standard.

This standard requires digital data transmission, a frequency range between 900, 1800 and 1900 MHz and a certain cellular honeycomb structure, hence the name “cellular phone”.



BTS:	Base Transceiver Station
BSC:	Base Station Controller
MSC:	Mobile Switching Service Centre
HLR:	Home Location Register
VLR:	Visitor Location Register
AC:	Authentication Centre
EIR:	Equipment Identification Register

GSM – OPERATING PRINCIPLE

Every mobile phone user has “a domestic address” (in the MSC) where the various pieces of information are stored, including the customer data and the mobile call data.

Each mobile user and his or her mobile phone is booked in a cell (BTS). (each BTS has a maximum range of 16 kilometres and can simultaneously handle 97 calls).

7 BTS's are connected to a base station controller (BSC).

There are 44 MSC's for cities of more than 100,000 inhabitants and one MSC for each region.

If, for example, a user moves from one BTS zone to the next, there is a so-called handover to the next BTS.

The mobile phone transmits to the base station (BTS). This information is communicated via the base station controller (BSC) to the relative mobile switching service centre (MSC). The call is then sent with the “domestic address” (domestic MSC), for example, to a fixed network or another mobile switching service centre (MSC).

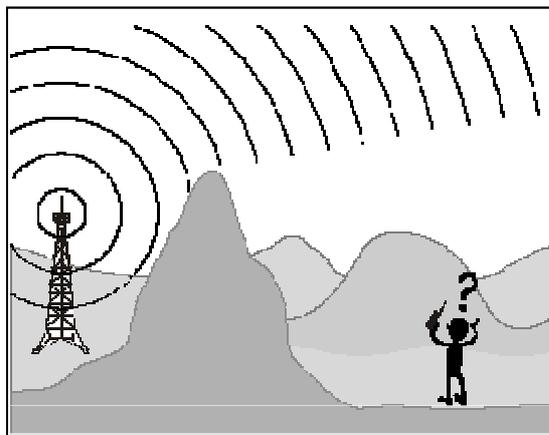
GSM - LIMITATIONS

Making calls over the mobile networks, sometimes brings some unwelcome problems with it.

For example:

Silent radio zones

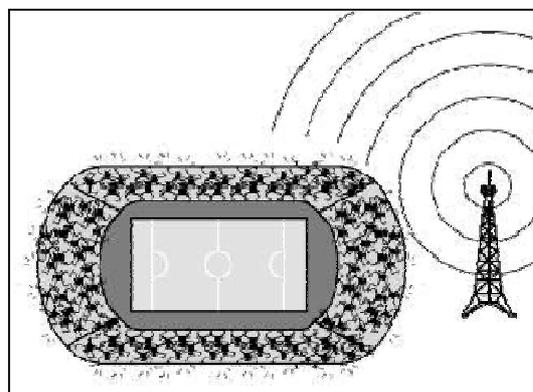
Considering that the GSM signals propagate at extremely high speed, the so-called "silent zones" are equivalent to the "shade zones" of large obstacles that may cause attenuation of the radio signal. As a result, communication is impossible.



System overload

When too many users with mobile phones connected to one cell want to make a call at the same time (for example, in a football stadium, traffic jam, etc.)

the result is that the network is overloaded and you can't get a connection.



Bluetooth

Bluetooth is a wireless short-range connection system between two different devices, in the case of a car, a mobile phone and the audio system.

The name Bluetooth derives from the name of an ancient Danish king, Harald Blåtand, known for his penchant for uniting the peoples of Denmark. Bluetooth is the English translation of Blåtand.

The system was originally developed by

Ericsson, IBM, Intel, Nokia and Toshiba, which now form the Special Interest Group (SIG).

The first Bluetooth standard was established in 1999 with version v1.0, in 2000 it was updated to version v1.1 and then to v1.2, later on it was updated to version 2.0, currently the most widespread, and recently to 3.0, the latest on the market (21 April 2009).

The system was designed to connect not only mobile phones but also other devices such as computers, palmtops, printers, keyboards, mice, cameras, etc. With the first version, the range of action covered was 10 metres, with the later versions it became 50 metres and now in some cases is even 100 metres. The radio communication frequency used ranges from 2.40 to 2.48 GHz (far below that used by mobile phones) and this frequency range is further split into 79 channels, each of which have a bandwidth of 1 MHz.



BLUETOOTH® - OPERATION

You can keep your Bluetooth mobile phone in your pocket, get into the car, turn on the multimedia entertainment system and dial a telephone number using the alphanumeric keyboard on the NIT or scroll the mobile phone contact list on the screen with the mobile phone still in your pocket. Once the call has been forwarded or received, the audio system automatically interrupts the music programme you were listening to, switches to the call, and displays all the call information (such as caller ID, call time etc.) on the screen.

MAIN BLUETOOTH FUNCTIONS

- Answer call
- Dial number
- Redial last number called
- Search numbers in memory
- Speed-dial button for the first 9 numbers in memory
- Hands-free volume adjustment
- Caller ID
- DTMF (Dual Tone Multi Frequency)
- Download contact list
- Mute audio system during call

ADVANTAGES FOR THE CUSTOMERS

- Complete integration with the multimedia system
- Wide choice of compatible mobile phones
- Hands-free option
- Access to contact list
- Voice controls
- Controls on the steering wheel

**SYSTEM LIMITATIONS**

- No SMS
- Voice commands stored on the phone
- No battery charger
- Downloading the contact list may take a few minutes
- No external antenna
- Not all Bluetooth® mobile phones can be connected

SYSTEM PAIRING

To connect two Bluetooth devices, it is essential that an initial so-called "pairing procedure" be performed: after enabling the Bluetooth function in both devices, one of the two is used to start searching for the other; when found, a recognition code, known as "pairing" code, must be entered. Once the code has been entered the two devices are connected to each other and ready to exchange information. Sometimes the pairing code is preset by the manufacturer and indicated in the use and maintenance handbook, other times it can freely be made up (always 4 digits, example: 1-2-3-4) and entered in both the devices when requested. The pairing procedure is required only the first time the devices are connected.

CONNECTION DIAGRAM

Among the communication networks today (also Bluetooth is a communication network) the Master-Slave and Multimaster systems are the most common.

Master-Slave principle

The master is the active partner in this system. It has a say in the network and can send a message to the participants or receive one from the participants on its request.

The slave is the passive partner in this system. The master asks it to receive or send data. The Bluetooth connection utilizes the Master-Slave principle.



Multimaster principle

In a Multimaster system all the participants are master and slave at the same time. In other words, all the stations can act as master at a given moment. If at least two stations send data at the same time, conflict must be avoided by following a specific protocol. The Bluetooth connection is unable to use the Multimaster connection principle.



Problems and warnings for pairing:

Normally, latest-generation multimedia systems function as master by default, but they can also act as slave if forced to do so.

The mobile phones commonly found on the market function as slave and pairing (Master-Slave) therefore does not create any problems.

In this case, the pairing procedure starts from the vehicle multimedia system from where the search for the mobile phone to be paired is launched. When the pairing code is requested, a 4-digit code must be entered, first in the multimedia system and then in the mobile phone.

The more sophisticated mobile phones, such as those that have e-mail or PDA functions (BlackBerry, iPhone, etc.), often act as master (the Multimaster principle cannot be managed by Bluetooth) and could hence come into conflict with the vehicle's multimedia system and not pair or pair but with limited functionality.

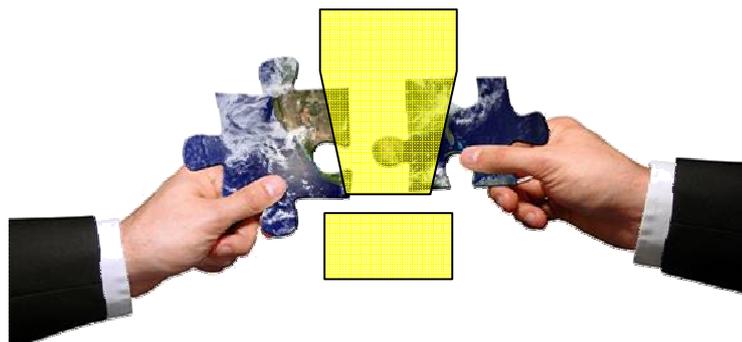
In the case of a mobile phone that functions as master, the pairing procedure must start from the mobile phone from where the search for any multimedia devices is launched. The vehicle device (for example: "Bose Media Device" for the vehicles equipped with a NIT Bose) that must be selected will appear on the mobile phone display.

When the pairing code is requested, a 4-digit code must be entered, first in the multimedia system and then in the mobile phone.

This procedure forces the vehicle multimedia system to no longer function as master but as slave and there will thus once again be a Master-Slave configuration, where the mobile phone functions as master and the multimedia system as slave.

This technique allows you to pair some mobile phones that cannot be paired with the normal procedure (search from the multimedia system).

Nonetheless, some mobile phones may still have pairing problems or limited functionality because of the software installed. These are often mobile phones sold or loaned for use by telephone operators that install dedicated software on them, which may come into conflict with the vehicle multimedia system. In this case, there is no technical solution to pair these mobile phones if not to try and update the phone software by installing the original software of the mobile phone, which can normally be downloaded from the website of the phone manufacturer.



BLUETOOTH - WARNINGS

Bluetooth is a standard connection system, but this standard is updated with new versions (v1.0, v1.1, v1.2, 2.0 or 3.0). For this reason, it is important that the two devices to be connected have the same standard and therefore the same Bluetooth version, otherwise they might not connect to each other or have limited functionality. When buying a mobile phone, it is therefore important to check compatibility with the vehicle multimedia system. Not all Bluetooth mobile phones can be paired with the vehicle multimedia system.

When the mobile phone is connected to the vehicle hands free system via Bluetooth, the phone battery is not charged and the phone antenna is used. In addition, when the Bluetooth function is enabled, the mobile phone battery runs down faster.

SDARS

Satellite Digital Audio Radio Service (SDARS) is a music transmission service via satellite for which the first licence was granted in the USA in 1997.

Satellite radio uses the 2.3 GHz S-band of frequencies.

The most famous satellite radio stations today are Sirius Satellite Radio, XM Satellite Radio and Worldspace. XM Radio uses two geostationary satellites. Sirius Satellite Radio uses three satellites that travel in elliptical orbit. Worldspace currently uses two geostationary satellites, but is planning to add a third one to expand the service for Central and South America.

Sirius Satellite Radio and XM Satellite Radio both cover the USA. Worldspace currently serves Asia and Africa.

Projects are underway for this service to also cover Europe. This services allow the user to listen to one station across great distances.



DAB

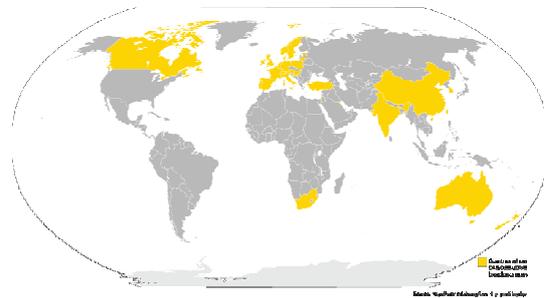
Digital Audio Broadcasting (DAB) is a digital system that allows transmission of radio programmes with a quality comparable to that of a compact disc.

Digital code transmission has several advantages over analogue transmission:

Less influence of any interferences on the signal.

It is no longer necessary to manually search for the station in relation to the receiver's position.

Improvement of existing services and introduction of innovative multimedia services, such as information associated with programmes (PAD: Program Associated Data) or independent of them (N-PAD: Non Program Associated Data).



Signal multiplication, i.e. the possibility to have the same channel share several signals and consequently more users able to share the same transmission medium without interference between them.

Flexibility and wide choice, thanks to a system that is essentially one data flow that can therefore transmit a large number of services. These may include: existing audio programmes with the addition of information in the form of texts, graphs or multimedia; Brand-new radio services and multimedia applications.

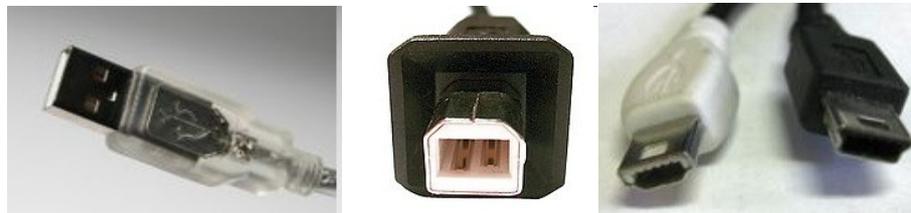
The DAB Club Italy stations started digital transmissions already.



USB

USB (Universal Serial Bus) is a serial communication standard that allows different peripherals to be connected to an electronic device. It was designed to allow connection of several peripherals to only one standardised interface and only one type of connector, and to improve plug-and-play functionality thus allowing the devices to be connected/disconnected without having to turn the device off and on.

The USB 1.0 standard (January 1996) supports only 1.5 Mbit/s connections, a speed adequate for mice, keyboards and slow devices. The 1.1 version (September 1998) increases the speed to 12 Mbit/s. The greatest novelty of USB 2.0 (April 2000) is that the transfer speed has been increased to 480 Mbit/s.

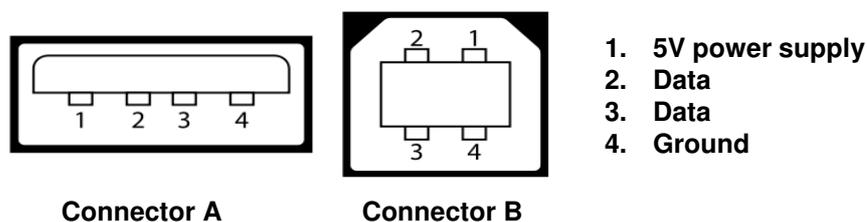


The USB system is asymmetrical and consists of a single handler and many peripherals connected by a tree structure through devices called hubs. It supports up to a maximum of 127 peripherals.

The maximum length the cable may have without the signal becoming too weak is 5 m; going beyond this limit, one or more active hubs need to be used to amplify the signal. The specifications lay down that a maximum of 5 hubs may be connected consecutively (USB 2.0 = max 25m; USB 1.0 & 1.1 = max. 5m).

The standard lays down that the connector must have a cable (called VBUS) to power the low-consumption peripherals. Peripherals that have high energy requirements must be powered separately. The energy limits laid down by the standard must be strictly observed on pain of damaging the handler, given that the minimum specifications of the USB standard do not provide for disconnection in the event of an overload.

The USB specifications establish two types of connector to connect the devices: A and B. In recent years, some manufacturers have introduced variants of the connector to fit in their miniature devices.



Infotelematic Systems

Quattroporte – GranTurismo - GranCabrio

Infotelematic Systems: Quattroporte – GranTurismo - GranCabrio

While the previous chapter gives an overview of the technology used in the infotelematic systems in modern motor vehicles, the goal of this chapter is to give the reader a detailed description of the infotelematic units (NIT) and related systems as found in the recent Maserati models. The following systems are described:

- Blaupunkt NIT (Quattroporte up to MY08)
- Magneti Marelli NIT (GranTurismo, GranCabrio and Quattroporte Restyling)
- Bose NIT (Quattroporte Restyling, optional)
- Bose Surround Sound system (all models)
- Rear seat entertainment system (RSE) (only for Quattroporte models, optional)
- TV node (only for Quattroporte models, optional)
- MMBC system (Maserati Multimedia Business Center) (only for Quattroporte Collezione Cento model)



Blaupunkt NIT (Quattroporte up to MY08)



The Blaupunkt NIT (Infotelematics Node) is an integrated device with a 7" screen and incorporated controls. The NIT is built in the centre console. All the Quattroporte vehicles from 2003 up to MY08 are equipped with the Blaupunkt NIT.

The Blaupunkt NIT features the following functions:

- 7" TFT display
- RDS radio
- CD-player
- CD-changer (optional, external device)
- Satellite navigation
- Telephone (optional, external device)
- On-board computer
- Vehicle settings (setup)
- Analogue TV tuner (optional, external device)
- Rear Seat Entertainment system (optional, external device)

Note: For the Blaupunkt NIT without telephone option, a Bluetooth retrofit kit is available from the Maserati Spare Parts Department. For further information, see the Technical Information Bulletin No. 200922.

Blaupunkt NIT description

The InfoTelematics node is an ECU located in the centre of the dashboard which combines information, telematics, audio/ video functions. The NIT has a multi-function display and a series of interaction controls connected to the main electronic control unit.

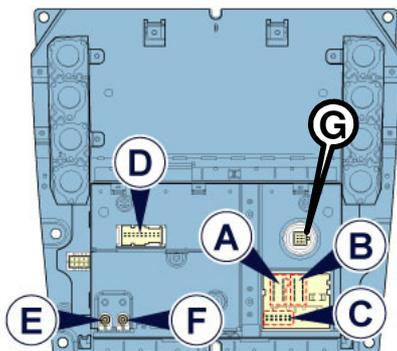
The InfoTelematics Node features the following functions:

- It receives and transmits information via B-CAN line (e.g.: diagnosis, warning lights, commands, data)
- It incorporates the interactive menu controls
- It controls a high-definition colour display for various kinds of information, navigation or television (optional)
- It is interconnected with the dashboard wiring via a NIT bridging cable, for connection to the vehicle electric system
- It is interconnected with the telematic wiring harness for point-to-point connection with the TV tuner (optional), the CD changer (optional) and RSE (optional)
- It interfaces with the GPS, GSM and radio antennas by means of coaxial cables
- Vehicle setup

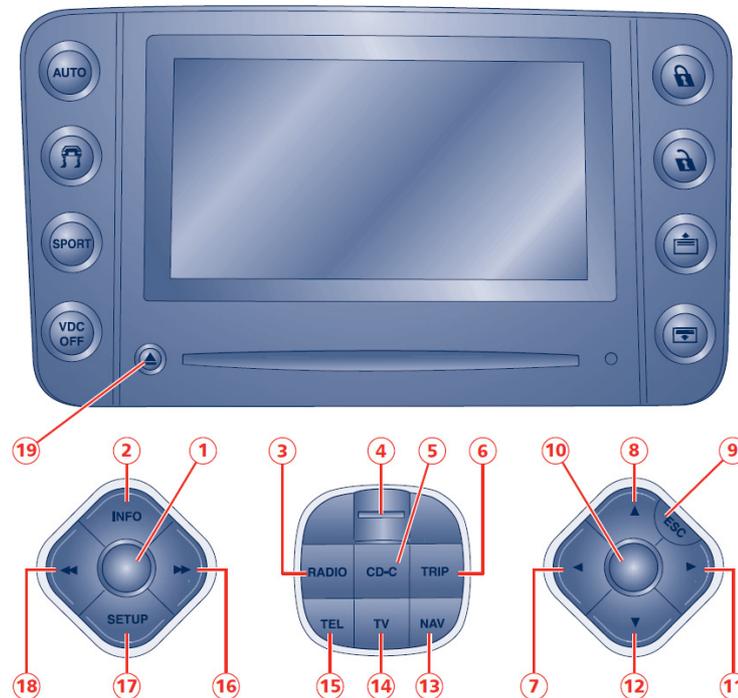
Electrical characteristics of the Blaupunkt NIT:

No-load power absorption (sleep mode):	2 mA
Power supplies:	+30
Earths:	1

Blaupunkt NIT electrical connectors

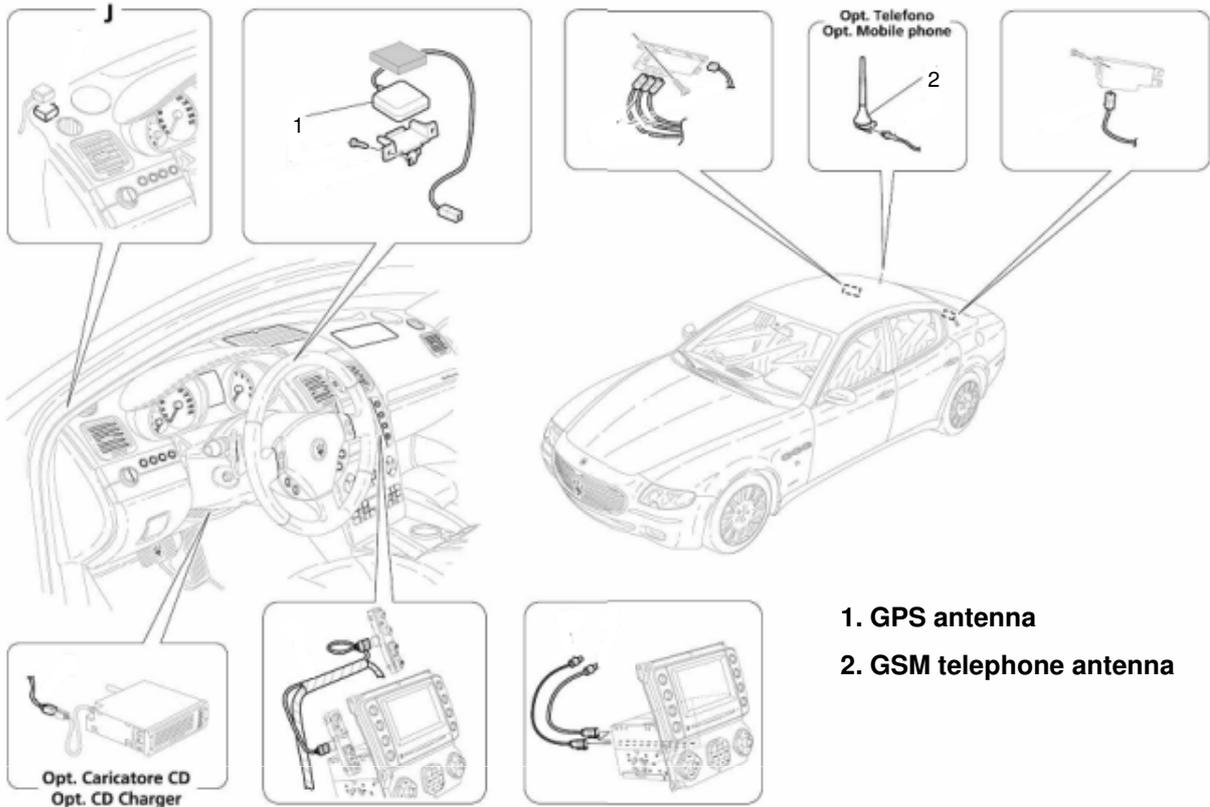


- Connector A: speakers
- Connector B: B-CAN lines, power supply and earth, Mute line from GSM-Box, connection to Bose amplifier
- Connector C: I-CAN lines, audio inputs from telephone, CD-changer connections
- Connector D: audio/video connections for TV node and RSE system
- Connector E: FM antenna (white)
- Connector F: AM antenna (yellow)
- Connector G: GPS antenna

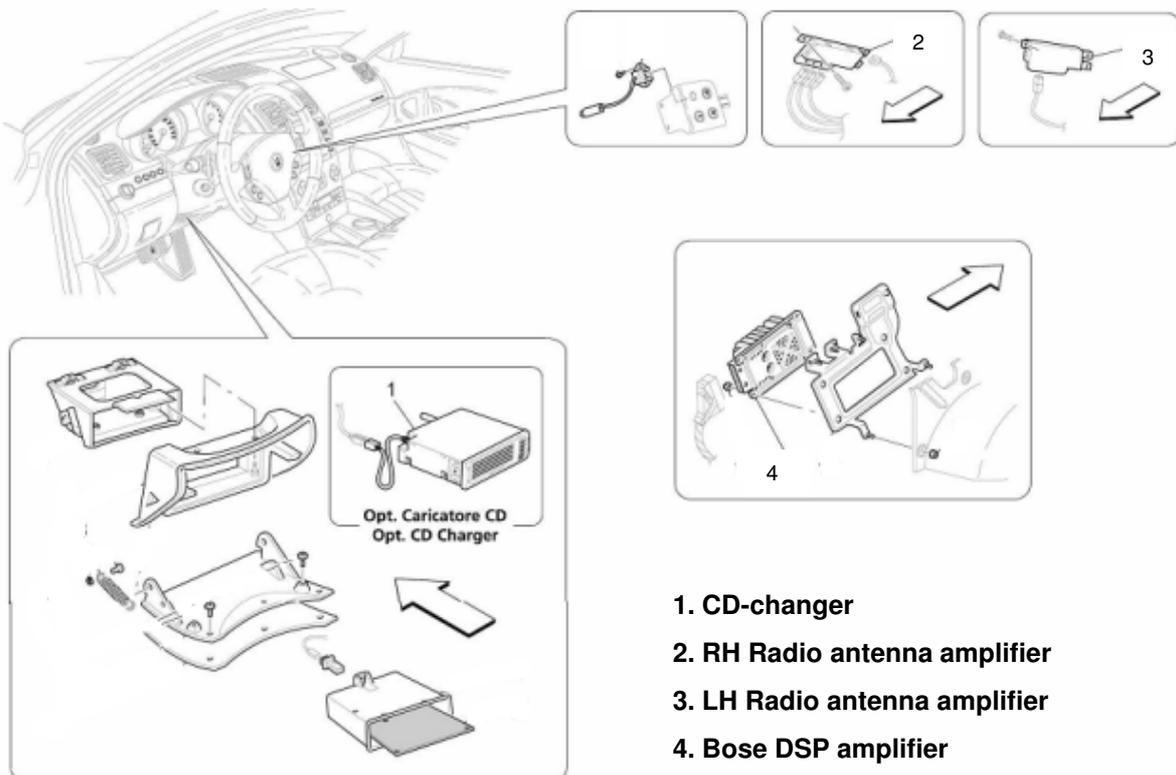
Blaupunkt NIT controls

1. ON/OFF knob and volume adjuster
2. Info button
3. Radio button for access to the radio function
4. Slot for telephone SIM card (optional)
5. Control button for CD or CD-changer operation
6. Trip button for the onboard computer
- 7 to 12. Controls for navigation/selection in the various menus
13. NAV button, to start navigating
14. TV button for access to the TV function (only with the vehicle stationary, optional)
15. TEL button for access to the telephone function (optional)
16. Track selection or tuning to the next radio station
17. SETUP button for the NIT and vehicle settings
18. Track selection or tuning to the previous radio station
19. CD / CD-ROM eject button

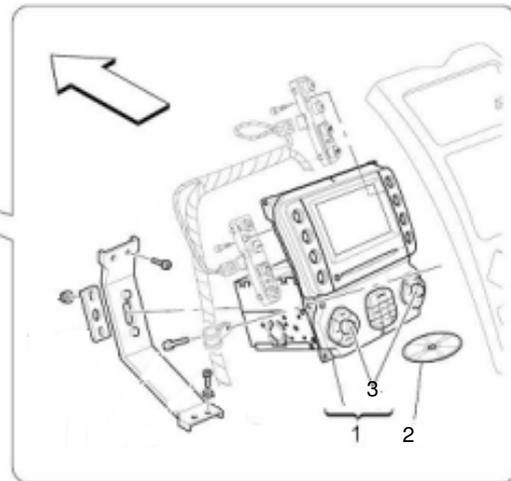
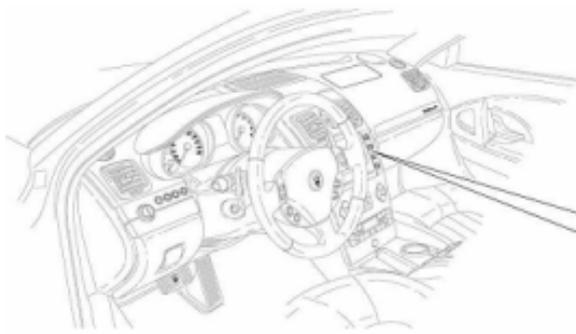
Blaupunkt NIT– Component location in the vehicle



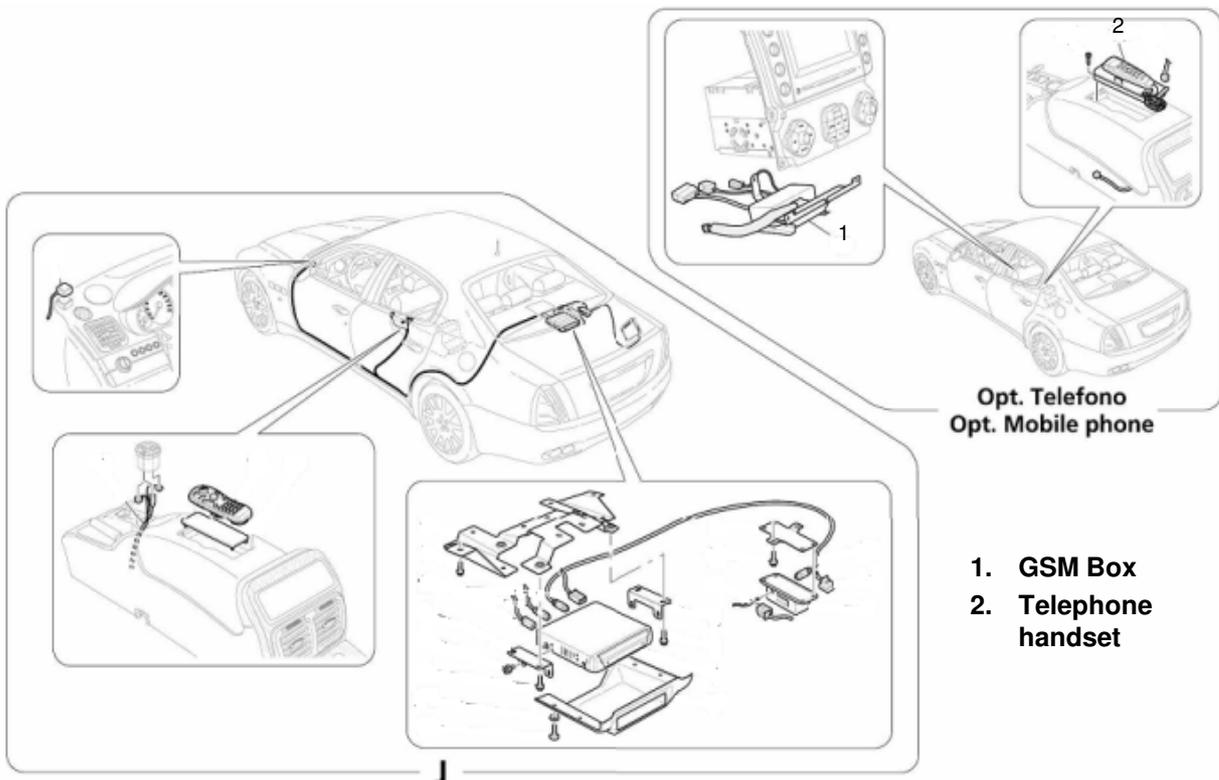
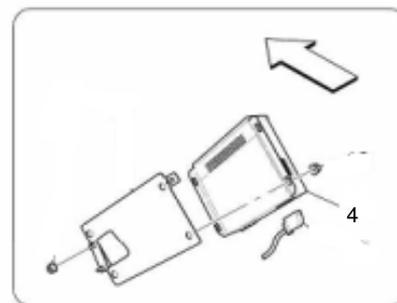
- 1. GPS antenna**
- 2. GSM telephone antenna**



- 1. CD-changer**
- 2. RH Radio antenna amplifier**
- 3. LH Radio antenna amplifier**
- 4. Bose DSP amplifier**



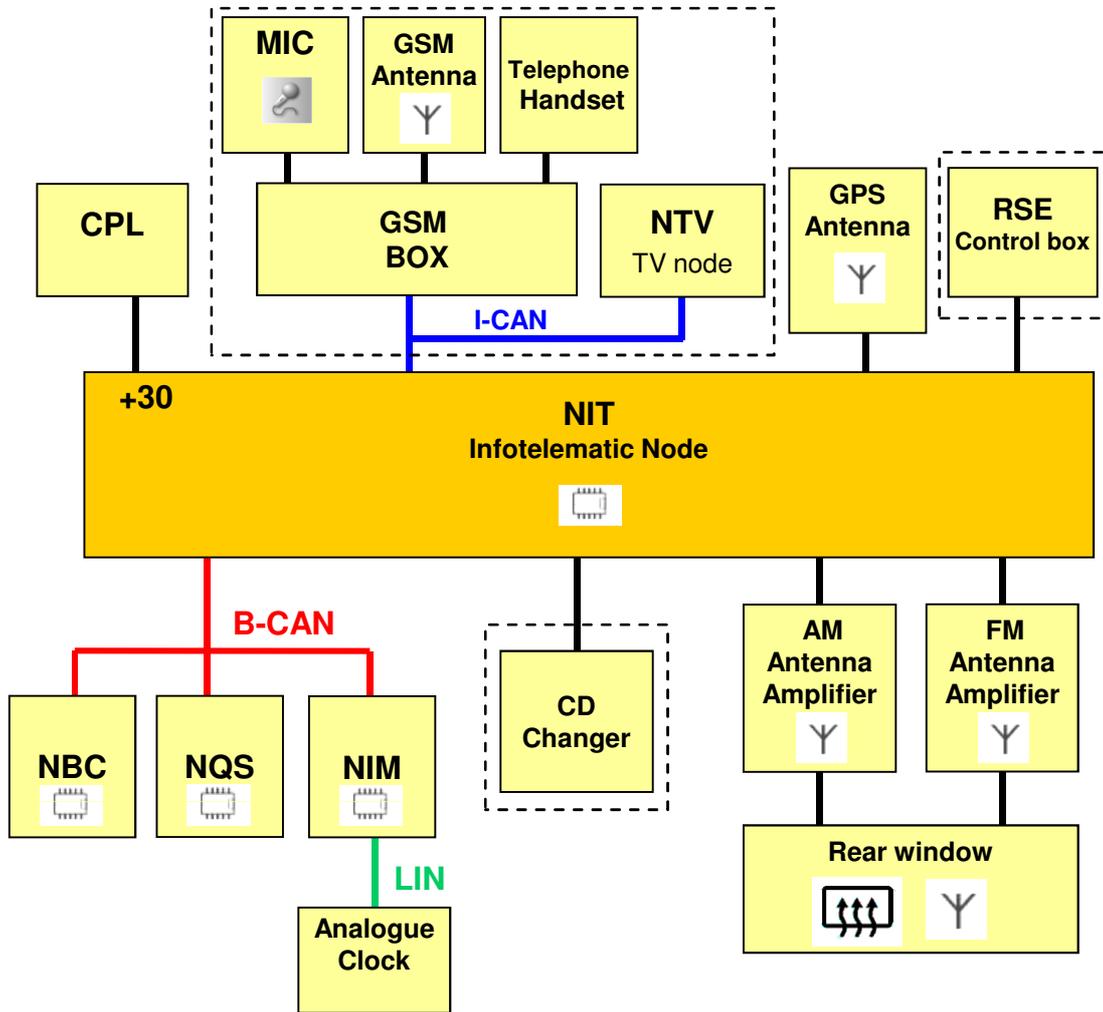
1. Complete NIT module
2. CD-ROM for satellite navigation
3. NIT module knob
4. TV node (in the boot compartment, optional)



Opt. Telefono
Opt. Mobile phone

1. GSM Box
2. Telephone handset

Blaupunkt NIT functional diagram



Notes:

- The NTV TV receiver (optional) and the GSM-BOX for mobile phone (optional) are not integrated in the NIT. These devices interface with the NIT via a dedicated CAN line, called I-CAN. The I-CAN operating principle is the same as that of the B-CAN line.
- The CD changer for 6 CDs (optional) is an external device positioned in the area underneath the steering column.
- The analogue clock is set from the NIT menu. For this reason, the NIT interfaces with the clock through the NIM. The analogue clock follows the time set in the NIT. If the analogue clock time is different from the NIT time setting, it can be adjusted manually. See Technical Information Bulletin No. 201005 issued by the Maserati Technical Service Department for further information.
- The RSE (Rear Seat Entertainment) is available on request.

Special procedures in the event of Blaupunkt NIT replacement

Proxi alignment

In the event that the NIT is replaced, it is necessary to perform the "Proxi alignment" procedure, so that the new component receives the vehicle configuration data from the NBC and is recognised by the vehicle network. This is necessary for a correct operation of the NIT.

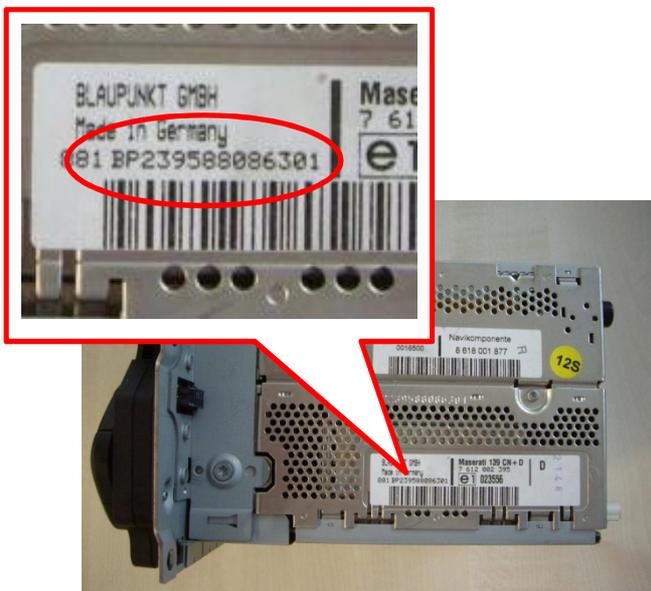
Connect the diagnosis tester to the EOBD connector of the vehicle and perform the "Proxi alignment" procedure.

Keycode

The Blaupunkt NIT is protected by a Keycode. This is a 4 digit alphanumeric code and is specific for every NIT. A tag with this code is provided with every vehicle when sold and it must be kept on a safe place. The Keycode must be entered after the NIT or the vehicle's battery has been disconnected.

To prevent any criminal attempt to identify the Keycode by trying to enter different codes several times, the system is locked for 20 minutes after an incorrect Keycode has been entered.

During this time, *do not turn off the system and do not disconnect the battery* (if the battery is disconnected, the system goes into permanent locked mode). After 20 minutes, you may try to enter the correct Keycode another two times. If you fail to enter the correct code, the system will switch to locked mode permanently.



In the event of loss of the NIT keycode, it can be recovered via the Maserati Service dept. by means of the vehicle VIN, or by the BP-code which can be found on the identification tag on the NIT (see picture).

Date and time settings

It is necessary to set the correct date and time after the NIT or the vehicle's battery has been disconnected.

Magneti Marelli NIT (GranTurismo, Quattroporte Restyling, GranCabrio)



Overview

The GranTurismo, GranCabrio and Quattroporte Restyling models are equipped with the Multi Media System (MMS) developed by Magneti Marelli: a 7" high-resolution TFT colour display positioned in the centre of the dashboard allows the user to view the functions relating to the satellite navigation with TMC Premium (where available), CD player, car radio with USB port, Bluetooth and onboard computer.

The complete equipment can be further enriched with an optional iPod interface.

System performance is enhanced by using a 30 GB internal memory, capable of supporting the entire cartography and the jukebox function, which replaces the CD changer.

The internal memory (hard disc) reduces the trip calculation times dramatically, and allows the user to store about 180 hours of music directly downloadable from the Audio CD player of the vehicle.

The satellite navigation, the large colour display and the use of a 3D graphic processor provide perspective view navigation which is greatly appealing and easy to understand.

System control is user-friendly and intuitive, thanks to the controls positioned in the centre of the dashboard; in addition, the most frequently used functions can be easily accessed using the buttons on the steering wheel. With a view to total safety, the audio system and the navigation can be controlled by means of a practical voice control system, to avoid any distraction.

Also the Text to Speech voice synthesis system (artificial reproduction of the human voice) adds to the driver's comfort: SMS messages and TMC Premium traffic information (where available) are read out through the audio system speakers without having to look at the display.

The Magneti Marelli NIT features the following functions:

- 7" TFT display
- RDS radio
- CD player with MP3
- Integrated 30GB hard disk with Jukebox mode
- Satellite navigation
- TMC/TMC Premium Traffic information
- Telephone (only for NIT HW 7, optional)
- Bluetooth (only for NIT HW 8.0 and 8.1)
- USB port with recharge function (optional for NIT HW 7 and standard for NIT HW 8.0 up to introduction of USB Full)
- USB Full port (data reload and exchange) (initially optional and then standard for NIT HW 8.0; Always standard for NIT HW 8.1; not available for NIT HW 7)
- AUX-IN socket (only in combination with USB Recharge or USB Full)
- iPod interface (optional, only for NIT with USB Full)
- Voice controls
- On-board computer
- Vehicle settings (setup)
- Rear Seat Entertainment (optional, external device)
- SIRIUS satellite radio (external device, only for HW 8.1)

Three hardware versions are available for the Magneti Marelli NIT:

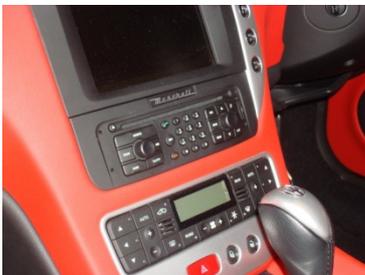
- **HW 7:** only for the GranTurismo up to Assembly 42930, and for all models for the Japanese market
- **HW 8.0:** GranTurismo from MY09 (from Assembly 42931), Quattroporte Restyling and GranCabrio for all the markets, except USA, Canada and Japan
- **HW 8.1:** GranTurismo from MY09, Quattroporte Restyling and GranCabrio (GranTurismo Convertible) for USA and Canada markets

Magneti Marelli NIT user interface

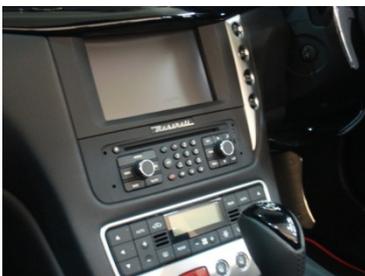
**Magneti Marelli NIT for
Quattroporte Restyling**



Magneti Marelli NIT for GranTurismo / GranCabrio



On the first GrandTurismo vehicles, the NIT knobs were in black plastic. There are also two slots on either side of the NIT, which are required to fit special tools if the NIT is removed.



On the more recent GranTurismo vehicles as well as on all the GranCabrio vehicles, the two NIT knobs have a chrome-plated finish which gives them a more elegant look.

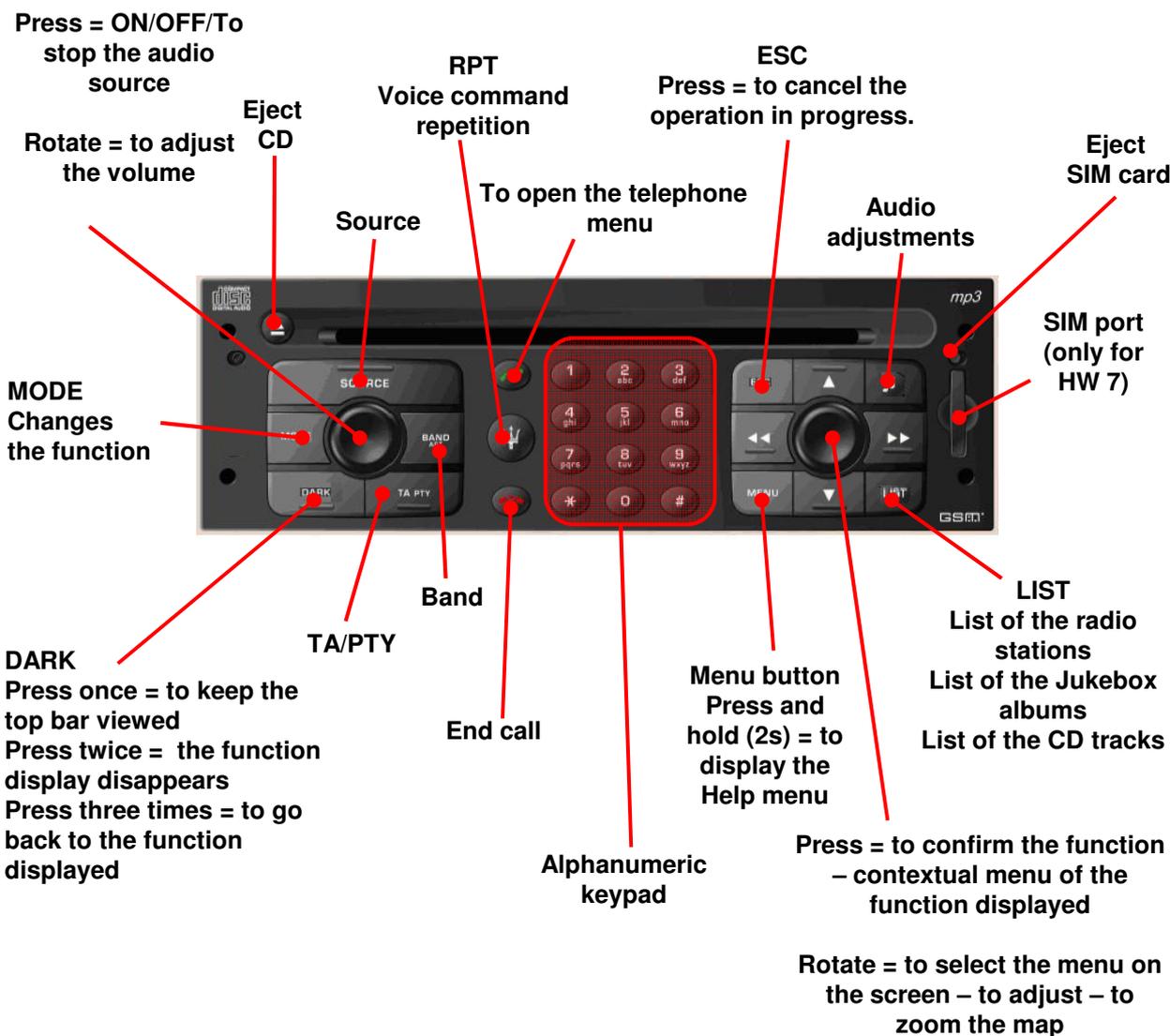


Also the NIT knobs of the Quattroporte Restyling version have a chrome-plated finish. The Quattroporte does not have the slots for fitting the NIT removal tools (see further on in the manual)

Magneti Marelli NIT controls

Some controls have multiple functions, depending on the system current operating conditions.

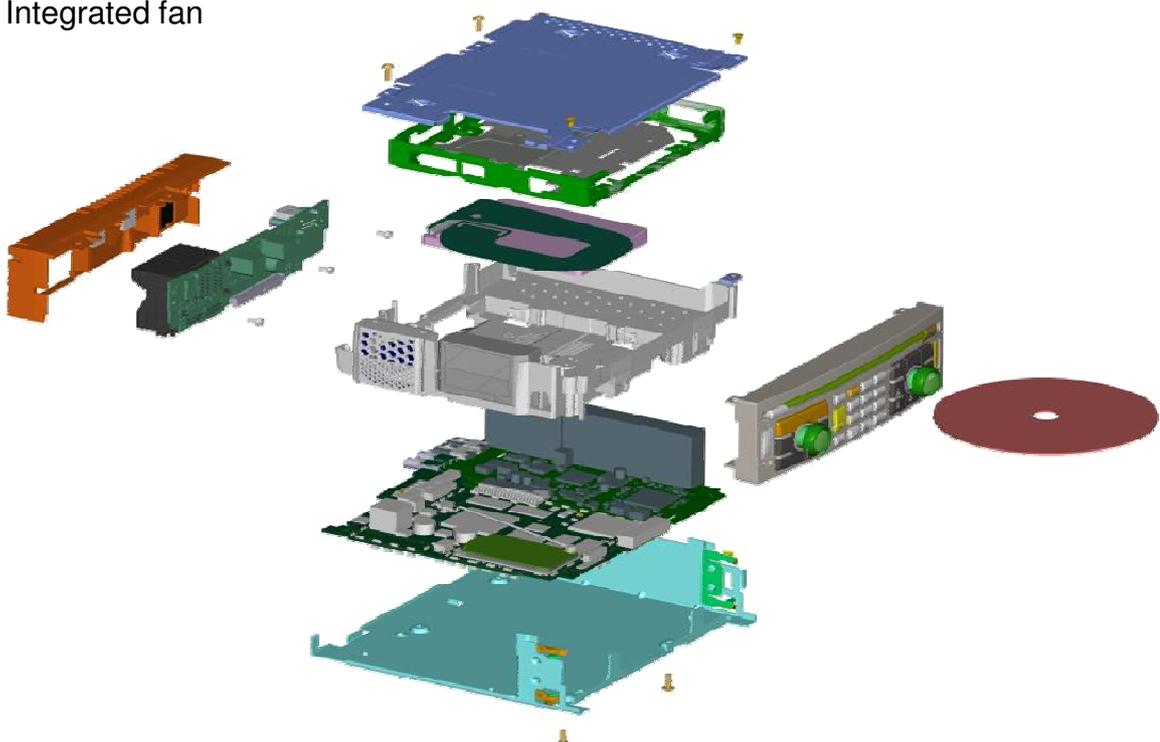
In some cases, the activation of the function selected is controlled by the pressure on the button (button pressed briefly or at length).



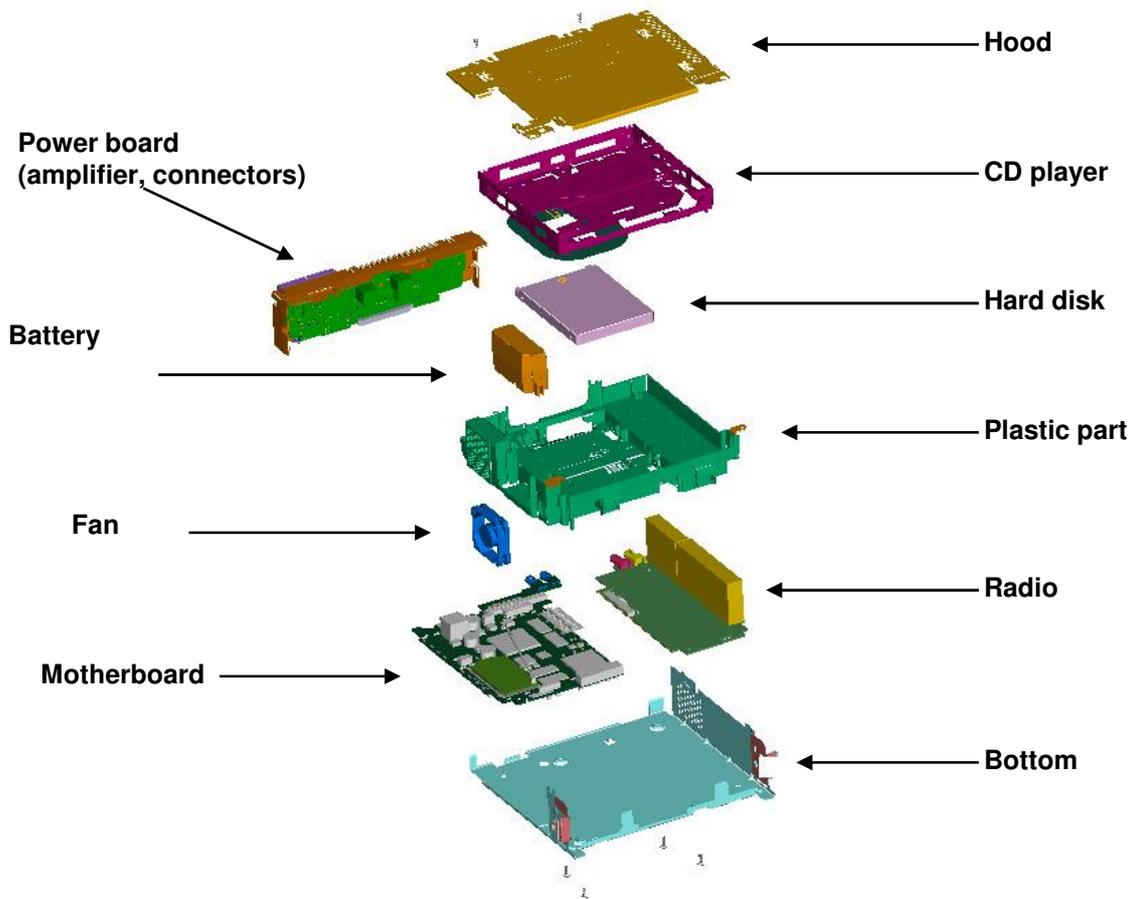
Internal components of the Magneti Marelli NIT

The NIT is comprised of the following components:

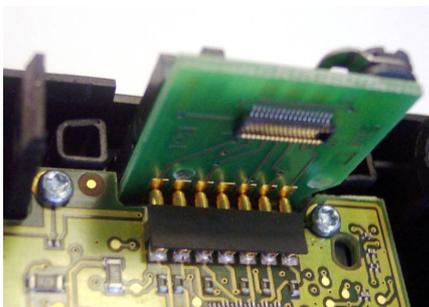
- Front panel (differently designed for the Quattroporte and GranTurismo/GranCabrio) models
- Plastic and aluminium housing
- Connector block with heat sink
- Motorola CPU MPC5200 700 MIPS, 400 MHz
- CPU DDRAM 128MB, 133 MHz (like PC RAM)
- 30GB hard disk - Hitachi Endurastar J4K30 2.5"
- LiteOn CD player (audio) and CD-R (data) (MP3 compatible)
- Radio receiver (triple diversity tuner)
- GSM receiver for telephone (Dual-band and GPRS)(only for NIT HW7)
- GPS receiver with 16MB flash memory
- Bluetooth module (only for NIT HW 8.0 and 8.1)
- CAN interface
- Video controller with 64 MB DDRAM / 200MHz CPU
- Amplifier 4 x 45W
- Safety battery
- Integrated fan



Internal components of the Magneti Marelli NIT



The CD player (LiteON) has a loading mechanism which prevents vertical mechanical movements after inserting the CD



Fixed contacts in the NIT replace the flat cables, preventing any possible false contacts or flat cable problems



The assembly process is designed around the plastic holder, to improve accuracy



A specific geometry ensures correct and exact positioning of each component in the Magneti Marelli NIT

Internal components of the Magneti Marelli NIT

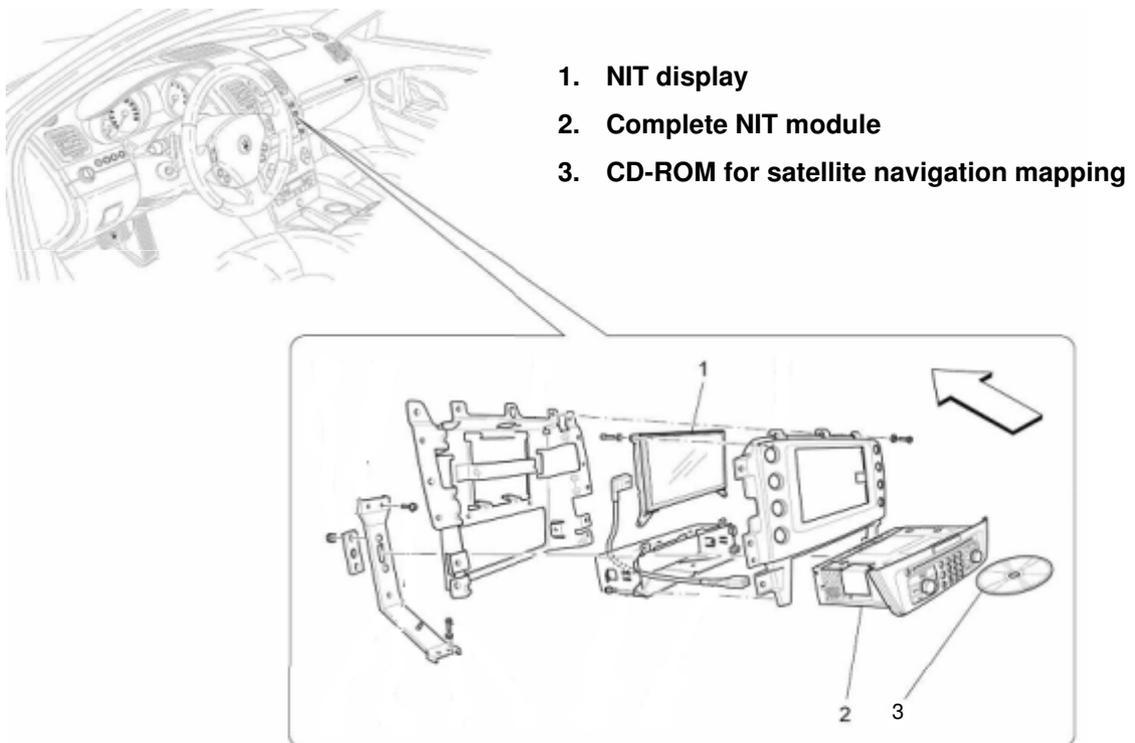


External components of the Magneti Marelli NIT

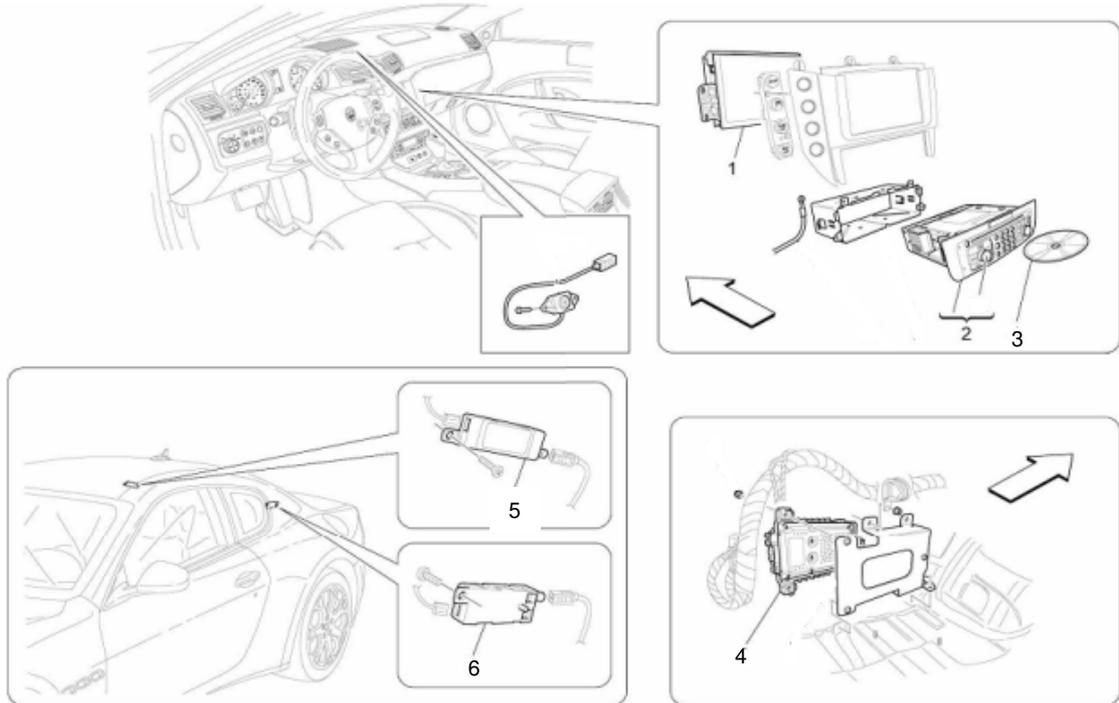
The following components are not an integrated part of the Magneti Marelli NIT itself:

- 7" TFT colour display
- GPS antenna
- 2 radio antennas with external amplifiers.
- GSM antenna (only for NIT HW 7)
- External audio amplifier DSP (only with Bose Surround Sound system, depends on the version)

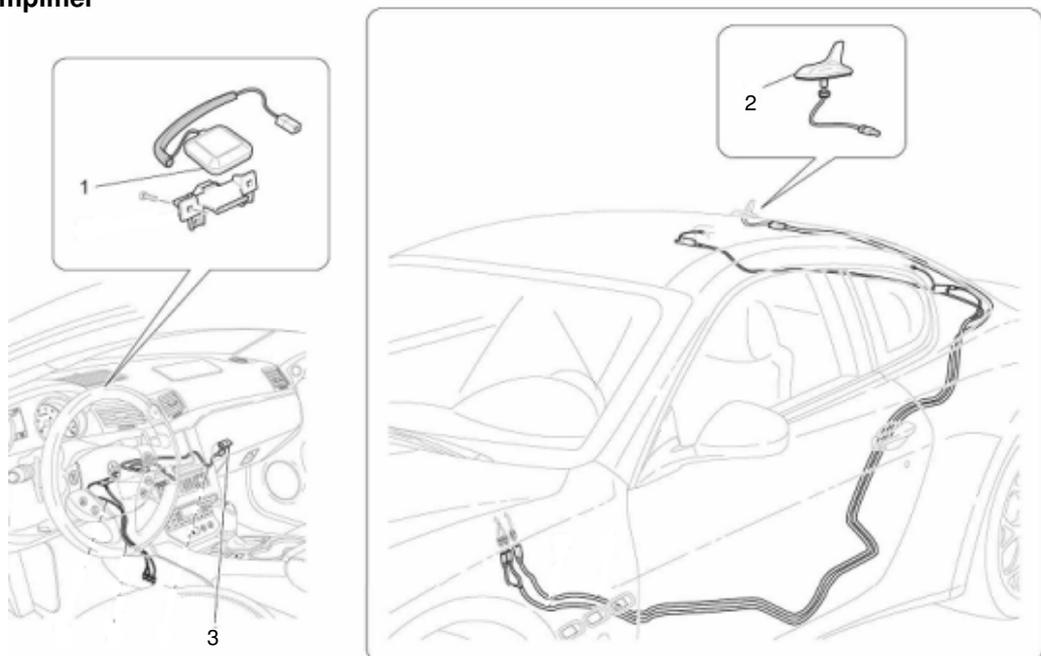
Component location – Quattroporte Restyling



Component location - GranTurismo

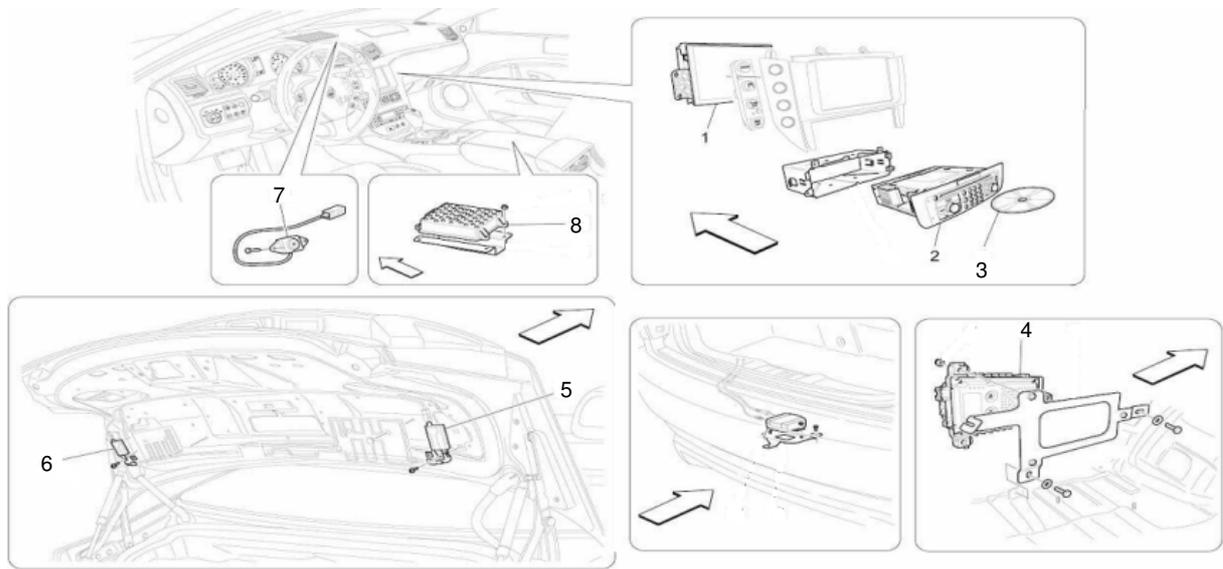


- 1. NIT display
- 2. NIT module
- 3. CD-ROM for satellite navigation mapping
- 4. Sound system amplifier
- 5. RH radio amplifier
- 6. LH radio amplifier

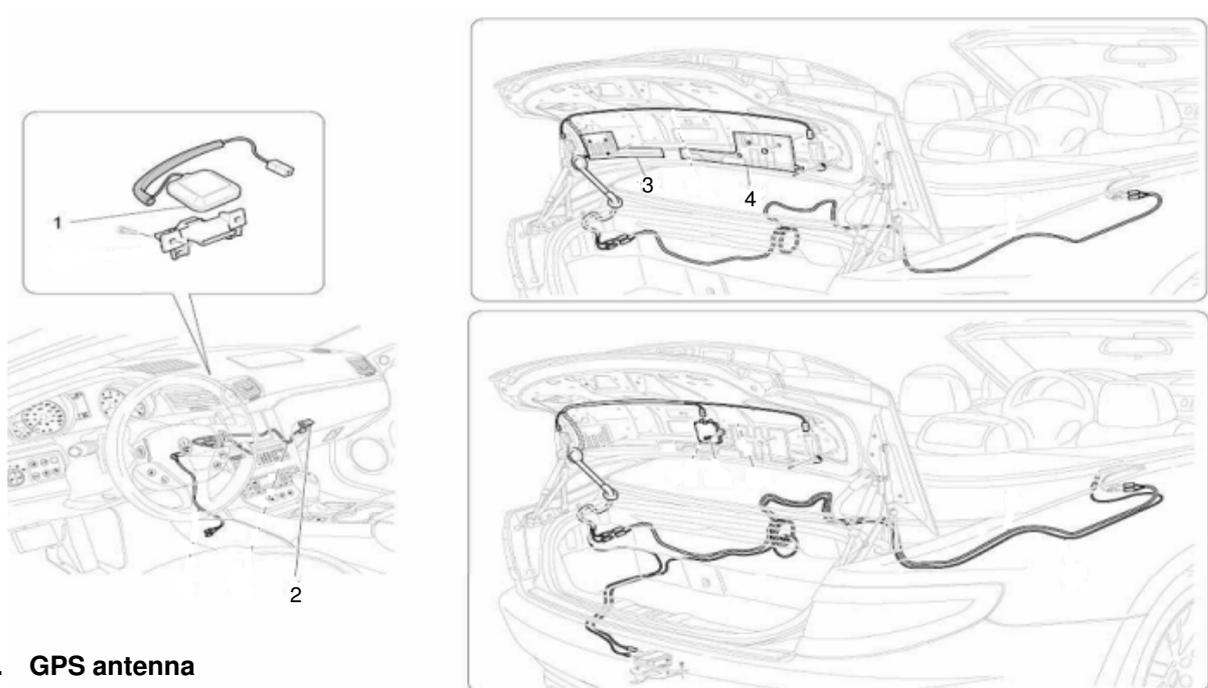


- 1. GPS antenna
- 2. GSM telephone antenna (only for NIT HW 7)
- 3. USB/AUX-IN socket

Component location - GranCabrio

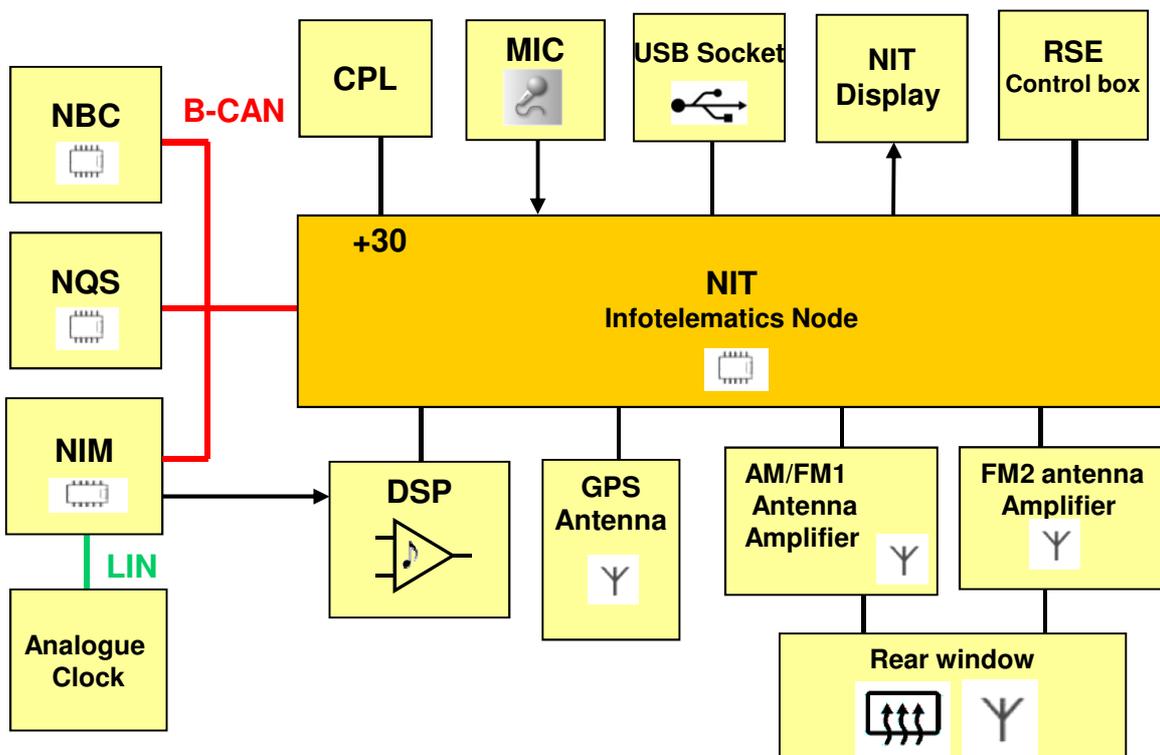


- | | |
|------------------------------------|------------------------------------|
| 1. NIT display | 5. RH radio amplifier |
| 2. NIT module | 6. LH radio amplifier |
| 3. CD-ROM for satellite navigation | 7. Stereo volume adjustment sensor |
| 4. Sound system amplifier | 8. BOSE Bassbox amplifier |



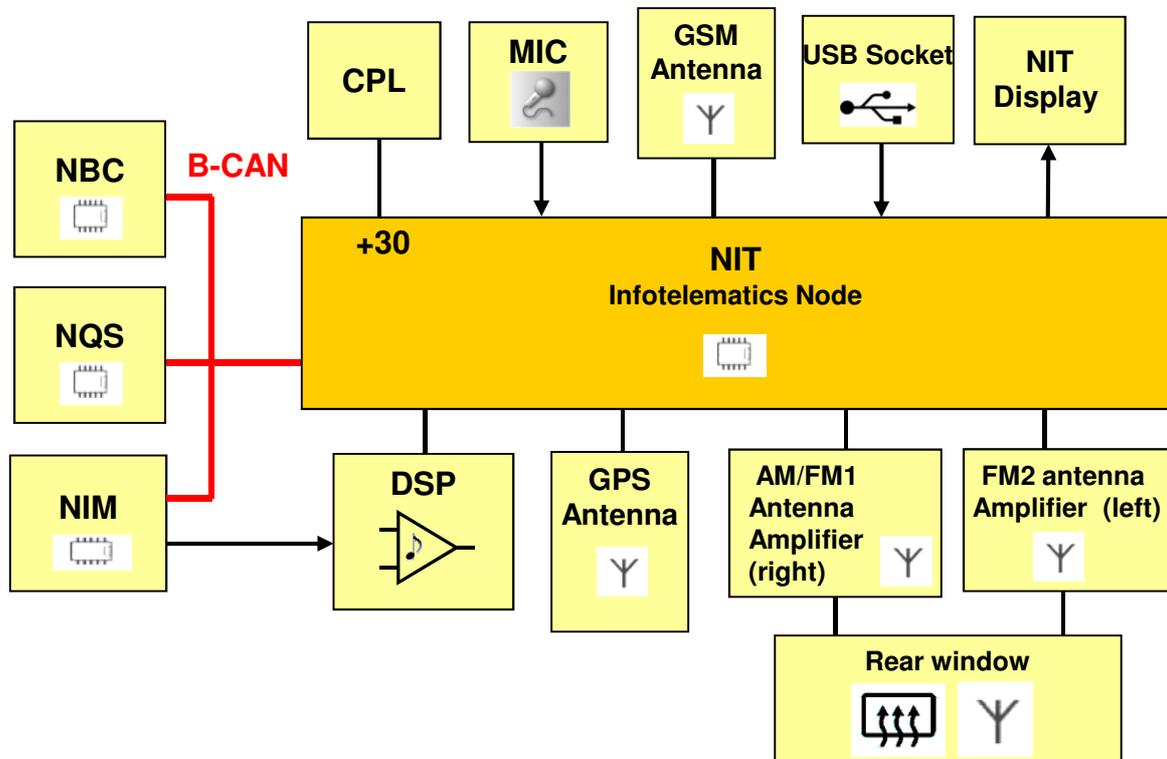
- | |
|----------------------------|
| 1. GPS antenna |
| 2. USB/AUX - IN socket |
| 3. Flexible antenna FM2 |
| 4. Flexible antenna AM/FM1 |

Magneti Marelli NIT functional diagram - Quattroporte

**Notes:**

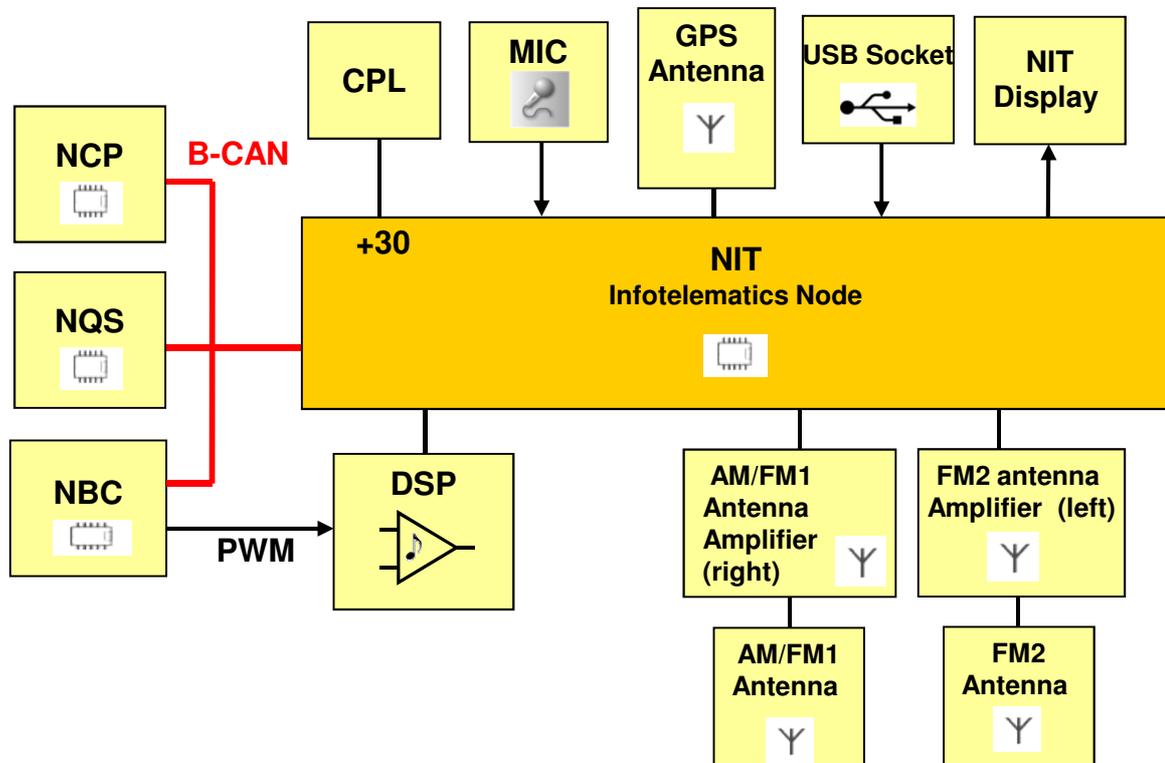
- The Magneti Marelli NIT display is external and is connected to the NIT by means of an LVDS connection
- A TV receiver is not available for the Quattroporte models with Magneti Marelli NIT.
- The two radio antennas, integrated in the rear window of the vehicle, are connected to the NIT by means of two amplifiers positioned in the “C” pillars (right/left) of the vehicle.
- The analogue clock is set from the NIT menu. For this reason, the NIT interfaces with the clock via the NIM and the B-CAN line. The analogue clock follows the time set in the NIT. If the analogue clock time is different from the NIT time setting, it can be manually adjusted. See Technical Information Bulletin No. 201005 issued by the Maserati Technical Service Department for further information.
- The Centerpoint® surround sound function of the Bose amplifier (DSP) is activated by means of an active low signal from the NIM. The NIM receives the activation request signal from the NIT via the B-CAN line.

Magneti Marelli NIT functional diagram - GranTurismo

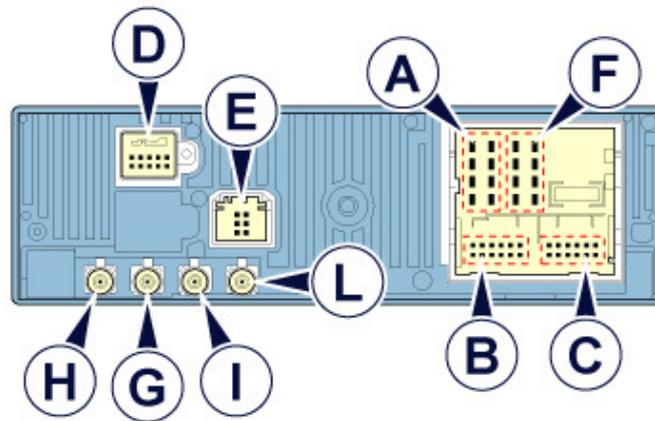
**Notes:**

- The Magneti Marelli NIT display is external and is connected to the NIT by means of an LVDS connection
- The RSE system is not available for the GranTurismo model.
- The GSM antenna is fitted only on the NIT HW 7 with optional mobile phone (GranTurismo up to Assembly No. 42092).
- USB Recharge/Full socket depending on the version, see further on in the manual.
- The Centerpoint® surround sound function of the Bose amplifier (DSP) is activated by means of an active low signal from the NIM. The NIM receives the activation request signal from the NIT via the B-CAN line.

Magneti Marelli NIT functional diagram - GranCabrio

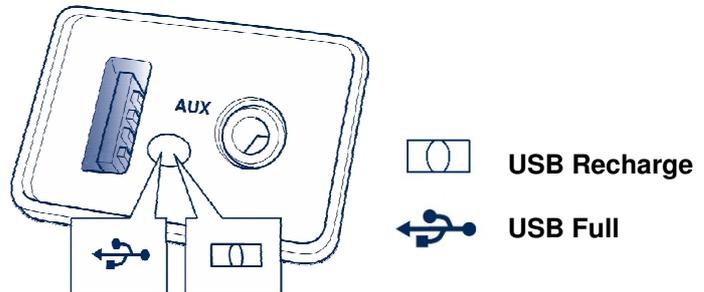
**Notes:**

- The RSE system is not available for the GranCabrio model.
- The radio antennas are not integrated in the rear window like for the Quattroporte and GranTurismo models, but are positioned underneath the rear boot lid.
- USB Recharge/Full socket depending on the version, see further on in the manual.
- The infotainment system of the GranCabrio model does not involve the NIM node.
- The soft top roof node (NCP) informs the other nodes about the roof status (open/closed) via the B-CAN line.
- The NBC informs the Bose audio amplifier (DSP) by means of a pulse width modulation (PWM) signal about the following information: roof status (open/closed), Centerpoint (enabled/disabled), Audiopilot (enabled/disabled).

Magneti Marelli NIT electrical connectors

- A. 8-pin ISO connector with audio outputs (for speakers or Bose DSP amplifier)
- B. 10-pin connector for various audio, aux, video, microphone inputs, and display brightness control line
- C. 10-pin connector for AUX-IN (LH, RH and reference)
- D. LVDS (Low Voltage Differential Signalling) connector for display output signals
- E. Connector for USB socket (earth, power supply and data)
- F. 8-pin ISO connector for earth, power supply, display earth and power supply, B-CAN line and Bose DSP amplifier
- G. Screened connector for LH radio antenna amplifier (AM/FM1)
- H. Screened connector for RH radio antenna amplifier (FM2)
- I. Screened connector for GSM antenna (only for NIT HW7)
- L. Screened connector for GPS antenna

AUX-IN and USB connection of the Magneti Marelli NIT



The AUX-IN/USB socket is housed in the glove compartment and there may be two types. The type fitted is recognisable from the symbol shown next to it.

USB Recharge socket (optional for NIT HW 7 and for the first vehicles with NIT HW 8.0)

This socket is exclusively dedicated to powering the external source, of course, if this source has been designed for this use (e.g. iPod). This socket cannot be used for data exchange.

USB Full socket (optional for the first NIT HW 8.0 versions, standard for the most recent NIT HW 8.0 versions; always fitted on the NIT HW 8.1)

This socket allows to both exchange data and power the connected source. If using an USB key with MP3 music files stored on it, they will automatically start playing after inserting the key.

This will not occur if you are already listening to a music source; in this case, you need to select the USB function by repeatedly pressing the SRC button.

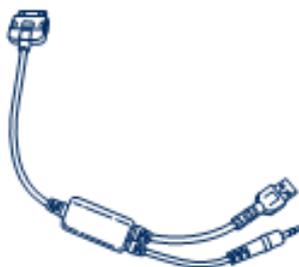
The music will only start playing after the system has scanned the key. The scanning time depends on the number of files stored on the key; during this time, the message "Please wait ..." is displayed.

AUX-IN socket (always present in combination with the USB socket)

The AUX-IN auxiliary input allows you to connect any audio player to the NIT, provided it has an analogue audio output with a 3.5mm jack-type connector.

Connecting an iPod to the Magneti Marelli NIT

Using the iPod cable harness available at the Maserati Spare Parts Department, an iPod can be easily connected to the USB/AUX-IN socket located inside the glove compartment.



iPod cable harness

If the NIT has a USB Recharge socket:

the iPod cannot be controlled via the NIT but needs to be controlled from the device itself. The AUX-IN socket receives the analogue audio signal while the USB socket is used only to power the device.

If the NIT has a USB Full socket (only for NIT HW 8.0 and HW 8.1):

in this case, the iPod can be controlled via the NIT (depending on the iPod version, the compatibility can be partial only).

Important note: To enable this function, the NIT must satisfy the following conditions:

1. Software version BR2 or later
2. Function enabled in the Proxy of the vehicle (by means of the Proxy configuration procedure)



The iPod connecting cable allows the playing of audio files from an iPod device. Maserati does not guarantee the playing of audio files when connecting different devices (for example: iPhone).

Magneti Marelli NIT software (SW) versions

Proceed as follows to read out the SW version of a Magneti Marelli NIT:

- Press the “MENU” button
- Select “Radio – Telephone diagnosis”
- Select “Unit description”
- “SW Version unit” indicates the software version present in the NIT

NIT Magneti Marelli software versions		
SW version NIT	HW version NIT	Notes
J1	HW 7	original SW for NIT HW 7
P1	HW 7	SW designed to solve the "blocked Maserati logo" problem. This SW is needed if the AUX-IN/USB-recharge option is installed in the vehicle.
Q1	HW 7	As SW P1, but with further improvements.
T	HW 7	Latest SW for NIT HW 7, contains further improvements and is to be installed on every NIT HW 7.
IR5	HW 8.0	original SW for NIT HW 8.0
KR6	HW 8.0	SW designed to solve the "blocked Maserati logo" problem on NIT HW 8.0
GR1	HW 8.1	
BR2	HW 8.0	needed SW version for installing of iPod connection cable
HR3	HW 8.0 & 8.1	original SW for NIT HW 8.1 and NIT HW 8.0 for GranCabrio vehicles
IR4	HW 8.0 & 8.1	Latest SW version for all NIT HW 8.0 and HW 8.1 versions. Contains many improvements and expanded list of compatible Bluetooth mobile phones. This SW is to be installed on all NIT HW 8.0 and HW 8.1 versions.



Always make sure that the latest available software version is installed on the NIT (SW “T” for NIT HW 7 and SW “IR4” for NIT HW 8.0 & HW 8.1 at the moment of the writing of this document).

Service indications for the Magneti Marelli NIT

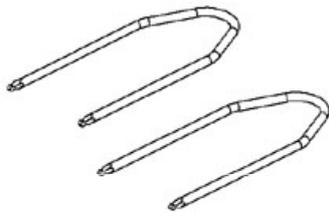
Replacing the Magneti Marelli NIT

In the event that the NIT is replaced, it is necessary to perform the "Proxi alignment" procedure, so that the new component receives the vehicle configuration data from the NIT and is recognised by the vehicle network. This is necessary for a correct operation of the NIT.

Connect the diagnosis tester to the EOBD connector of the vehicle and perform the "Proxi alignment" procedure.

Removing the Magneti Marelli NIT

- GranTurismo /GranCabrio: using the specific tools for NIT removal
- Quattroporte: There are no holes to fit the specific tools. See the Maserati technical documentation for NIT removal



Magneti Marelli NIT removal tool No.
900027673 (only for GranTurismo /
GranCabrio)



Important note for connecting/disconnecting the Magneti Marelli NIT:

The connection/disconnection order is particularly important to prevent breaking the LVDS interface components.

Connection:

- First connect the LVDS connector (Connector D)
- Then connect the ISO connectors (connectors A, B, C, F)

Disconnection:

- First disconnect the ISO connectors (connectors A, B, C, F)
- Then disconnect the LVDS connector (connector D)



Never disconnect the LVDS connector when the NIT is on!

SW loading procedure in BOOTROM conditions for the Magneti Marelli NIT:

The software loading procedure is performed when the NIT is in continuous reboot conditions. The NIT cyclically goes through the following phases: start with Maserati logo on white background, black screen, shutdown and restart.

If the procedure is correctly performed, the NIT loads the SW, and the next time it is turned on it starts normally with the functioning application.

The procedure is described below:

- Remove the NIT from the dashboard without disconnecting the cables
- Turn the key to ON, start the engine and keep it running
- Insert (*) the SW upgrade CD (**) for the NIT HW version in question (see the table on the previous page)
- Immediately disconnect the 40-pin connector
- Identify the area with the two microswitches at the bottom of the NIT and locate the one farthest from the edge
- Hold this microswitch pressed
- Insert and lock the 40-pin connector
- A few seconds after inserting the connector, release the microswitch
- Check that the systems starts with a white screen without any indication on the display
- Wait for the words “Check Disk” to appear at the top left of the display
- Wait for all the loading phases to start and complete:
 1. CRC loading (with % progress from 0% to 100%)
 2. Upgrade 1/2 (with % progress from 0% to 100%)
 3. Upgrade 2/2 (with % progress from 0% to 100%)
- Wait for the CD to eject and remove it from the reader
- Wait for the system to shut down and restart
- Check that the SW application starts after the Maserati logo has appeared

(*) If there is an Audio/MP3 CD in the player, skip step 3 going to the next step and insert the SW upgrade CD only after the Audio/MP3 CD has been ejected, which will automatically occur after step 8.

(**) As the original SW upgrade CD might stay locked in the NIT if the procedure is not completed successfully, it is advisable to use a backup copy. Do not burn the backup CD directly from the original CD, but make a copy on the PC of all the folders and files contained on the original CD and then burn this data on an empty CD.

Bose NIT (Quattroporte Restyling MY09 & MY10)



Overview

The new Bose® Multi Media System differs from the standard system in the following functions: DVD player; wav, wma, acc files reading; user interactive; UMusic® function Music Library; proximity sensors for display; radio station tuning system; system customisation via the “preferences” option. In addition, the iPod interface and TV tuner are available for this system.

Information is displayed in a particularly innovative fashion, and is recalled and viewed faster thanks to the proximity sensors which detect the presence of the user. The sensors anticipate when the user will touch the knob and consequently react by enlarging and expanding the required information in the centre of the screen. When the user moves his hand away, the display goes back to standby mode. Another entertainment novelty is the UMusic® function, which acts as a real virtual DJ playing the tracks the user likes most and continuously adapting to his music taste. Furthermore, voice commands to display the menu or to move through the chapters or tracks are available for the entire system.

The basic equipment of the new Quattroporte range consists of a Bose® Surround Sound audio system with 11 speakers and an integrated 4x25 Watt RMS equalizer, specifically designed and built for this vehicle acoustics. The entire sound system becomes an integral part of the car, to offer a music quality quite similar in depth, clarity and sensations to that of the best concert halls. Moreover, the AudioPilot® technology detects and measures the ambient noise and continuously adjusts a number of acoustic signal parameters accordingly, in order to ensure optimal sound quality levels inside the passenger compartment.

Among the customisation options is the Rear Seat Entertainment system, consisting of a rear central screen with DVD player, an auxiliary input for using a video game console or connection of external devices (for example, video cameras), listening through a headset or the main audio system.

The Bose NIT features the following functions:

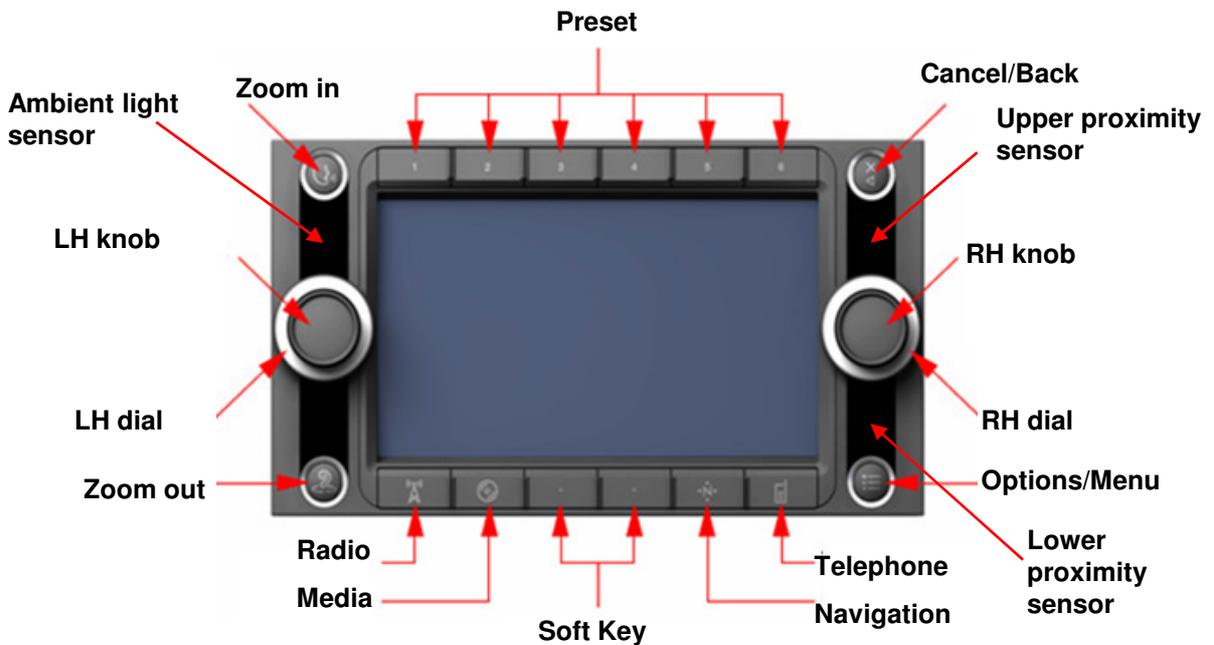
- 7" TFT display
- RDS radio
- CD/DVD player supporting MP3, WAV, WMA, MPEG2 ACC files
- Integrated 30GB hard disk with U-Music mode (virtual DJ)
- Satellite navigation
- Traffic information
- Bluetooth
- AUX-IN socket
- USB port
- iPod interface
- Voice controls
- On-board computer
- Vehicle settings (setup)
- Analogue TV tuner (optional, integrated device)
- Rear Seat Entertainment (optional, external device)
- XM satellite radio (only for USA and Canada markets)
- Reverse gear camera (optional)

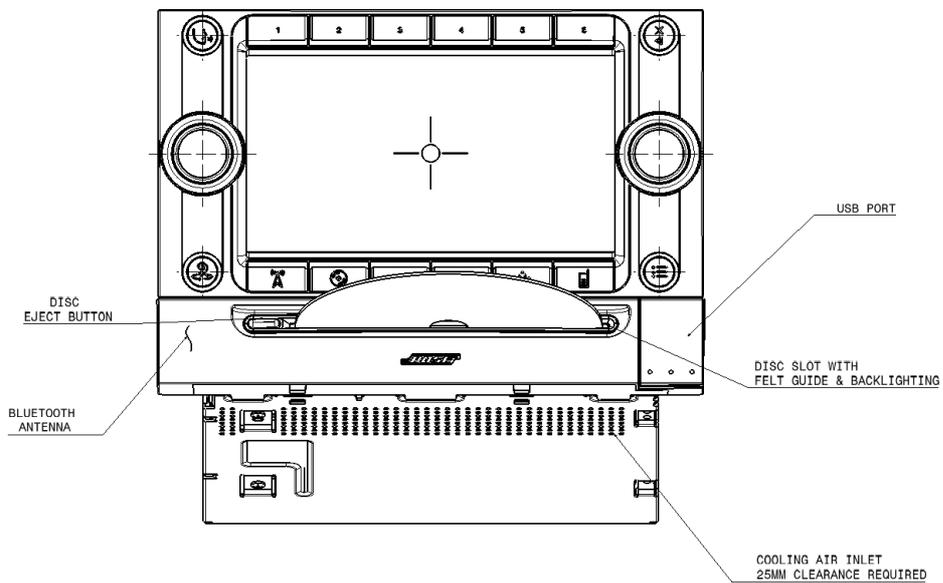
Notes:

- The Bose NIT is available as option for the Quattroporte Restyling (MY09 & MY10)
- The Bose NIT is a standard equipment for the Quattroporte Restyling model (MY09 & MY10), for the USA and Canada markets.
- Since February 2010, the Bose NIT is no longer available for all the markets.

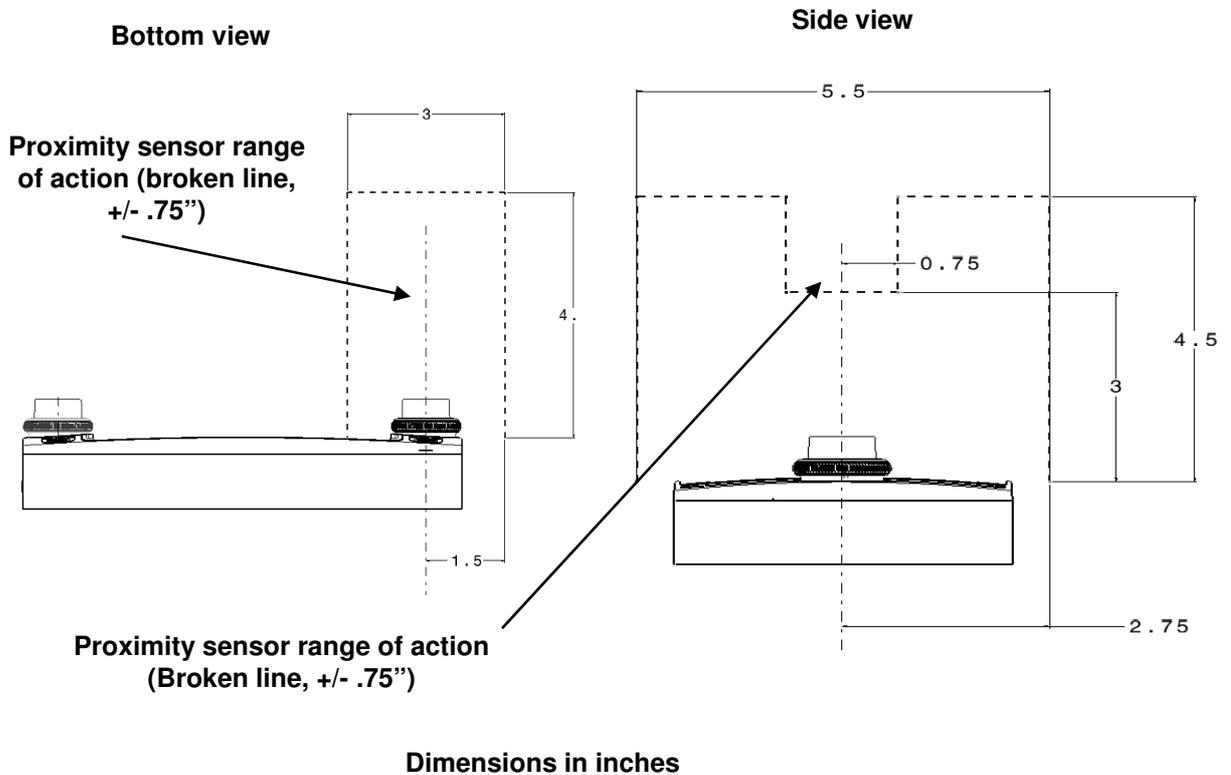
Bose NIT controls

All the control functions can be accessed by means of the two knobs on the sides of the console.

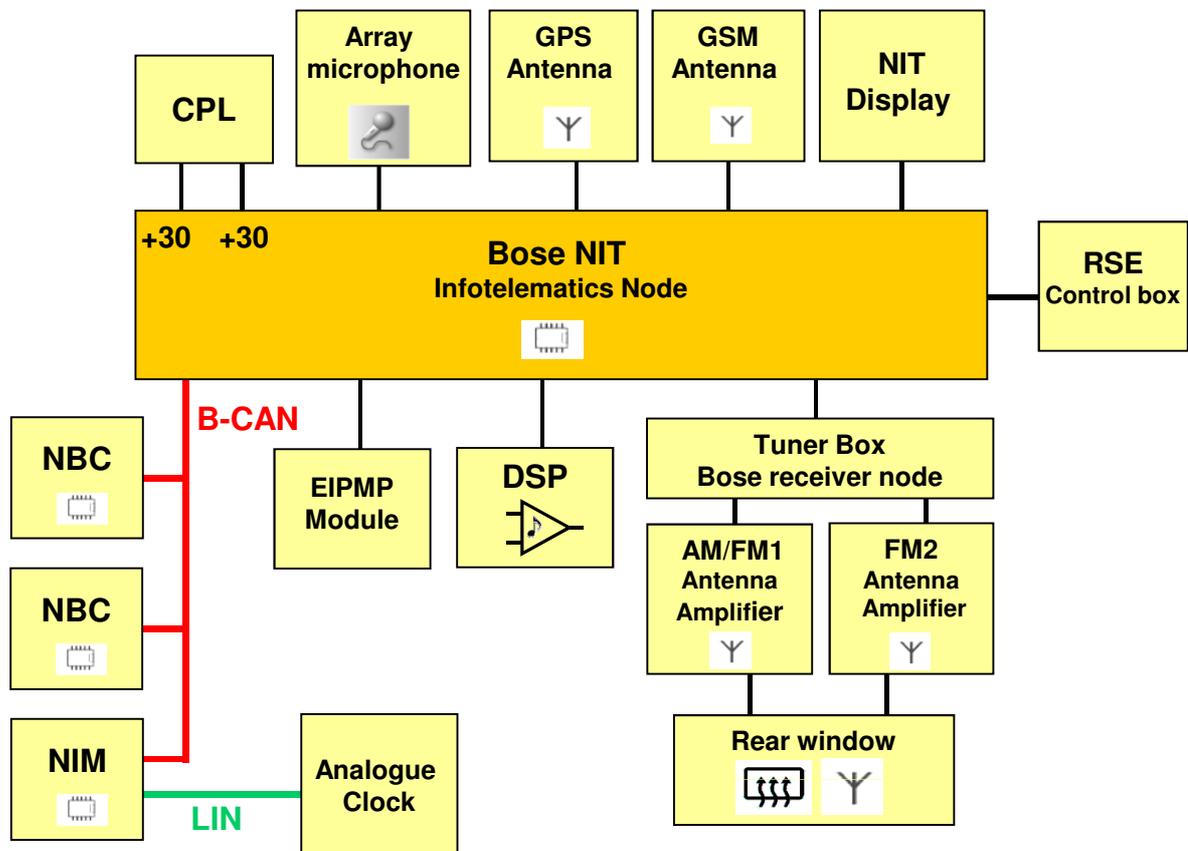




The proximity sensors detect when the user's hand comes close and activate display of the menus, which can be selected by turning the right-hand dial.



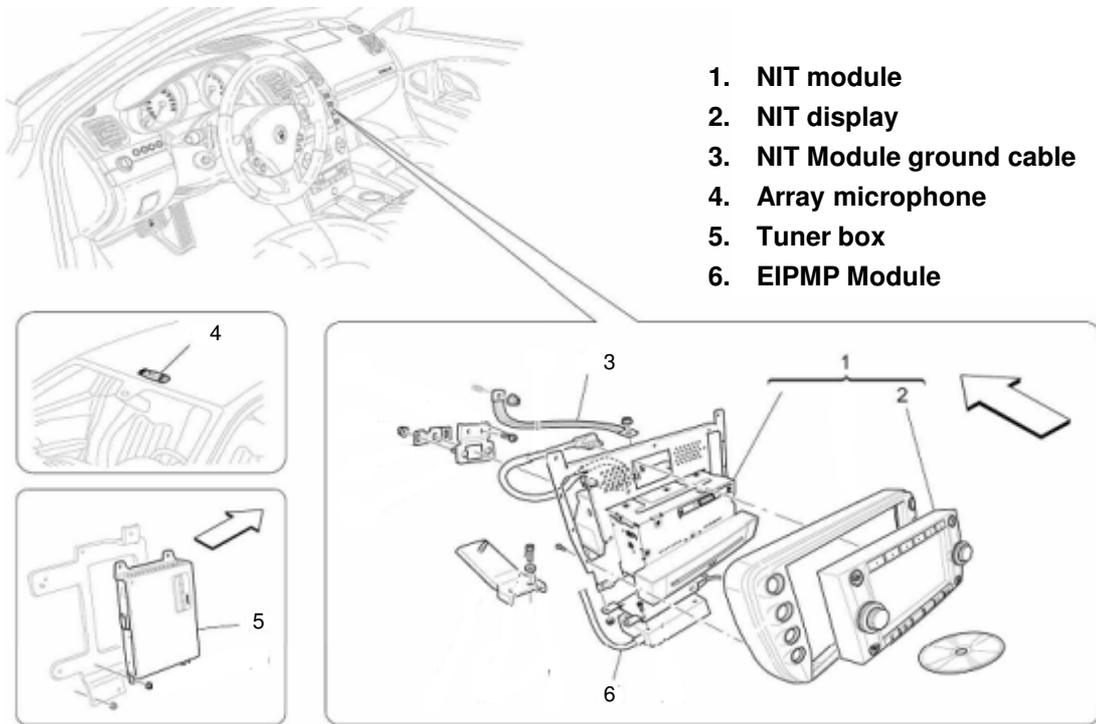
Bose NIT functional diagram



Notes:

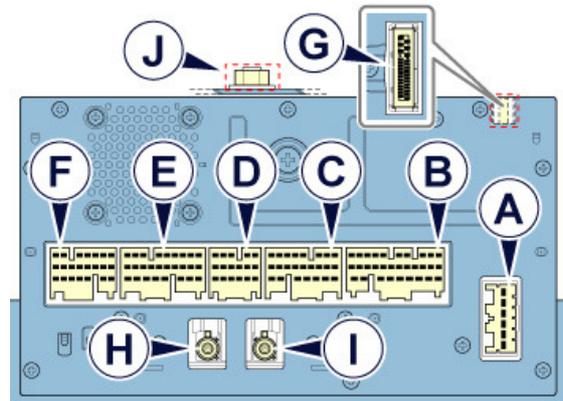
- The antenna amplifiers of the Bose NIT are not connected directly to the NIT but their signals go through the tuner (Bose Tuner Box) positioned in the luggage compartment.
- Two +30 (direct positive) power supplies arrive at the NIT.
- The EIPMP module (optional) is an interface box for the optional iPod connector and is fitted underneath the NIT unit.
- The Array microphone contains multiple microphones for the hands-free calling, voice controls and Audiopilot® functions. It is fitted in the roof console.
- The (optional) analogue TV receiver is not an external unit but is integrated inside the Bose NIT.

Bose NIT component location

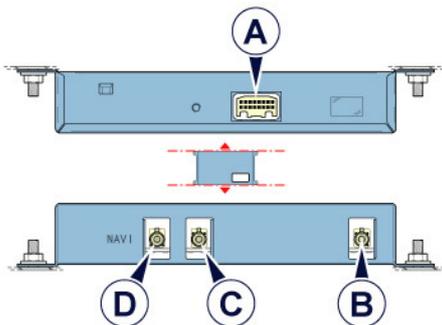


Bose NIT electrical connectors

- A. Connector for power supplies, ground and B-CAN line
- B. Connector for tuner box and for Bose DSP amplifier
- C. Not used
- D. Array microphone connector
- E. Not used
- F. Not used
- G. LCD display connector
- H. Not used
- I. GPS antenna
- J. Earth connection



Bose Tuner Box



- A. Power supply, connections with Bose NIT
- B. Antenna amplifier, left hand side
- C. Antenna amplifier, right hand side
- D. Not used

Special procedures in the event of Bose NIT replacement

In the event that the NIT is replaced, it is necessary to perform the "Proxi alignment" procedure, so that the new component receives the vehicle configuration data from the NIT and is recognised by the vehicle network. This is necessary for a correct operation of the NIT.

Connect the diagnosis tester to the EOBD connector of the vehicle and perform the "Proxi alignment" procedure.

DVD player region code programming and check procedure

The DVDs commercially available are marked with a region code and likewise the DVD player is set to play only DVDs with the same region code.

The following (numerical) regional symbols are printed on DVDs:

- 1: USA/Canada
 - 2: Europe, Japan, South Africa, Middle East
 - 3: Asia (including Hong Kong)
 - 4: Australia, New Zealand, Pacific Islands, Central America , South America, Caribbean
 - 5: Russia, India, Africa
 - 6: China
- All: All regions (can be used everywhere)

For legal reasons, the region code can ONLY be changed FIVE times. After this, the player will remain locked on the last code set.

The region code of the DVD player of the Bose NIT can be viewed and modified with the Maserati Diagnosi tester unit.

Select the Parameter menu to view the region code and the Active Diagnose menu to modify it.

SW version check for Bose NIT



Proceed as follows to check the SW version of the Bose NIT:

- Select the radio function
- Press and hold the MENU button and the "1" button simultaneously until the "Silverbox" menu is viewed on the screen.
- Select and confirm with the right hand knob to view the software version.

Bose Surround Sound system

Description

The Bose Surround Sound amplifier (DSP*) is positioned in the luggage compartment, on the left-hand side, and is interconnected with the rear wiring harness. The DSP amplifier controls the audio system based on 4 audio channels received by the NIT. It controls the following functions:

- Signal for front and rear woofer
- Rear LH and RH speakers
- Central speaker
- Secondary amplifier activation
- Bass box
- AudioPilot microphone (only for vehicles using the Magneti Marelli NIT)



Current draw in sleep mode:	0.5 mA
Power supplies:	+15, +30
Earths:	1

The Surround Sound system in the passenger compartment is capable of decoding the front left, central front, front right, left surround sound, right surround sound information coming from the following devices:

- DVD-Video
- DVD-Audio
- CD

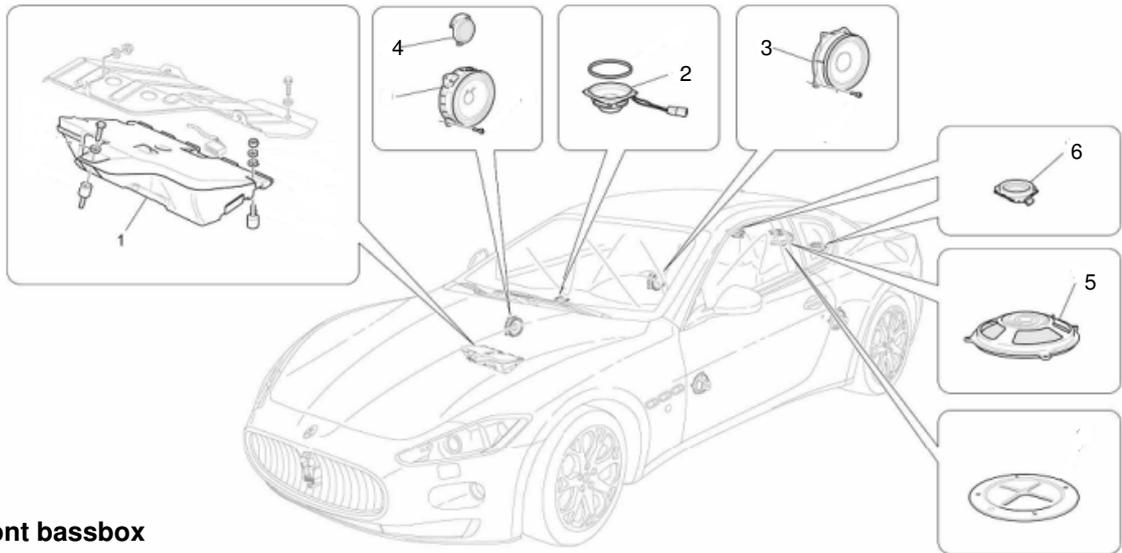
The system must support eight output channels.

(*) DSP: Digital Signal Processor

Surround Sound system for GranTurismo

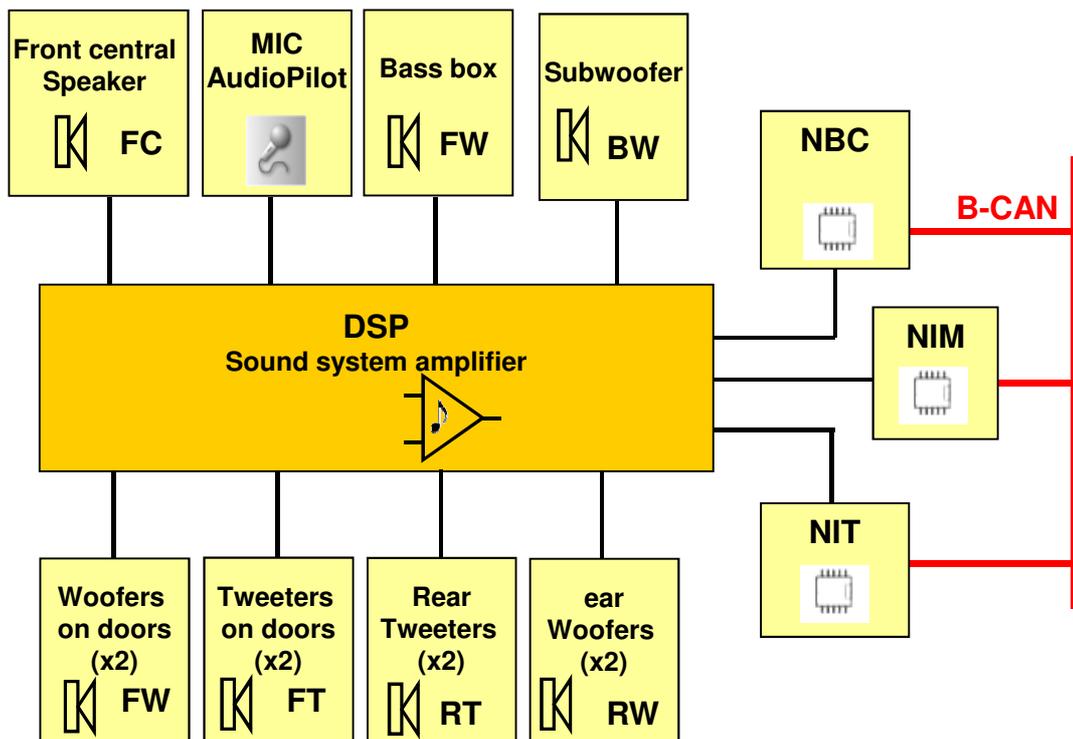


1. One 8 cm Twiddler® (neodymium medium-high range speaker) in the dashboard (Centerfill).
2. Two 3.6 cm neodymium tweeters in the triangles of the mirrors.
3. Two 16.5 cm neodymium medium-high range speakers in the doors.
4. One 13 cm Nd® Richbass® woofer in customised bass reflex box with TSM amplifier in the footwell.
5. Two 16.5 cm neodymium medium-low range speakers in the rear side panels.
6. Two 8cm Twiddler® (neodymium medium-high range speakers) in the rear parcel shelf.
7. One 25.5 cm PowerNd® woofer in the rear parcel shelf.
8. Digital amplifier in the rear left-hand side panel of the luggage compartment with Bose Digital Signal Processing, Bose Surround technology (Centerpoint® and SurroundStage®), AudioPilot® Noise Compensation Technology and 8 channels for customised equalization.
9. Microphone that detects the noise level in the passenger compartment for the AudioPilot® function, positioned in the dashboard.



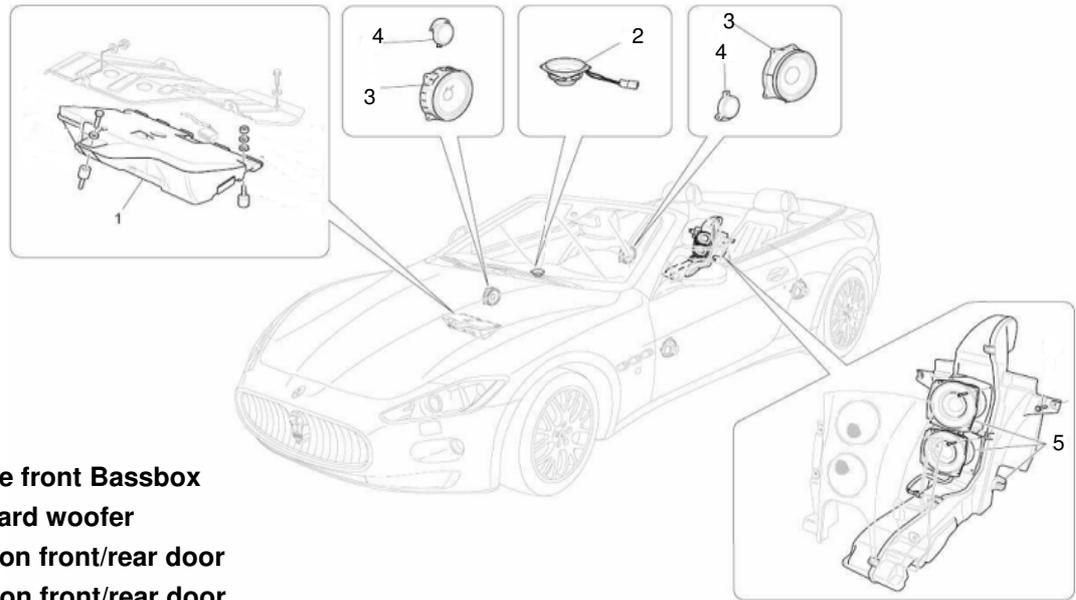
1. Front bassbox
2. Central dashboard woofer
3. Woofer on front/rear door
4. Tweeter on front RH door
5. Subwoofer on rear parcel shelf
6. Tweeter on rear shelf

Bose Surround Sound system functional diagram – GranTurismo



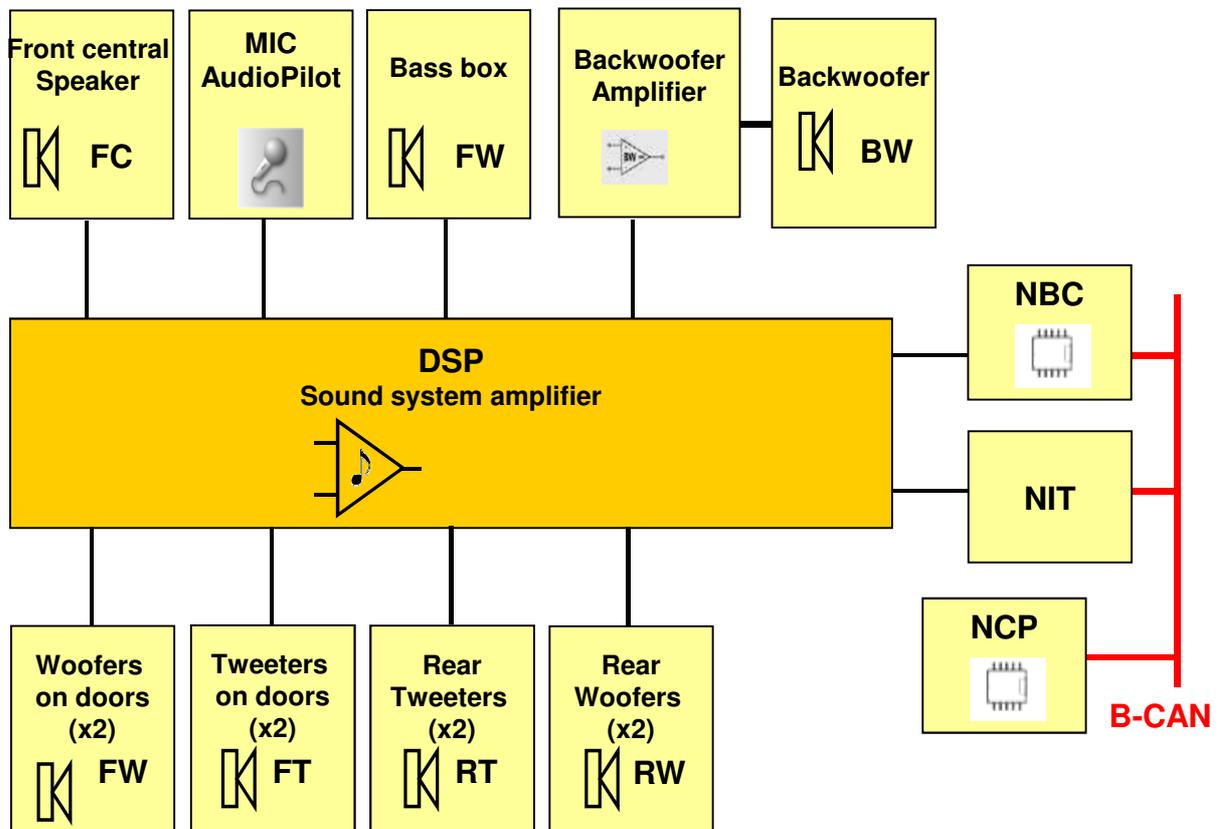
Surround Sound system for GranCabrio

1. One 8 cm Twiddler® (medium-high range Neodimium Speaker) in the dashboard (Centerfill).
2. Two 3.6 cm neodymium tweeters in the triangles of the mirrors.
3. Two 16.5 cm neodymium medium-high range speakers in the doors.
4. One 13 cm Nd® Richbass® woofer in customised bass reflex box with TSM amplifier in the passenger-side footwell.
5. Two 3.6 cm neodymium tweeters in the rear side panels.
6. Two 16.5 cm neodymium medium-low range speakers in the rear side panels.
7. Two 11.5 cm Nd® Richbass® woofers in customised bass reflex box between the rear seats.
8. Digital amplifier in the rear left-hand side panel of the luggage compartment with Bose Digital Signal Processing, Bose Surround technology (Centerpoint® and SurroundStage®), AudioPilot® Noise Compensation Technology and 7 channels for customised equalization.
9. TSM amplifier in the footwell area, for rear bass reflex box.
10. Microphone that detects the noise level in the passenger compartment for the AudioPilot® in the dashboard.

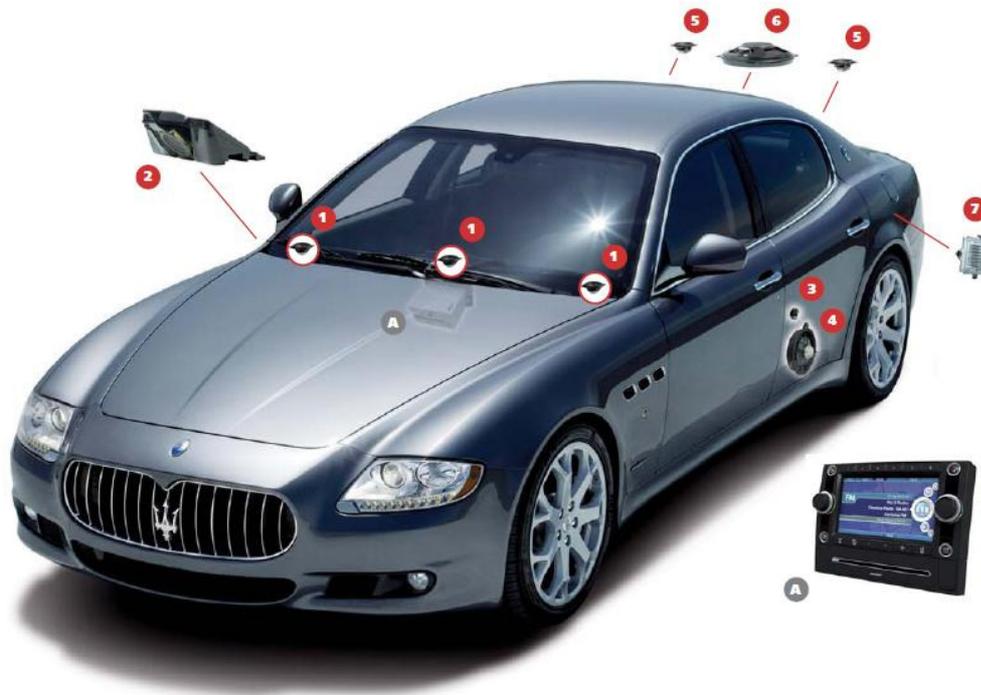


1. Complete front Bassbox
2. Dashboard woofer
3. Woofer on front/rear door
4. Tweeter on front/rear door
5. Rear complete BOSE Bassbox

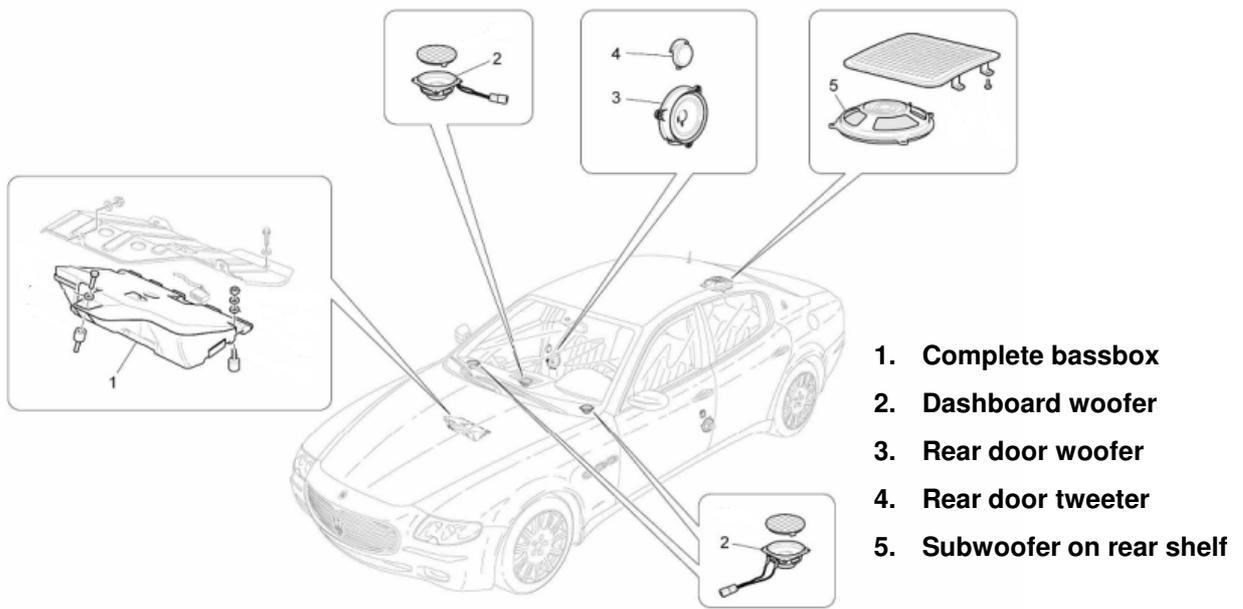
Bose Surround Sound system functional diagram – GranCabrio



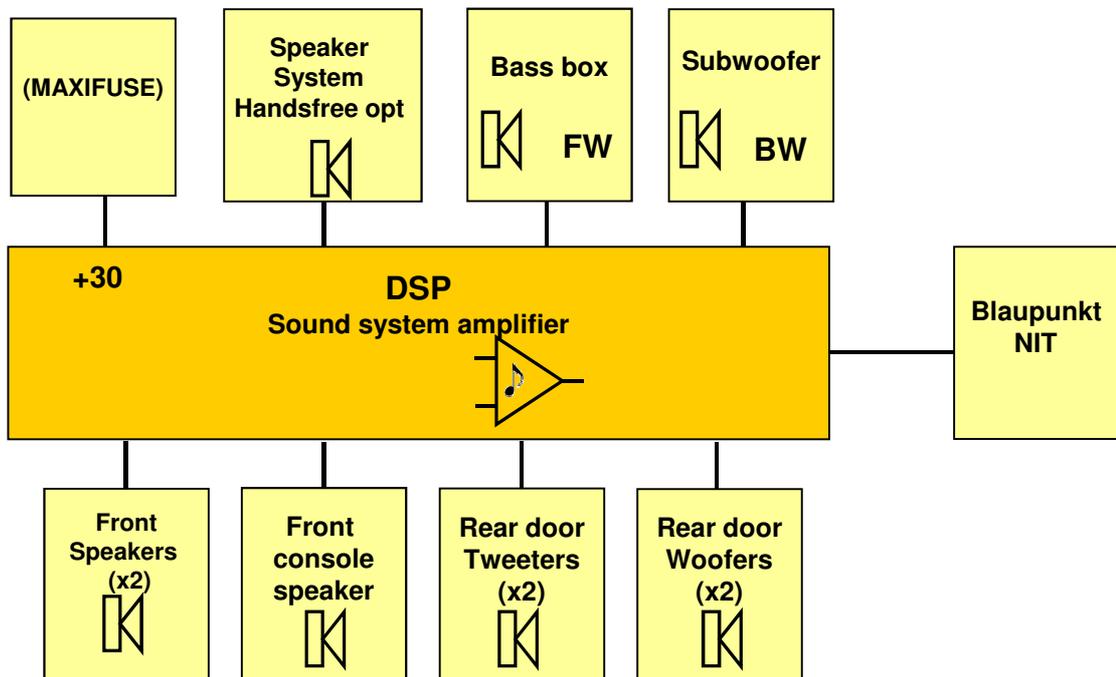
Surround Sound system for Quattroporte



1. Three 8 cm Twiddlers® (neodymium medium-high range speakers) in the dashboard.
2. One 13 cm Nd® Richbass® woofer in customised bass reflex box of 6.8 litres with TSM amplifier in the footwell.
3. Two 3.6 cm neodymium tweeters in the rear doors.
4. Two 16.5 cm neodymium medium-low range speakers in the rear doors
5. Two 8 cm Twiddlers® (neodymium medium-high range speakers) in the rear parcel shelf.
6. One 25.5 cm PowerNd® woofer with high-performance amplifier in the rear parcel shelf.
7. Digital amplifier in the rear left-hand side panel of the luggage compartment with Bose Digital Signal Processing, Bose 5.1 Surround technology (Centerpoint® and SurroundStage®), AudioPilot® Noise Compensation Technology and 8 channels for customised equalization.

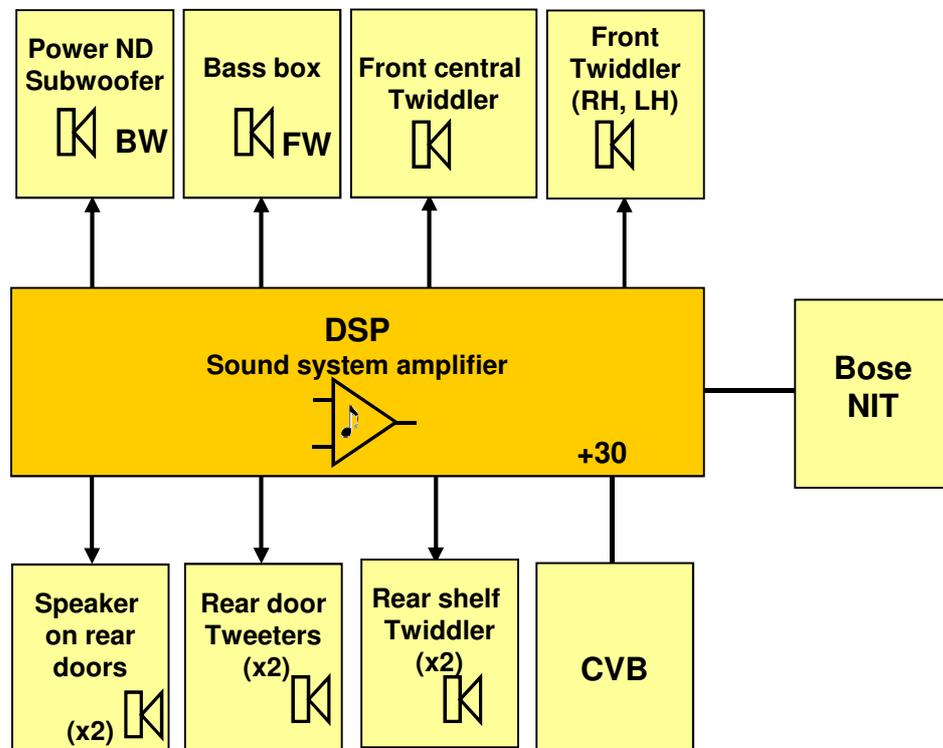


Bose Surround Sound system functional diagram – Quattroporte with Blaupunkt NIT



The DSP radio amplifier for the Blaupunkt NIT receives the power supply (+30) from the fuse control unit (MAXI FUSE) B004 positioned in the luggage compartment.

The system includes: bass box, subwoofer, 3 front speakers, 2 tweeters on the rear doors, 2 woofers on the rear doors.

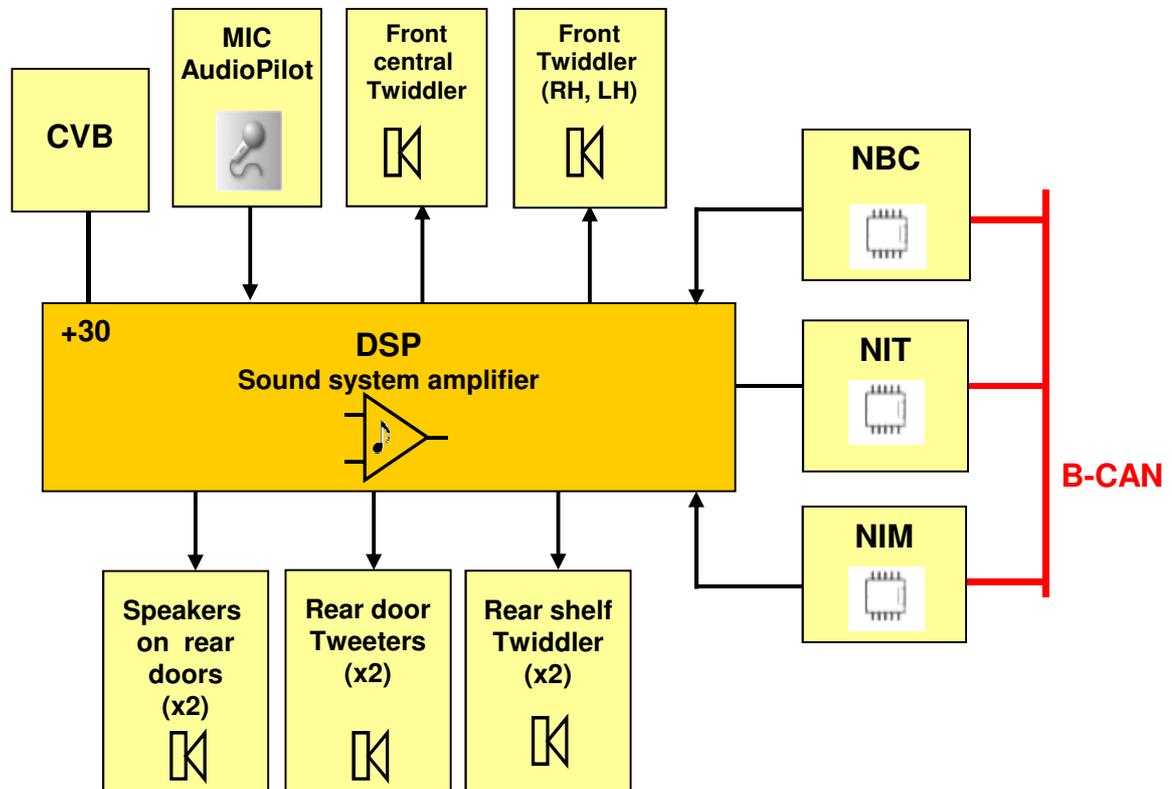
Bose Surround Sound system functional diagram– Quattroporte with Bose NIT

The DSP radio amplifier for the Bose NIT receives the power supply (+30) from the luggage compartment control unit (CVB) B016, positioned in the luggage compartment.

The system includes:

- Subwoofer
- Bass box
- 3 front twiddlers
- 2 speakers in the rear doors
- 2 tweeters on the rear doors
- 2 twiddlers in the rear parcel shelf

Bose Surround Sound system functional diagram – Quattroporte with Magneti Marelli NIT



The DSP of the Magneti Marelli NIT for the Quattroporte features no connection with the Subwoofer and the Bassbox. The system includes:

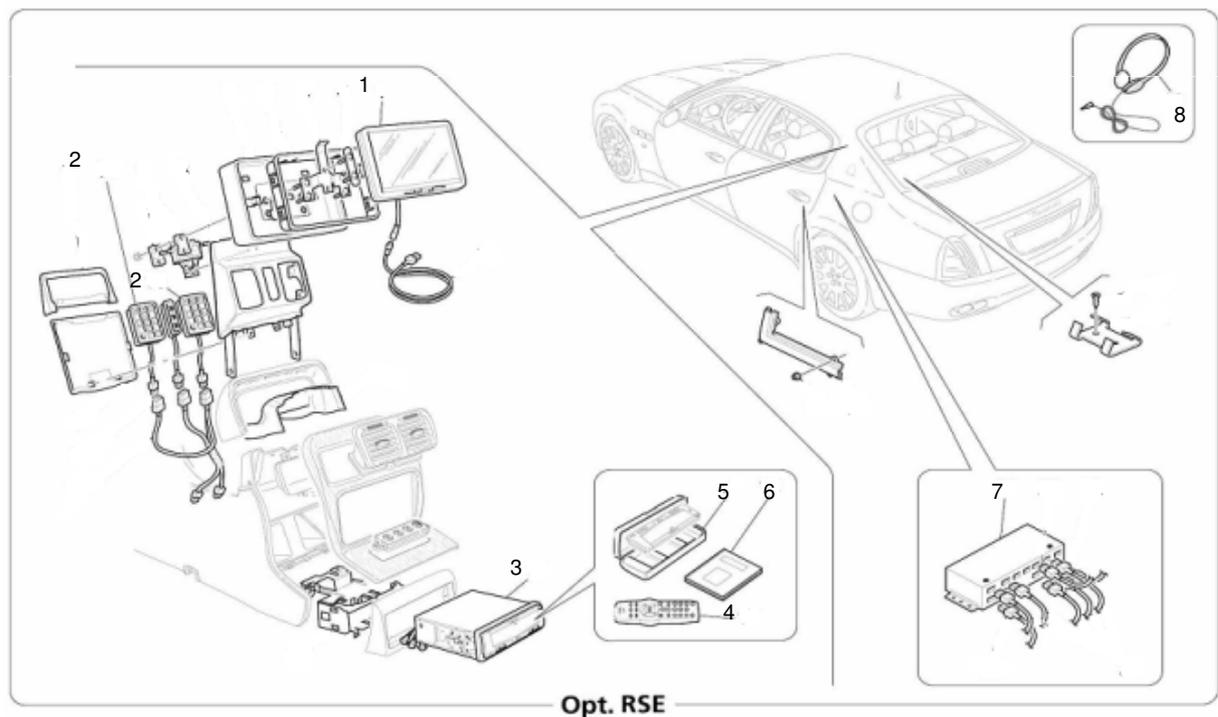
- 3 front twiddlers
- 2 speakers on the rear doors
- 2 tweeters on the rear doors
- 2 twiddlers on the rear shelf

Rear Seat Entertainment System

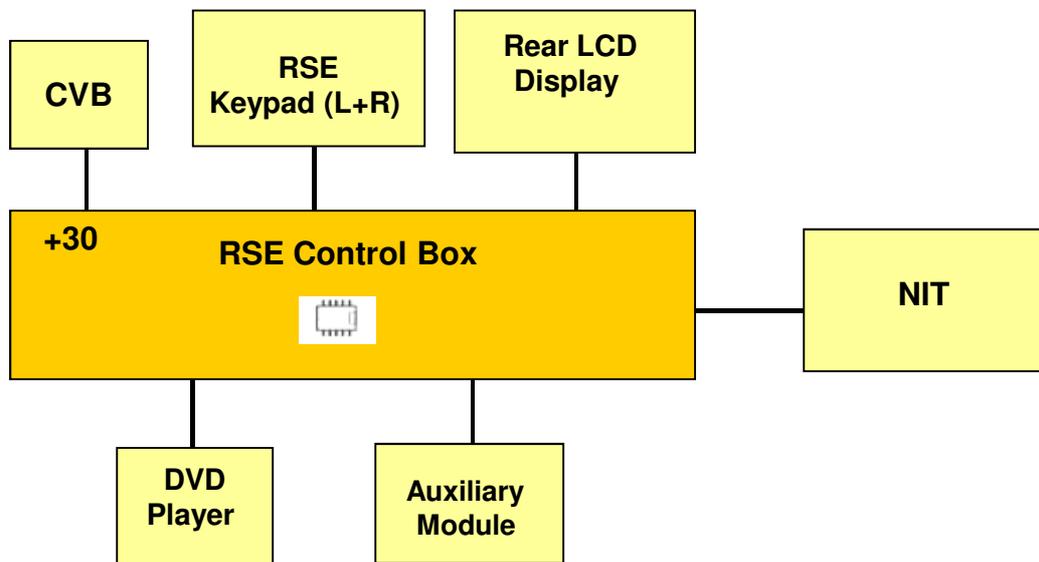
Maserati offers two versions of the optional Rear Seat Entertainment (RSE) system for the Quattroporte:

RSE 1: rear central screen, DVD player, auxiliary input for connection of external devices (e.g. video cameras), listening only through a headset and volume control via the rear system keypad.

RSE 2: like RSE 1, plus an analogue TV receiver, audio listening with headset (with volume control via the rear system keypad) or through the vehicle audio system (with volume control via the front Infotainment system).



- | | |
|-----------------------|--------------------------|
| 1. RSE Monitor | 5. DVD player front door |
| 2. RSE keypad | 6. DVD player manual |
| 3. DVD player | 7. RSE Control box |
| 4. DVD remote control | 8. RSE system headset |

RSE system functional diagram**Note:**

- The RSE Control Box is positioned underneath the rear left-hand seat and is +30 powered from the luggage compartment control unit (CVB).
- The Auxiliary module is located on the user control panel in between both keypads. It houses the auxiliary inputs for audio and video (white, red and yellow plugs for analogue Audio/Video inputs)

RSE DVD player region code programming and check procedure

The DVD player of the RSE system is preconfigured with region code 2.

The code configuration procedure is only necessary for vehicles marketed in countries with region codes other than 2.

For legal reasons, the region code can ONLY be changed FIVE times. After this, the player will remain locked on the last code set.

To change the DVD player region code, proceed as follows:

- Press the ON/POWER button on the remote control.
- Open the DVD front panel quickly and press the EJECT button.
- Close the DVD player front panel quickly.
- Press the SETUP button on the remote control.
- Press the MENU button on the remote control.
- Press the STOP button on the remote control.
- Press the relative numerical button (from 0 to 9) on the remote control to enter the new region code.

If the procedure is successful, the words REGION CODE will appear in the top left corner of the display. If the procedure is unsuccessful, it must be repeated from the beginning.

To check which region code is set on the DVD player, proceed as follows:

- Check that the DVD player is on. If it is not, press the ON/POWER button on the remote control.
- Open the DVD front panel quickly and press the EJECT button.
- Close the DVD player front panel quickly.
- Press the SETUP button on the remote control.
- Press the MENU button on the remote control.
- Press the MENU button on the remote control once again.
- Press the "0" numerical button on the remote control.
- Read the currently set REGION CODE that appears on the display.

TV receiver (Quattroporte up to MY08)

Description

The receiver system described on this page was available as option for the Quattroporte up to MY08 equipped with Blaupunkt NIT.

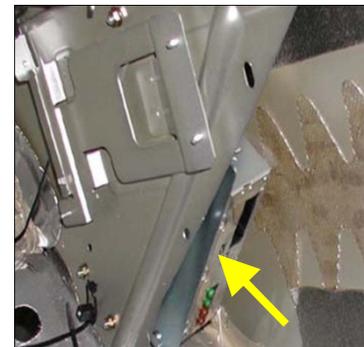
The module consists of a Diversity TV receiver positioned in the luggage compartment on the right-hand side, with an antenna integrated in the rear window.

The user interface is controlled via the NIT, while a dedicated CAN line (I-CAN) controls data exchange between the NIT and the TV node (NTV)

You can watch TV on the colour display of the NIT module or on the rear screen if the vehicle is equipped with the RSE2 system (Rear Seat Entertainment).

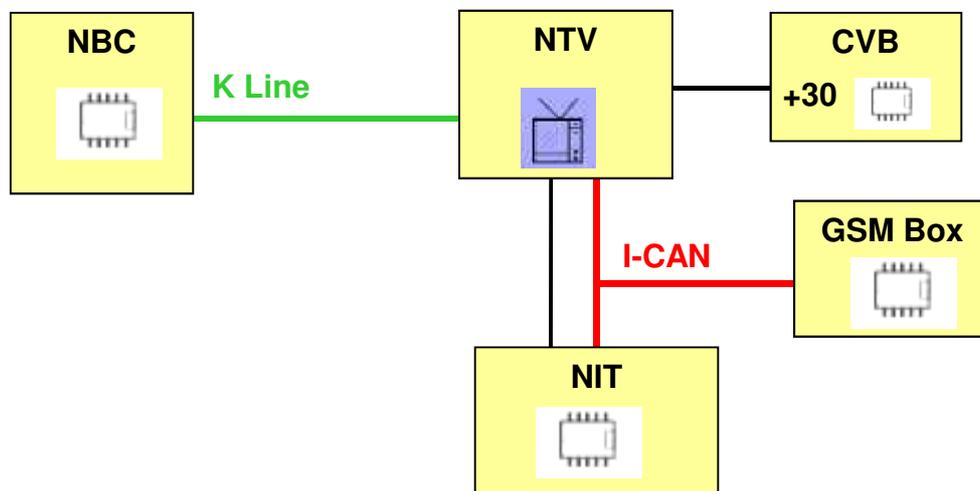
Note:

- The TV option is not available on vehicles equipped with Magneti Marelli NIT.
- For the Quattroporte Restyling equipped with Bose NIT, a TV receiver is available as option. In this case, the TV receiver is integrated in the NIT.



No-load current absorption (sleep mode):	< 1 mA
Power supplies:	+30
Earths:	1

TV node functional diagram



Maserati Multimedia Business Center (Quattroporte Collezione Cento)



System description

Dedicated to the rear seats, the Maserati Multimedia Business Center (MMBC) system is equipped with Audio/Video Aux-In functions, iPod interface, CD/DVD/MP3 player as well as Internet and e-mail functions.

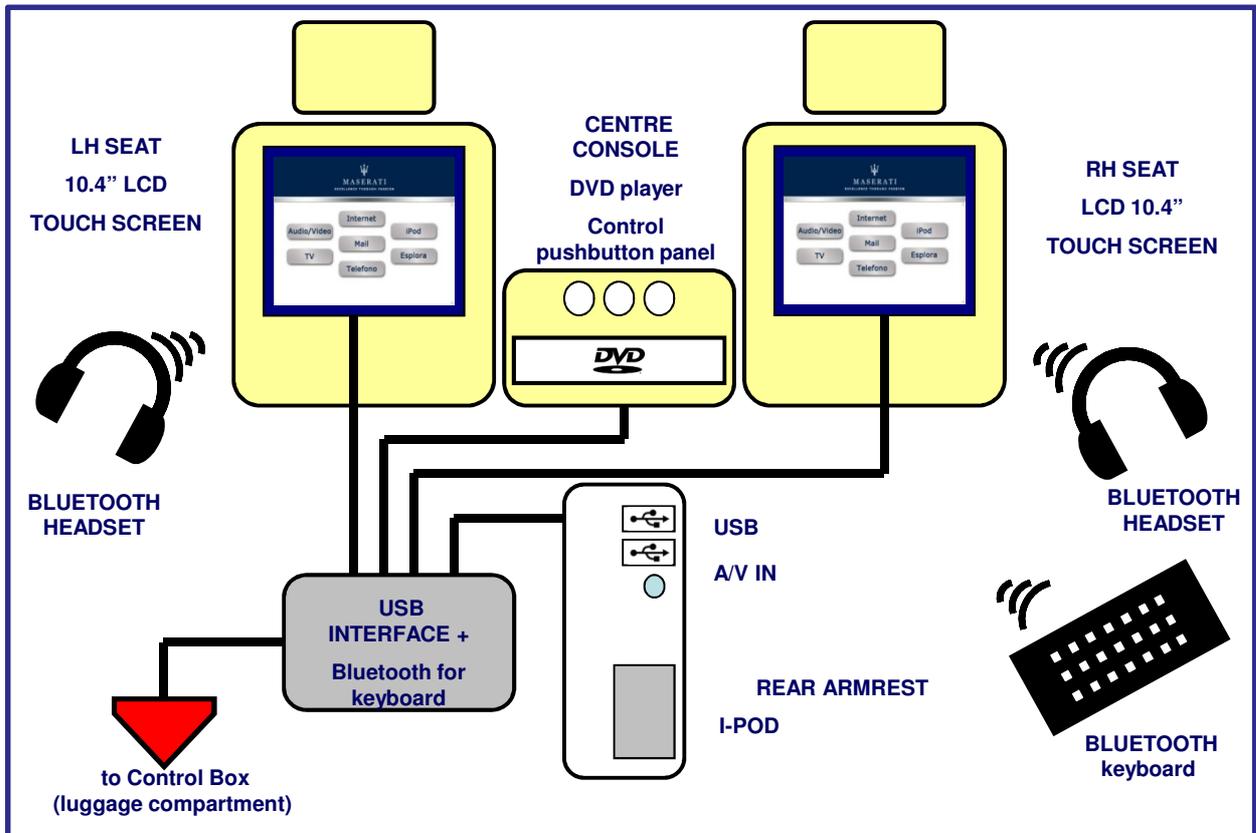
The system is controlled by means of two 10.4" touch screens incorporated in the back rests of the front seats, a small control panel in the centre console and a wireless keyboard using Bluetooth technology that folds into the rear seat armrest.

The system allows the user to interact with external devices by means of a specific connection panel fitted in the rear seat armrest and equipped with the following:

- 2 USB ports
- A/V AUX connection
- iPod connection

The user can listen to the MMBC system audio using the vehicle Hi-Fi system or the Bluetooth stereo headsets provided with the system.

MMBC system layout



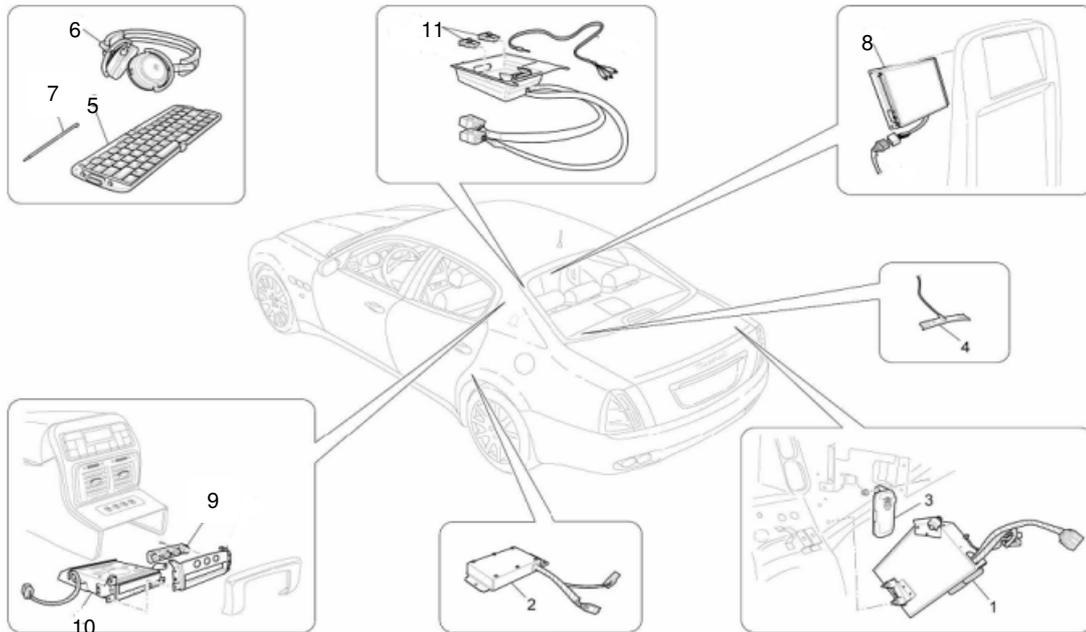
System connection

All the system peripherals are connected by means of a special wiring, which is fitted by the factory in the existing rubber through hole, behind the rear left-hand seat, and secured on top of the passenger compartment wiring, perfectly following the existing layout in order to make assembly operations (in the assembly line) as easy and clear as possible.

The multimedia system wiring interacts with the rest of the vehicle system at 3 points:

- **NIT:** Uses the *TV tuner* input (not used in this version) to distribute the audio through the stereo system of the vehicle.
- **Passenger compartment:** Takes the engine RPM, Key On and Alarm System Active signals (read only) from the connector positioned underneath the rear left-hand seat.
- **Luggage compartment:** Reads the *+VDC (12 V) and GND (earth) signals* for system power supply from a connector positioned at the fuse control unit on the right-hand side of the luggage compartment.

MMBC system component location



- | | |
|---|--|
| <ul style="list-style-type: none"> 1. Control box 2. USB Interface box 3. Modem 4. MMBC GPS antenna 5. Wireless keyboard | <ul style="list-style-type: none"> 6. Wireless headset 7. Multimedia system pen 8. Touch screen monitor in seat backrest 9. Multimedia system control keyboard 10. DVD reader 11. USB Socket |
|---|--|

- USB interface box: positioned underneath the rear left-hand seat in the same position as the RSE module.
- CONTROL BOX: positioned in the luggage compartment on the right-hand side above the battery, in the same position as the TV tuner, and uses the same connectors.
- NIT: The TV input of the NIT is used for listening through the vehicle system and therefore the cables normally used by the TV tuner will be connected.
- MODEM: positioned in the luggage compartment above the battery, while its antenna is situated underneath the rear shelf on the left-hand side.

Control Box

The entire system is controlled by a main unit (called **Control Box**) positioned in the luggage compartment on the right-hand side and contains the electronic control components. The UMTS modem (quad band-worldwide) required for connection to the Internet is installed in this control unit. A special adhesive antenna fitted underneath the rear shelf on the left-hand side allows UMTS network reception.

The electronics is divided into three modules:

- System activation/deactivation control
- Control logic based on compact industrial PC with Flash HD (steady state) and system SW installed (MS Windows XP Embedded customised according to the specific use)
- UMTS modem for Internet connection

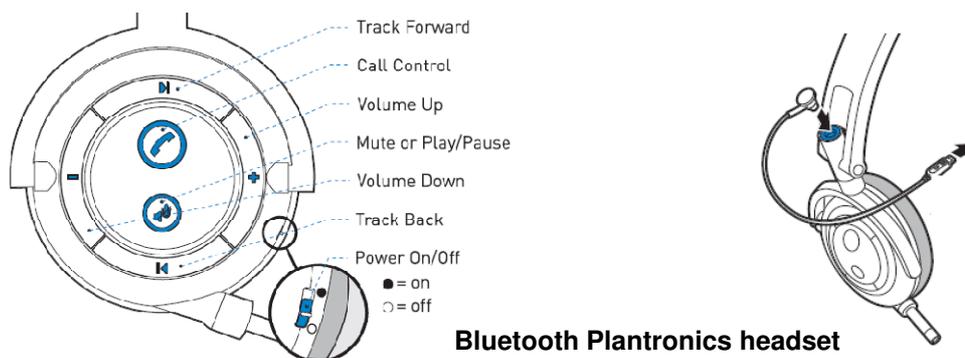
The Bluetooth transmitters/receivers with their respective keys for headset frequency re-alignment in case of replacement are positioned on the Control box case.

USB interface box:

A second control unit (called **USB interface box**) installed underneath the rear left-hand seat, acts as switching node for the various signals coming from the Control Box and going to the various system peripherals; it features a Bluetooth transmitter/receiver for the keyboard.

Sound System

- The user can listen to the multimedia audio system using the vehicle stereo system, by pressing the TV button on the NIT, or the Bluetooth stereo headset provided.
- The multimedia audio system works in parallel on both the NIT and the Bluetooth line, so that you only need to turn on the headset to switch to "privacy" mode. The headset with Bluetooth technology for connection to the MMBC system comes already configured.



Bluetooth keyboard

The keyboard is delivered together with the MMBC entertainment system.

It is housed in a special casing and uses the Bluetooth technology for connection to the MMES system.

In the event that the keyboard does not work and must be replaced, you must configure the new one in Personal Computer mode. Each keyboard is identified by a different part number. Therefore, the Bluetooth procedure for recognising them is not sufficient: they must be stored in the Control Box as system-paired device.



Bluetooth keyboard



Audio CD Player/ changer



iPod adaptor



USB sockets

Seat backrests with integrated touch screen monitor

The 10.4" LCD display is fitted on a special trim shield for the seat. This has been obtained by gluing a polyurethane plate to the trim shield derived from the M139 and modified at the top by means of mechanical machining (cutting). Once assembled, the trim plate is hand-upholstered with seamless Benova artificial leather, in the same colour as the seats.

The CPL display is fitted on the special trim shield by means of appropriate metric fasteners, and comprises:

- Display fastening bracket in laser-cut folded sheet.
- Display control electronics
- 10.4" LCD touch screen



**Touch screen monitor
In seat backrest**

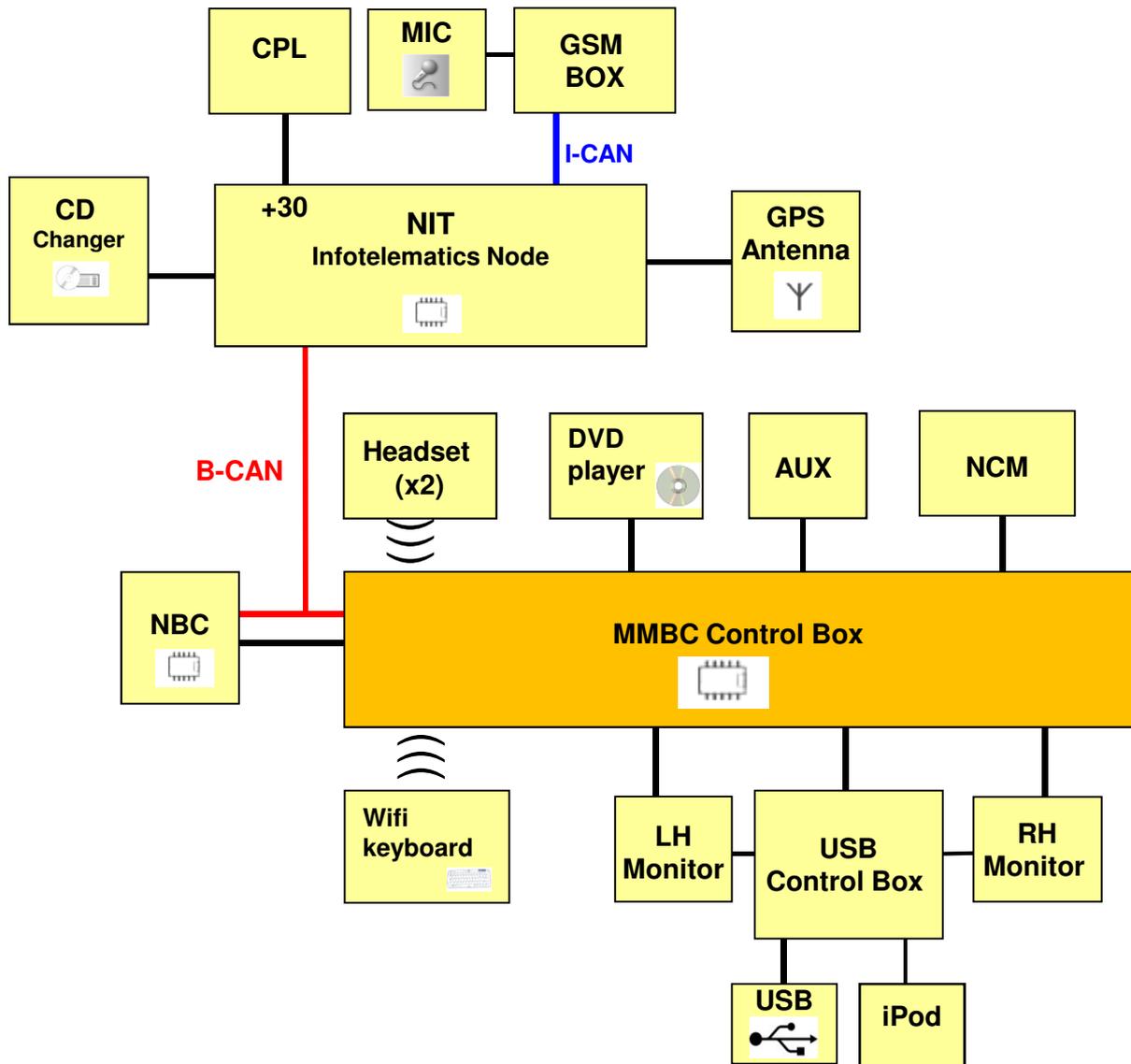
Centre console with CD/DVD player

The original Quattroporte centre console has been modified by removing the ashtray and the relative support and modifying the metal reinforcement bracket of the console frame. The components removed have been replaced with a painted polyurethane fake leather trim plate in matching colour. This is secured on the centre console using the existing metric fasteners. The control pushbutton panel and the DVD player fastening brackets are fitted on the same specific trim plate.



CD/DVD player

MMBC system functional diagram



Whenever using a battery charger or booster on the vehicle, it is absolutely essential to first access the fuse box above the battery and remove the 10A MMBC system protection fuse.

MMBC system operation

Activation/deactivation logic

The *Key On*, *Engine RPM* and *Alarm System Active* signals are used for activation/deactivation control.

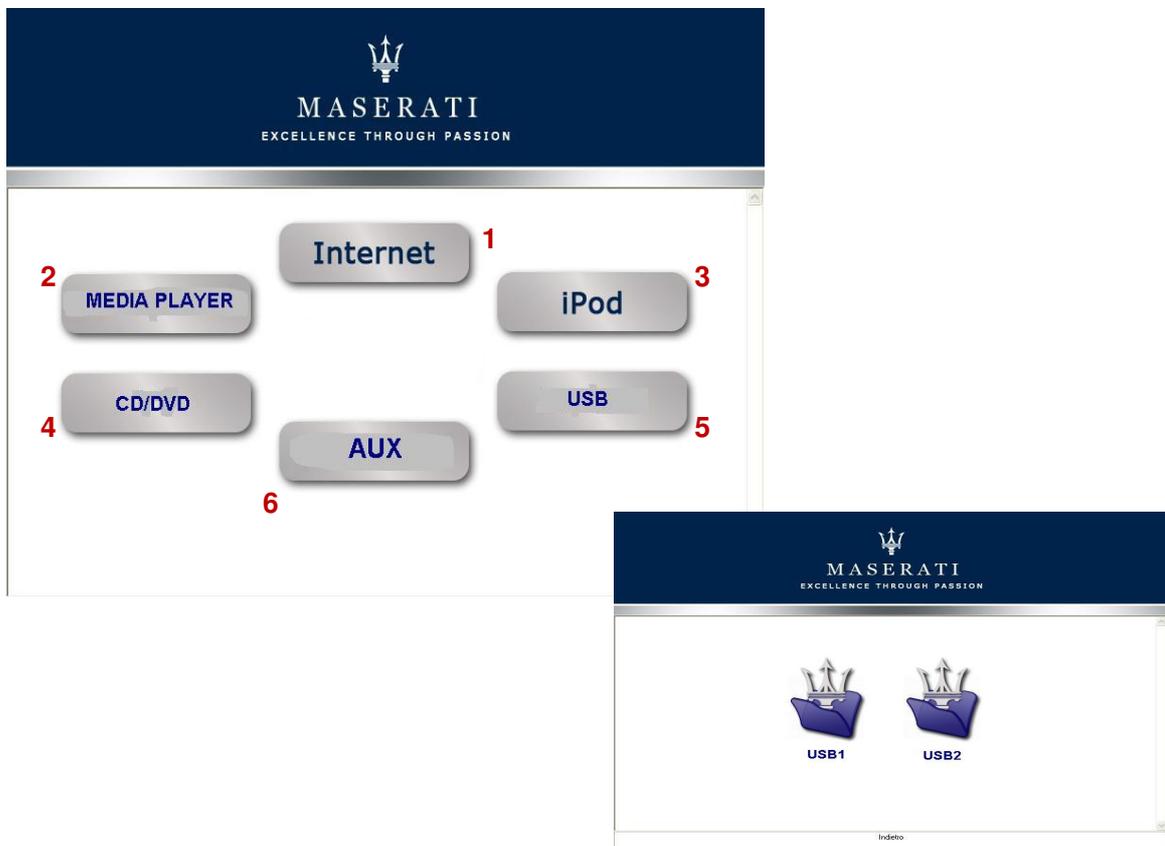
To prevent battery discharge, the MMBC system can only be activated after the engine has been started. When the engine is turned off, a warning message informs the user that the time to system shutdown is 5 minutes, and another message is shown 30 seconds before shutdown.

If the engine is restarted while the system is turning off, the timer is reset and the system remains active until the next time the engine is turned off.

The system can also be shut down manually using the keys on the keypad positioned on the rear of the centre console (both displays must be off).

If the vehicle is locked by means of the alarm system, the 5-minute timer is bypassed and the system will instantly be deactivated.

Home page with 6 buttons:



INTERNET

Activate the INTERNET function by briefly pressing the button (1), to access the WINDOWS EXPLORER page.

Using the keypad provided, you can type in the desired Web address and start navigation.

To close the function and return to the main interface, touch the X symbol in the top right corner of the display.

MEDIA PLAYER

Activate the MEDIA PLAYER function by briefly pressing the button (2) to access the MEDIA PLAYER interface page. This will allow the user to listen to and view the files contained in the CD/DVD player and the peripherals connected to the USB ports.

To close the function and return to the main interface, touch the X symbol in the top right corner of the display.

I-POD

Connect an iPod via the interface installed in the rear armrest and activate the iPod function by briefly pressing the button (3) to access the iTunes software through which you can listen to the files contained in the peripheral.

In addition, connecting an iPod peripheral to the special interface, you can automatically recharge its batteries even when the iPod function is not selected.

To close the function and return to the main interface, touch the X symbol in the top right corner of the display.

CD/DVD

Activate the CD/DVD function by briefly pressing button (4): you can view the disc contents in the CD/DVD player.

USB

Activate the USB function by briefly pressing button (5): you can view the contents of the connected USB peripherals.

AUX

The AUX button (6) activates the audio/video acquisition board, transmitting the devices connected to the rear armrest input to the system .

Service operations on the MMBC system**Reconnecting the MMBC System Control Box:**

If you replace the Control Box, you must configure the peripherals connected to it.

Connect a keyboard and a mouse to the two USB ports.

Start the engine and turn on the MMBC system using the relative control buttons.

Wait for the system to load and for the home page to be displayed.

Check the MODEM and SIM CARD parameters.

The SIM Card given by the customer must be a "Data" or data-voice" SIM Card.

Simultaneously press "*ALT – F4*" on the keyboard. Using this command, you will access the Personal Computer interface and the configuration menu.

Select the following controls:

"START" - "PROGRAMS" and select the application *"MOBILE PARTNER"*

Wait for the program to complete the automatic search for the telephone provider of the SIM CARD used.

Select *"TOOL"*, then *"PIN OPERATIONS"* and finally select *"DISABLE"*

This procedure must be performed if you wish to turn off the PIN code entry request that the SIM CARD requires for each network connection.

Select "TOOL", then "OPTION" and "PROFILE MANAGER". Select "EDIT" or "NEW" to create a connection profile.

You may create one profile only, which is the profile associated with the SIM CARD provider, so as to avoid excessive and unnecessary roaming and therefore connections through other telephone service providers.

Configure "DIAL UP", i.e. the provider's Internet access point.

Configure the "APN" (Access Point Network), select "STATIC" and write the provider's APN in the box below (e.g.: ibox.itin.it).

Select the data by selecting "SAVE" and then exit the application.

Try to connect to the Internet to check that the data entered is correct. In the event that "ERROR 619" is found, you must reconfigure the parameters for connection to your provider.

If everything is correct, exit Personal Computer mode and go back to MMBC mode.

Calibrate the right-hand and left-hand display.

The displays are plug and play devices, therefore they are automatically recognised by the control box.

However, the display calibration procedure must always be performed:

Keep the keyboard and the mouse connected to the two USB ports.

Keep the engine and the MMBC system turned on.

Keep the system in Personal Computer mode. If it is no longer in this mode, press "ALT F4".

Select:

"START" - "PROGRAMS" and select the application "PENMOUNT UNIVERSAL DEVICES"

A window with the drive icon will be displayed (right-hand or left-hand display or both), select it.

Select "CONFIGURE" and then "STANDARD CALIBRATION".

Follow the instructions on the display you need to calibrate.

When the calibration procedure has been completed successfully, select "OK" to exit the application.

If the display is still not calibrated after three consecutive attempts, the application will automatically close and the PENMOUNT UNIVERSAL DEVICES program will have to be run again.

Repeat the same procedure for the other display.

If everything is correct, exit Personal Computer mode and go back to MMBC mode.

Configure the Bluetooth keyboard.

Select "START - SETTINGS - CONTROL PANEL" and then "BLUETOOTH DEVICES", then select "ADD" to start storing the keyboard desired.

Check that the message "The device is configured and ready to be found" is highlighted. If not, highlight it by selecting the relative box.

Slide the switch to the right, to the "HID" position. While searching for the peripheral the LED flashes and when it has been found the LED goes off.

The guided procedure will find the connected keyboard. Select the type of keyboard found: the auto-configuration procedure will start automatically and the parameters will be stored in the control box memory.

During the procedure, you will be requested to choose whether to enter or not a PASSKEY. We recommend you do NOT set a communication password.

Should the installation procedure fail, repeat it following all the above mentioned steps and taking care to move the HUB device - found underneath the rear left-hand side seat - as close as possible to the keyboard.

Turn off the keyboard before turning off the MMBC system.

If everything is correct, select the AUTOBOX icon at the bottom right and return to the MMBC procedure.

From the MMB C mode, check that all the system devices work properly (CD-DVD, USB1 USB2, AUX IN and Internet connection).

Reconnecting the MMBC System UMTS Modem:

The UMTS modem is a plug and play device, it is therefore automatically recognised by the control box. Therefore, in the event of modem replacement, you do not need to configure the Hardware.

If you replace the Modem or the SIM CARD (if you changed your telephone provider) you must configure the telephone service provider and the address to connect to.

Check that the SIM CARD is of the "DATA" or "DATA - VOICE" type. The standard SIM CARDS enabled only for telephone VOICE transmission cannot be installed.

SIM CARD configuration:

Connect a keyboard and a mouse to the two USB ports.

Insert the SIM CARD you wish to use. If the SIM CARD used is the same that was installed in the previous modem, the procedure described below has the purpose of verifying that the parameters recognised by the new modem are correct. If the SIM CARD is another one, the procedure below must be performed to configure the new connection.

Start the engine and turn on the MMBC system using the relative control buttons.

Wait for the system to load and for the home page to be displayed.

Simultaneously press "*ALT – F4*" on the keyboard. Using this command, you will access the Personal Computer interface and the configuration menu.

Select the following controls:

"START", "PROGRAMS" and select the application "MOBILE PARTNER" and "MOBILE PARTNER" again.

Wait for the program to complete the automatic search for the telephone provider associated with the SIM CARD used.

Select "*TOOL*", then "*PIN OPERATIONS*" and finally select "*DISABLE*"

This procedure must be performed if you wish to turn off the PIN code entry request that the SIM CARD requires for each network connection.

Again under "*TOOL*", select "*OPTION*" and "*PROFILE MANAGER*".

Select "*EDIT*" or "*NEW*" to create the connection profile.

You may create one profile only, which is the profile associated with the SIM CARD provider, so as to avoid excessive and unnecessary roaming and therefore connections through other telephone service providers.

Configure "*DIAL UP*", i.e. the provider's Internet access point.

Configure "*APN*" (Access Point Network), select "*STATIC*" and in the box underneath write the APN of the provider (e.g. ibox.itin.it).

Save the data set by selecting "*SAVE*" and exit the application.

Try to connect to the Internet to check that the data entered is correct. If "ERROR 619" appears, the provider's connection parameters must be reconfigured.

If everything is correct, exit Personal Computer mode and go back to MMBC mode.

Reconnecting the MMBC System Bluetooth keyboard:

In the event that the keyboard does not work and must be replaced, you must configure the new one in Personal Computer mode. Each keyboard is identified by a different part number. Therefore, the Bluetooth procedure for recognising them is not sufficient: they must be stored in the Control Box as system-paired device.

Connect a keyboard and a mouse to the two USB ports.

Start the engine and turn on the MMBC system using the relative control buttons.

Wait for the system to load and for the home page to be displayed.

Simultaneously press "*ALT – F4*" on the keyboard. Using this command, you will access the Personal Computer interface and the configuration menu.

Select "START", "PROGRAMS" and the application "BLUETOOTH DEVICES". Subsequently select "ADD" (Add device) to start the memorisation procedure for the desired keyboard type.

Check that the message "The device is configured and ready to be found" is highlighted. If not, highlight it by selecting the relative box.

Slide the switch (1) to the right, to the "HID" position. While searching for the peripheral the LED flashes and when it has been found the LED goes off.

The guided procedure will find the connected keyboard and all active Bluetooth devices. We recommend that you deactivate all Bluetooth devices in the vicinity that are not involved in the configuration.

During the procedure, you will be requested to choose whether to enter or not a *PASSKEY*; We recommend you *DO NOT* set a communication password.

Select the type of keyboard found: the auto-configuration procedure will start automatically and the parameters will be stored in the control box memory. The LED on the keyboard will turn off to indicate that the configuration procedure has been successfully completed.

Should the installation procedure fail, you must repeat the configuration procedure. Before restarting the procedure, you must access "CONTROL PANEL - BLUETOOTH DEVICES", select any stored keyboard and remove it.

Turn the keyboard and the MMBC system off.

Turn on the MMBC system and perform the new keyboard storage procedure again, proceeding as described above.

If everything is correct, exit Personal Computer mode and go back to MMBC mode

Turn the keyboard off before turning off the MMBC system, to prevent discharging the keyboard batteries.

Reconnecting the MMBC System Bluetooth Headset:

If you need to replace this component, you must reconfigure the Bluetooth connection.

To access the universal adapters, remove the battery compartment cover on the right-hand side of the luggage compartment.

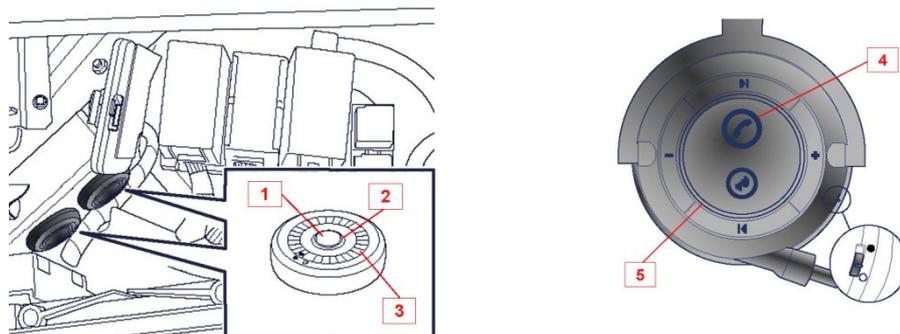
Each adapter is associated with a headset, you may therefore configure only two headsets.

Turn on the adapter by turning the dial (3) to the ON position).

With the headset off and the MMBC system off, set the connection:

- Press and hold the call control button (4).
- Turn on the headset, the LED (5) will start flashing alternately red and blue;
- Release the call control button (4)
- Turn on one of the universal adapters and press the connection button (1) until the LED (2) alternately flashes red and blue.
- The connection is successful if both the LED of the headset and that of the adapter flash blue.

Turn the adapter off by turning the dial (3) to the OFF position.



Reconnecting the MMBC System RH/LH LCD touch screen:

The LCD screens are plug and play devices, therefore they are automatically recognised by the control box.

If you replace the LCD screens you must always calibrate the new component.

Connect a keyboard and a mouse to the two USB ports.

Start the engine and turn on the MMBC system using the relative control buttons.

Wait for the system to load and for the home page to be displayed.

Simultaneously press "*ALT – F4*" on the keyboard. Using this command, you will access the Personal Computer interface and the configuration menu.

Select "*START*" - "*PROGRAMS*" and then select the application "*PENMOUNT UNIVERSAL DEVICES*".

A window with the drive icon will be displayed (right-hand or left-hand display or both), select it.

Select "*CONFIGURE*" and then "*STANDARD CALIBRATION*".

Follow the instructions on the LCD screen you need to calibrate.

When the calibration procedure has been completed successfully, select "*OK*" to exit the application.

If the LCD screen is still not calibrated after three consecutive attempts, the application will automatically close and the *PENMOUNT UNIVERSAL DEVICES* program will have to be run again.

If everything is correct, exit Personal Computer mode and go back to MMBC mode.

Heating, Ventilation and Air Conditioning System Node (NCL)

Delphi

Vehicle air-conditioning

The “climate in the car” directly affects the driver as well as comfortable and safe driving. A comfortable temperature in the vehicle is determined by the outside temperature and sufficient air intake:

- low outside temperature, e.g. -20°C > high inside temperature 28°C , high air flow rate 8 kg/min
- high outside temperature, e.g. 40°C > low inside temperature 23°C , high air flow rate 10 kg/min
- average outside temperature, e.g. 10°C > low inside temperature 21.5°C , low air flow rate 4 kg/min

even a modern heating and ventilation system is not fully up to the task of creating a comfortable temperature in the vehicle when the outside temperature is high. Why?

- Especially when the sun beats down on the car, the superheated air inside can only be exchanged with air at ambient temperature.
- As the air flows from the air intake to the passenger compartment, it generally gets even hotter by several degrees.
- If you open a window or the sunroof or put the fan on full blast trying to feel more comfortable, all you get is an air current and other annoying things such as noise, exhaust gas, pollen.

When relative humidity is high, your body “feels” much warmer.

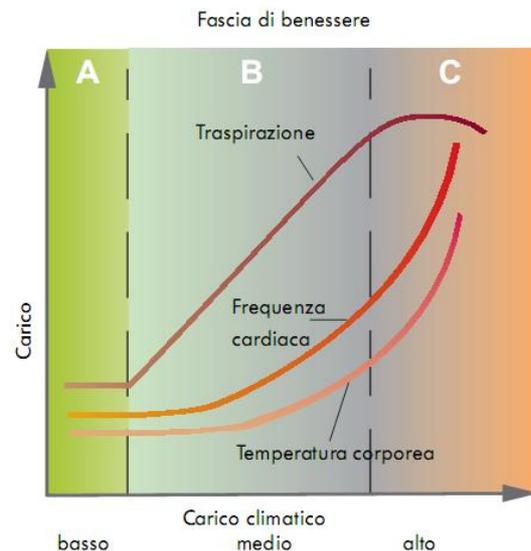
Temperature in un'automobile della classe media con: viaggio di 1 h temperatura esterna 30°C raggi solari sull'automobile			
	Zona	Con climatizzatore	Senza climatizzatore
Testa		23°C	42°C
Torace		24°C	40°C
Piedi		28°C	35°C

Effects on the human body of an uncomfortable temperature in the vehicle

The best temperature for a driver is around 20 - 22°C. This corresponds to climatic load A, the comfort zone.

Intense sun on the car, increases the inside temperature by over 15°C above the outside temperature. The body temperature and the heart rate increase. This also results in higher perspiration. The brain does not receive enough oxygen. In this connection, see zone B of the climatic charge.

As from zone C there is already a body overload. Traffic doctors call it “climatic stress”.



As special research has shown, an increase in temperature from 25 to 35°C decreases sensory perception and the faculty of combination by 20%. It is estimated that this value corresponds to 0.5 g/l alcohol in the blood.

A secondary technical effect, but as important as lowering the temperature, is dehumidification of the air and purification of the air connected to it. Anti-pollen and active carbon filters are complementary factors for air purification. Purifying the air greatly benefits people that suffer from allergies.

Physics in the cooling technique

The law of physics

For many substances, there are three known phases. For example, water has a *solid*, a *liquid* and a *gaseous* phase.

Research on cooling goes back many years and is still ongoing. A first system to cool foodstuffs was to put them in an “icebox”. Ice (water in the solid phase) absorbs the heat in foodstuffs which cool down as a result. This causes the ice to melt and turn into a different phase becoming water.

If the water were fed with more heat, it would start boiling and evaporate and turn into the gaseous phase.

By cooling the gaseous substance, it can be converted back into a liquid and with further cooling into a solid substance.



Ice – solid



Ice - Becomes liquid
when it absorbs heat



Water - Becomes
gaseous
when it absorbs heat

This principle applies to almost all substances.

- When a substance changes from the liquid to the gaseous phase, it absorbs heat.
- When a substance changes from the gaseous to the liquid phase, it emits heat.
- The heat always passes from the hotter to the colder substance.

The air-conditioning technique exploits and technically puts into practice the effects of the heat exchange whereby a substance changes its state at certain points.

Pressure and boiling point

If the pressure on a liquid changes, its boiling point changes. All liquids behave in a similar manner.

Boiling point (at sea level pressure):

H ₂ O (water):	100 °C
Engine oil:	380 – 400 °C

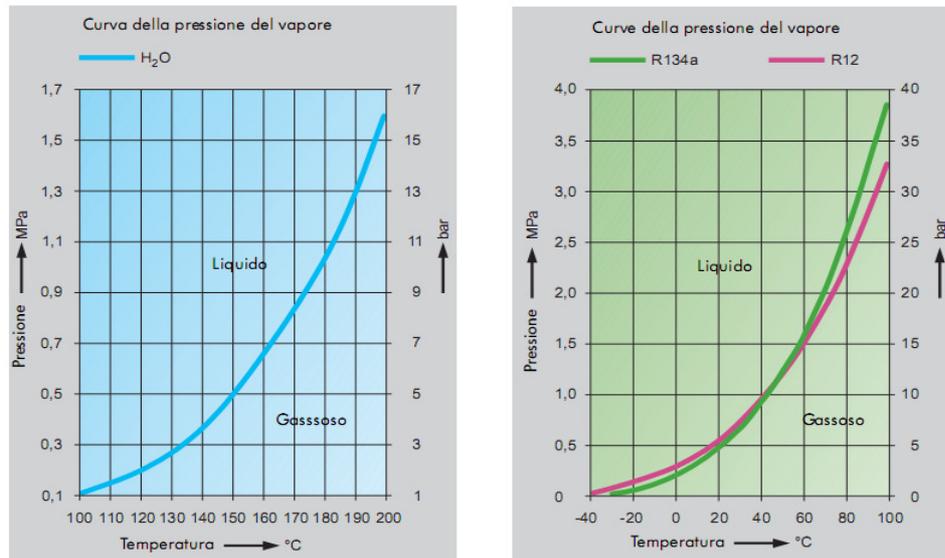
We know that the smaller the pressure to which water is exposed the lower the temperature at which it starts boiling (i.e. becoming vapour).

This evaporation process is also used in car air-conditioning systems. To this end, a substance with a low boiling point is used, known as refrigerant.

Boiling point (at sea level pressure):

R12 refrigerant:	-29.8 °C
R134a refrigerant:	-26.5 °C

(the coolant boiling point indicated in the tables always refers to an atmospheric pressure of 0.1 MPa = 1 bar.)



From the vapour pressure curves for the two coolants R134a and R12 (R12 is no longer used) and for water we know that:

- Keeping the pressure constant, when the temperature drops, the vapour transforms into liquid (in the air-conditioning circuit, this occurs in the condenser),
- or reducing the pressure, the refrigerant changes from liquid to vapour (in the air-conditioning circuit, this occurs in the evaporator).

Refrigerant

Refrigerant is a gas and easily reaches its boiling point. In gas form it is invisible, in vapour or liquid form it is colourless like water.

It is not permitted to mix different refrigerants with each other, and only the type specified for the relative system may be used.

In Germany, marketing of R12 refrigerant has been banned since 1995, and since July 1998 it is not even permitted to use it in air-conditioning systems.

In today's car air-conditioning systems, exclusively R134a refrigerant is used. This is a fluorocarbon free of chlorine atoms like R12, which split and damage the earth's ozone layer. The vapour pressure curve of R134a is very similar to that of R12 as is its cooling power.

The refrigerant is gaseous or liquid in relation to the existing pressure and temperature conditions in the cooling circuit.

State of R134a refrigerant during circulation in the air-conditioner

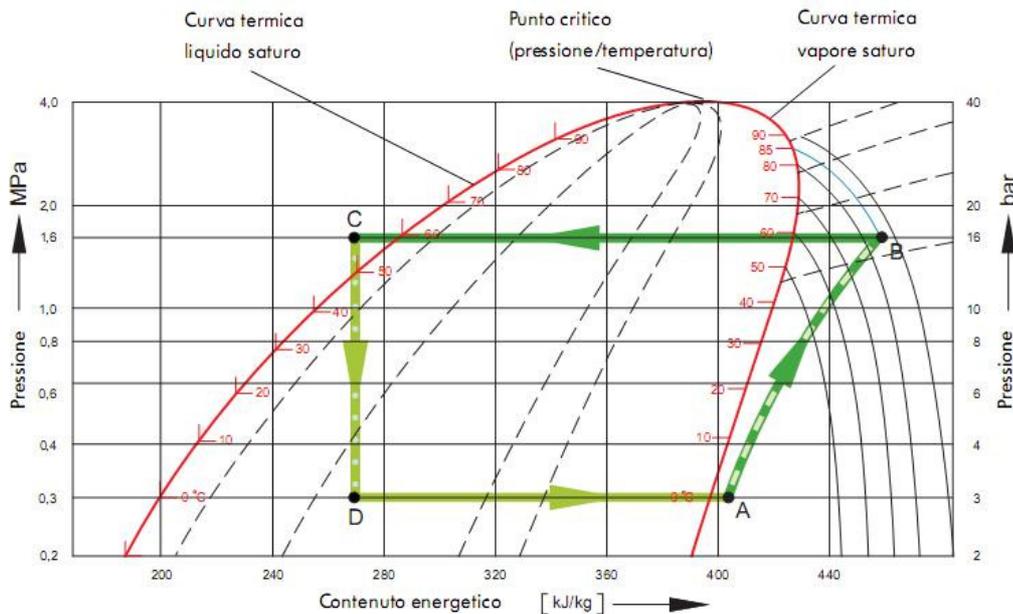
Other than the vapour pressure curve, the circulation process shows the transformation of the refrigerant under the action of pressure and temperature, in addition to the energy balance, during which it re-acquires its original state.

The graph is a detail of the diagram of the R134a coolant states in a car air-conditioning system. The absolute values will differ depending on the cooling power necessary for the type of vehicle.

The energy content is important for the design of an air-conditioning system. It indicates how much energy is needed for the process to function (evaporation heat, condensation heat) to achieve the required cooling power.

Physical data of R134a:

Boiling point: - 26.5 °C Critical temperature: 100.6 °C
 Solidification point: -101.6 °C Critical pressure: 4.056 Mpa (40.56 bar)



- A ——— B Compression in the compressor, increase in pressure and temperature, gaseous, high pressure, high temperature
- B ——— C Condensation process in the condenser, high pressure, decrease in temperature, slightly cooled liquid will flow from the condenser
- C - - - - - D Expansion = sudden depressurization causes evaporation
- D ——— A Evaporation process (heat absorption) in the evaporator. Transformation process from vapour to gaseous, low pressure
- Thermal curve for point B

System lubricant

In order to lubricate all the moving parts of the air-conditioning system, a special oil is required – refrigerant circuit lubricant– free of impurities, such as sulphur, wax and humidity. This oil must be compatible with the coolant, given that a part of it is mixed with the coolant with which it circulates, but at the same time it must not attack the system seals. It is not permitted to use other oils, given that these would cause copping, carbonization and the formation of residues with consequent premature wear and destruction of the moving parts.

A special synthetic oil is used for the R134a circuit. This is used only for this refrigerant, given that it does not mix with other liquids. Added to this, the coolant oil may be suitable for only one type of compressor.

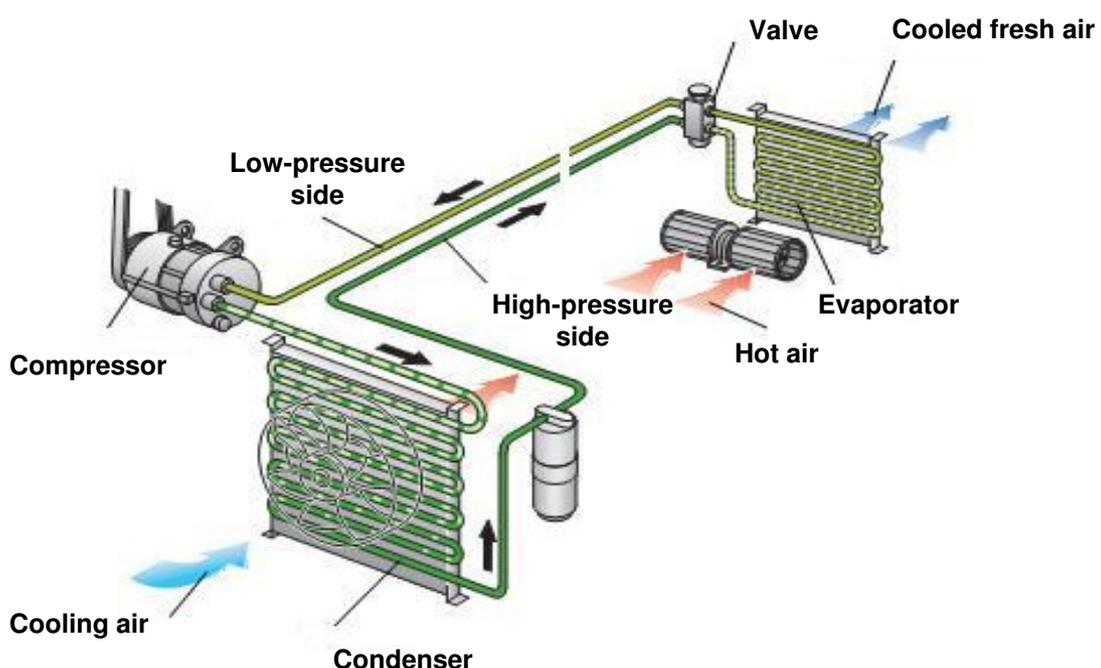
Cooling technique

Refrigerant circuit – principle

We know that if we want to cool something we need to extract heat. To this end, a compression cooling system is adopted in motor vehicles. A refrigerant circulates in a closed circuit continuously changing from the liquid to the gaseous state. It is:

- compressed in gaseous form,
- condensed by heat extraction,
- evaporated by reducing the pressure by means of heat absorption.

Cold is not generated, but heat is extracted from the air coming into the vehicle.



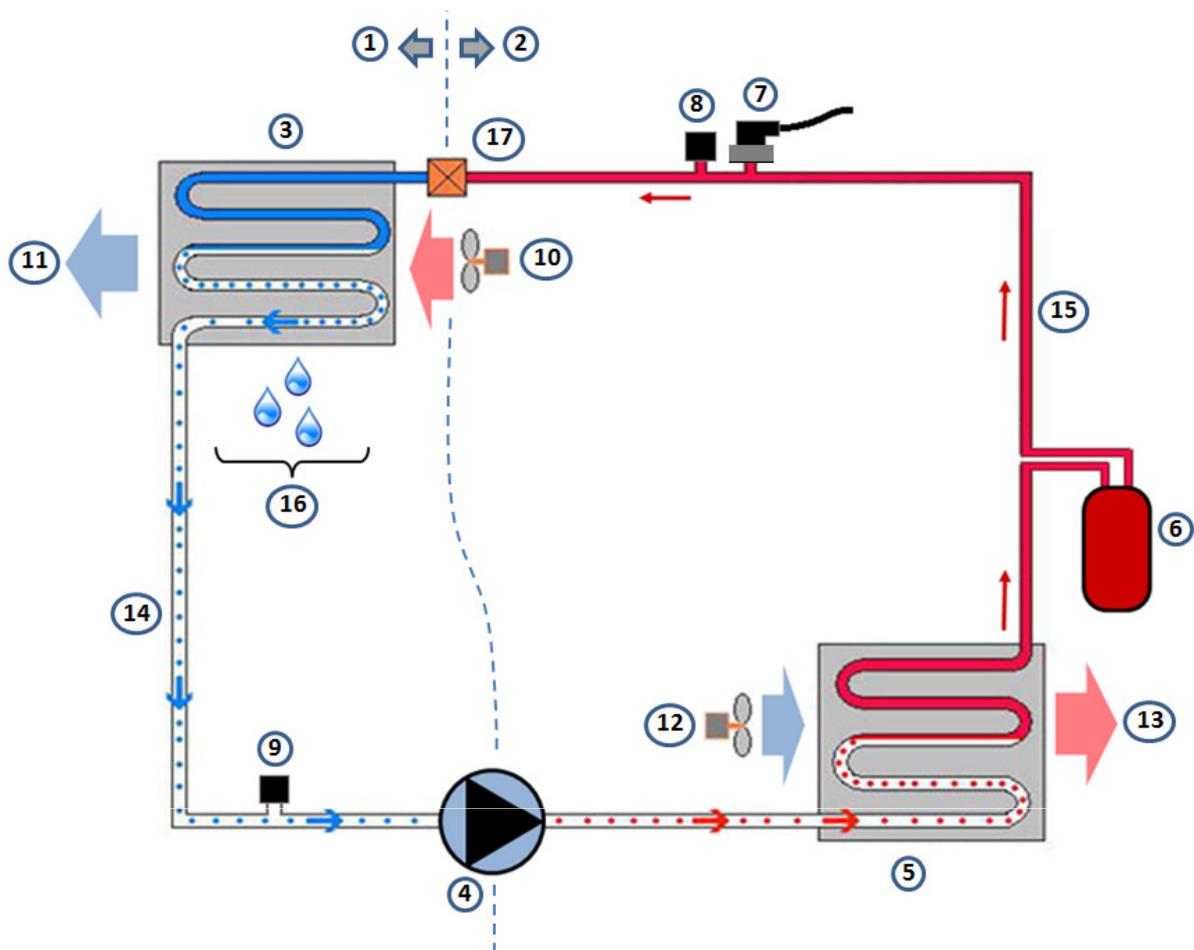
The compressor aspirates cold gaseous refrigerant at low pressure. In the compressor, the refrigerant is compressed and warms up. It is pumped into the circuit (high-pressure side). In this phase, the refrigerant is gaseous and strongly compressed at high temperature.

After running along a short path, the refrigerant arrives at the condenser. In the condenser, heat is extracted from the compressed hot gas by the air which flows through it (dynamic air or operation of the fan). When the dew point dependent on the pressure is reached, the gaseous refrigerant condenses and liquefies. In this phase, the coolant is therefore liquid, highly pressurised and at average temperature.

The liquid and compressed refrigerant flows towards a tight passage which may be a bottleneck or an expansion valve. From here it is sprayed into the evaporator while being depressurised (low-pressure side). In the evaporator, the refrigerant expands and evaporates. The heat necessary for evaporation is extracted from the hot air that passes across the evaporator plates and is thus cooled. A pleasant coolness is generated inside the vehicle. In this phase, the refrigerant is in vapour form and has a low pressure and a low temperature.

The refrigerant, now once again gaseous, flows out of the evaporator, is aspirated by the compressor to then flow through the circuit again. At this point, the circle is closed. In this phase, the refrigerant is once again gaseous and has a low pressure and a low temperature.

Refrigerant circuit layout

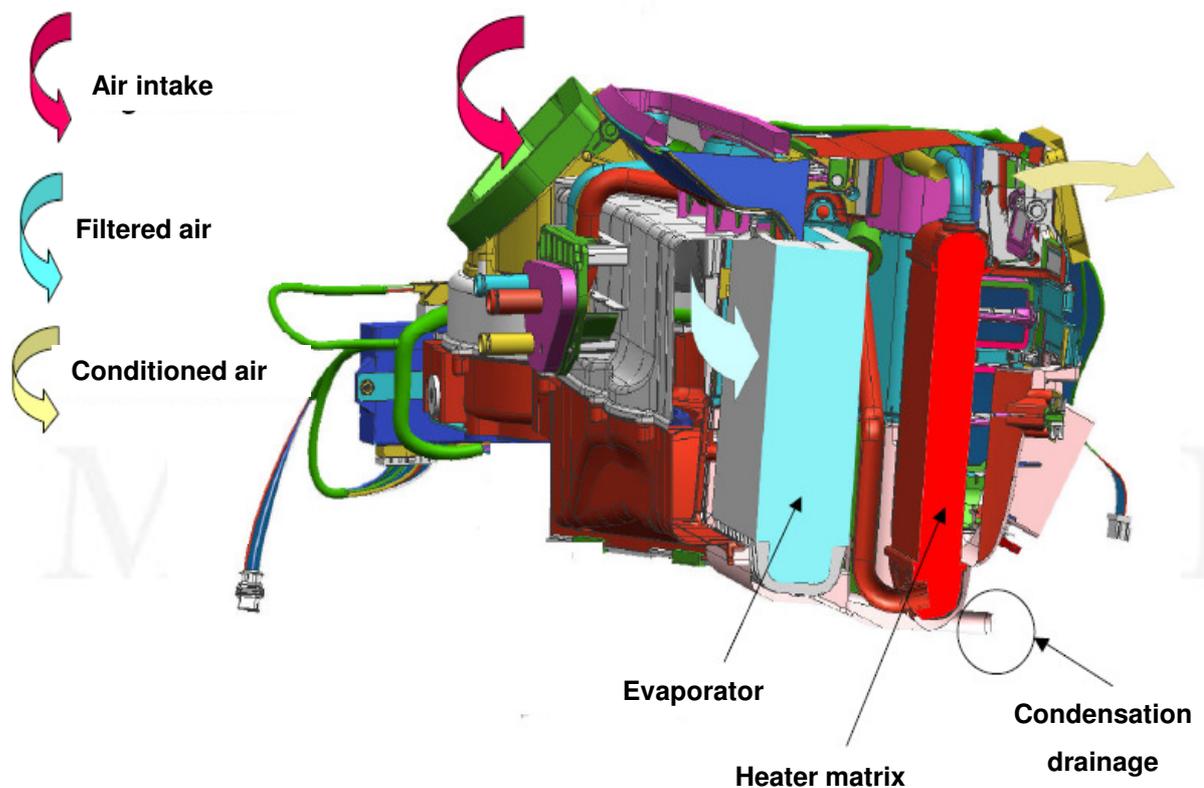
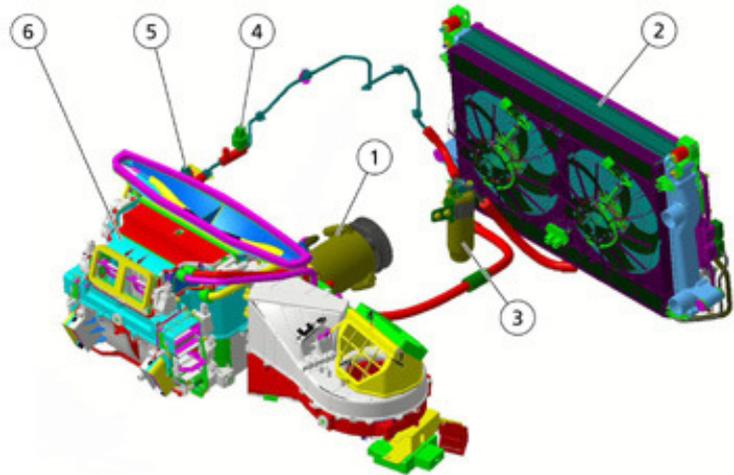


1. Low pressure side
2. High pressure side
3. Evaporator
4. Compressor
5. Condenser
6. Dehydrator/ filter
7. Multilevel pressure switch
8. High pressure service valve
9. Low pressure service valve
10. Blower motor blows hot, humid air from the cabin space to the evaporator
11. Cold, dry air coming out entering the cabin space
12. Radiator fan provides fresh air to the condenser
13. Hot air coming out
14. Refrigerant in gaseous state
15. Refrigerant in liquid state
16. Condense water drain
17. Thermal expansion valve

System Description

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

1. Compressor
2. Condenser.
3. Dehydrator filter.
4. Four-level pressure switch.
5. Thermal expansion valve (TXV)
6. Distribution unit (made up of):
 - Electric fan
 - Evaporator
 - Pollen filter
 - Heater radiator



Fluid types and quantities for A/C circuit of Maserati vehicles

Quattroporte 4.2L all versions <i>Refrigerant</i>	R134 a	1050 g ± 20g
<i>Lubricant</i>	SP10	125 ml

Quattroporte 4.7L MY09-10 <i>Refrigerant</i>	R134a	600 g ± 20g
<i>Lubricant</i>	Ucon RL 897	200 ml +/- 10 ml

GranTurismo 4.2L <i>Refrigerant</i>	R134 a	600 g ± 20g
<i>Lubricant</i>	Ucon RL 897	200 ml +/- 10 ml

GranTurismo /GranCabrio 4.7L <i>Refrigerant</i>	R134 a	600g ± 20g
<i>Lubricant</i>	Ucon RL 897	200 ml +/- 10 ml

Alfa 8C /Alfa 8C Spider <i>Refrigerant</i>	R134 a	600g ± 20g
<i>Lubricant</i>	Ucon RL 897	200 ml +/- 10 ml



In the event of service operations on the A/C refrigerant circuit, it is necessary to protect the circuit against contaminations. If a component is replaced, care must be taken that the new component is installed as soon as the old part is removed, and the time that the circuit is exposed to the outside air is reduced to a minimum. This is necessary to avoid humidity contamination.

In case the A/C circuit has been exposed to the outside air for a time longer than a few hours, or there are reasons to suspect contamination, the dehydrator/filter must be replaced.

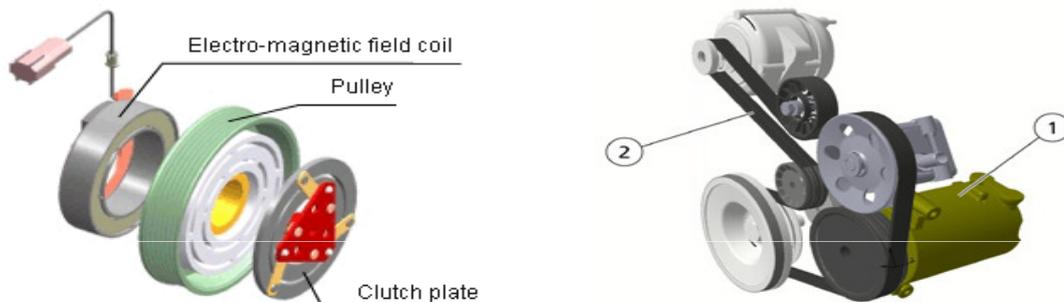
Compressor

The compressor (1) is the driving force of the air conditioning circuit, it is driven by the engine by means of a poly-V belt (2) and activated/deactivated by means of an electromagnetic clutch.

The electromagnetic clutch is activated by the engine control node (NCM). Inadequate system pressure values, or certain engine conditions (torque request, engine rpm and temperature) will reject the activation request from the NCL.

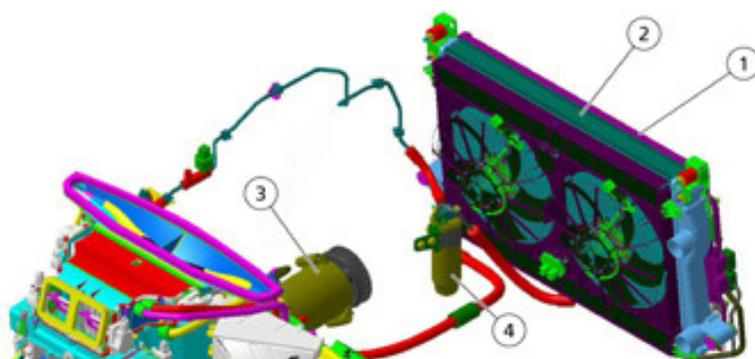
The task of the compressor is to:

- suck refrigerant vapour from the evaporator
- compress this vapour to raise it's temperature above ambient temperature
- pump hot vapour to the condenser



Condenser

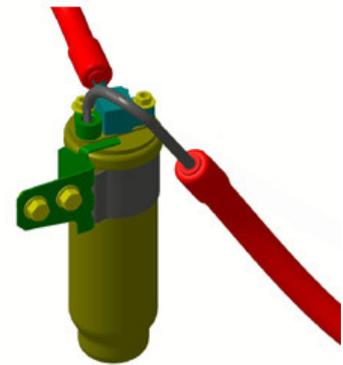
The condenser (1) is a heat exchanger located in front of the engine water cooling radiator (2) and it is therefore hit by the air when the vehicle is moving. The condenser is positioned between the compressor outlet (3) and the dehydrator filter intake (4) and its function is to liquefy the refrigerant coming from the compressor in a gaseous state. During this condensation process of the refrigerant, the heat absorbed in the evaporator is transferred to the ambient air.



Quattroporte 4.2L

Dehydrator filter (Quattroporte with 4.2L engines)

The dehydrator filter is connected to the condenser outlet and the evaporator intake and performs the following functions: It filters the coolant (which contains parts of the compressor oil), removing any impurities and it keeps the fluid away from possible dampness. It also acts as a reserve tank for the coolant itself.



Quattroporte 4.2L

Dehydrator filter (new type)

Quattroporte models with 4.7L engine onwards, and all GranTurismo - GranCabrio vehicles, use a new type of dehydrator filter which is integrated in the condenser body.

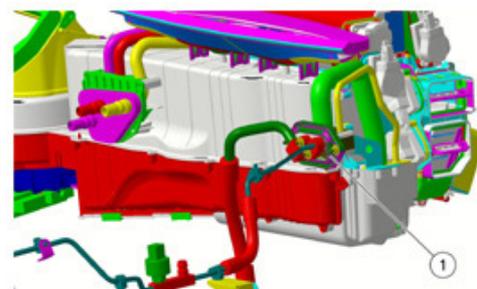


Quattroporte 4.7L,
GranTurismo, GranCabrio

Thermal expansion valve (TXV)

The expansion valve (1) is fitted on the evaporator inlet and outlet lines and regulates the flow and release of the liquid refrigerant flowing into the evaporator.

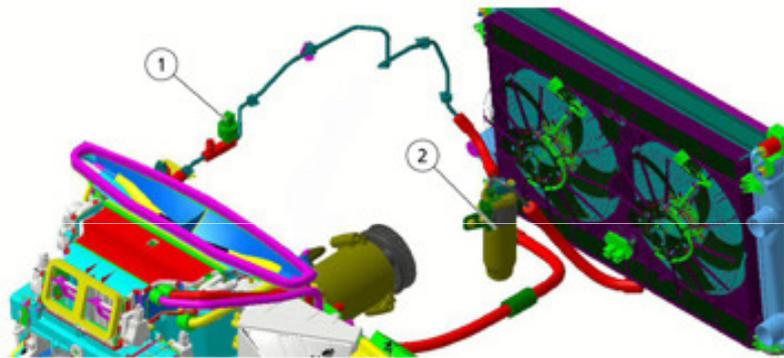
Inside the valve, the refrigerant is subject to a sudden and drastic drop in pressure and temperature. The expansion valve acts as the metering device in the refrigerant circuit.



Multilevel pressure switch

The multilevel pressure switch is located on the high pressure inlet pipe downstream of the dehydrator filter (2). It is a 4-level pressure switch (1) which monitors the system safety and its correct operation. The 4 pressure levels enable the compressor and the cooling system electric fan to switch on and off:

- 1st level (approx. 2,5 bar): minimum pressure: the compressor switches off below this pressure.
- 2nd level (approx. 15 bar): pressure required for the electric fan to switch on at the first speed.
- 3rd level (approx. 20 bar): pressure required for the electric fan to switch on at the second speed.
- 4th level (approx. 27° bar): Maximum pressure: the compressor switches off above this pressure.



(image of Quattroporte 4.2L)

TGK valve

This device is made up of a solenoid valve that steplessly controls the flow of engine coolant throughout the heater matrix. Two TGK valves are used: one on each exit pipe of the heater matrix. By this way a separate and precise control of the heated air temperature entering the cabin space at each side (left/right) is achieved (dual zone climate control). The TGK valves are activated by the NCL by means of a PWM signal.



**Left hand side:
yellow connector**

**Right hand side:
black connector**

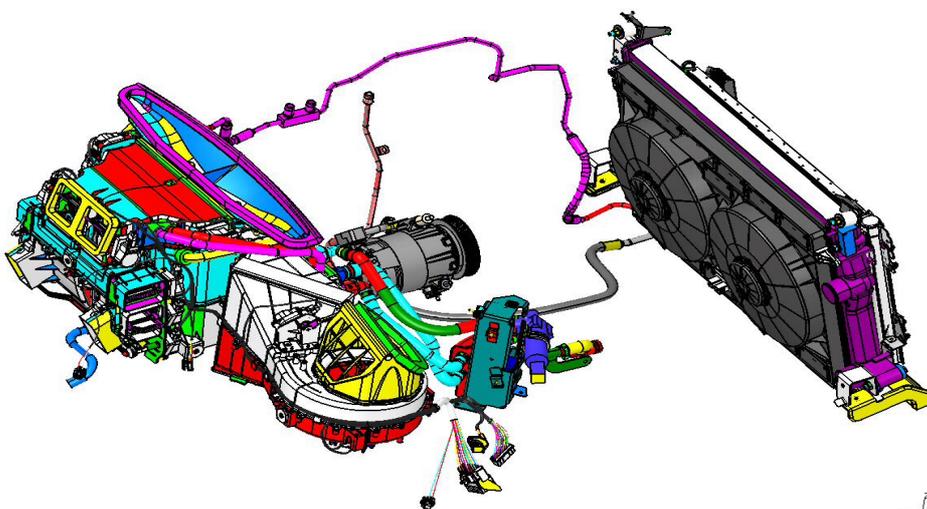
Front distribution unit

This is the housing inside which the external air, or re-circulating air, is conditioned and distributed to the vents selected by the user.

It is located in the passenger compartment, underneath the dashboard.

The distribution unit houses:

- air flaps and air flap actuators
- evaporator (this is a heat exchanger housed inside the distribution unit. It is composed of an aluminium structure with flaps to increase the heat exchange surface. The evaporator's function is to remove heat and humidity from the air in the passenger compartment. Heat is absorbed from the air entering the cabin space by means of the evaporation process of the liquid refrigerant into gas)
- Heater matrix (this is a heat exchanger, housed inside the distribution unit and has the task of heating the air entering the passenger compartment. The heater matrix is of the dual zone type: it is internally divided in two separate sections and connects to the engine coolant circuit via three pipes: one for inlet and two for exit)
- 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 carbon) reduces the fastidious smells of substances generated, in part, by the surface dampness retained)
- Blower motor (its function is to provide outside or recirculation air to the evaporator/heater matrix. It is operated by a 12 V brushless electric motor and operated at different speeds by a signal from the NCL. It is installed inside the air conditioning/heating unit at passenger's side)

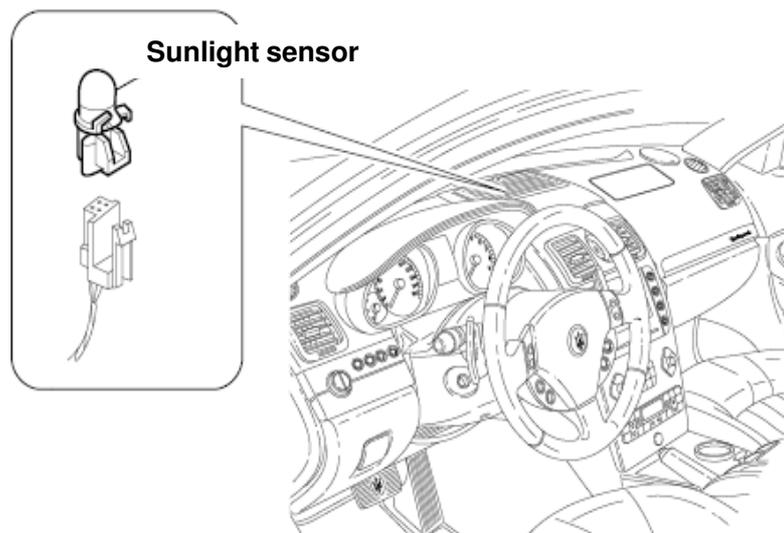


GranTurismo / GranCabrio / Quattroporte 4.7L

Sunlight sensor

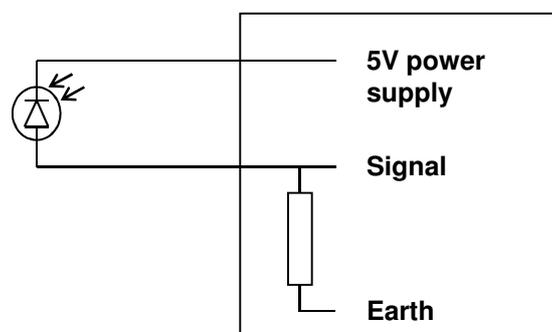
The sunlight sensor measures the thermal energy generated by the sun radiations. It is positioned on the dashboard near the windscreen.

In order to provide optimal and separate control, the sensor is of the dual zone type (left/right).

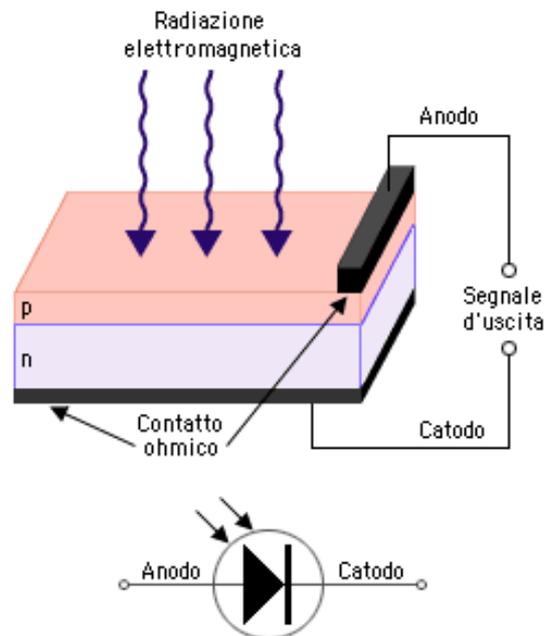


The sun radiation sensor is fitted on top of the dashboard, in a central position and is directly connected to the NCL.

It is used by the electronic control unit to differently distribute the ventilation in the vehicle in relation to the height of the sun. It detects if the sun is at the zenith or at 45° (the effect of sun radiation is less when the sun is at the zenith as it does not go through the car windows). The sensor may cause a temperature difference of about 2°C from the value set in some areas of the passenger compartment. The current is generated by the photoelectric effect (photodiode) and is produced in proportion to the brightness.



A photodiode is a particular type of diode that functions as an optical sensor capable of detecting a certain wavelength and transform this event into an electric current signal.



A photodiode is essentially a special diode characterised by an asymmetrically doped p-n junction. The p zone, i.e. the zone doped with N_a acceptors is much more doped than the n zone, which is characterised by N_d donor atoms. The p zone, very close to the external structure of the photodiode, is in its turn coated with a non-reflective layer and fitted with two silicon monoxide electrodes. A lens is normally fitted on the non-reflective layer, whose function is to make the light rays falling on the surface perpendicular.

Controlling the humidity rate to prevent window misting

Calculating the window misting risk allows the control unit to start or stop the automatic demisting action.

The outside temperature, the humidity rate in the passenger compartment and sun radiation are the factors used to calculate the window misting risk.

In relation to the risk calculated, the ECU can:

- Activate air-conditioning
- Limit the cooling power of the evaporator.
- Increase the amount of air diffused by the demisters.
- Limit the use of automatic recirculation.
- Automatically activate electric window demisting.

Anti-mist sensor

The anti-mist sensor or fog sensor is an electronic device which measures the amount of damp on the windscreen by means of an infrared light and a photo diode. It sends a PWM signal to the NCL, based on the amount of damp on the windscreen, which is then used by the NCL to command the air recirculation flap.

When the windscreen mist rate exceeds the set threshold, the flap opens the outside air intake, cutting out the AQS sensor signal.

When the windscreen mist rate goes back to the permitted levels, the recirculation flap will switch to the status required by the system.

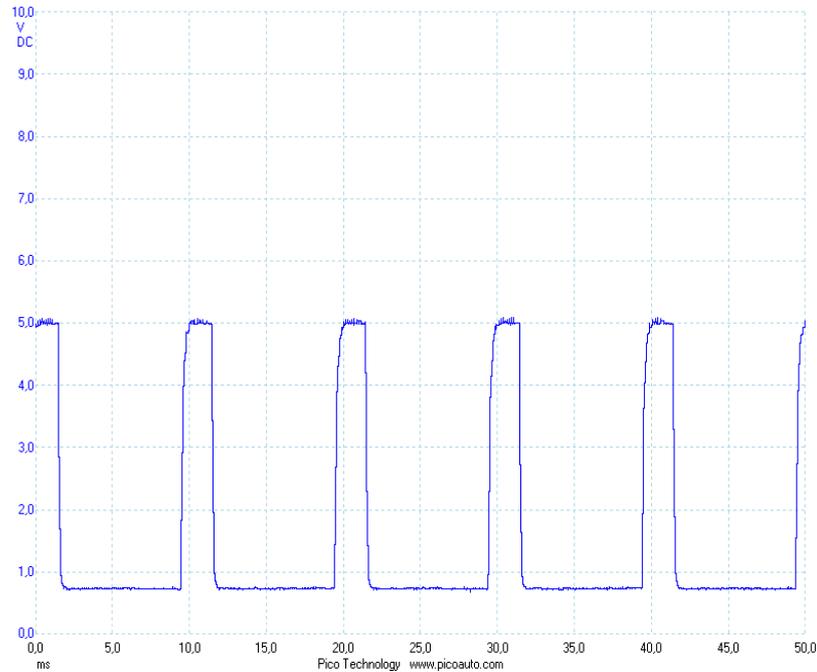
The sensor is fitted on the internal rear-view mirror support.



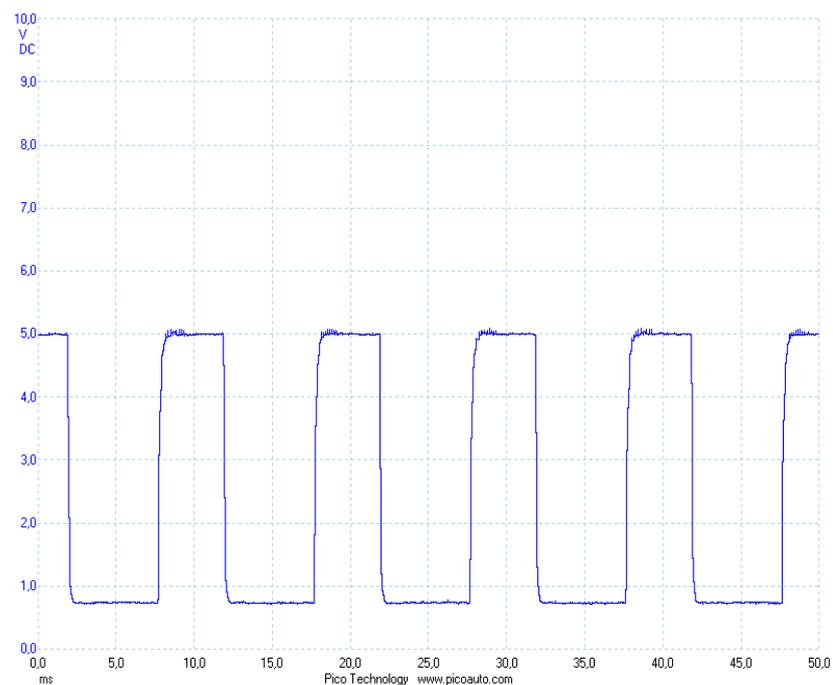
Anti-mist sensor signal

Signal measured by means of an oscilloscope, when the windscreen in the sensor area is not misted.

Picoscope settings: Time scale: 5ms/div Voltage scale: $\pm 10V$



Signal measured by means of an oscilloscope, when the windscreen in the sensor area is misted.



Description of the passenger compartment temperature and humidity sensor

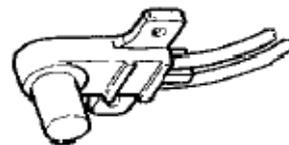
This sensor includes:

- A relative humidity sensor (1) in the passenger compartment, which transmit a signal with a frequency proportional to the humidity rate (5.8 KHz to 7.3 KHz).
- A temperature sensor with negative temperature coefficient (2).
- A micro-motor (3) that drives a turbine which cools the above mentioned two sensors, being powered by the positive after contact.

Outside air temperature sensor

This sensor reads the temperature of the outside air. It is an NTC sensor fitted inside the external rear-view mirror, on the driver's side. The sensor is connected to the NPG, which informs the NCL about the outside temperature via the B-CAN line.

The sensor has a range of -40 °C / 80 °C.



AQS - Air quality sensor (only for Quattroporte)

The anti-pollution or air quality sensor is an electronic device which sends a control signal to the recirculation flap:

- When the air pollution rate exceeds the set threshold beyond which the gases are considered harmful, the flap closes the outside air intake and the NCL activates internal air recirculation;
- When the air pollution rate goes back to the permitted levels, the flap reopens the outside air intake and recirculation is deactivated by the NCL.
- It is fitted on the outside air intake of the distribution unit.

Description of the air quality sensor (AQS)

This is a semiconductor that allows measuring carbon monoxide and the gases of the nitric oxide family. Located at the front of the radiator (for Quattroporte vehicles up to MY06, this sensor was located on the firewall), if hydrocarbon or NOx odours are detected, the system automatically activates recirculation.

It is inactive when it is very cold (the windscreen would mist up more)

The levels available are from 1 to 5 as well as the off position

The signal corresponding to the polluting gases in the air is transmitted separately using a 39 Hz pulse-modulated current.

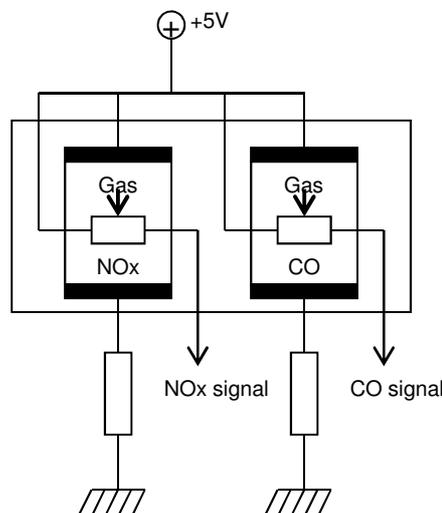
This information is used by the ECU for the automatic recirculation function. When the user activates this function, the built-in choke opens and closes in relation to the outside pollution.



- 1. Air quality sensor
- 2. Sensing element membrane

The sensor is made up of two sensing elements, one for carbon monoxide (CO) and one for the nitric oxides (NOx). The sensing elements consist of a semiconductor which, once brought to the operating temperature, reacts when it comes into contact with the polluting gases. The sensing elements are protected by a membrane which lets through the gas molecules and holds back humidity and dust.

The voltage signal generated by the semiconductor elements is transformed into a PWM signal by a dedicated integrated circuit inside the sensor.



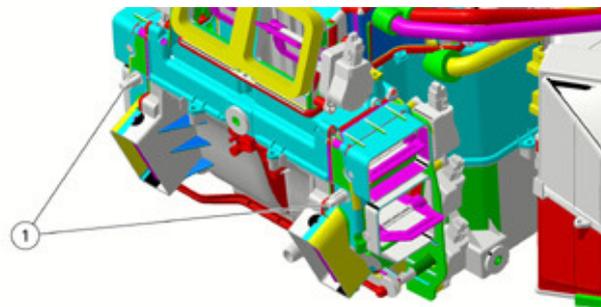
Treated air temperature sensor

These sensors (1) read the temperature of the air treated by the air conditioning /heating system before it is blown into the passenger compartment.

There are two treated air temperature sensors, located near the central vents.

These are NTC sensors with the following specifications:

- working range: -40°C / 100°C
- accuracy: 0.5 °C
- resistance at 25°C: 10Kohm ± 5%.



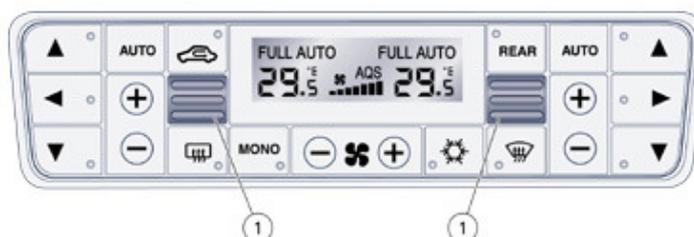
Passenger compartment air temperature sensor.

This sensor (1) measures the actual temperature inside the passenger compartment.

It is an NTC sensor incorporated into the front control panel, with the following specifications:

- working range: -40°C / 85°C
- resistance at 25°C: 10Kohm ± 5%.

The sensor is ventilated; it actually incorporates a small brushless electric fan with 6 blades, a rotation speed of 3600 rpm and an air delivery above 2.0 m/s. This fan is always powered, so that the temperature value read is not affected by the stationary (and therefore hotter) air inside the dashboard.



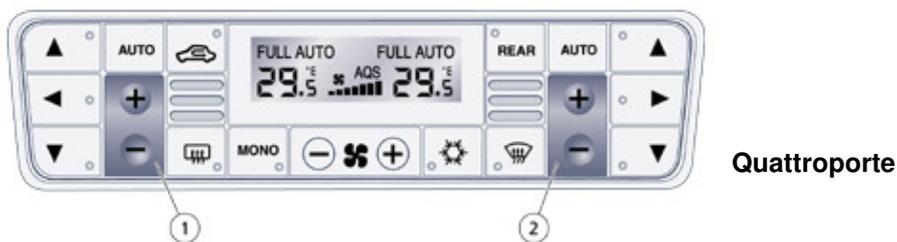
Quattroporte up to MY06

The Quattroporte up to MY06 is equipped with two sensors, while the Quattroporte from MY07 and the GranTurismo are equipped with only one sensor.

Air mixing flap actuators

The treated air temperature is adjusted using the temperature setting buttons (1 and 2). The actuators activate rotation of the mixing flaps, in accordance with the ECU command.

Stepper motor actuators on BUS lines supplied by 12 Volt (protected) provided by the NCL .



Air distribution actuators

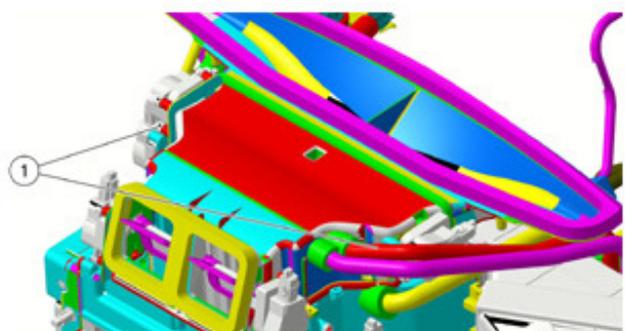
Using a rack mechanism, which has guide grooves with two pins and two lever mechanisms, the actuator moves the distribution flaps into the 5 possible combinations:

Main positions: DEF, VENT, FLOOR

Combined positions: BILEVEL, HEAT

The actuator specifications are as follows:

- Nominal voltage : 12V
- Nominal control frequency: 356 Hz
- Nominal speed: 5 rpm
- Reduction ratio: 300



Recirculation actuator

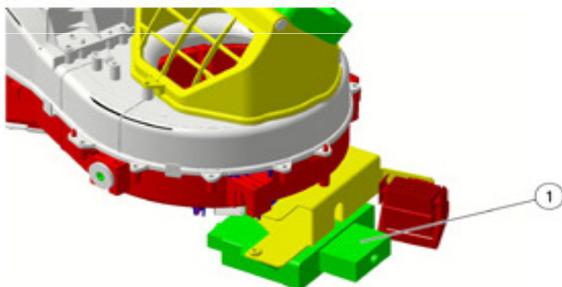
The recirculation actuator controls the flap rotation in the two pre-defined positions (dynamic air and air recirculation) without intermediate positions.

Heating, Ventilation and Air Conditioning System Node (NCL)

The air conditioning system node (NCL) (1), located on the right-hand side front passenger's foot well, is fitted underneath the ventilation/ heater unit.

It is connected to the low-speed B-CAN network, from which it receives the following information:

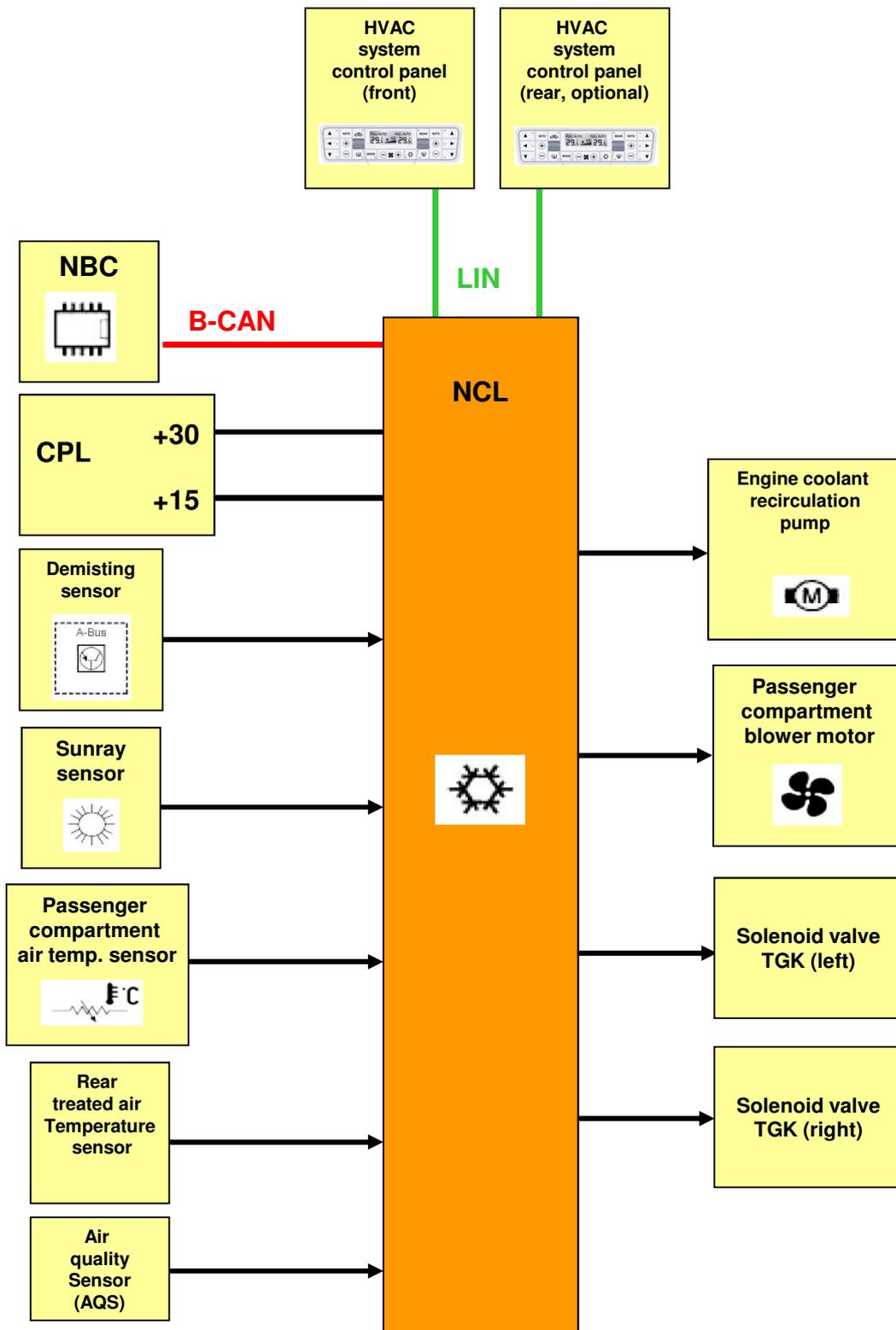
- outside air temperature
- engine water temperature
- engine RPM
- vehicle speed (tachometric signal)
- battery voltage (battery charge level)
- rear window heating status
- compressor status
- status of the vehicle lights.
- Roof open / closed status (GranCabrio only)



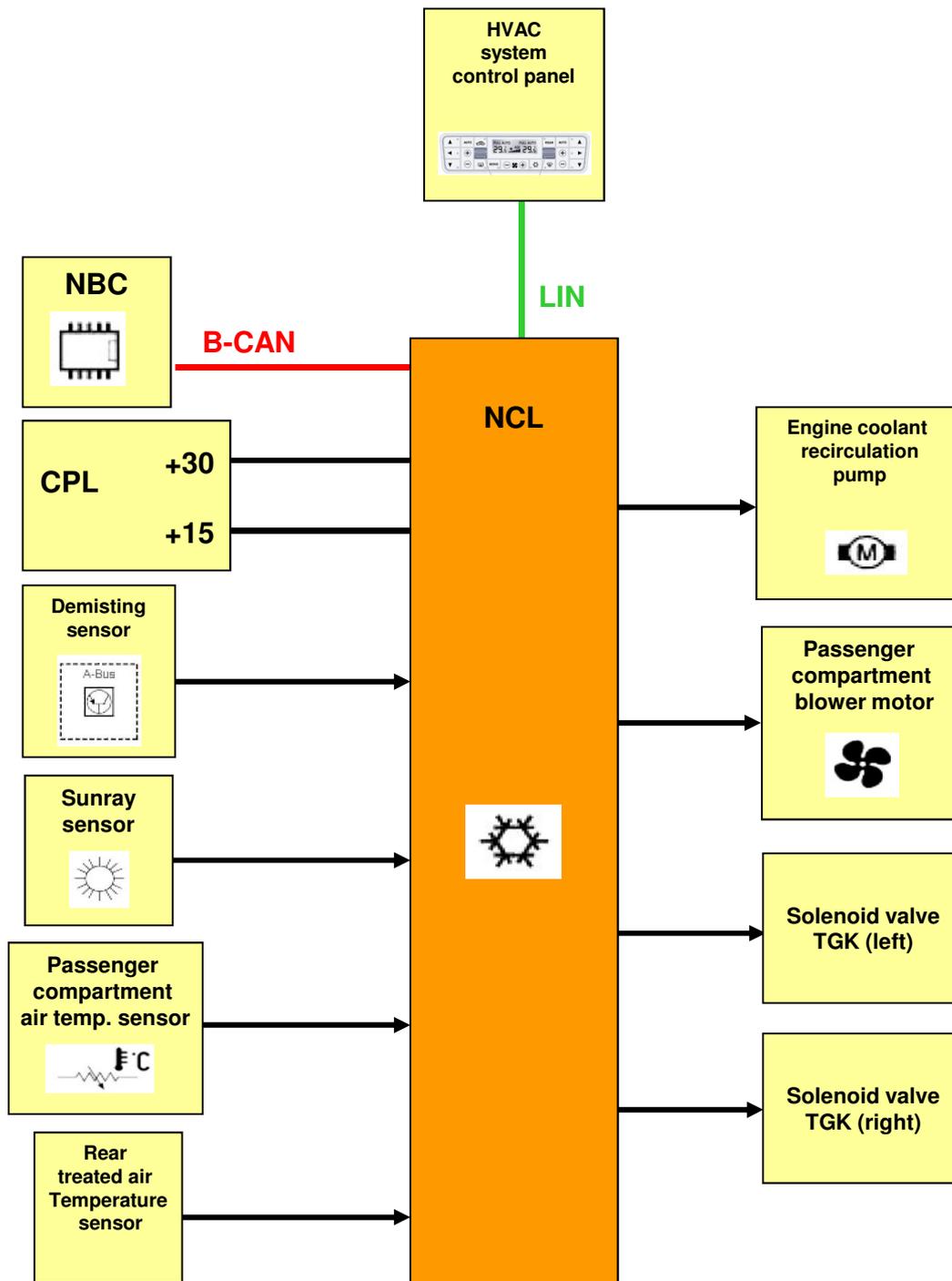
The NCL is located underneath the air distribution unit at passenger's side and can easily be recognized by its orange color

Current draw in sleep mode:	1.3 mA
Manufacturer	Delphi
Power supplies:	+30, +15
Earths:	1 (branches out on two pins)

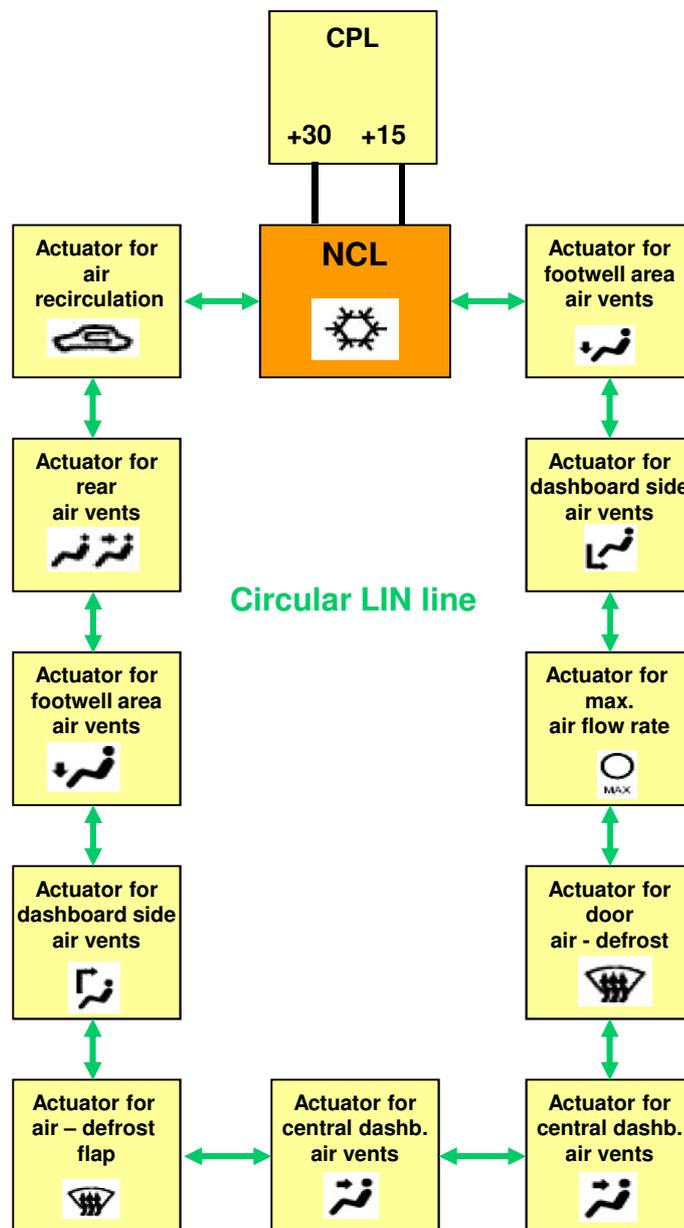
Functional diagram NCL (Quattroporte)



Functional diagram NCL (GranTurismo – GranCabrio)



Air flap actuators (Quattroporte – GranTurismo - GranCabrio)



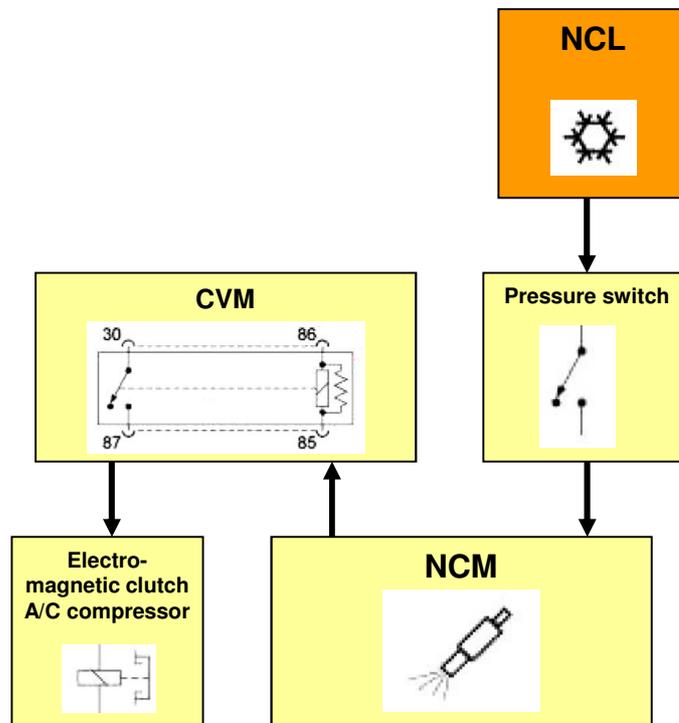
The various air flap actuators are connected with the NCL via a bidirectional serial communication line (LIN) to create a circular network. All actuators receive the same information from the NCL, but the network protocol (master – slave) defines which command from the NCL every actuator has to obey.

Note: do not swap the position of the different actuators.

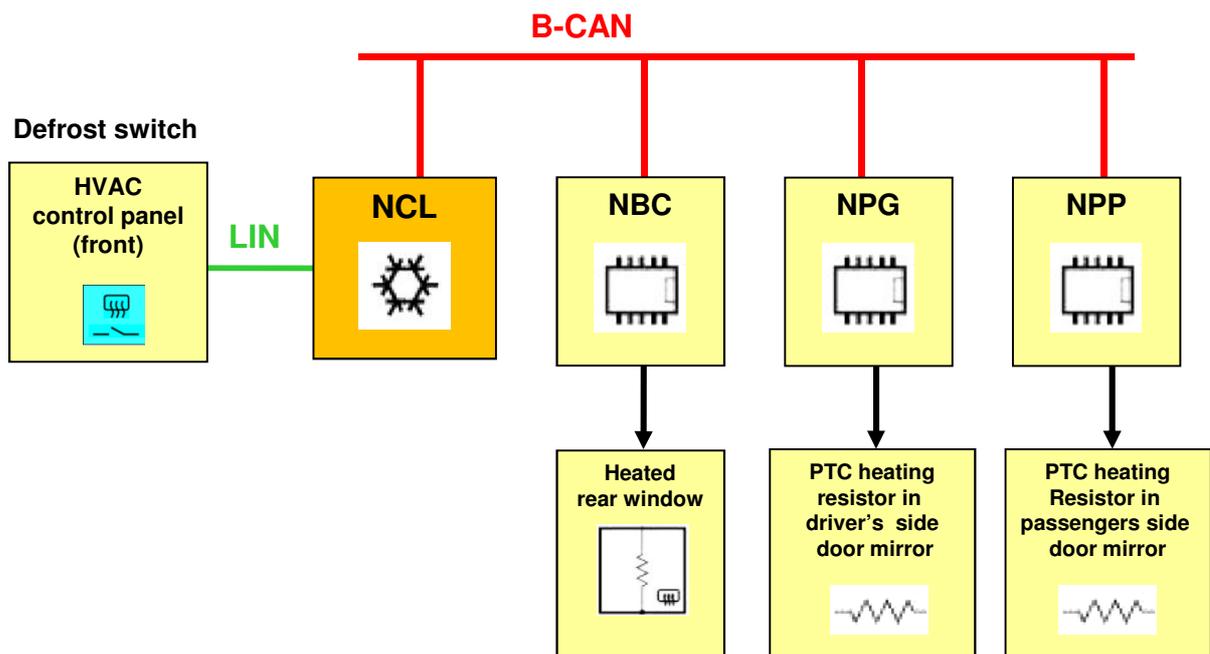


In the event of replacement of one or more air flap actuators, it is necessary to perform the NCL CYCLE procedure with the Maserati Diagnosi diagnostic tool.

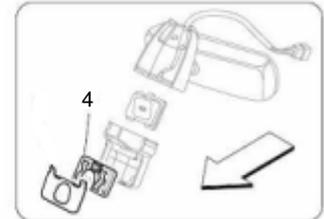
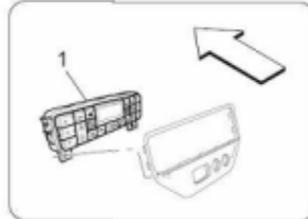
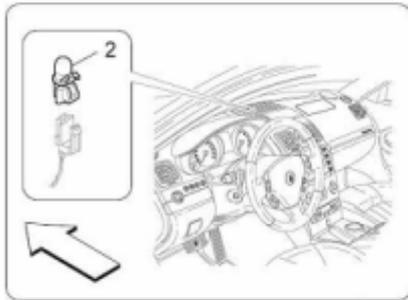
Compressor activation (Quattroporte – GranTurismo - GranCabrio)



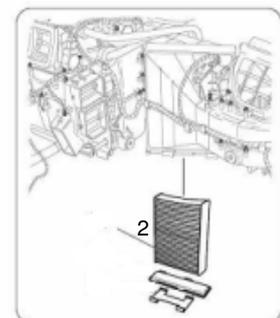
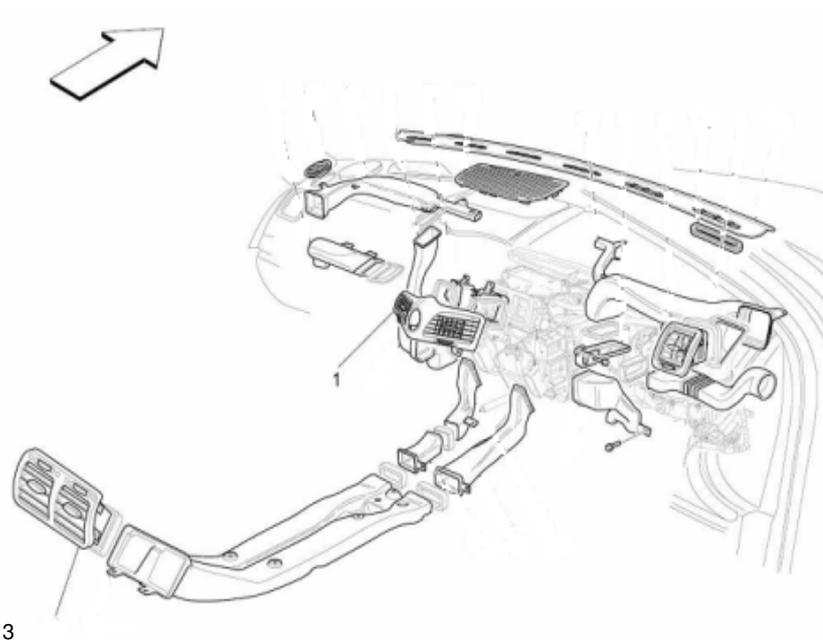
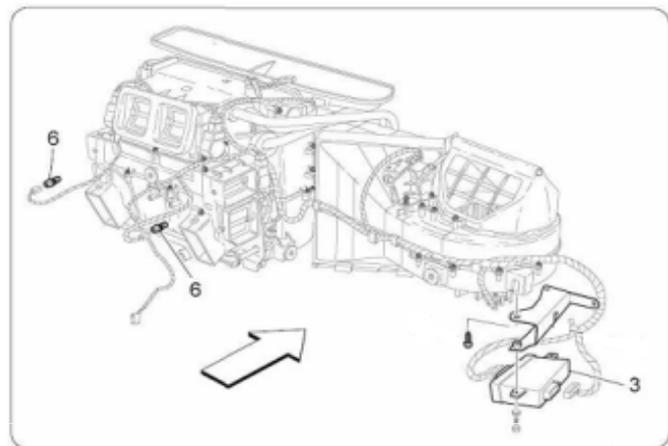
Rear window defrosting and rear view mirrors defrosting function (Quattroporte – GranTurismo - GranCabrio)



Location of the system components (GranTurismo – GranCabrio)

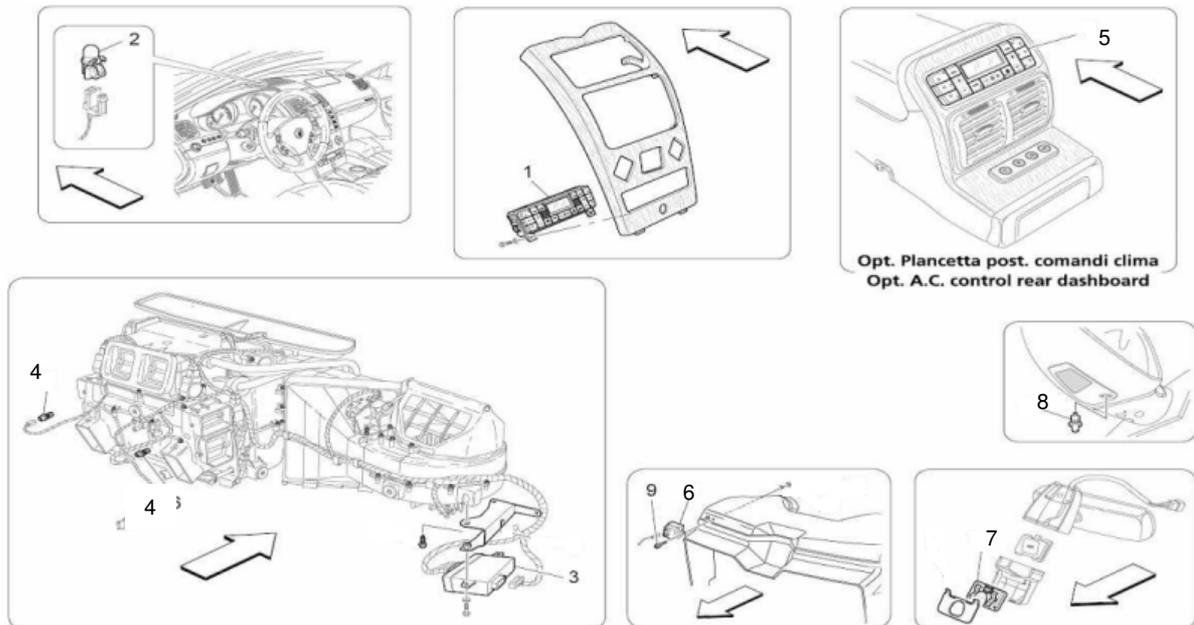


- 1. Front air conditioning control panel
- 2. Sun radiation sensor
- 3. A/C control ECU
- 4. Demisting sensor
- 6. RH/LH air sensor



- 1. Central air vent on dashboard
- 2. Pollen filter
- 3. Rear central air vent

Location of the system components (Quattroporte)



1. Front HVAC control panel
2. Sun radiation sensor
3. NCL
4. RH/LH air sensor
5. Rear HVAC control panel
6. AQS sensor
7. Anti-mist sensor
8. Outside temperature sensor (driver's side)

Special procedures in the event of NCL replacement

Proxi alignment:

In the event that the NCL is replaced, it is necessary to perform the "Proxi alignment" procedure, so that the new component receives the vehicle configuration data from the NBC and is recognised by the vehicle network. This is necessary for a correct operation of the NCL.

Connect the diagnosis tester to the EOBD connector of the vehicle and perform the "Proxi alignment" procedure.

Cycle procedure:

In the event that the NCL is replaced, it is necessary to perform the cycle procedure with the diagnostic tester. The cycle procedure includes a self-learning of the different system actuators and a complete system functionality check. Proceed as follows to perform the cycle procedure:

- Connect the diagnostic tester
- Enter the "CYCLE ENVIRONMENT"
- Select the configuration cycle for the NCL and proceed by following the guided instructions on the screen.

System initialization

Every time the battery is reconnected, when the vehicle is started the HVAC system will run through a self-initialization process when the A/C is switched on (compressor activated). The display automatically shows the passenger compartment temperatures set to 22°C.

The system will run automatically through the following steps:

- AUTO (automatic operation, the words FULL AUTO are displayed)
- Compressor enabled (the LED on the button is illuminated)
- Defrosting/demisting function (MAX DEF) deactivated (the LED on the button is off)
- Heated rear window deactivated (the LED on the button is off)
- Recirculation controlled by the automatic system (if active, 'AQS' is displayed)
- Air ventilation and distribution are set by the system
- REAR deactivated (the LED on the button is off)



The message "99" on the HVAC system control panel display indicates a communication failure between the control panel and the climate control node (NCL).

TGK valve self learning

Every time the battery is connected, the acquisition procedure relating to both the water valves is started. If this procedure is successfully completed (valid strokes) it will not be repeated. If, instead, it is unsuccessful (even one of the 2 strokes is not valid), the procedure will be repeated upon every network wake-up or key ON, until it is successfully completed.

After connecting the battery, turn the key to ON and wait at least 20 seconds before starting the engine.

The steps for a correct self-learning of the strokes are the following:

- complete valve opening
- memorisation of the opening position of both valves
- complete valve closing
- memorisation of the closing position of both valves
- memorisation of the stroke value of both valves (Stroke =Opening-Closing)
- stroke analysis
- if you connect the NCL control unit with the battery ON and active network or key turned to ON, you must first fit the yellow connector (26-way) and then the white one (20-way). Failure to observe this rule will most likely lead to an incorrect stroke acquisition, involving recovery and incorrect operating values until the next key ON. even in this event however, since both connectors have been fitted, turn the key to ON and wait at least 20 seconds before starting the vehicle.

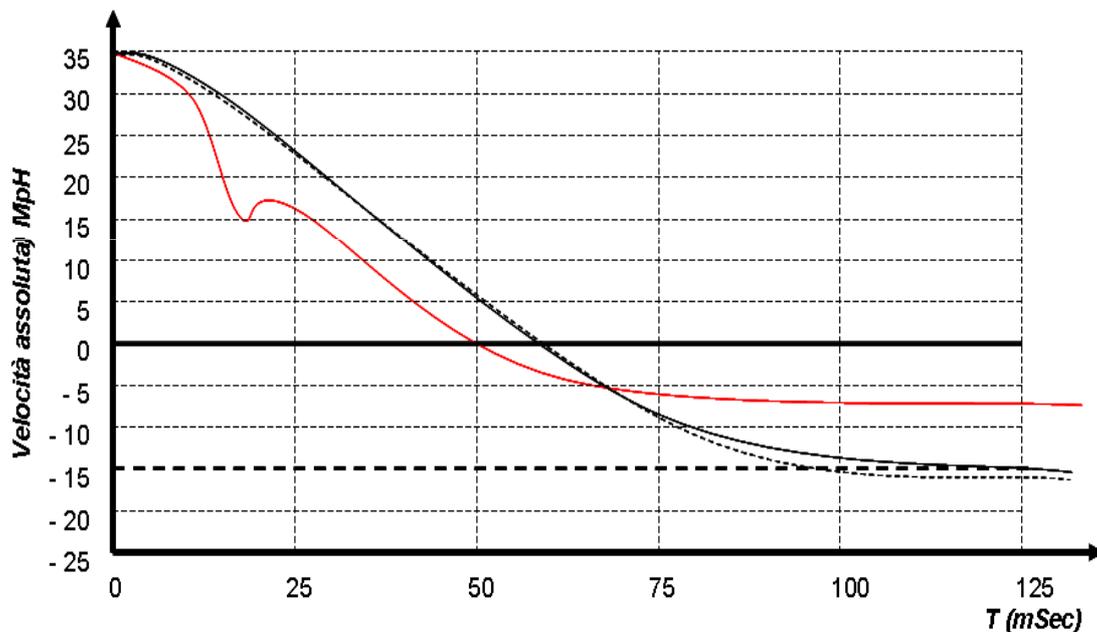
Airbag node (NAB)

TRW

Overview

The passive safety systems that equip modern vehicles are essential for compliance with the strict limits laid down by the European Union. First and foremost, the seatbelts, which in the event of a collision prevent the occupants from being thrown against the windscreen or the steering column, causing very severe injuries. It is also important to remember that the most sophisticated passive safety systems, such as the airbags, are totally useless and in certain conditions can cause even more harm than the accident itself if the seatbelts are not fastened.

The graph shows the trends of the absolute speeds (with respect to the ground) of the driver's head and chest, as experimentally measured in a crash test with an initial speed of 35 mph (circa 56 km/h). Note that the lines refer to a driver with the seatbelt fastened.



- Driver's head
- - - - - Driver's chest
- Dashboard

If the driver had not fastened the seatbelt, his absolute speed would have remained almost unchanged, i.e. 35 mph, at least until he crashed into the dashboard or the inside roof which in the meantime underwent strong deceleration.

The moment the driver comes into contact with the dashboard, this difference in speed is cancelled out and, as the intensity of a collision depends on this value, the speed difference must be as low as possible in order to reduce the impact severity.

A pretensioner is generally a pyrotechnic device which by making a small pyrotechnic charge explode in the event of a collision, pushes a small piston that rewinds the seatbelt (if fitted on the winder) ensuring that the occupant's body cannot move from the seat.

In the Quattroporte and GranTurismo, the pretensioners are fitted on the front seatbelts and on the two rear side seatbelts; in the GranCabrio they are only on the front seatbelts.

The airbag is a passive safety device consisting of a cushion (airbag) which, in the event of a collision, inflates automatically, placing itself between the occupant's body and the structures of the vehicle.

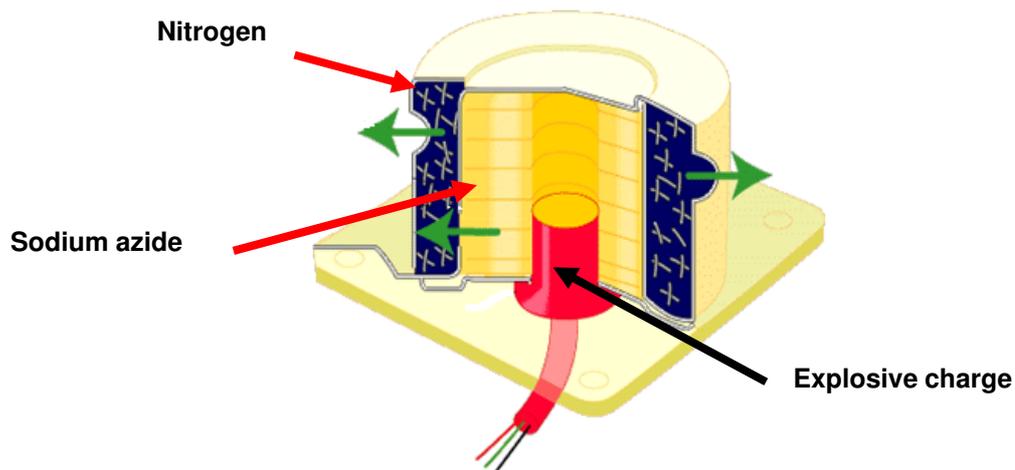
A complete airbag system is made up of an ECU, airbag modules, seatbelt pretensioners and crash sensors.



The driver's airbag is fitted in the steering wheel and protects the driver in the event of a head-on collision. The front passenger's airbag is positioned on the dashboard and protects the passenger in the case of a head-on collision. The side airbags are positioned either on the outside of the front seats or on the front door panels and protect the driver's and front passenger's chest in the event of a side impact. The "drop-down" airbags are positioned on the roof and protect the head of the front and rear occupants.

The **airbag module** is made up of a folded Nylon bag (90-120 litres for the driver and front passenger), a metal casing (called housing) - which allows the airbag module to be secured on the dashboard, above the glove compartment, in the steering wheel and in the front seats - a plastic cover with an aesthetic function, and a gas generator in the form of a cylinder.

The generator body is made of aluminium and contains a small pyrotechnic charge which, by exploding, provides the gas necessary to inflate the bag. The charge contains sodium azide (NaN_3) which decomposes into molecular sodium and nitrogen. When the generator body receives the electric signal from the airbag ECU, the internal pyrotechnic charge is activated.

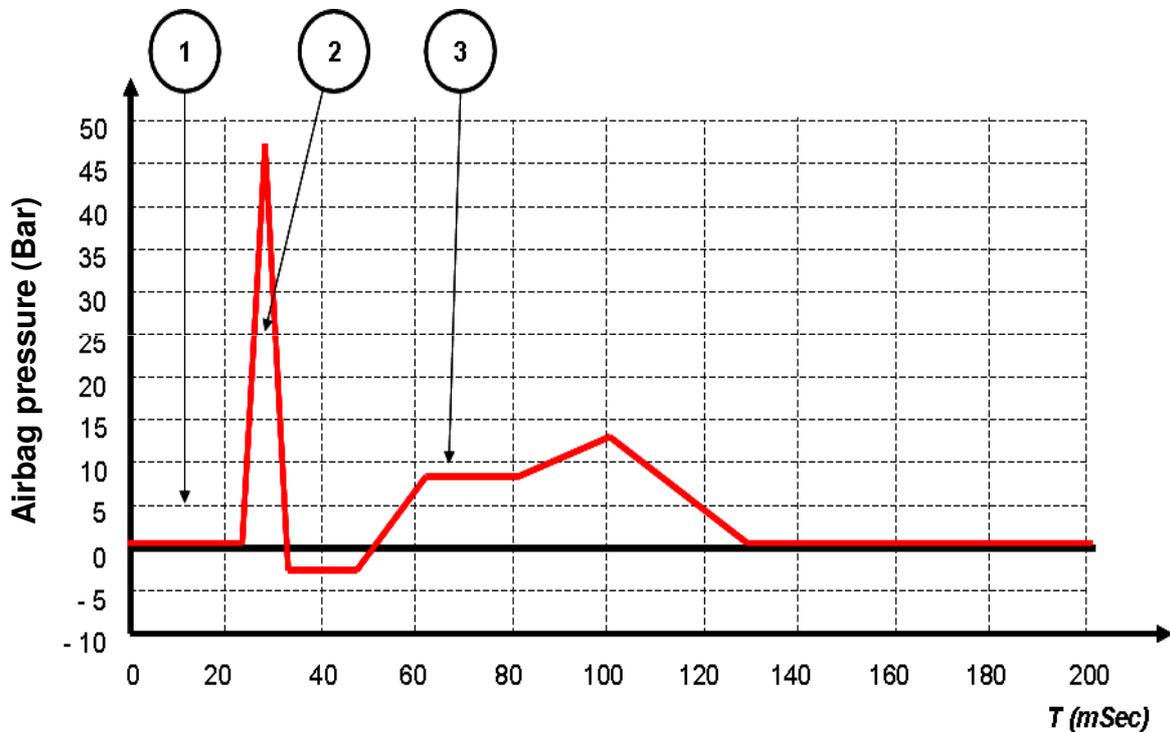


The airbag must retain a certain permeability to the gas with which it is filled, so that it can deflate when it comes into contact with the occupant. If not, the airbag would behave like a sort of pneumatic spring, pushing the occupant backward (rebound effect) and becoming a source of dangerous strain to the head and neck.

The retention forces an airbag exercises on the occupants may be divided into three categories:

- 1) Forces due to the internal bag pressure
- 2) Forces due to the transfer of quantities of motion
- 3) Forces due to the tension of the airbag fabric.

The airbag is under pressure and as such, the moment it comes into contact with the occupant, it transfers this pressure to the occupant. There are instants when the internal airbag pressure is null or even negative.



In the very latest versions, the front airbags (driver and front passenger) are equipped with a double detonation system, so that the airbag is inflated with two different volumes in relation to the severity of the collision. In some vehicles, the passenger's airbag can moreover voluntarily be deactivated by flicking a switch found at the end of the dashboard on the passenger's side should a child seat need to be positioned on the front seat.

Other than the module, the side protection system also has two satellite sensors positioned in the vehicle B pillars, which contain a piezo-resistive accelerometer capable of measuring the accelerations that occur during a side collision.



The side airbags (driver and passenger) are activated independently from each other and from the front airbags. In the event of a side or rear impact (nose to tail) or the vehicle overturning, failed activation of the front airbags is not a sign of system malfunctioning.

The ECU controls the entire system and all its components and activates the airbags when necessary. The ECU is 12V powered with the key in MAR position, but it is in any case in a condition to continue operating for a few fractions of a second if the power is cut. This is made possible by a buffer capacitor that accumulates sufficient electric energy to generate the airbag activation signal and write the crash data. This helps ensure that the system functions even if the collision causes a drop in the system voltage (e.g. damage to or breakage of the battery, power supply cables cut-out etc.).

The ECU is the device that assesses the severity of the collision and, if necessary, activates the airbag device (module).

Components

The airbag system is composed of an electronic control unit, side and front crash sensors, airbag modules for front protection of the occupants in the front seats, Sidebag modules for side protection (chest) of the occupants in the front seats, head bag modules for side protection (head) of the occupants in the front and rear seats, and seatbelts with pretensioners on the front and rear side seats.

Airbag Node (NAB)

The NAB manages the entire system, controlling all of its components and, with the help of the remote front and side sensors, it is capable of recognising an impact situation quickly enough to activate, depending on the type and severity of the impact, either only the pretensioners or only the front bags, or the pretensioners and the front airbag modules, or the curtain bags and the sidebags.

The airbag Node (NAB) is connected to the B-CAN line.

NAB positioning in the vehicle

The NAB is firmly secured to the casing underneath the vehicle centre console, near the barycentre, to allow the internal deceleration sensor(s) to monitor the vehicle deceleration accurately.



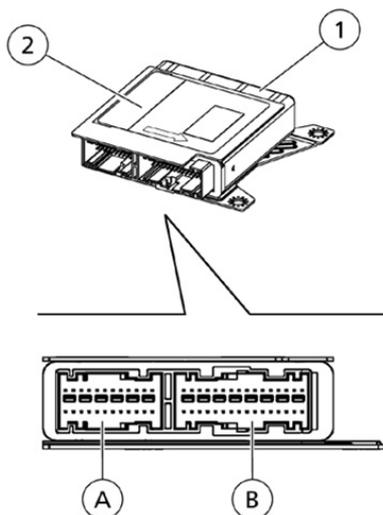
The NAB used in the GranTurismo/Quattroporte models uses an integrated electro-mechanical safing trigger switch to confirm the impact signal received by the front crash zone sensors.

The new generation NAB used for the GranCabrio model houses three electronic deceleration sensors (in X, Y and Z direction) for detection of frontal and lateral impact and for roll over detection.

If, in a head-on collision, the vehicle deceleration value, read by the remote sensors located in the engine compartment and by the sensor in the NAB and processed in terms of impact severity, exceeds the level of severity set for the activation of the devices, the NAB allows this command to be sent only if the safety sensor is closed at the same moment.

The functions described below are designed for proper system management:

- **energy storage:** The NAB is powered with 12V with the key at position "MAR" but it is in any case capable of functioning for a few fractions of a second in the event of a power cut or a drop in the power supply voltage, so that the system operation is guaranteed and data may be written to the crash memory;
- **earth fastening check:** the NAB control logic checks the electrical contact between the bodywork and the NAB.
- **fault memory:** with the key at MAR and while driving normally, the NAB continually checks the functionality of the circuit and diagnoses all the electrical parts of the system.
- **crash memory:** records information relating to impact situations followed by the activation of the pretensioners and of the front or side modules.



- 1. **Airbag Node (NAB)**
- 2. **Identification plate**
- A. **24-way connector**
- B. **32-way connector**

Current draw in sleep mode:	0 mA
Power supplies:	+15
Earths:	1

System operation

In the event of a head-on collision, the electronic sensor and the crash zone sensors in the engine compartment detect a deceleration signal along the vehicle longitudinal axle. If the signal, handled by the processor inside the NAB, indicates an impact of such severity that the system is required to intervene, the NAB activates only the pretensioners, as the first level of intervention. In the event of a more severe impact and if the safety sensor is closed at the same time, the NAB will enable activation of the pretensioners and the front airbags. If the passengers are not wearing the seat belts, the relative pretensioners are not activated and the airbag intervention thresholds are adjusted as this condition is taken into account.

The front airbags feature a dual-stage activation, which works using a small pyrotechnic charge in the event of low impact collisions and is activated fully when the maximum protection level is required.

Similarly to the event of a side impact, the NAB is capable of identifying the direction and intensity of the collision and, as a result, activates just the airbags on the side concerned by the collision.

A side impact is recognised based on signals from the remote sensors located on the B pillar and on the signal received from the accelerometer in the NAB. The purpose of the sensors on the pillar is to detect side impacts extremely quickly and accurately, to process the signal and send an pulse to the NAB which, by processing the signal further and comparing it with its own internal accelerometer's signal, decides whether to activate the airbags or not.

Every time one of the controlled systems has been activated (pretensioners, front airbags, side airbags) the NAB memorises its activation in its non-erasable memory and illuminates the fault warning light on the instrument panel.

The NAB needs to be replaced in the below cases:

- After 3 collisions with activation of the front seat belt pretensioners only
- After 3 collisions in total with activation of the side airbags
- After 1 collision with activation of the pretensioners and front airbags
- Any combination of the above cases which amounts to one of the limits indicated

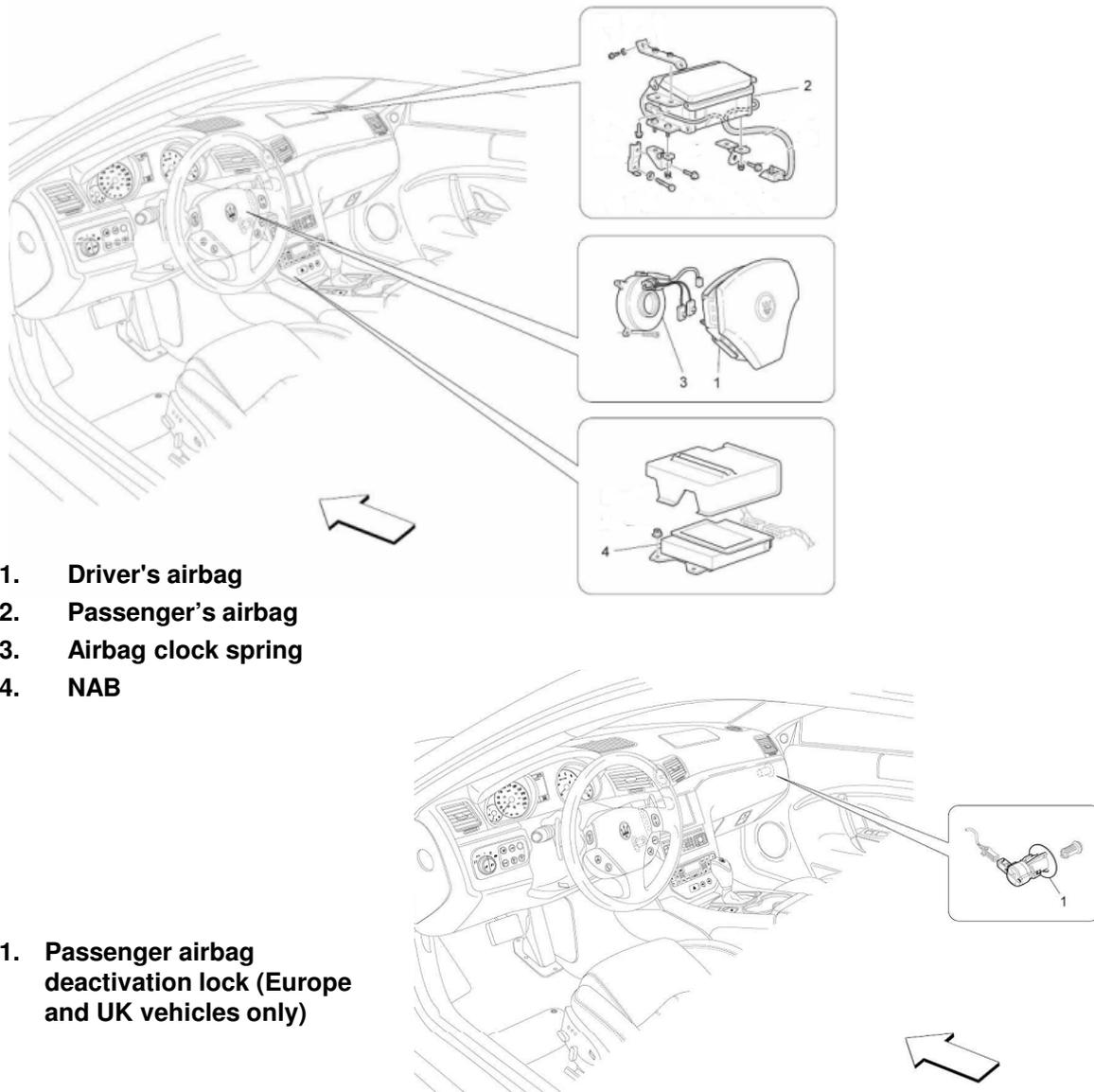
System self-diagnostics

The NAB runs a continuous self-diagnosis of the system operation. This involves:

- detecting and memorising any faults;
- recognising the various components and the type of failure that has occurred;
- signalling occurrence of these faults by illuminating the warning light on the instrument panel.

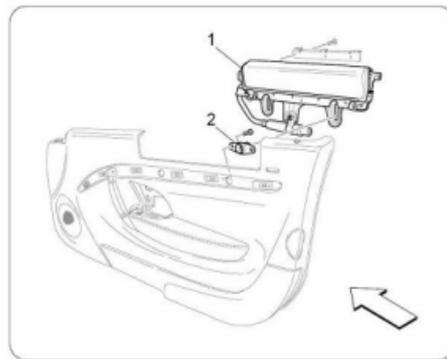
The faults memorised in the NAB can only be deleted once the failure has been repaired and by using the diagnostics equipment.

Location of the passive safety system components

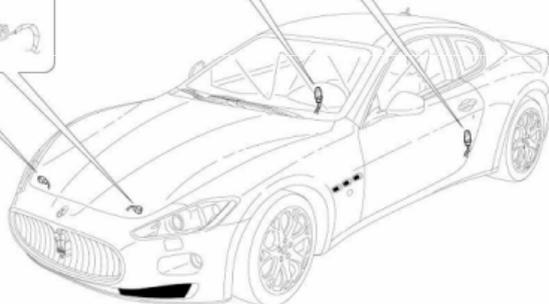
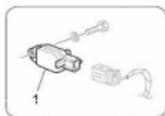
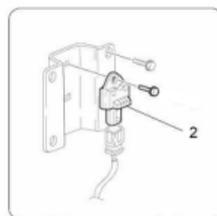
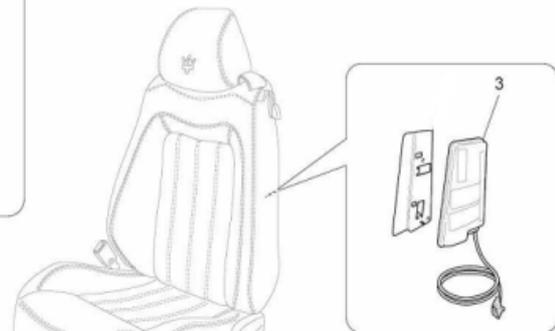


1. Driver's airbag
2. Passenger's airbag
3. Airbag clock spring
4. NAB

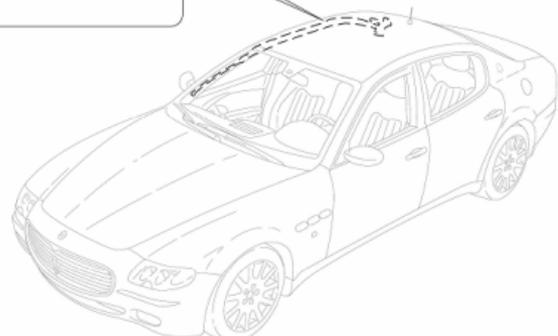
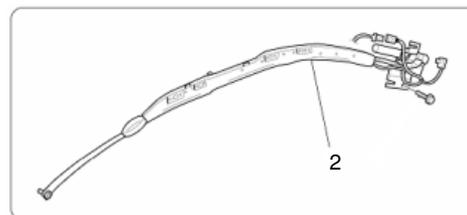
1. Passenger airbag deactivation lock (Europe and UK vehicles only)



1. Door-mounted airbag module
2. Door-mounted airbag fitting
3. Front sidebag module



1. Front crash sensor
2. Side crash sensor

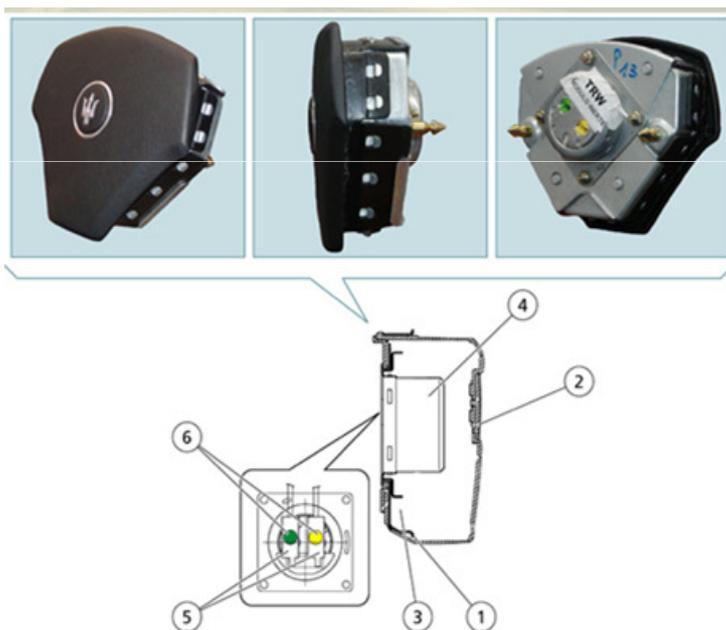


2. Window bag (only for Quattroporte)

Driver's frontal airbag module

The module is composed of:

- a plastic cover with a leather finish; which, in the event of activation, tears at predetermined points to allow the cushion (airbag) to deploy correctly;
- a cushion (airbag), with a volume of approx. 60 litres, made of nylon with a special weave designed to reduce abrasions on the skin as much as possible in the event of contact and folded up specially so that it deploys gradually and not straight towards the driver;
- a dual-stage hybrid gas generator;
- an external housing.
- On the bottom of the gas generator there is a warning plate bearing the instructions for its handling.



1. Fastening bracket
2. Cover
3. Folded bag
4. Gas generator
5. Warning plate
6. Points of connection to the electrical system

The airbag is inflated by a gas generator which has two intervention stages. These can be activated separately depending on the severity of the collision.

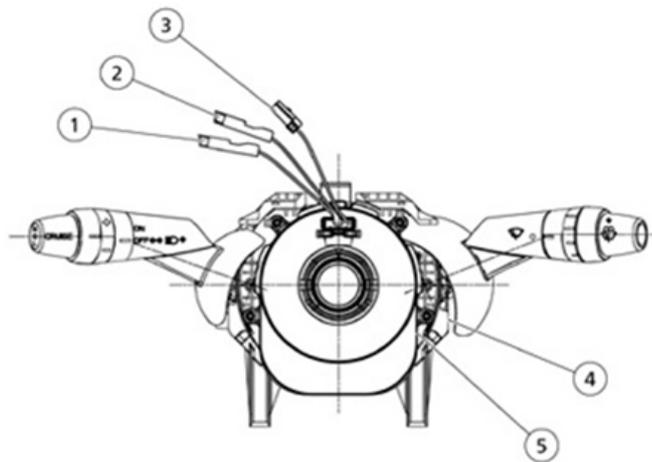
The delay between the first and second stage activation (hundredths of a second), allows the energy used to inflate the airbag to be adjusted. This delay is managed by the ECU which, depending on the intensity of the collision, determines both the first stage activation and the delay before the actuation of the second, thereby optimising the energy needed to inflate the airbag. Thanks to the permeability of its fabric, the airbag is deflated in tenths of a second.

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).

On the steering wheel side of the upper disc, there is a ring which automatically locks the rotation between the two discs when the device is detached from the steering wheel.

The device is supplied complete with the steering column stalks.



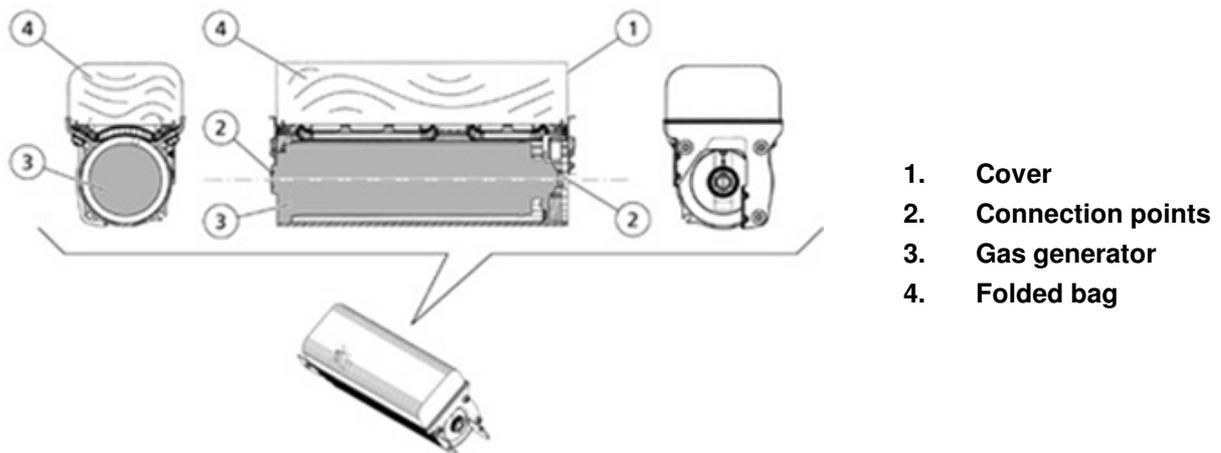
1. **Electrical connector for first stage airbag connection**
2. **Electrical connector for second stage airbag connection**
3. **Cable for steering wheel electrical functions**
4. **Light switch**
5. **Clock spring**

Inside the two disks, the airbag module connection cables and those for the various electrical functions are coiled up with enough turns to follow the rotations of the steering wheel. The upper disk is rotated by means of the recesses inside the lock ring, which fit into the seating on the steering wheel hub. In the working position, the steering wheel presses against the ring, releasing it from the recesses, and so enabling the rotation between the two disks.

When the steering wheel is removed, the ring, pushed by a spring, blocks rotation between the two disks. This function prevents the upper disk, which is no longer linked to the steering wheel, from rotating freely and causing the coil inside the device to wind or unwind and possibly break.

Passenger's frontal airbag module

The passenger side airbag module is located inside a compartment in the dashboard, just above the glove compartment, and is secured to the dashboard and to the dashboard cross member by means of special brackets. As the driver's module, it deploys to provide frontal protection for the passenger in the event of impacts that exceed a set threshold, and can also be deactivated voluntarily using a manual switch (except on the USA, JAP, AUS versions)



The airbag is inflated by a gas generator which has two operation stages. These can be activated separately depending on the severity of the collision.

The delay between the first and second stage activation (hundredths of a second), allows the energy used to inflate the airbag to be adjusted. This delay is managed by the ECU which, depending on the intensity of the collision, will determine both the first stage activation and the delay before actuation of the second, thereby optimising the energy required to inflate the airbag.

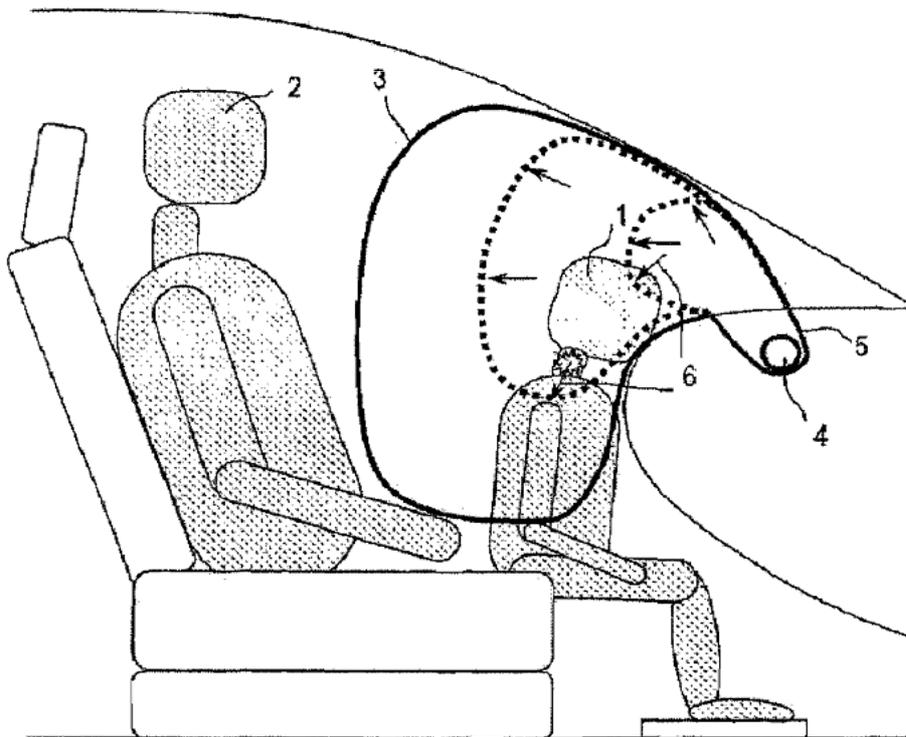
The increase in the airbag's volume tears the airbag cover at predetermined points. Once the airbag has fully deployed, it is in the optimal position to provide its protective function for the vehicle's occupant. Thanks to the permeability of its fabric, the airbag is deflated in tenths of a second

Low Risk Deployment airbag

The Quattroporte restyling, GranTurismo models from 2009 and GranCabrio models are equipped with a new-generation passenger-side airbag system that uses an “**intelligent**” technology, called “low risk deployment”.

The new passenger-side airbag system with Low Risk Deployment function represents a point of excellence in technological development in the field of vehicle occupant protection and provides absolute safety in all head-on collision conditions.

Thanks to its various components, the airbag easily adapts to all possible situations: additional breather holes allow pressure reduction when the airbag impacts against an obstacle in proximity of the dashboard; the low concave part adapts to the size and orientation (forward or backward) of child seats. Finally, the division into two side lobes allows better holding back the shoulders reducing the pressure on the chest and head of adults.

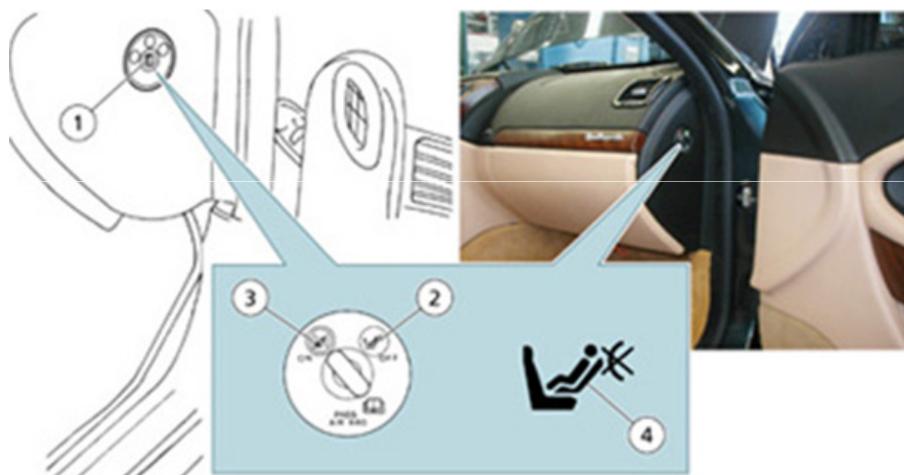


Key-operated switch for passenger's airbag deactivation (only for Europe and UK specification vehicles)

A switch operated with the ignition key can be used to enable (ON) or disable (OFF) the passenger's airbag module. The switch is located at the end of the dashboard on the passenger's side, so it is only accessible when the door is open.

In this case, the NAB disables activation of the passenger's airbag, but always enables operation of the relative pretensioner (only if the seatbelt is fastened). This is because if there is a passenger and the switch has been mistakenly set to OFF, the airbag will not be activated but the pretensioner will.

With the key at OFF, the NAB also controls activation of the "passenger airbag OFF" warning light located on the instrument panel, and of the same warning light on the roof console (GranCabrio excluded). Duplication of these warning lights is to ensure they are clearly visible to both the driver and the passenger.

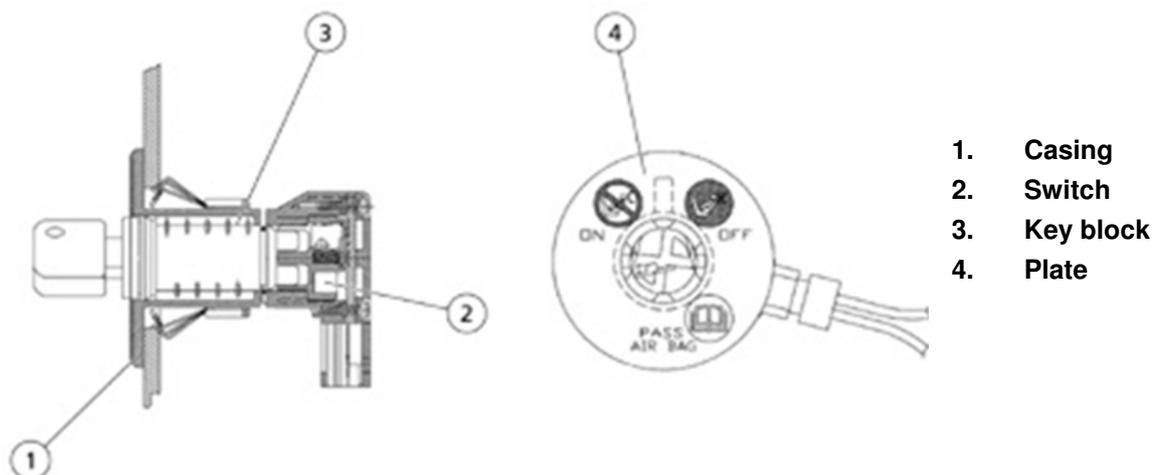


1. Key switch
2. OFF position: passenger's airbag disabled
3. ON position: passenger's airbag enabled
4. Passenger airbag off warning icon on instrument cluster

The unit is composed of a casing which houses the switch, a key block inserted in the casing and held in place by a clip and a plate indicating the current position the switch (ON or OFF).

There is also a seat for the electrical system connector on the casing.

Any switch failures are signalled by the illumination of the Airbag system fault warning light.



The switch can be operated, using the vehicle ignition key, any time the driver wishes to enable or disable the front passenger side module.

During the normal diagnosis cycle run when the key is turned to ON (four seconds), the ECU checks the switch status. If the status read is OFF, the module is disabled to prevent any activation, the corresponding signal is memorised and the passenger airbag OFF warning light is illuminated on the instrument panel. If the status read is ON, at the end of the four seconds of the diagnostic cycle, the warning light flashes for a further four seconds and then goes off.

The remaining side airbag modules are not affected by these deactivation commands.

In the event of a switch malfunction or failure the system operates so as to ensure:

- the passenger module is not activated
- the airbag system fault warning light is illuminated
- the passenger airbag OFF warning light is illuminated
- the deactivation status is memorised.

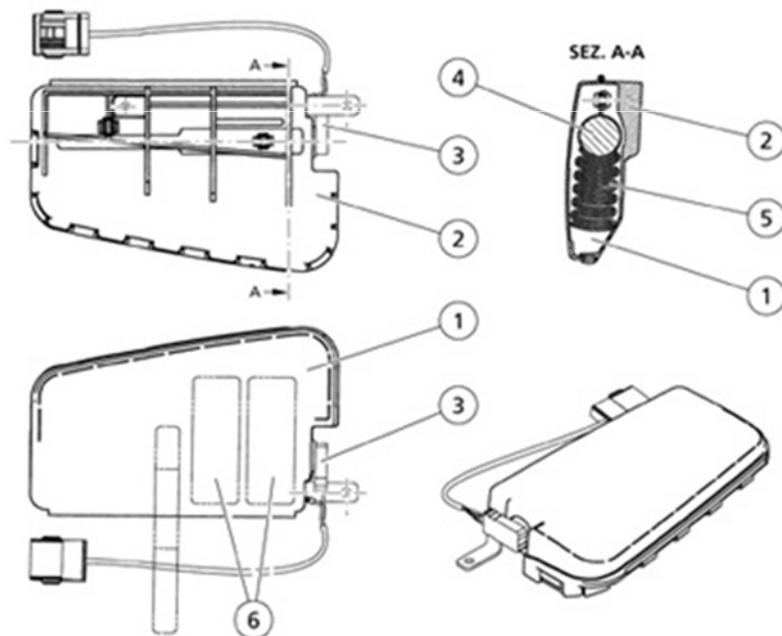
Side airbag module (Sidebag)

The sidebag module is composed of a plastic casing which houses the gas generator and a permeable nylon airbag with a volume of approx. 12 litres.

The module casing has a cover with predetermined breakage areas which, when the seatback trim cover is in place, are located in position with the easy yielding seam sections on the outer trim cover.

On the base of the casing there is a warning plate bearing the instructions for handling the module.

The module is connected to the electrical system with two cables covered by yellow sheaths, that are housed, with the seat earth wire, in a protective fabric cable guide, fastened to the seat structure. The two cables end with a yellow connector. The connectors for module connection, for the seatbelt fastened sensor (driver's side only) and the heater, if any, are anchored to an extractable mount found on the base of the seat.



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

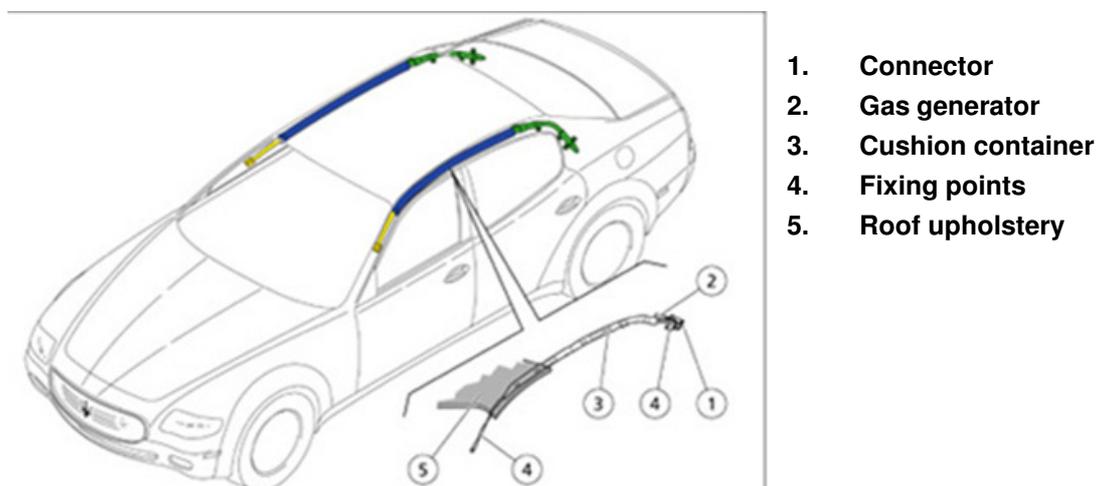
The gas generator that inflates the module is activated electrically by means of a signal from the NAB. Following this signal, a pyrotechnic charge is set off which releases the gases contained in the generator. As the gases are released, they seep out through specially designed openings and trigger the inflation of the airbag.

The increase in the airbag volume causes its housing to break along the specific tearable areas and its seams to split open in the sections provided, on the back covering panel, allowing the cushion to deploy correctly. Once fully inflated, the airbag is in the optimal position to protect the vehicle's occupant. After being inflated with the gases, the airbag deflates in tenths of a second thanks to the fabric's permeability.

Lateral curtain bags for Quattroporte

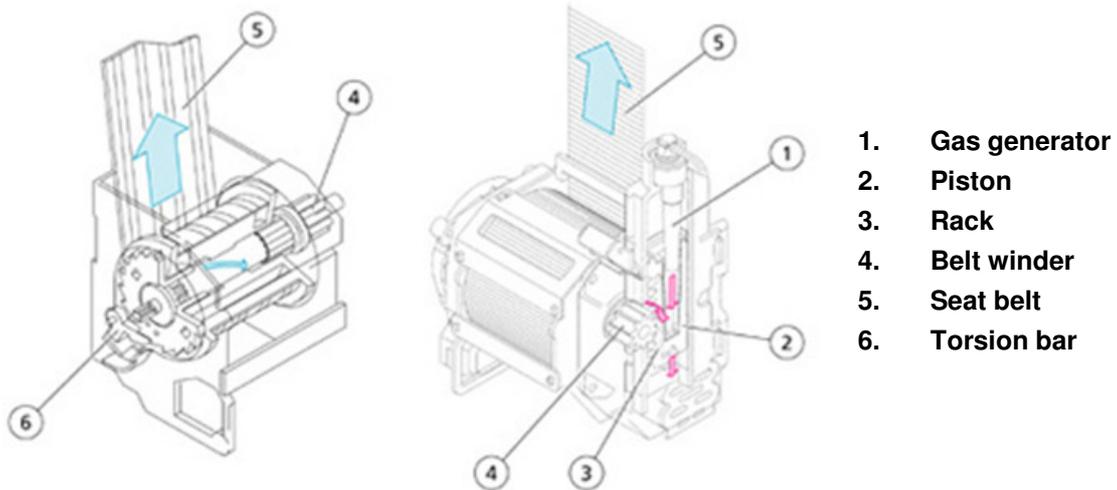
The module consists of:

- A gas generator fastened with brackets to the vehicle C pillar
- A steel pipe with calibrated holes, fastened with a clamp to the gas generator, which diffuses the gas uniformly along the airbag;
- A cushion (airbag) with a volume of approx. 21 litres, fastened to an inflation pipe, made of permeable nylon and folded into a plastic containment sheath.
- A plastic container, which wraps and protects the bag, controls the inflation direction and incorporates the fixing points to the roof.
- Cushion retaining straps
- A connector for attachment to the electrical system
- A warning plate bearing handling instructions.

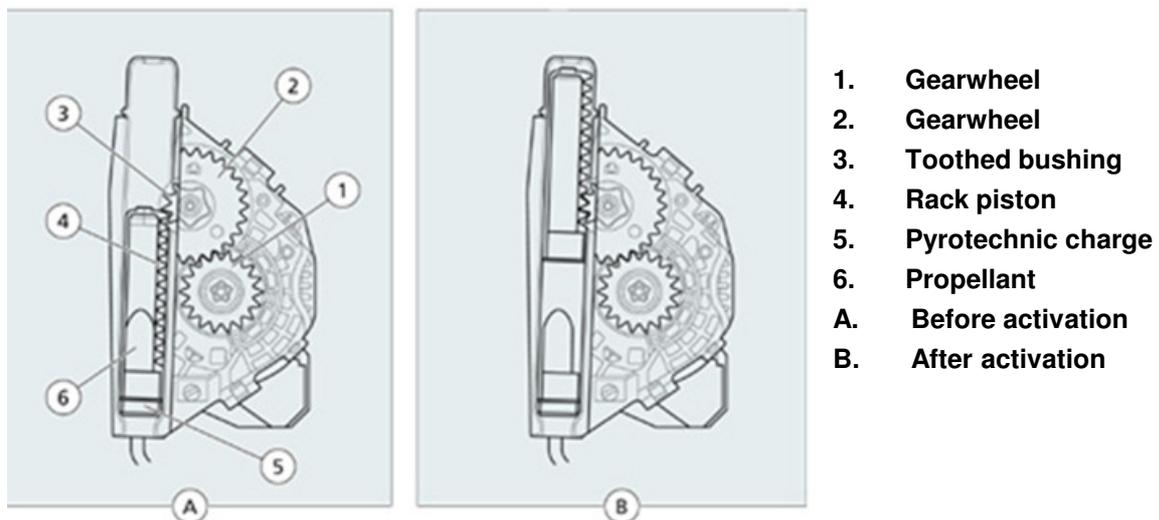


Seat belts pretensioners

The seat belt winders are fitted with electrically-controlled pretensioners, which are operated by the airbag ECU, with a load limiting device. This device, introduced to enhance passive safety, is capable of reducing the load pressure normally exerted by the seat belts against the shoulders and chest following an impact, minimising the injuries resulting from the action of the seat belts.

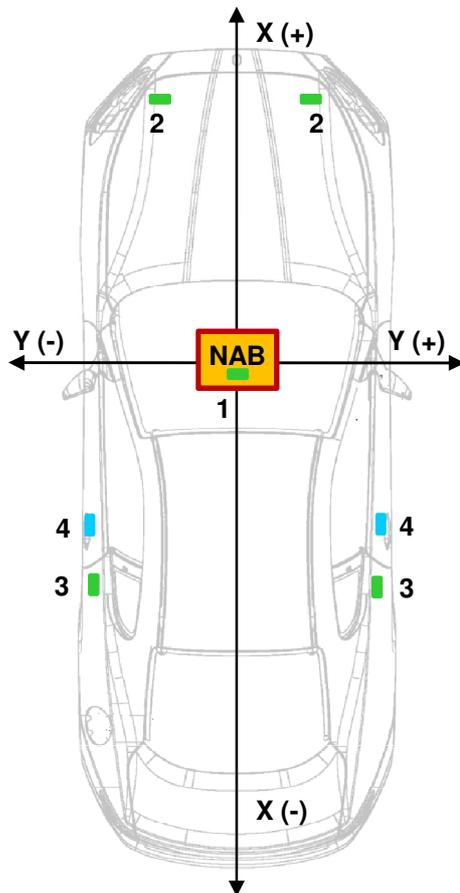


When the vehicle decelerates sufficiently quickly, the electronic sensor in the ECU sends a signal which trips the pyrotechnic charges of the gas generators (5). The combustion of the propellant (6) produces a chemical reaction that generates an inert gas whose pressure creates a force which pushes the rack piston (4) upwards. This makes the gearwheel (1) connected to the gearwheel (2) rotate. The gearwheel then engages with the toothed bushing (3) and changes the spindle rotary movement, making it move in the direction opposite to the seat belt unwinding direction, thereby winding it by a few centimetres.



Crash sensors

On Maserati vehicles, we can identify the following crash sensors, each with their specific use:



1. Acceleration sensor(s) inside NAB
2. Front crash zone sensors for advanced impact warning.
3. Lateral crash sensors
4. Lateral pressure sensors for advanced impact warning (GranCabrio only)

Acceleration sensor inside the NAB

Here we can identify two types of sensors:

- Mechanic type sensor in X direction: Quattroporte, GranTurismo
- Electronic type triple sensors for X-Y-Z direction: GranCabrio

Front crash zone sensors

The front crash zone sensors (left + right) have a dual function:

- Advanced impact warning: the NAB will prepare itself for quick airbag activation in case the impact is subsequently confirmed by the acceleration sensor inside the NAB.
- Impact angle detection: in order to allow the NAB to calculate which airbags to activate in the event of an impact (front + lateral airbags left/right, based on the impact angle).



Quattroporte



GranTurismo



GranCabrio (new type sensor)

Lateral crash sensors

To measure the acceleration following a side impact, two satellite sensors containing an accelerometer are fitted inside the B-pillars

The satellite sensor is composed of a casing containing the acceleration sensor. On the rear of the casing, there is a pin to ensure it is positioned correctly in its seat. The casing also has a connection point for the electrical system.

The sensor signal is sent to the NAB. If the acceleration value read by the relative sensor exceeds a preset threshold, the information is compared with the reading taken by the sensor integrated in the NAB. If the values read are congruent, the NAB activates the side airbags on the side affected by the impact.



Quattroporte



GranTurismo



GranCabrio (new type sensor)

Lateral pressure sensor (GranCabrio only)

The enhanced passive safety system of the GranCabrio features an additional sensor located inside each door. This sensor, with integrated processor and piezo-electric element, will detect the pressure wave caused by the deformation of the door sheet in the event of a side impact. The information provided by this sensor is used by the NAB for advanced impact warning: the NAB will prepare itself for quick airbag activation in case the impact is confirmed by the acceleration sensors.



Lateral pressure sensor for advanced impact warning

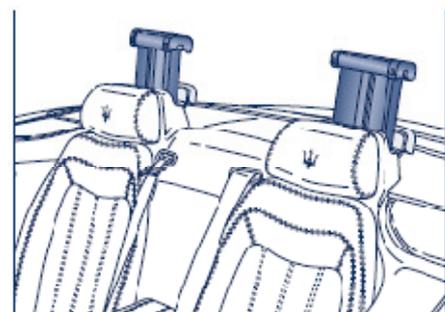
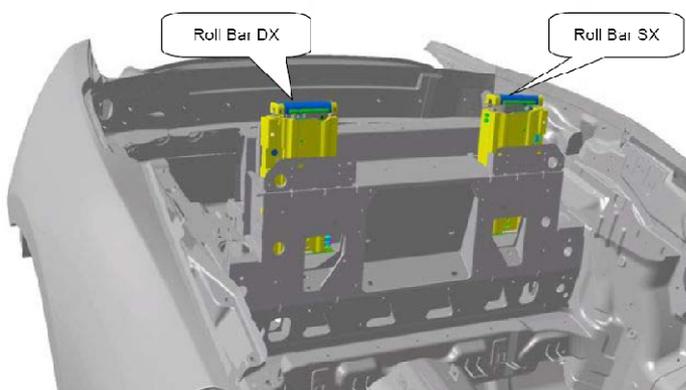
Rollover protection system (ROPS) (GranCabrio)

All the GranCabrio vehicles are equipped (standard) with rollover protection system (ROPS) consisting of an active roll bar. The system is concealed in the headrests of the rear seats and is activated (opens) when a risk of overturning is identified. The rollover protection system and the reinforced windscreen frame provide optimal protection in the event of overturning.



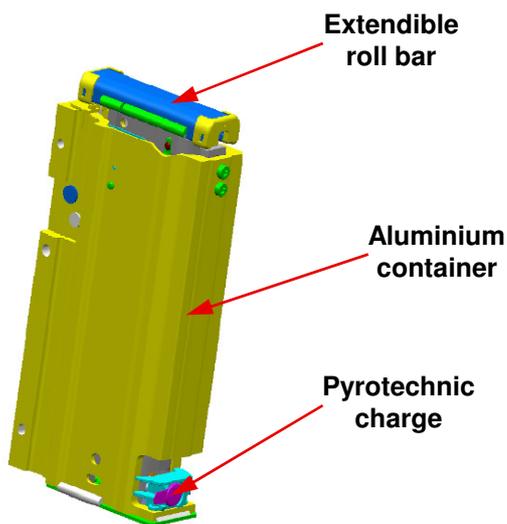
The system has two sliding shock absorbers arranged in two drawer-like containers that extend in vertical direction. Both containers are secured on the vehicle chassis behind the backrests of the rear seats. They are tilted backward by 15°, in the direction of the rear window (soft top closed). When the roll bars are activated, they break through the rear window to reach their full extension. This ensures absolute safety also for very tall passengers travelling in the rear seats. Should the roll bars open in the direction of the roof, the soft top canvas would restrict their extension reducing the safety margin.

The roll bars are activated when vehicle handling is such that imminent rollover is plausible, and also if the vehicle is involved in a side or rear collision of a certain intensity; they open to prevent damage to the system and to handle any future emergency conditions.



The active roll bars are controlled by the airbag node (NAB) and are activated by means of a pyrotechnic release mechanism. A specific control logic in the NAB assesses the rollover risk and activates the roll bars when a preset roll angle is reached.

The total activation time plus the system extension time is less than 190 milliseconds, in other words, an interval far shorter than the time the vehicle takes to turn around its own axis.



Once the extendible roll bar is positioned in its container, it is loaded by a spring and locked by means of a locking pawl. Upon activation, the pyrotechnic charge releases the locking pawl and the roll bar is expelled by the force exercised by the spring.

During expulsion, a non-return mechanism locks the roll bar in the open position to prevent it from returning pushed by an external force, for example, if the vehicle hits the ground while overturning.

The two extendible roll bars are always activated at the same time and must be replaced if they have been opened.



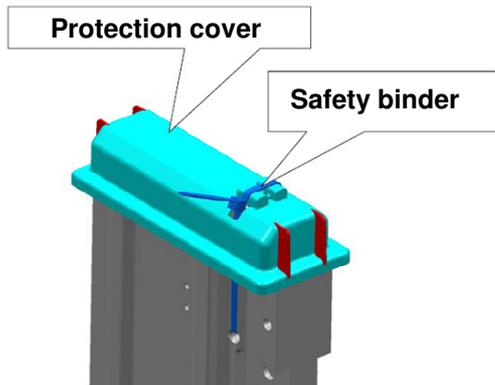
The tungsten pin concealed underneath the plastic breaks the rear window during roll bar activation.

In normal conditions, the extendible roll bars are covered by a plastic protection cover situated behind the rear headrests. The cover contains an integrated tungsten pin. The pin is visible but concealed underneath a pre-cut hole in the plastic. The pin slips out of the plastic cover when the roll bars are activated and breaks the rear window at the moment of impact (soft top closed).

The roll bars need to break through the rear window in order to reach their full extension (281mm) and provide optimal protection for the occupants in the event of the vehicle overturning.

Warnings and instructions for handling active roll bars

The extendible roll bar is available as a spare part and comes with a protection cover. This cover prevents accidental roll bar activation during storage, transport and installation, which might cause injury.



If a roll bar needs to be replaced, remove the protection cover only after completing its installation in the vehicle.

The electrical connectors on the left- and right-hand side of the roll bar have a specific colour:

- Right-hand roll bar: green connector
- Left-hand roll bar: blue connector

Make sure that they are correctly positioned!



Like for the airbag modules, the vehicle battery must always be disconnected before removing or installing the roll bars. Reconnect the battery only after installation has been completed.



If the roll bar is dropped during transport, it must be returned to the supplier for inspection. It may not be installed on the vehicle even if it does not show any visible signs of damage.

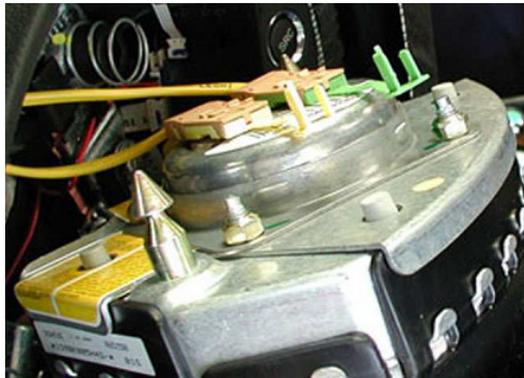
Diagnosis

The airbag node (NAB) checks the electrical continuity of the roll bar connector and wiring. If an error is found, a DTC is stored. The active right- and left-hand roll bars can be replaced individually in the event of a system error.

Special procedures in the event of airbag removal

If you need to remove the airbag inflation device, strictly follow the procedure below:

- 1) Wait at least 10 minutes after disconnecting the battery before starting to remove the module
- 2) Undo the fastening screws;
- 3) Detach the airbag pin coupling.
- 4) Store the devices with the cover facing up in a locked metal cabinet.



Special procedures in the event of NAB replacement

After replacement of the Airbag Node, it is necessary to perform the initialisation procedure (Cycle).

To perform the initialisation procedure, detach the electrical connectors of the driver's side frontal airbag, passenger's side frontal airbag and both side bags positioned under the front seats.

Connect the diagnostic tester

Enter the "CYCLE ENVIRONMENT"

Select the configuration cycle for the Airbag Node and proceed.

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.

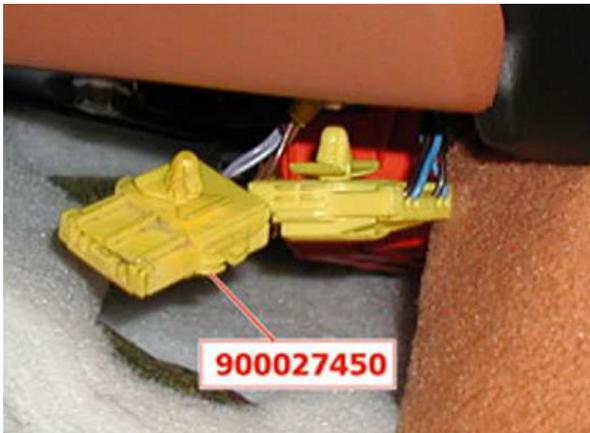


CAUTION

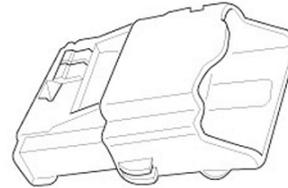
The NAB used in the GranCabrio models is of a new generation (different hardware and different software with respect to the one used in the Quattroporte and GranTurismo models) and is now a "proxed" node. This means that after replacement, the Proxi Alignment procedure must be performed by using Maserati Diagnosi.

Continue with the cycle until the tester prompts you to connect the driver's side frontal 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.



Connect the test connector **900027450**.



Wait until the following screen pages prompt you to remove the test connector **900027450** and to attach passenger's side frontal airbag connector.

Attach the passenger's side frontal airbag connector.

Subsequently the screen page prompting you to attach the side bag connectors will be displayed.

Connect the side bag connectors.

The diagnostic tester will then perform a check of the switches for the front and rear seat belts.

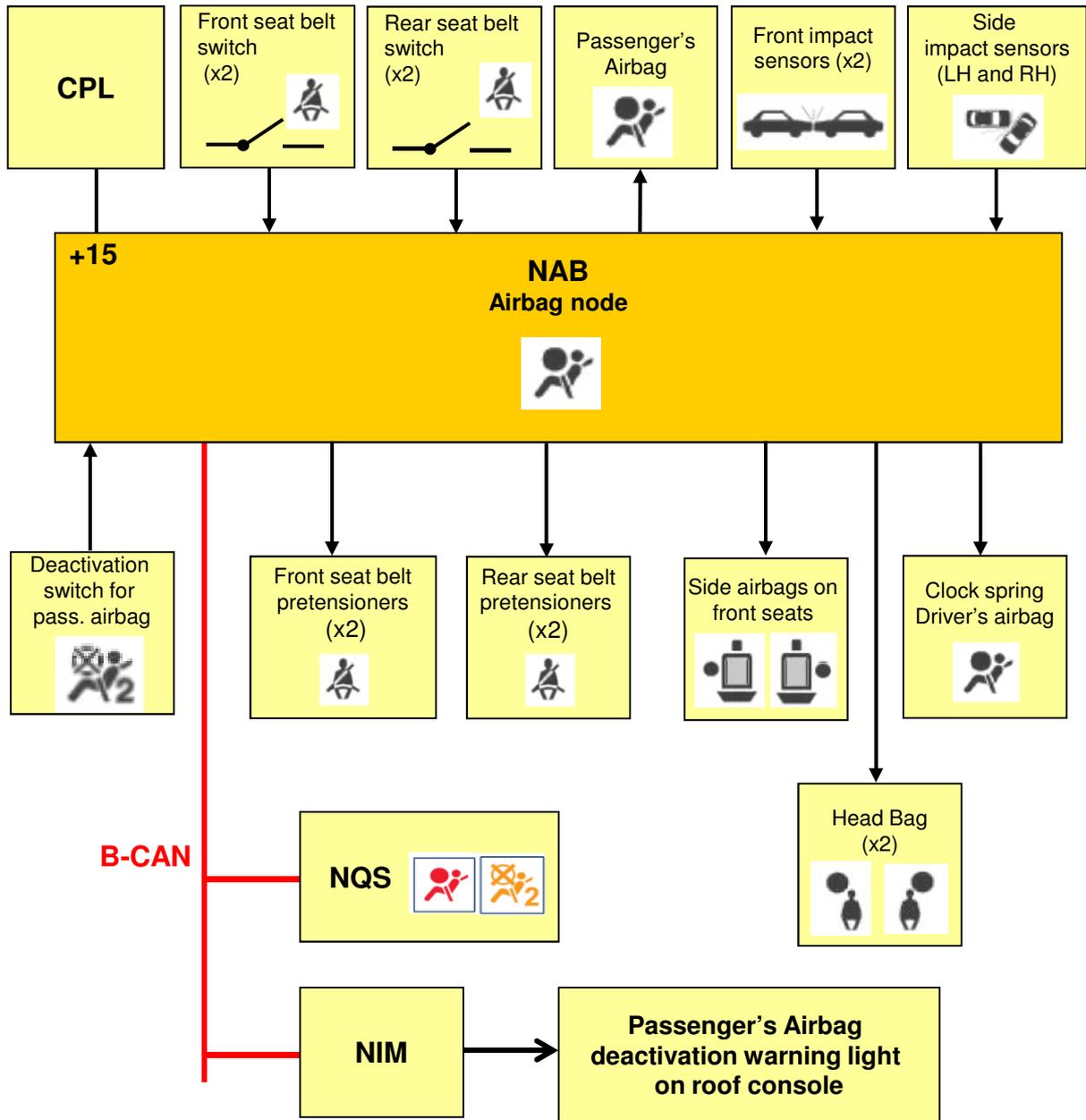
Connect the seat belts in the following order:

- Front seat, driver's side
- Rear left-hand seat
- Central seat
- Rear seat, passenger's side
- Front seat, passenger's side
- The connected 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.

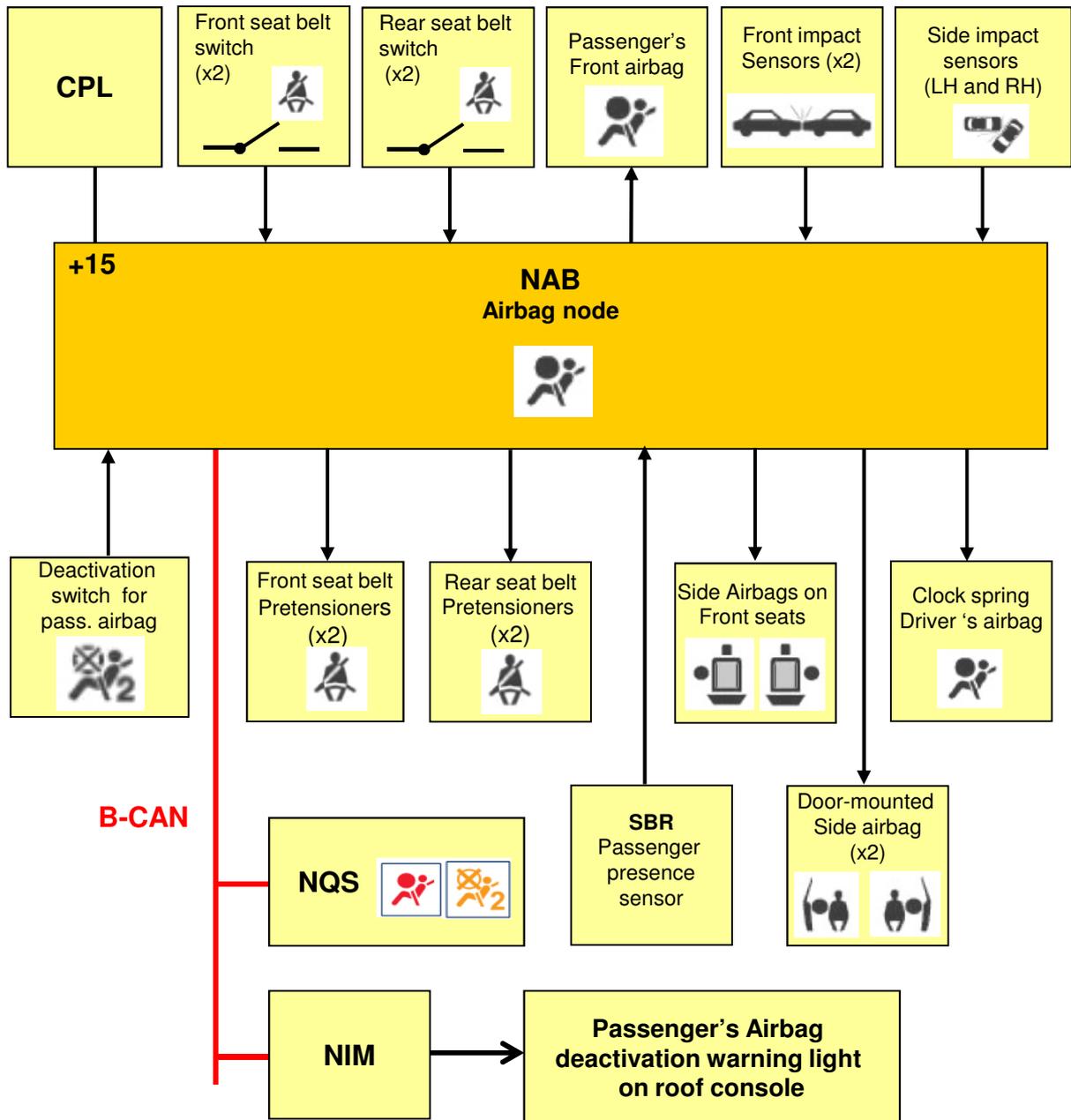
- Reply "yes" and continue with the cycle.
- Keep the printed document in a safe place.

Functional diagram NAB (Quattroporte)



Note: For the USA and CND markets, the Quattroporte models up to MY08 included are equipped with the AWS (Advanced Weight Sensing) system instead of a key activated switch for passenger's airbag deactivation.

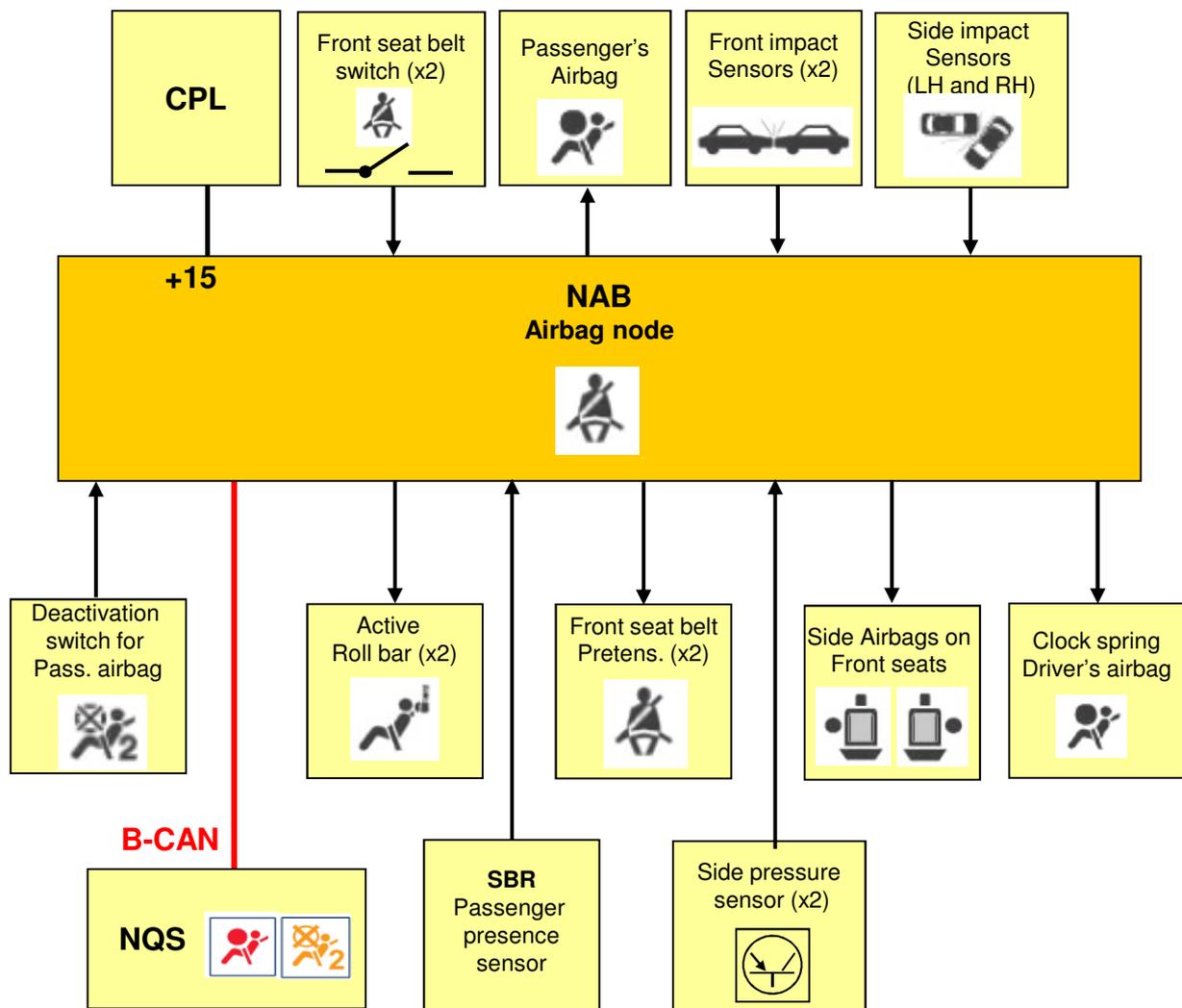
Functional diagram NAB (GranTurismo)



Notes:

- The front passenger's seat occupancy sensor for the Seat Belt Reminder (SBR) is only present on vehicles with the new Low Risk Deployment passenger's airbag (from 2009 onwards)
- For the USA and CND markets, the GranTurismo models up to 2008 are equipped with the AWS (Advanced Weight Sensing) system instead of a key activated switch for passenger's airbag deactivation.

Functional diagram NAB (GranCabrio)

**Notes:**

- The airbag system of the GranCabrio uses a new generation airbag node (NAB) and impact sensors, included two new pressure sensors for advanced side impact warning.
- The front passenger's seat occupancy sensor for the Seat Belt Reminder (SBR) is present on all GranCabrio vehicles.
- GranCabrio vehicles have no repeater warning light on the roof console for the passenger's side airbag deactivation.
- GranCabrio vehicles have no side bags integrated in the door panels and no pretensioners for the rear passenger seat belts.
- GranCabrio vehicles feature a new, larger type of side airbags integrated in the seat backrests.

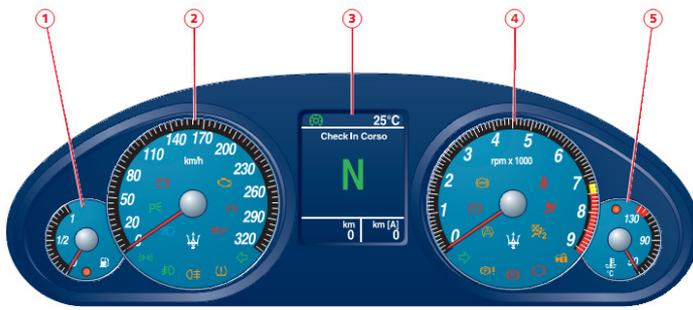
Instrument Panel Node (NQS)

Magneti Marelli

Description

The instrument cluster (NQS) is of the of the electronic type and performs the functions listed below:

- It receives and transmits information via the B-CAN line (e.g.: diagnosis, warning lights, commands, data).
- it is interconnected with the dashboard wiring.
- It handles all the information displayed on the instrument panel.
- It calculates, stores and displays the vehicle’s mileage.
- It contains an internal clock and informs other nodes (NIT, NIM) about date and time.



1. Fuel level gauge and low fuel indicator
2. Tachometer/speedometer
3. Display
4. Rev. Counter
5. Coolant thermometer and high temperature warning light

Power absorption in sleep mode:	<3 mA
Power supplies:	+30, +15
Earths:	1



Special procedures in the event of NQS replacement

In the event that the air NQS is replaced, it is necessary to perform the "Proxi alignment" procedure, so that the new component receives the vehicle configuration data from the NBC and is recognised by the vehicle network. This is necessary for a correct operation of the NQS.

Connect the diagnosis tester to the EOBD connector of the vehicle and perform the "Proxi alignment" procedure.

Carry over of the vehicle mileage in case of NQS replacement: when ordering a new instrument cluster from the Maserati Parts dept. for a specific vehicle, the original mileage must be communicated to the factory. The new NQS will arrive pre-configured and already containing the vehicle's correct mileage.



Important note: Make sure that the date and time in the NIT and the NQS are set correctly before performing a Service reset of the NQS. Failure to do so could lead to permanent damage to the NQS. See Technical Information # 201004 from the Maserati Service dept. for more details.

Indicators and warning lights (within the gauges)

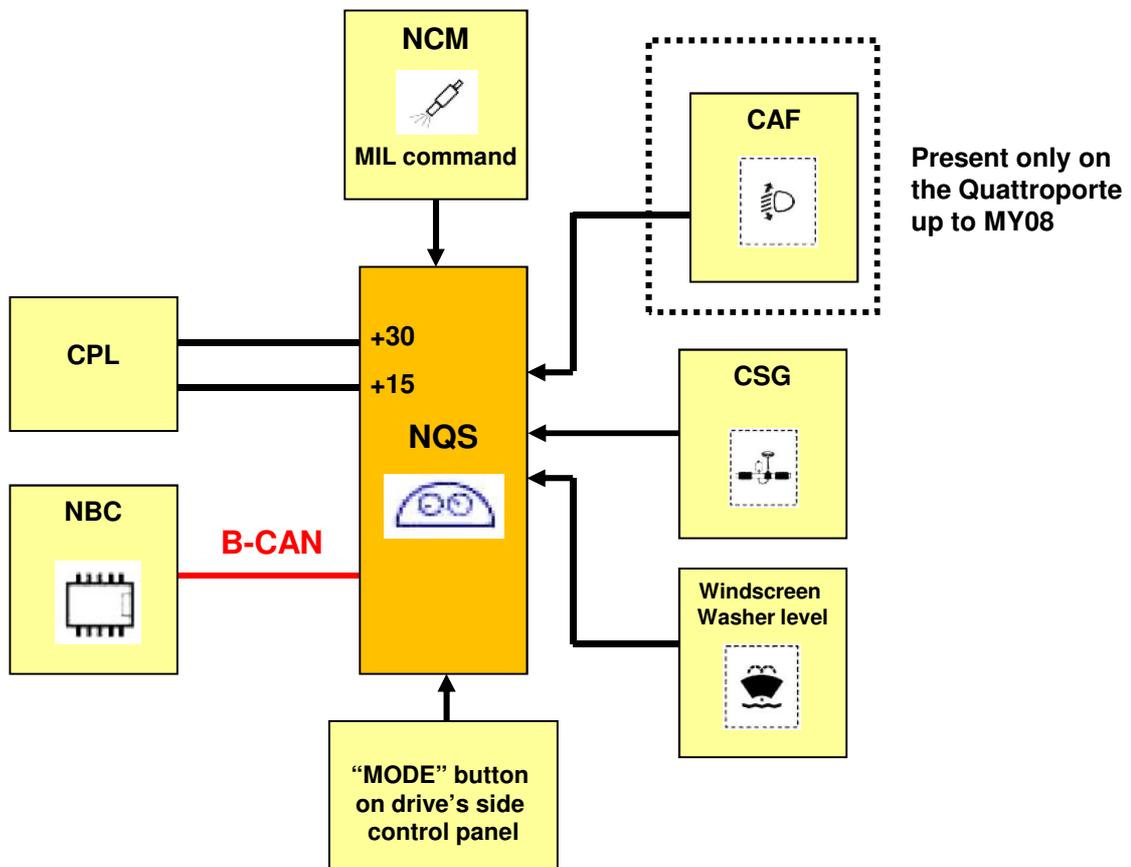
	Rear fog lights		Passenger airbag OFF warning light		Low oil pressure (*)
	Fog lights		Immobilizer		ABS failure warning light
	Position lights/ Low beams		Brake pads worn		Low brake fluid level
	High beams		Parking brake applied		Tyre pressure
	Parking lights		Parking brake failure		Seat belts not buckled
	Alternator /battery failure		MSP system failure		Airbag system failure
	Engine control system failure(EOBD) (*)		Right-hand Direction indicators		
	Gearbox failure Automatic (*)		Left-hand Direction indicators		

(*) icons repeated on the central info display

Warning icons on the central info display

	Inertia switch, fuel cut-out enabled		Power steering failure
	Windscreen washer fluid		Low engine oil level
	Cruise Control		Low automatic /robotized gearbox oil level
	Lighting system failure		ALC system failure
	Stop light failure		ASR system failure
	Twilight sensor failure		Rain sensor failure
	Soft top failure		Parking sensor failure
	Excessive temperature in the catalytic converters		Doors and lids open
	Shock absorber failure		Ice hazard
	MSP system failure		"Low grip" mode
	Vehicle set to "SPORT" mode		Seat heating
	Deactivation of EPB automatic operating mode		Scheduled maintenance
	Automatic gearbox Mode selected		

Functional diagram NQS (Quattroporte – GranTurismo – GranCabrio)



The instrument cluster (NQS) receives all input data necessary to activate the different gauges and warning lights via the B-CAN line, with exception of the inputs listed below:

- Engine control system fault light (MIL) request from the NCM
- Speed sensitive power steering system (CSG) warning light input
- Windscreen washer low fluid level switch
- Headlight level control failure input from CAF (Quattroporte model up to MY08 included only)
- "MODE" button input

Parking sensors node (NSP)

Valeo

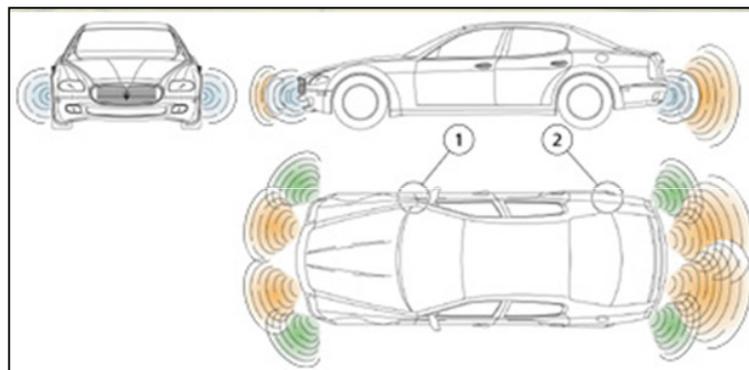
Characteristics

The Parking Assistance system provides the driver with information about the distance when the vehicle is approaching obstacles located in front and behind it. The system represents a useful aid for parking manoeuvres, as it informs the driver of any obstacles or hindrances that are out of his/her sight.

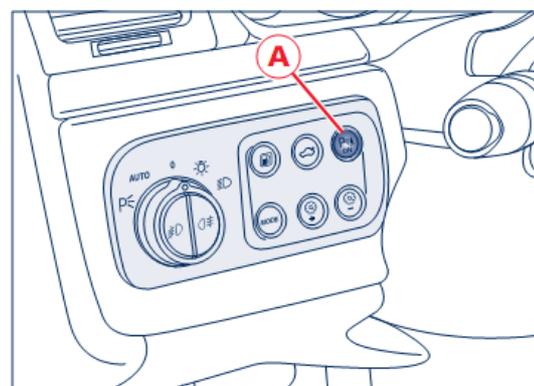
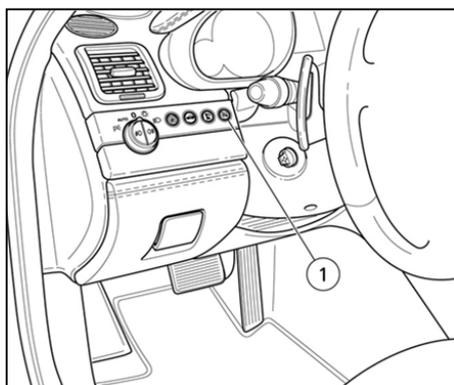
Information concerning the presence/distance of an obstacle is transmitted to the driver by means of a buzzer beeps.

The frequency of the beeps also depends on how far away the obstacle is. By supplementing his/her direct visual information with that provided by the system's warning sound signals, the driver can avoid potential collisions.

The front buzzer (when present) can be activated/deactivated by means of the dedicated button inside the vehicle.



1. Front buzzer position
2. Rear buzzer position



**Front parking sensors activation/deactivation button
(Quattroporte and GranTurismo/GranCabrio)**

Ultrasonic sensors

The sensor is an ultrasonic transducer, which acts as a smart transmitter and receiver of ultrasonic pulse packages. Both the frequency and the voltage of the pulses are generated in the transducer.

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 via the same line used for requesting transmission.

Each sensor can also operate as a receiver only, so that it can perform a triangulation measurement between two sensors. This technique provides enhanced detection of small obstacles and in situations where reflection is critical.

The sensors have all the same electric and mechanical features; The maximum sensing range of each sensor can be adjusted via software, depending on the location of the same sensor.

The sensors' power supply is protected by an electronic fuse. The sensors are also equipped with sealed connectors.

Operation

When the NSP is switched on (turning the key to on) a self-diagnosis test is run and all the peripherals are tested. The system is ready for use in less than 0.5 seconds.

The distance is only measured when the system is active, while when it is inactive only the NSP microcontroller is operative.

There is a button to deactivate the front sensors. The deactivation button has a status LED and a lighting one; the NSP operates the status LED only. When the front sensors are activated, the status LED is switched off; When the front sensors are deactivated, the status LED is switched on;. The deactivation is also indicated on the instrument panel.

The front distance measurement begins when the status LED switches off.

Obstacle distance measurement

The NSP establishes the measurement timing. It controls the sensors, which translate the NSP's electric signals into an ultrasonic pulse train, at a rhythm of 10 measuring processes a second.

The signal, reflected off any obstacles, is intercepted by the sensor, translated into digital signal and sent to the NSP in this form.

The NSP compares the signal emitted with the one received and calculates, by means of suitable algorithms, 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 by means of beeps.

The transit time is measured using the NSP's clock frequency. This contains a counter, whose value is recorded both when the measuring begins and when the echo signal is received. The difference between these two values is equal to the time taken by the pulses to reach the obstacle and return.

As the speed of sound in air is known, this can be used to calculate the distance between the vehicle and the obstacle.

The measurement accuracy is ± 1 cm.

Each sensor is provided with its own specific counter records.

During each measuring cycle, the entire system is checked to ensure it is operating correctly. If the echo signal is not disturbed, the shortest transit time of all the sensors' signals is identified. A comparison with the previous measurements allows the system to establish whether the obstacle is getting nearer or further.

The position and the type of obstacle can be identified through each measurement taken and from the distance between the sensors. With this information, the real distance is determined with greater accuracy in critical conditions.

Reflections from the ground are ignored unless they have the characteristics of an obstacle.

Stop & Go function.

The Stop & Go function is present on the models GranTurismo, GranCabrio and Quattroporte Restyling in case they are fitted with front parking sensors (optional). It can be activated or deactivated by means of the vehicle configuration menu in the NIT.

When Stop & Go is activated, the front parking system will be active and the system will signal obstacles always when the vehicle speed is lower than 8 km/h.

This function is useful to signal the distance to the vehicle in front during slow traffic driving.

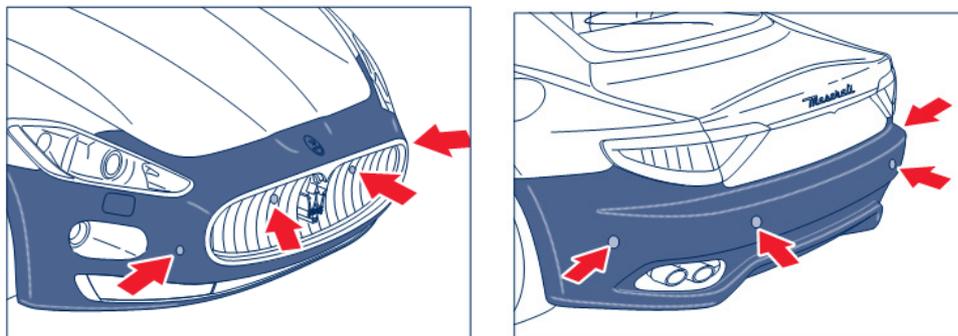
Obstacle distance indication

The ECU processes the information provided by the 4 front sensors and the 4 rear sensors, operating the front and rear speakers in the vehicle audio system, regardless of whether the system is in ON or OFF status. Depending on where the obstacle is located (on the right - in the centre - on the left), the sound is emitted by the respective speakers (right - both - left).

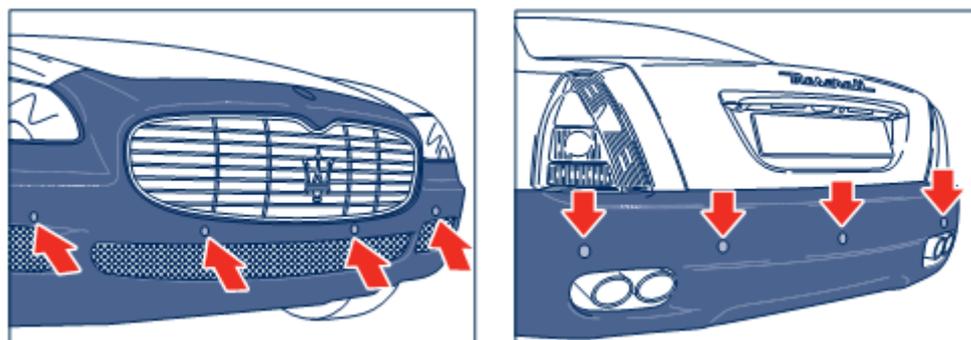
When these beeps are being emitted, anything audible on the stereo is muted.

The beeps coming from the speakers warn the driver that the vehicle is approaching an obstacle. The duration of the beep is 75 ms, while the pause between the beeps is directly proportional to the distance between the obstacle and the vehicle: A rapid series of beeps indicates the presence of an object which is extremely close. A continuous beep indicates the obstacle is less than 30 cm away.

The acoustic signal stops immediately if the distance from the obstacle increases. The beep frequency remains constant if the distance measured by the central sensors remains unchanged, while if this situation occurs for the side sensors, the signal is interrupted after 3 seconds (to prevent signalling when the driver is manoeuvring the vehicle alongside a wall for example).



GranTurismo – GranCabrio



Quattroporte

Error indication

Any failures/errors are displayed on the instrument panel and are also indicated by means of acoustic signals (beeps). The beeps stop after a maximum of 3 seconds.

If any errors/failures occur while the system is active, this is signalled immediately.



"Parking sensor failure" warning light

Sensor positioning

The system covers the central and side areas of the front and the rear of the vehicle, but performs differently thanks to the pre-programmed detection functions.

If the obstacle is located in the central area, this is detected at distances of less than 1.5 m (rear) or 1 m (front).

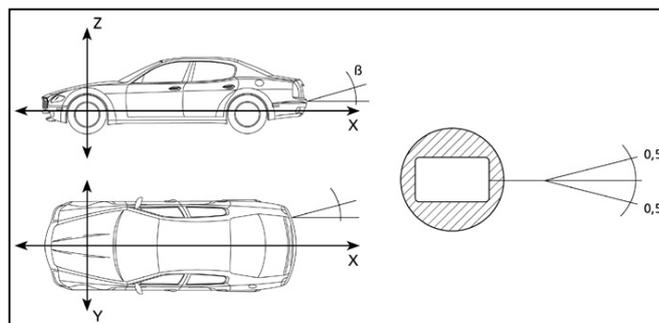
If the obstacle is located in a lateral position, it will be detected at distances of less than 0.6 m.

Conventional sensors must be located between 350 and 600 mm off the ground. If circular diaphragm sensors are used, the minimum height for positioning the sensors when the vehicle is fully loaded is 280 mm.

The horizontal fitting angle is approx. 7° .

For optimal performance, the maximum angle error allowed when positioning the sensor is $\pm 0.5^\circ$.

The sensors are positioned so as to guarantee a sensing range covering the entire front and rear of the vehicle.



Parking Sensor Node (NSP) description

The Parking Sensor Node (NSP) is located in the boot area at left hand side, it performs the following functions:

- It receives and transmits information via B-CAN line (e.g.: data, commands)
- it is interconnected with the front and rear wiring harness.

Current draw in sleep mode:	0 mA
Power supplies:	+15 (Quattroporte up to MY08), +15, +30 (GranTurismo, GranCabrio, Quattroporte Restyling)
Earths:	1



Example of NSP in the vehicle: GranTurismo

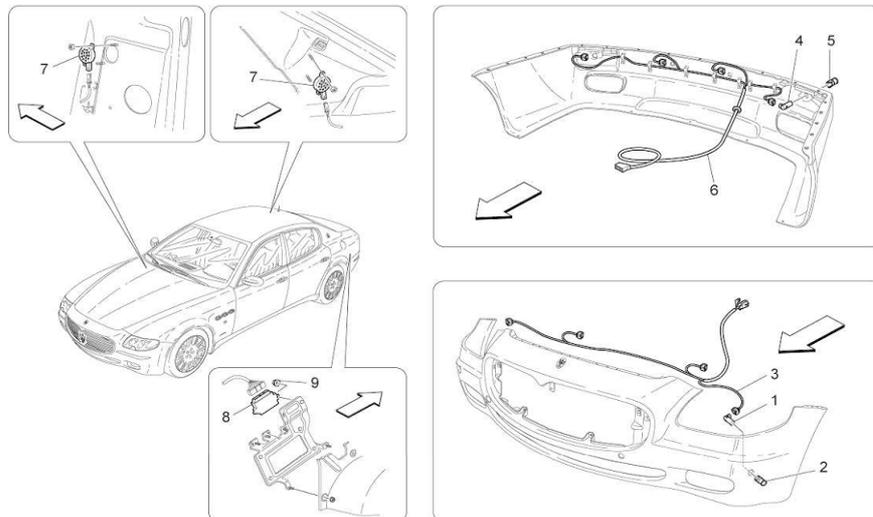
For Quattroporte up to MY08 included, two distinct specifications of the NSP can be distinguished. This depends on whether the vehicle is fitted with rear parking sensors only, or both rear and front sensors.

Aftermarket installation of front parking sensors involves therefore, besides the installing of the sensors and the wiring harness, also the replacement of the NSP.

The models GranTurismo, GranCabrio and Quattroporte Restyling use a new type of NSP which can be configured depending if the vehicle is or is not quipped with front parking sensors. In the event that front parking sensors are being installed aftermarket, it is necessary to modify the Proxi configuration of the vehicle.

NSP component location

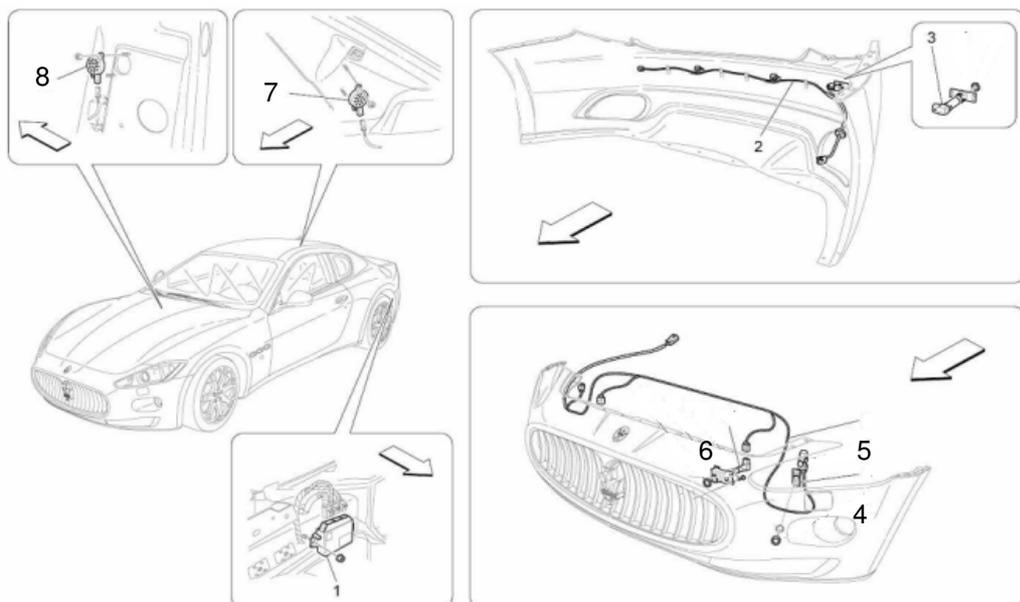
Quattroporte



- 1. Front parking sensor
- 2. Front sensor sleeve
- 3. Front sensor cable harness
- 4. Rear parking sensor

- 5. Rear sensor sleeve
- 6. Rear sensor cable harness
- 7. Front/rear sensor buzzer
- 8. Parking sensors ECU

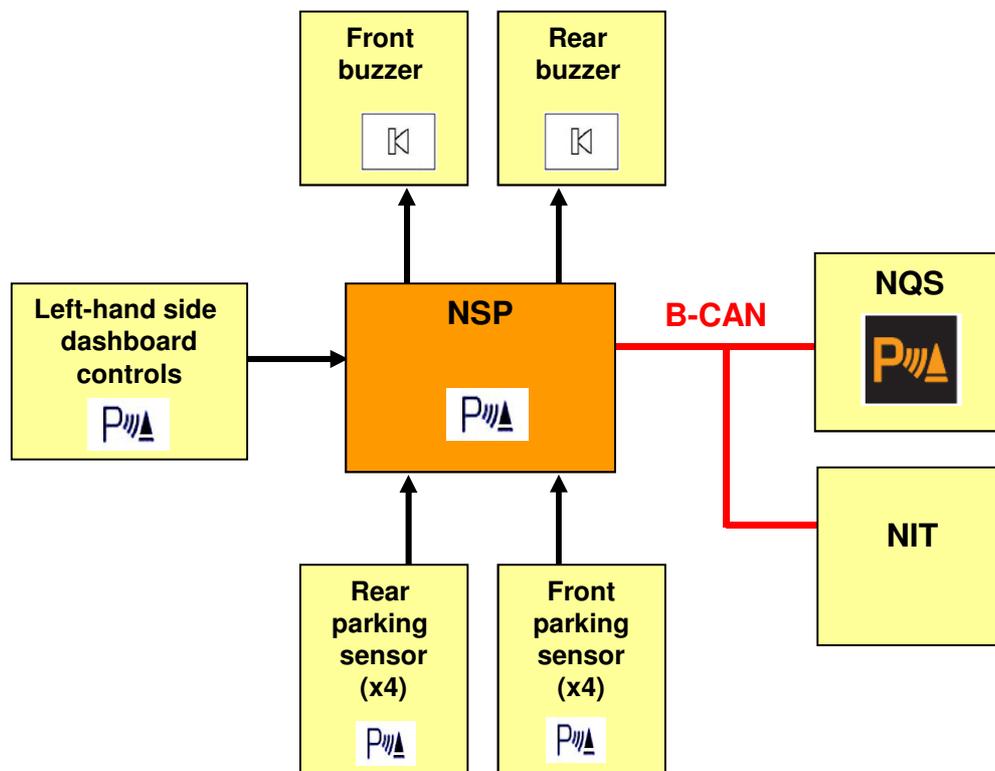
GranTurismo



- 1. Parking sensor ECU
- 2. Rear sensor cable harness
- 3. Rear parking sensor
- 4. Front sensor housing sleeve
- 5. Front sensor bridging cable

- 6. Front parking sensor
- 7. Rear sensor buzzer
- 8. Front sensor buzzer

Functional diagram NSP (Quattroporte – GranTurismo – GranCabrio)



Notes:

- Front parking sensors are optional for all vehicles.
- Activation / deactivation of the front parking sensors (if present) can be selected by the user by means of a specific push button on the left side of the dashboard (right side for RHD vehicles)
- The Stop & Go function for the GranTurismo, GranCabrio and Quattroporte Restyling models can be activated / deactivated from the vehicle configuration menu in the NIT (only if the vehicle has the optional front parking sensors). The NIT informs subsequently the NSP via the B-CAN line.

Special procedures in the event of NSP replacement

In the event that the air NSP is replaced, it is necessary to perform the "Proxi alignment" procedure, so that the new component receives the vehicle configuration data from the NBC and is recognised by the vehicle network. This is necessary for a correct operation of the NSP.

Connect the diagnostic tester to the EOBD connector of the vehicle and perform the "Proxi alignment" procedure.

Driver's Door Node & Passenger's Door Node (NPG – NPP)

Magneti Marelli

Driver's Door Node (NPG) Description

The Driver's Door Node is an ECU incorporated into the door controls. The NPG performs the following functions:

- It receives and transmits information via B-CAN line.
- It integrates the power window controls of all doors.
- It is interconnected with front driver's door wiring harness.
- It acquires the ambient temperature signal from the ambient temperature sensor.
- It acquires the door lock command signal from the lock switch on the central console.
- It acquires the rear-view mirror adjustment command signal from the joystick.
- It controls the power window and the finger-trap prevention (Quattroporte models only) on the driver's side.
- It manages the driver-side rear-view mirror movement.
- It manages the driver-side door lock / unlock.
- It controls the step lights / mirror lights / driver's footwell lights.

Current draw in sleep mode:	1 mA
Power supplies:	2 of +30,
Earths:	1 (it branches out on two pins)



Passenger's Door Node (NPP) Description

The Passenger's Door Node is an ECU integrated with the power window control. The NPP performs the following functions:

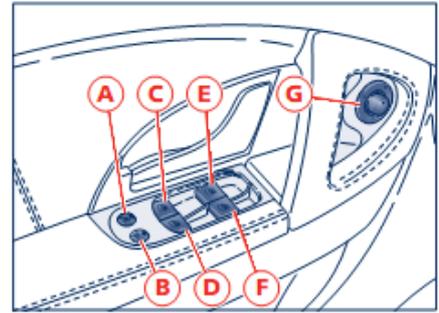
- It receives and transmits information via B-CAN line.
- It incorporates the front passenger-side window control
- It is interconnected with the front passenger-side door wiring harness.
- It acquires the door unlock command signal from the unlock switch on the central console.
- It controls the power window and the finger-trap prevention (Quattroporte models only) on the passenger side.
- It manages the passenger-side rear-view mirror movement.
- It manages the passenger-side door lock/unlock.
- It controls the door step lights /mirror lights / and the passenger's footwell lights.

Current draw in sleep mode:	1 mA
Power supplies:	2 from +30,
Earths:	1 (it branches out on two pins)

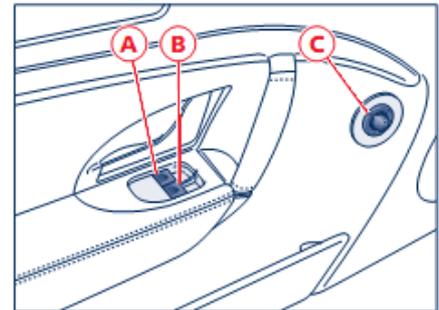


Controls on the driver's door - Quattroporte

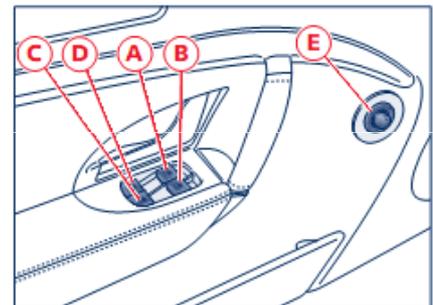
- A- Rear power window lock/unlock button
- B- Easy entry/exit system deactivation device
- C- Rear left-hand power window button
- D- Rear right-hand power window button
- E- Front left-hand power window button
- F- Front right-hand power window button
- G- External rear-view mirror adjustment button

**Controls on the driver's door - GranTurismo**

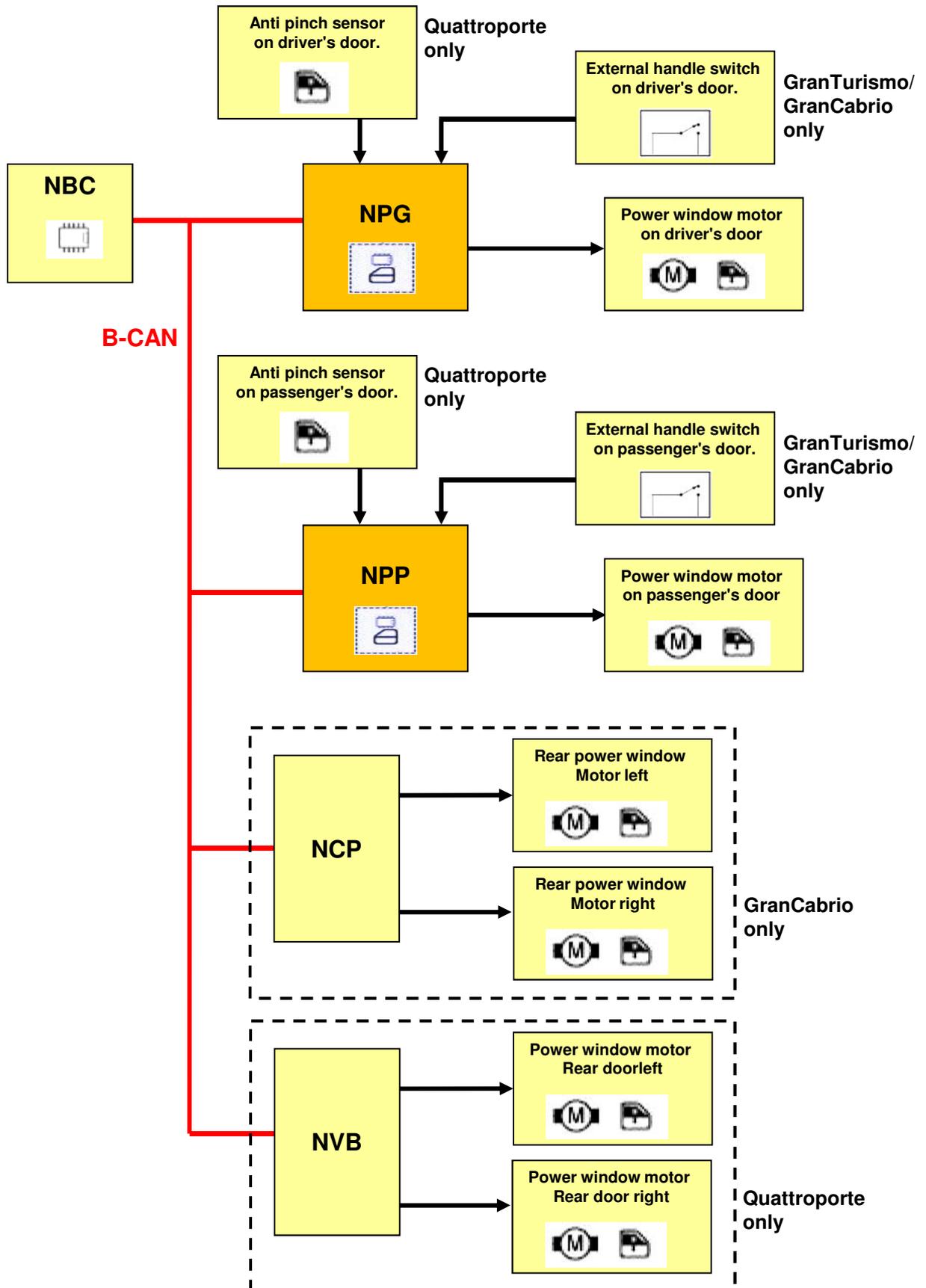
- A- Front left-hand power window button
- B- Front right-hand power window button
- C- External rear-view mirror controls

**Controls on the driver's door - GranCabrio**

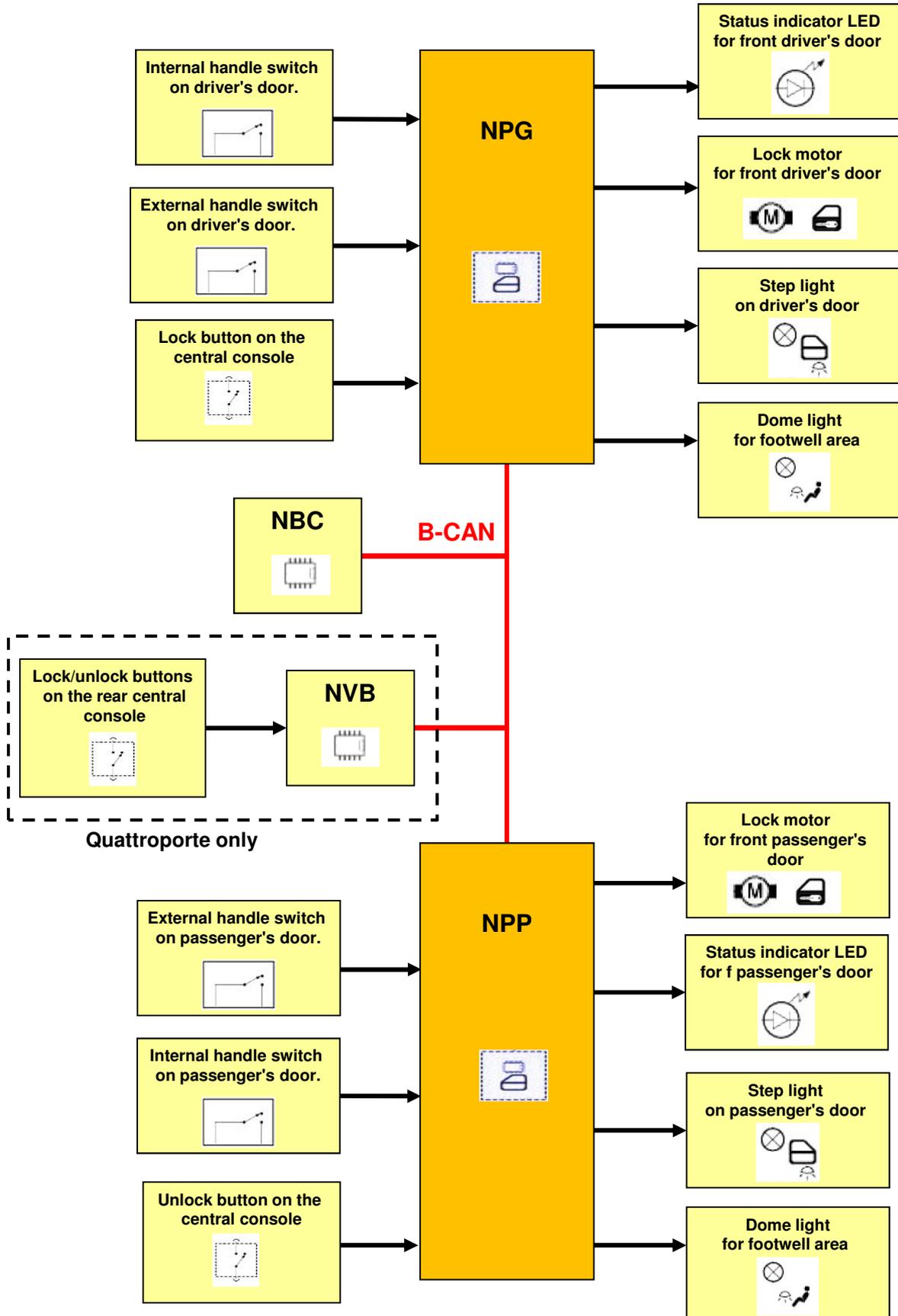
- A- Front left-hand power window button
- B- Front right-hand power window button
- C- Rear right-hand power window button
- D- Rear left-hand power window button
- E- External rear-view mirror adjustment button



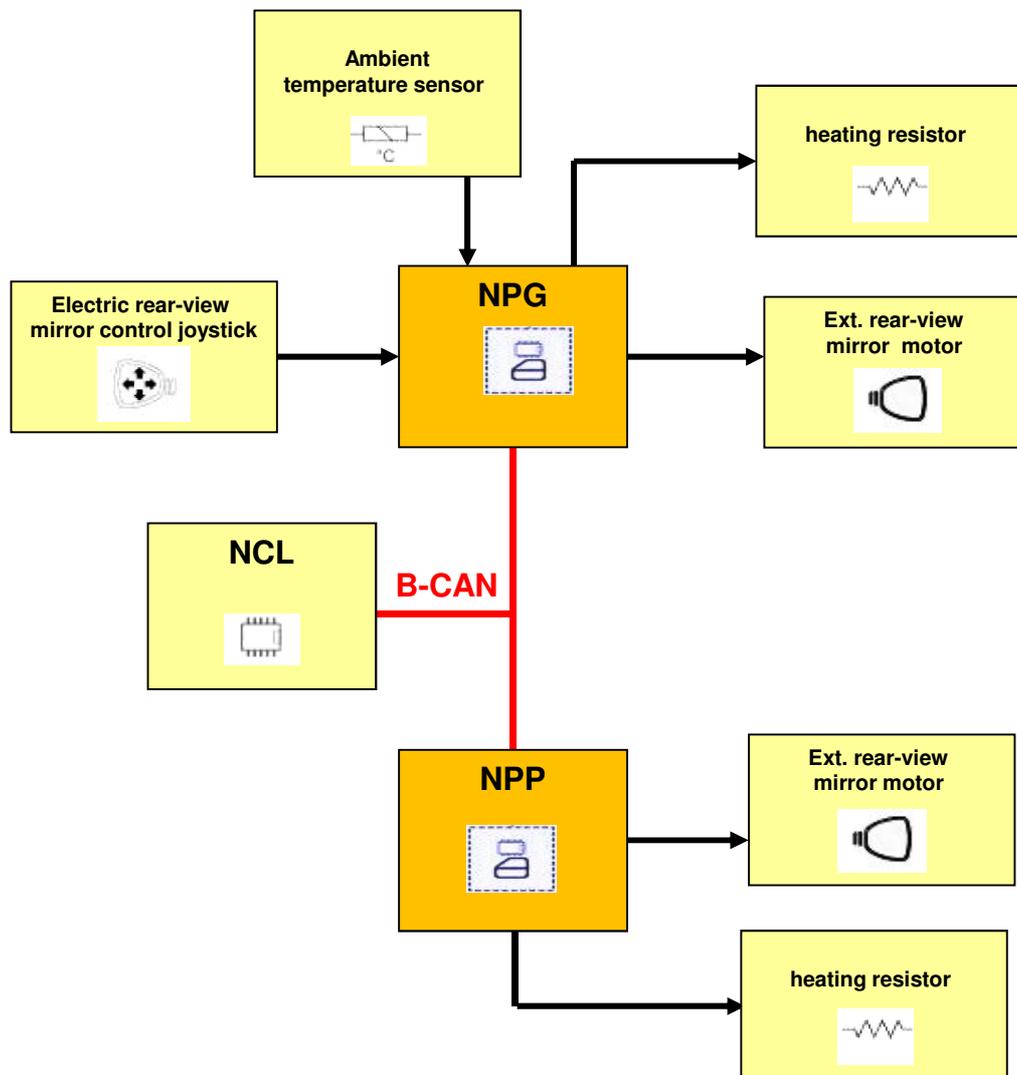
Power windows



Front door lock / unlock, dome and step lights



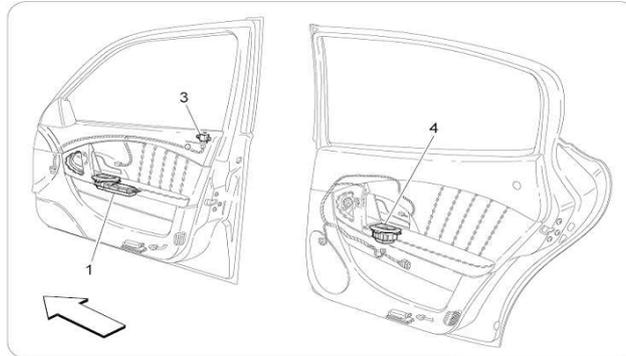
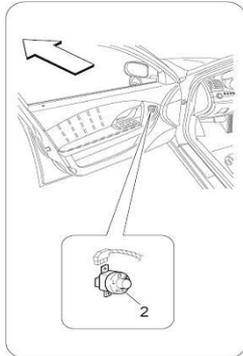
External rear-view mirror adjustment and heating



The NCL node is connected to the NPG and NPP nodes via the B-CAN line to control the temperature sensor and the heating resistor positioned in the side rear-view mirror.

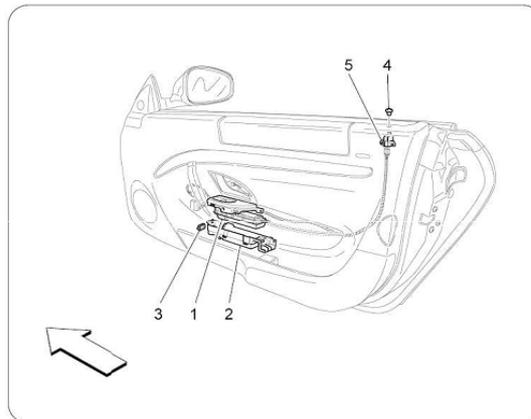
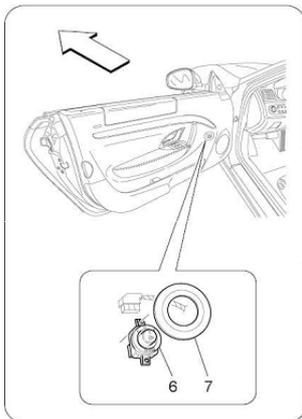
Location of the door function components

Quattroporte



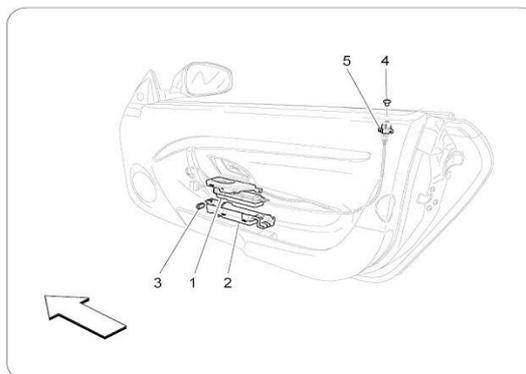
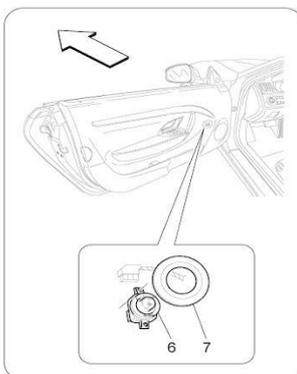
1. Front passenger-side door node
2. Rear-view mirror switch on driver's door
3. Front door panel LED
4. Rear door power window button

GranTurismo



1. Front door node
2. Door node mount
3. Door node mount rubber washer
4. Front door panel LED
5. LED mount
6. Rear-view mirror switch on driver's door

GranCabrio



1. Front passenger-side door node
2. Door node mount
3. Rubber washer
4. Front RH/LH door panel LED
5. LED mount
6. Rear-view mirror switch on driver's door
7. External rear-view mirror switch trim plate

Luggage Compartment Node (NVB)

Magneti Marelli

Description

The luggage compartment node is present only on the Quattroporte models and performs the following functions:

- it receives and transmits information through the B-CAN line
- It is interconnected with the rear wiring harness

In addition, it controls the following:

- All the connected devices on the rear doors
- Positive control for rear central headrest reclining
- Luggage compartment opening/closing
- Luggage compartment lighting
- Rear window shade raising/lowering control
- It acquires the signal from the inertia switch (only for Quattroporte up to MY06 included)

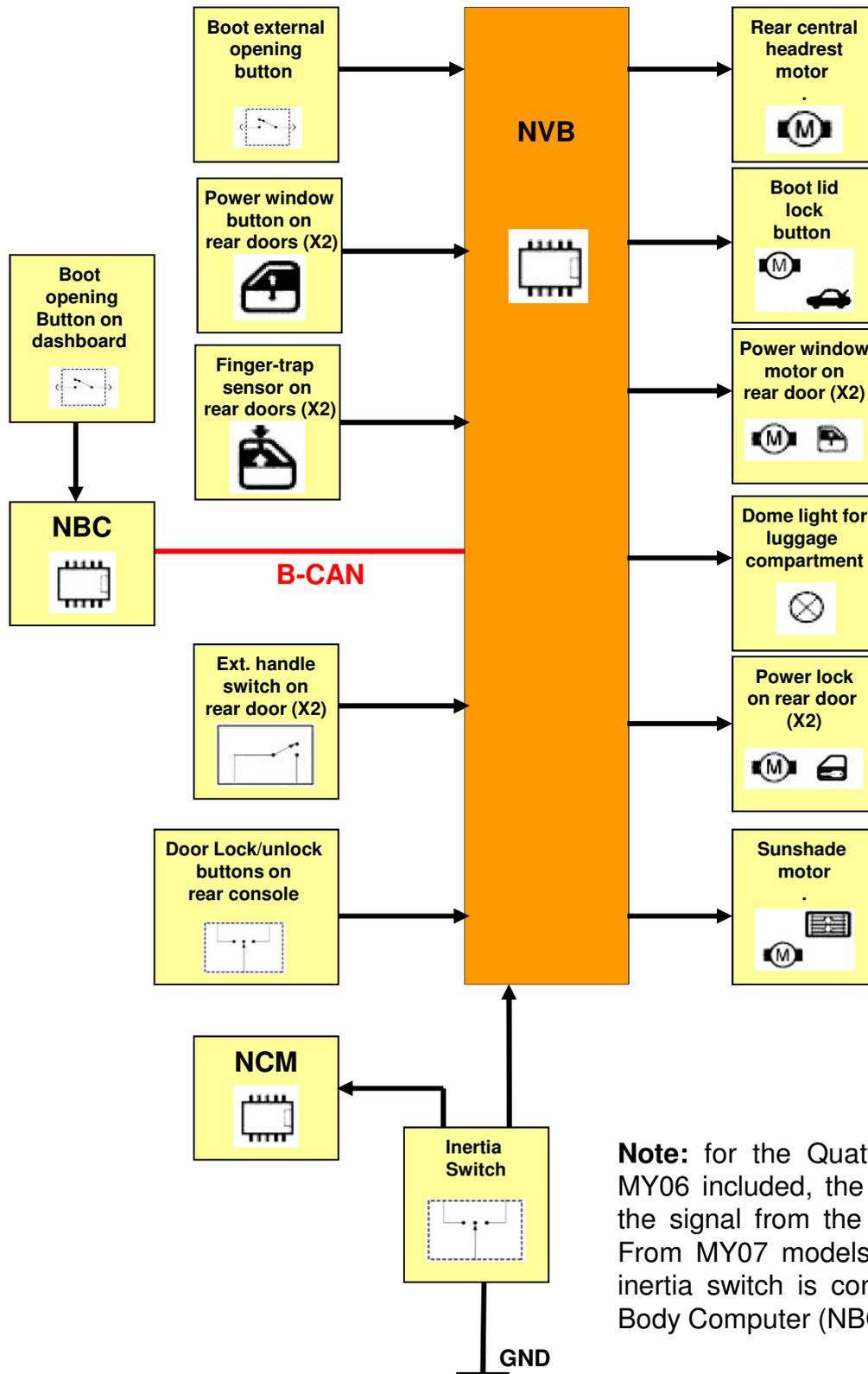
Note: the luggage compartment node is present only on the Quattroporte model. Luggage compartment opening for the GranTurismo and GranCabrio models is directly controlled by the NBC.

Current draw in sleep mode:	1 mA
Power supplies:	3 of +30
Earths:	2



The NVB is located underneath the rear parcel shelf

NVB functional diagram (Quattroporte):



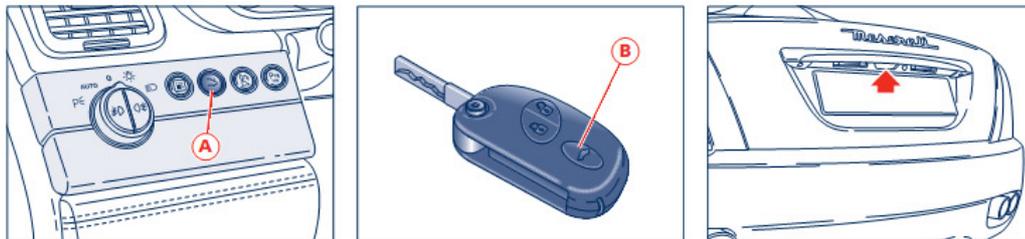
Note: for the Quattroporte up to MY06 included, the NVB receives the signal from the inertia switch. From MY07 models onwards, the inertia switch is connected to the Body Computer (NBC)

Luggage compartment functions (Quattroporte)

The luggage compartment lid can be opened from the inside or outside of the vehicle. Button A, used to open the lid from inside the passenger compartment, is located on the left of the steering wheel; operation is only possible with the ignition key removed or in the STOP and ACC position, or with the engine running but driving speed lower than 3 km/h.

To open the luggage compartment lid from the outside, press button B on the ignition key or insert the key in the lock on the luggage compartment lid and turn it anticlockwise, thus mechanically releasing the lock.

This mechanical procedure does not inhibit any subsequent electric opening request, whether coming from button A or B.



If the lock is released, press the button below the number plate light to open the luggage compartment lid.

To avoid accidental operation of the controls while driving, the luggage compartment lid can only be opened when the ignition key is removed or in the STOP and ACC position, or with the engine running but driving speed lower than 3 km/h.

Raising the lid is facilitated by the action of the gas struts.

The struts are calibrated to guarantee proper operation with the weights specified by the manufacturer.

Arbitrary additions of objects (spoilers, trunk racks, etc.) can jeopardize proper operation and safety in the use of the luggage compartment lid.

The luggage compartment is illuminated by a light that comes on automatically when the lid is opened; switching off is timed.

If the luggage compartment lid is left open, the light switches off after several minutes. To switch it on again, close the lid and then re-open it.

WARNING: If the luggage compartment lid is opened mechanically (inserting and turning the key in the lock), electric locking is disabled. At the next electric unlocking, electric operation will be resumed.

Roof Node (NIM)

Digitek

Description

The Roof Node (NIM), is positioned in the passenger compartment and connected to B-CAN to receive and send information to the other nodes of the network.

The NIM manages the following functions:

- Glove box electric opening (Quattroporte models only)
- Front interior lights activation (Quattroporte models only)
- Night panel LED lights activation front and rear (Quattroporte models only)
- Time setting for the analogue clock through a serial line (Quattroporte models only)
- Low level warning light of hydraulic fluid of robotized gearbox system (Quattroporte Duoselect and GranTurismo S only)
- Activation request of Centerpoint® function of the Bose audio amplifier (DSP) (Quattroporte and GranTurismo models with Magneti Marelli NIT only)
- TPMS calibration request (optional, not for the new generation 2.5 TPMS system)
- Activation ‘Passenger’s airbag OFF’ warning light on roof console (Quattroporte and GranTurismo models only)
- Comfort Seat display function on central info display (optional)

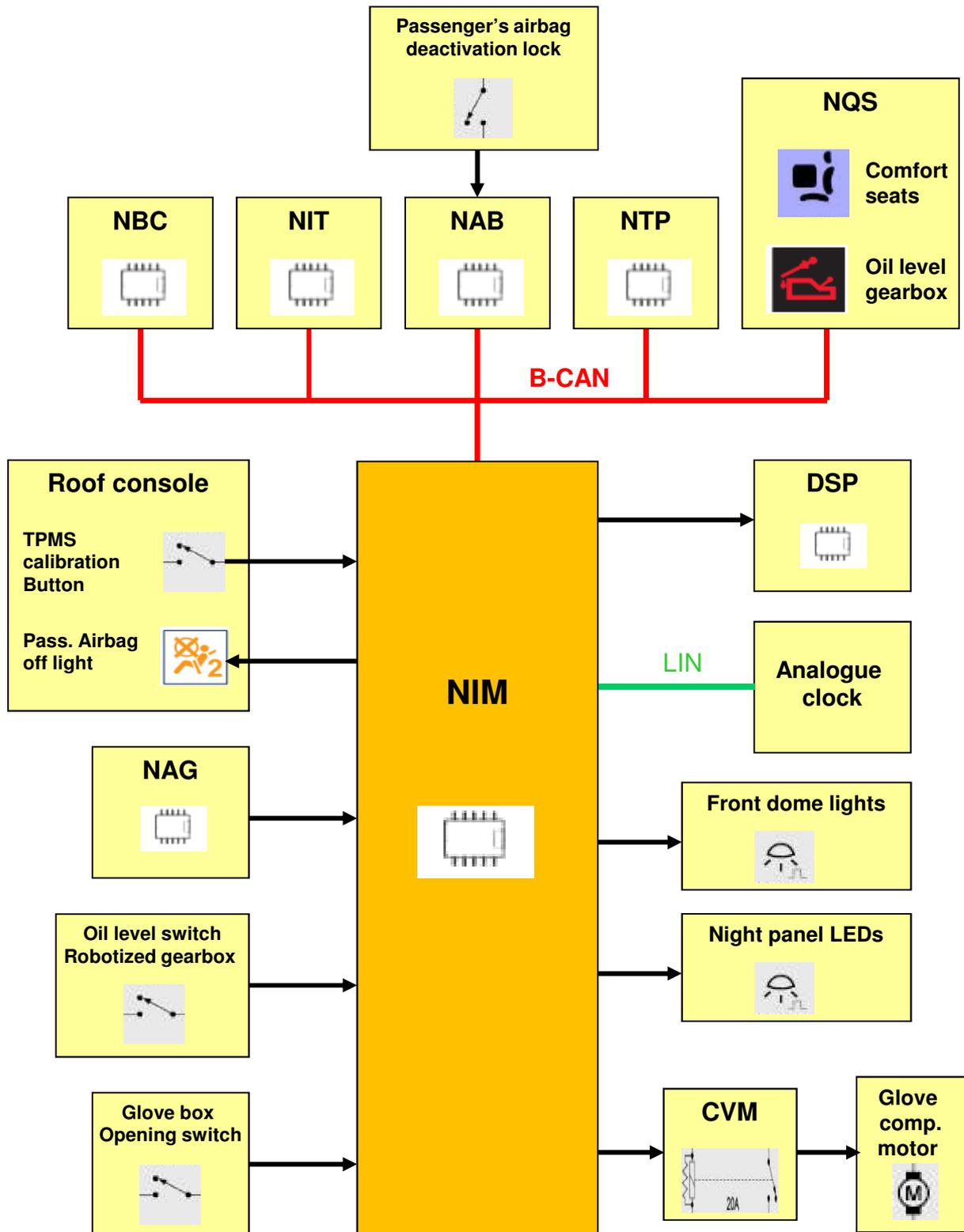
Current draw in sleep mode:	0.22 mA
Power supplies:	+30, +15
Operating voltage	11,3 – 14,5 V
Earths:	1



The NIM is fitted on the firewall at passenger’s side

Note: the NIM is present on all Quattroporte and GranTurismo models. The NIM is present on the GranCabrio model only if the vehicle is fitted with TPMS (optional) and /or with “Comfort pack” for the front seats (optional).

Functional diagram NIM



Special procedures in the event of NIM replacement

In the event that the air NIM is replaced, it is necessary to perform the "Proxi alignment" procedure, so that the new component receives the vehicle configuration data from the NBC and is recognised by the vehicle network. This is necessary for a correct operation of the NIM.

Connect the diagnostic tester to the EOBD connector of the vehicle and perform the "Proxi alignment" procedure.

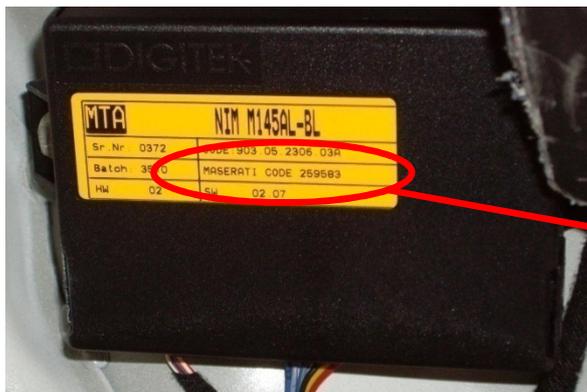
Undervoltage behaviour NIM

The minimum operating voltage of the NIM is 11,3 Volts.

For NIM units with a Maserati code lower than 223762 (Quattroporte models only) the following strategy applies:

- If the voltage drops underneath 10,5 V (eg.: weak battery), the NIM goes to lock mode. To unlock the NIM, it is necessary to disconnect its power supply (by disconnecting the NIM's connector or the vehicle's battery).
- The NIM will subsequently restore its original functionality as soon as its power supply is re-established (minimum 11,3 V).

For NIM units with a Maserati code of 223762 or higher, functionality will be automatically restored after a voltage drop, if the voltage is restored to normal level (minimum 11,3 V).



The Maserati Code is indicated on the yellow identification tag of the NIM

Driver Position Node (NAG)

Lear Corporation

Description

The NAG node is positioned underneath the driver's seat.

it receives and transmits information through the B-CAN line.

It controls the following functions:

- Seat and steering column movement
- Memorization of the seat / steering column / external rear-view mirror position
- Memorization of the passenger's side external rear-view mirror position when reversing
- Easy entry / exit function (activation/ deactivation from the NIT)
- Seat heating (Winter pack)
- Ventilation, massage and auto-adaptive function (Comfort pack Quattroporte)

Power absorption in sleep mode:	<1 mA
Power supplies:	+30, +15
Earths:	2



Notes:

- The NAG is present on all Quattroporte vehicles
- The NAG is present on GranTurismo/GranCabrio vehicles only in case the vehicle es equipped with Winter and/or Comfort seats

NAG Functionality

Easy entry/exit system

The easy entry/exit system helps the driver when entering/exiting the vehicle. Before the driver gets out, the seat moves back and the steering wheel rises.

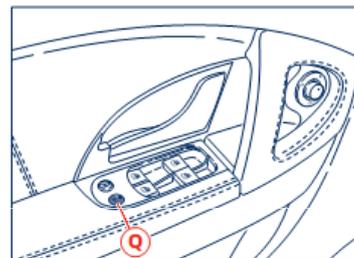
This function is activated when the door is opened only if the ignition key has been extracted or is in position STOP.

On re-entry, the driver finds the seat and steering wheel still in these positions. After sitting down and closing the door, when turning the key to position MAR, both the seat and the steering wheel return to their normal driving positions.

The function can be deactivated by pressing button Q.

Deactivation is signalled by the illumination of the LED on the button.

When the button is pressed a second time, the function is reactivated.



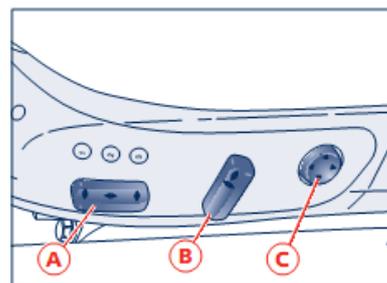
Back/forward adjustment

Push control A, on the outer side of the seat, forward or backward.

Height adjustment Grip control A at the centre and push it down or up.

Seat angle adjustment

- Front part of seat: push the front end of lever A up or down.
- Rear part of seat: push the rear end of control A up or down.



Seat back rake adjustment

Push lever B forward or backward to raise or lower the seatback.

Headrest adjustment

Move the lever B up or down to align the upper edge of the headrest with the top of the occupant's head.

Lumbar support adjustment

Push the horizontal arrows on control C to increase or decrease lumbar support and the vertical arrows to raise or lower it.

Comfort Pack (Quattroporte)

This includes the installation of the following systems inside the seats:

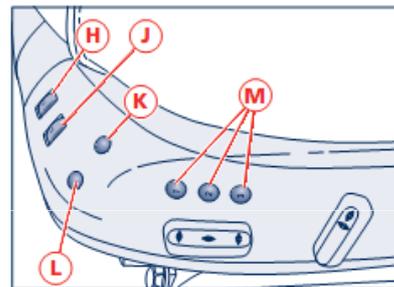
Ventilation system

This can be activated and deactivated by rotating wheel button H. By means of two fans (one in the cushion and one in the seat back), this system provides ventilation for the thigh and back areas.

Still using the wheel button H, the intensity of the ventilation can be set at 3 levels.

Heating system

Seat heating is switched on by rotating control J. Two heating pads are used to heat the seat. When this function is active for one or more seats, the relative warning light will illuminate on the display. Always using control J, you can adjust the heating intensity to 3 levels.



Massage System

This function is activated by pressing the corresponding button K and, by means of a system of inflatable and deflatable bags enclosed in the cushion and seat back, it provides a massage function in the thigh and lumbar region areas. The function can be switched off by pressing button K again.

The massage cycle lasts 5 minutes in total, after which the function cuts out and the previous settings are restored.

Self-adaptive system

The system is activated by pressing button L and it enables the seats to adapt to the occupant's body, thanks to the inflatable bags.

If the button is pressed a second time, the system is deactivated.

Each system is independent of the others and can be operated separately using specific buttons for each seat.

The Comfort screen page related to the modified feature will be displayed whenever you operate any control.

The seat comfort screen page can be displayed on the instrument panel by pressing the MODE button. This screen page shows the operating status of each individual system.

Winter Pack

With this type of equipment, the seat heating system is available for the front seats only.

Storing the positions of the seats and external rear-view mirrors

The system allows different positions to be stored and recalled for the driver's seat and for the external rear-view mirrors (buttons M).

The storage procedure is only possible with the ignition key in position MAR. Adjust the position of the seat, the headrest, the external rear-view mirrors and the steering wheel, then engage reverse gear and position the external passenger's mirror again to ensure the best possible visibility for reversing, then disengage reverse gear. Next press one of the three buttons "1", "2" or "3", each corresponding to a memorisable position, for more than 3 seconds until you hear a confirmation beep.

Lumbar support adjustment is not included in the seat position memorisation.

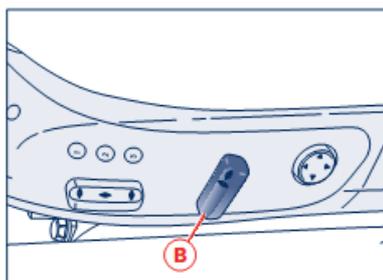
The memorisation of a new seat position cancels the one previously memorised with that particular button.

To recall one of the stored positions with the door open, press the relative button "1", "2" or "3" briefly.

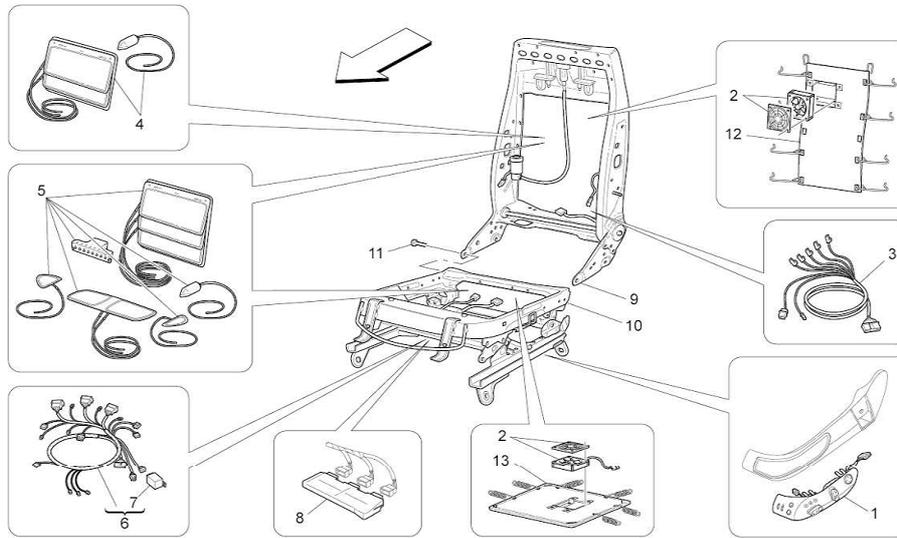
To recall the a stored position with the door closed, press the corresponding button until hearing a beep that confirms the seat has stopped.

Headrest

The headrests are adjusted electrically for the height and manually for the tilting position. To adjust the headrest vertical position, move the lever B up or down.

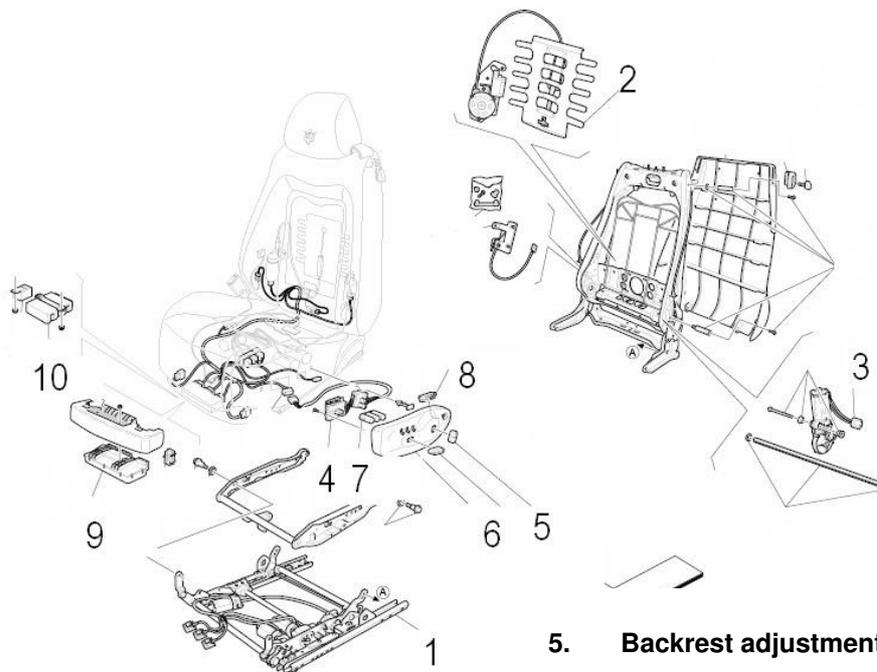


Location of front seat components - Quattroporte



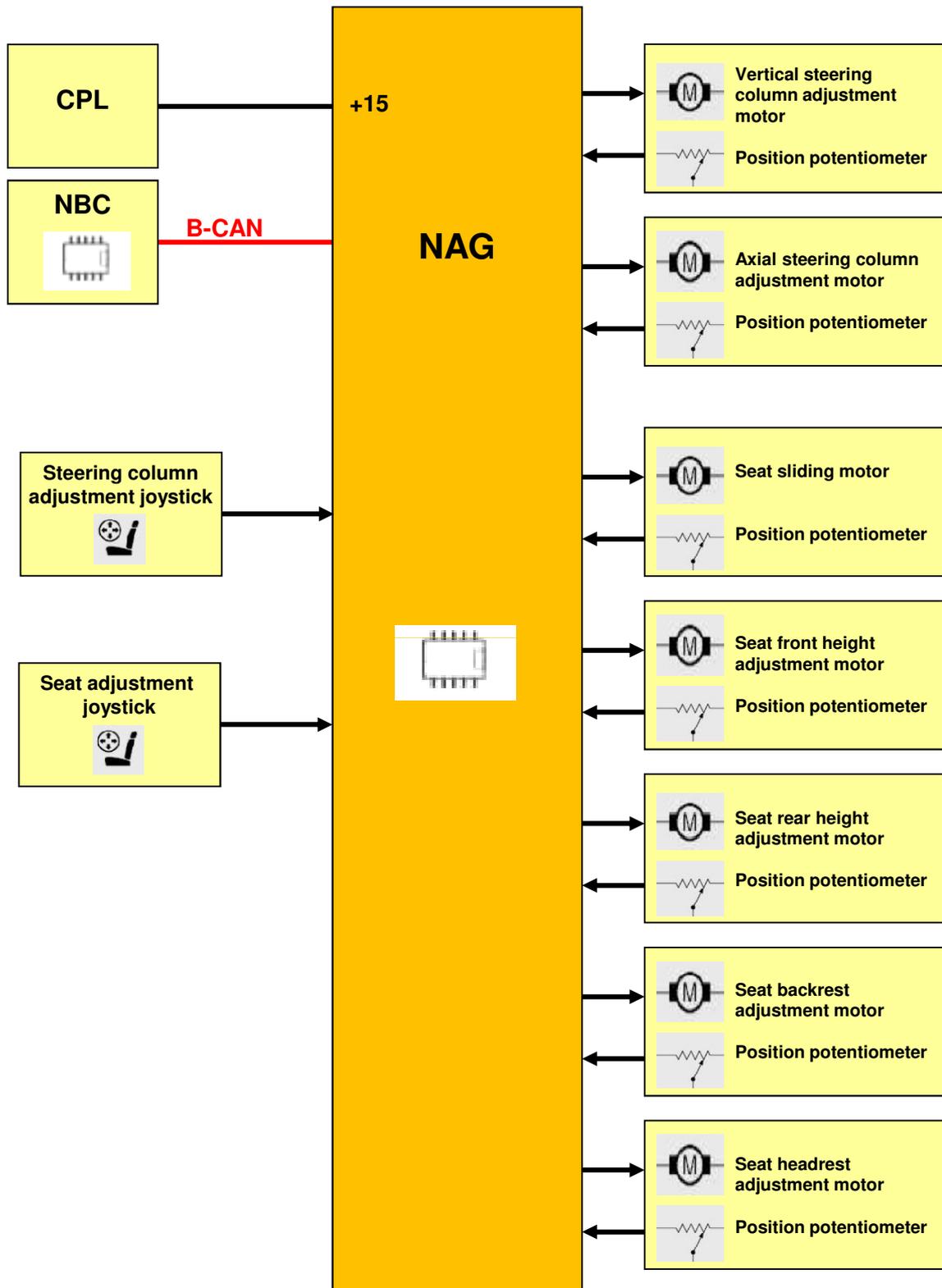
- 1. Front electric seat pushbutton panel
- 2. Front seat backrest fan
- 4. Front seat lumbar adjustment unit
- 5. Front seat comfort unit
- 7. Front seat heat pad ECU
- 8. Front seat memory ECU

Location of front seat components (GranTurismo – GranCabrio)

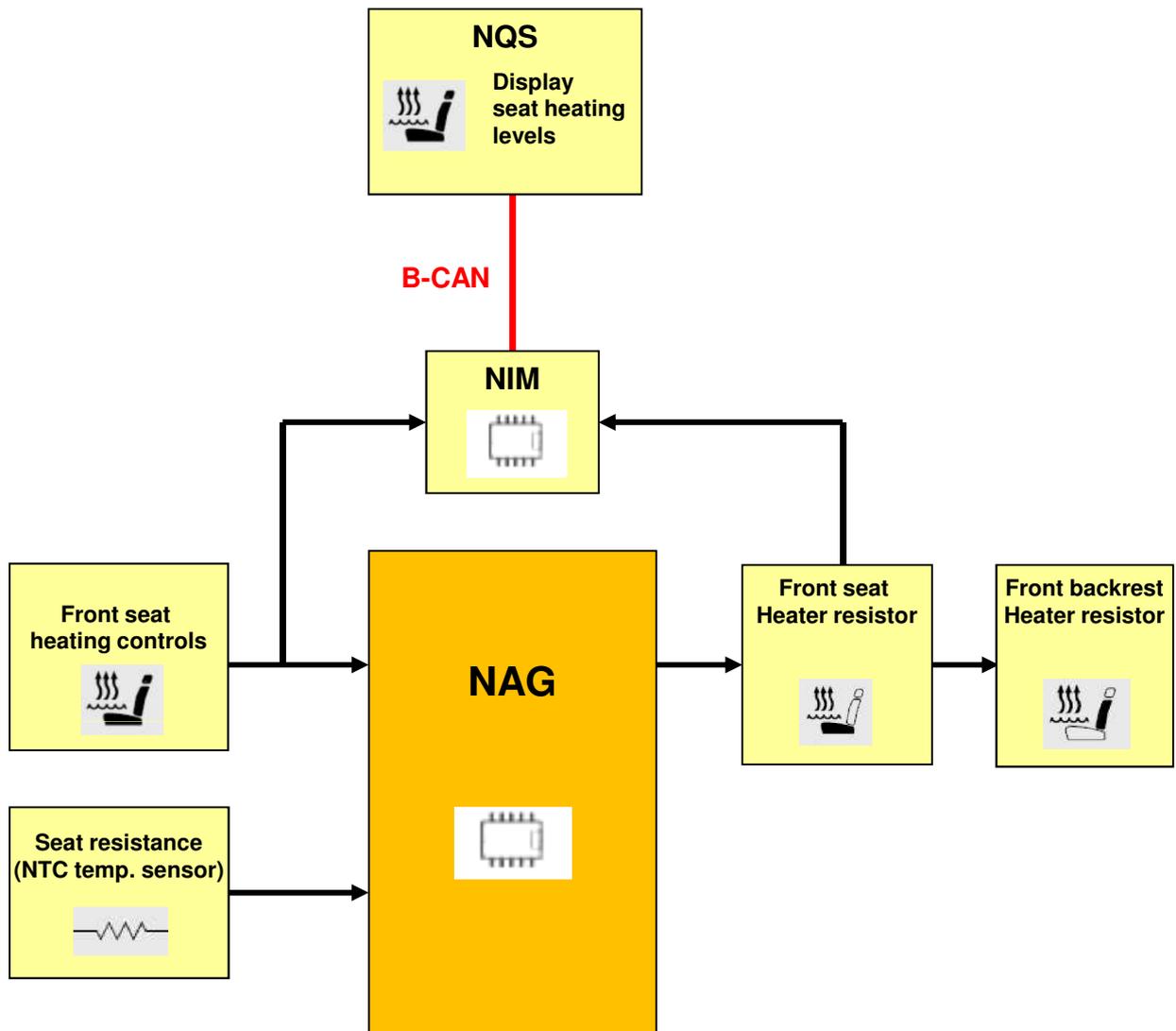


- 1. Front seat height adjustment unit
- 2. Lumbar support adjustment kit
- 3. Seatback adjustment motor
- 4. Seat cushion/backrest adjustment joystick
- 5. Backrest adjustment button
- 6. Seat cushion adjustment button
- 7. Button panel
- 8. Heat pad adjustment
- 9. Memory ECU
- 10. Easy Entry ECU

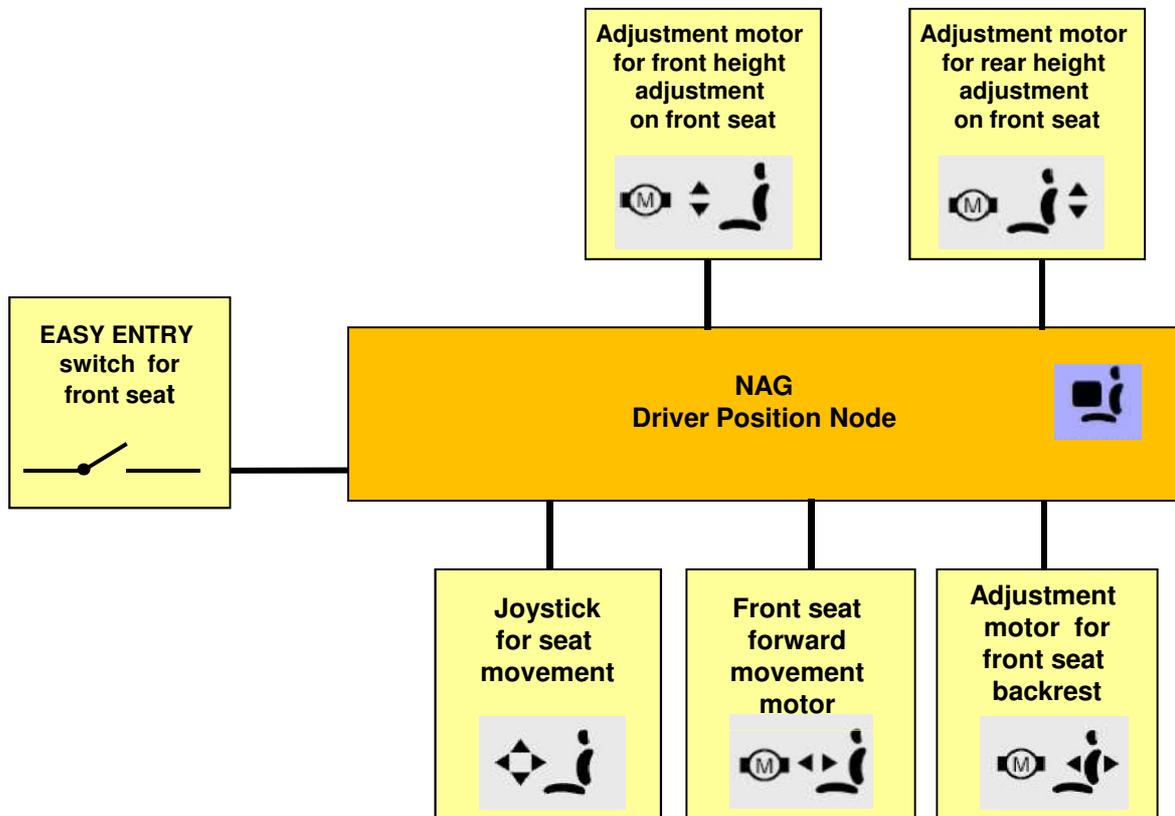
Functional diagram NAG – Seat and steering column adjustment



Functional diagram NAG – Seat heating function (Winter seats)



Functional diagram NAG – GranTurismo - GranCabrio



The Easy Entry switch is positioned on the seat backrest

This switch checks the forward tilt of the backrest and, together with the information confirming that the backrest has been released, allows the NAG to store the longitudinal position of the backrest and move the slide forward.

WARNING: If you need to disconnect the battery, wait at least 30 seconds from the last seat movement.

If you disconnect the battery before, you will have to run the initialisation procedure.

System initialisation for GranTurismo and GranCabrio

Following any power cut-out (e.g. after using the battery master switch or flat battery), check the seats to ensure that they are operating properly when the power supply is reconnected: Perform the following procedures on both seats in case of malfunction.

When the ignition key is in the STOP position and the door next to the seat concerned is closed, open the door and start the following procedure within 5 seconds, then complete the following cycle:

- 1) forward – STOP
- 2) backward – STOP
- 3) forward – STOP
- 4) backward – STOP
- 5) lower the seat-back thoroughly and wait for the seat to make two complete travels (forward and backward)
- 6) Position the seat in its normal position.

Alarm System (CAV – CSA)

Overview of the Security / Alarm systems

Definitions

Identification devices

An identification device identifies the person in possession of it as the owner of the vehicle.

Control devices

A control devices allows the user to request an action from the vehicle.

Warning devices

A warning device informs the user of a command activation and its possible negative outcome.

Alarm system

The alarm system protects the vehicle from unauthorised access to the passenger compartment emitting visual/acoustic warnings in the event of a break-in attempt.

Identification devices

- Remote control key

Key with remote control electronics that allows remote control of the vehicle door locking and alarm system. It contains a secret code that unambiguously identifies the vehicle.

Control devices

- Buttons on the remote control key

The remote control key has 3 buttons to control the system.

Warning devices

- Alarm Siren

The alarm system is equipped with a self-powered siren that allows emitting an acoustic warning also if the cables of the main battery are cut. The siren is also used to emit the warning beeps.

- Instrument panel with display

The instrument panel display is used to show warning messages to the user.

- Alarm system LED: A red LED is positioned next to the safety knob on the driver-side door panel.

Alarm system functionality

Alarm system activation

The alarm system is automatically activated when the vehicle is locked using the remote control or the passive entry device.

If you lock the doors using the mechanical key, the alarm system is not activated (for example, to comply with local regulations banning night-time acoustic alarms).

The normal door lock signals are supplemented with the emission of a 1-second beep that signals activation of the alarm system.

When the alarm system is activated, the red LEDs on the front door panels flash (deterrence function)

If at the time of activation of the alarm system, one or more doors or the luggage compartment lid are not closed, or malfunctioning or a failure of some alarm system modules is detected, a second beep of 0.5 seconds is emitted to warn the user of the failure condition.

Alarm system deactivation

The alarm system is automatically deactivated when the doors are unlocked using the remote control or the passive entry device.

The normal door lock warnings are integrated by emission of 2 beeps synchronous with flashing of the direction indicators.

The alarm system is not deactivated if the vehicle is unlocked using the mechanical key.

Alarm system protections

Perimeter / cable cutting protection

The alarm system provides perimeter protection in the event of a break-in attempt: the alarm sounds if any of the doors, luggage compartment lid or engine compartment lid are opened.

In addition, any attempt to cut the alarm system cables is detected.

Motion sensing protection

The alarm system includes a motion sensor that detects intrusion into the luggage compartment.

The motion sensor can be disabled by pressing the dedicated button on the roof panel within 1 minute from key-off: the moment the button is pressed, the LED on the button flashes for 3 seconds at a frequency of 3 Hz.

It remains disabled until the next time the vehicle is locked.

Anti-lifting protection

The alarm system protects the vehicle against attempts to steal it (e.g. by towing) or parts of it (e.g. the wheels) by continuously monitoring the vehicle inclination and detecting any variations.

The anti-lifting sensor can be disabled (for example, if the vehicle needs to be towed) by pressing the dedicated button on the roof panel within 1 minute from key-off: the moment the button is pressed, the LED on the button flashes for 3 seconds at a frequency of 3 Hz.

It remains disabled until the next time the vehicle is locked.

Break-in attempt warning

If a break-in attempt has been detected during the surveillance period, when the user turns on the instrument panel, the display shows the type of break-in detected (through the doors/luggage compartment, motion/anti-lifting sensors alarm, tampering with the electric system, etc.).

If an instrument panel does not have a display, the warning is given by coded flashing of the alarm system LED: this warning is signalled for 1 minute.

In an emergency

If the vehicle cannot be unlocked with the remote control (because of electromagnetic disturbances or flat batteries), the vehicle can be accessed using the mechanical key: the alarm system is activated when the driver's door is opened and the siren starts sounding.

To silence and deactivate the alarm, turn on the instrument panel:

- Insert the key in the ignition block and turn it to the MAR position.

That way, the vehicle can identify the transponder (even when the batteries are flat) and proceed with authorised deactivation of the alarm system.

Luggage compartment opening with remote control

When the alarm system is active and the luggage compartment button on the remote control is pressed to release it, the system disables the motion sensing/anti-lifting modules and the luggage compartment perimeter protection (the doors and engine compartment lid remain enabled).

When the luggage compartment is closed, the system re-enables the external sensors (motion/anti-lifting), emitting a beep and flashing the direction indicators to indicate that the passenger compartment protection has been reactivated.



The functionality and operating strategy of the alarm system can show differences depending on the destination country. The alarm system functionality is programmed inside the Body Computer by means of the Proxi file.

Motion-sensing alarm control unit (CAV)

The CAV is an electronic component provided with the front dome light panel, which is connected to the A-bus serial line by means of the internal roof panel wiring.

It integrates the motion and anti-lifting sensors and controls their deactivation button.

Current draw in sleep mode:	1mA – 8mA (in surveillance mode)
Power supplies:	+30
Earths:	1



ERROR: stackunderflow
OFFENDING COMMAND: ~

STACK: