Index

51 - AIR BAG

CONTENTS

INTRODUCTION P. 3

DESCRIPTION P. 5
Driver's side airbag module
Clock contact
Passenger's side airbag module
Electronic control unit (SDM)
Warnings for using airbag modules
Warnings for handling, storing and fitting airbag modules

SAFETY INSTRUCTIONS P. 8
In the event of an accident
Scrapping airbag modules
First aid

REMOVAL AND REFITTING P. 12
Component replacement - traceability
Electronic control unit (SDM) removal
New electronic control unit (SDM) fitting
Clock contact
Driver's side module removal
Driver's side module fitting
Passenger's side module removal
Passenger's side module fitting
Using the wiring after airbag deployment
Component electric connection operation sequence and system checks
Resetting the SDM unit
Control unit communications problems

DIAGNOSTICS P. 19
System configuration
AIRBAG warning light on
Troubleshooting table

INTRODUCTION

The airbag is a safety device consisting of a bag that automatically inflates in a front-on collision, placing itself between the driver or passenger's body and the structure of the vehicle.
This is a "passive safety system" since it comes into action once a certain deceleration value is exceeded (which can only result from impacting into an obstacle) without the occupant acting in any way.
The deployment conditions of the airbag are governed by an electronic control unit (SDM) which continuously processes vehicle deceleration. An electric pulse is sent when a predefined threshold is exceeded. This heats an electrical resistance housed in the gas generator which ignites. This causes a chemical firing reaction which in turn fires the pyrotechnic charge.
The pyrotechnic charge reaction generated by the inert gas is filtered and cooled by metal filters and is let out from the hoses on the gas generator casing to inflate the bag. The bag places itself between the front internal structure of the vehicle and the occupant's head (driver or passenger).
The inflated bag is a soft barrier that slows down the occupant's head during the collision. The bag is deflated by the gas which is let out from a hole in the back of the bag by the action of the occupant moving forwards.
The system deployment times are in the order of thousandths of a second to anticipate the forward movement of the body during the deceleration caused by the impact.
The pyrotechnic charge is contained in a sealed container in the gas generator. Its only purpose is to inflate the bag. In no case can the device transmit a form of energy which can fire any other gas generators stored in the immediate proximity.

⚠ Please note that the gas generator is the only airbag system component containing a pyrotechnic charge.

The SDM is the control unit governing all the airbag system functions. The SDM is the only control unit in the system. It contains both the accelerometer and the error memory.
The airbag warning light on the dashboard will come on during normal vehicle operation to indicate a failure concerning the airbag system. The failure will be stored in the SDM error memory as soon as the dashboard warning light comes on.
The airbag warning light indicates a failure without specifying its nature. Run the SDM control unit diagnostic procedure to verify the cause of the error. For this purpose a computer is connected to the SDM control unit via the RS232 serial interface. The interface is firstly connected to the OBD II connector which has a direct communication line to the SDM and then to the computer.
Restore the system after discovering the cause of the failure. The troubleshooting tables can be used for this purpose.

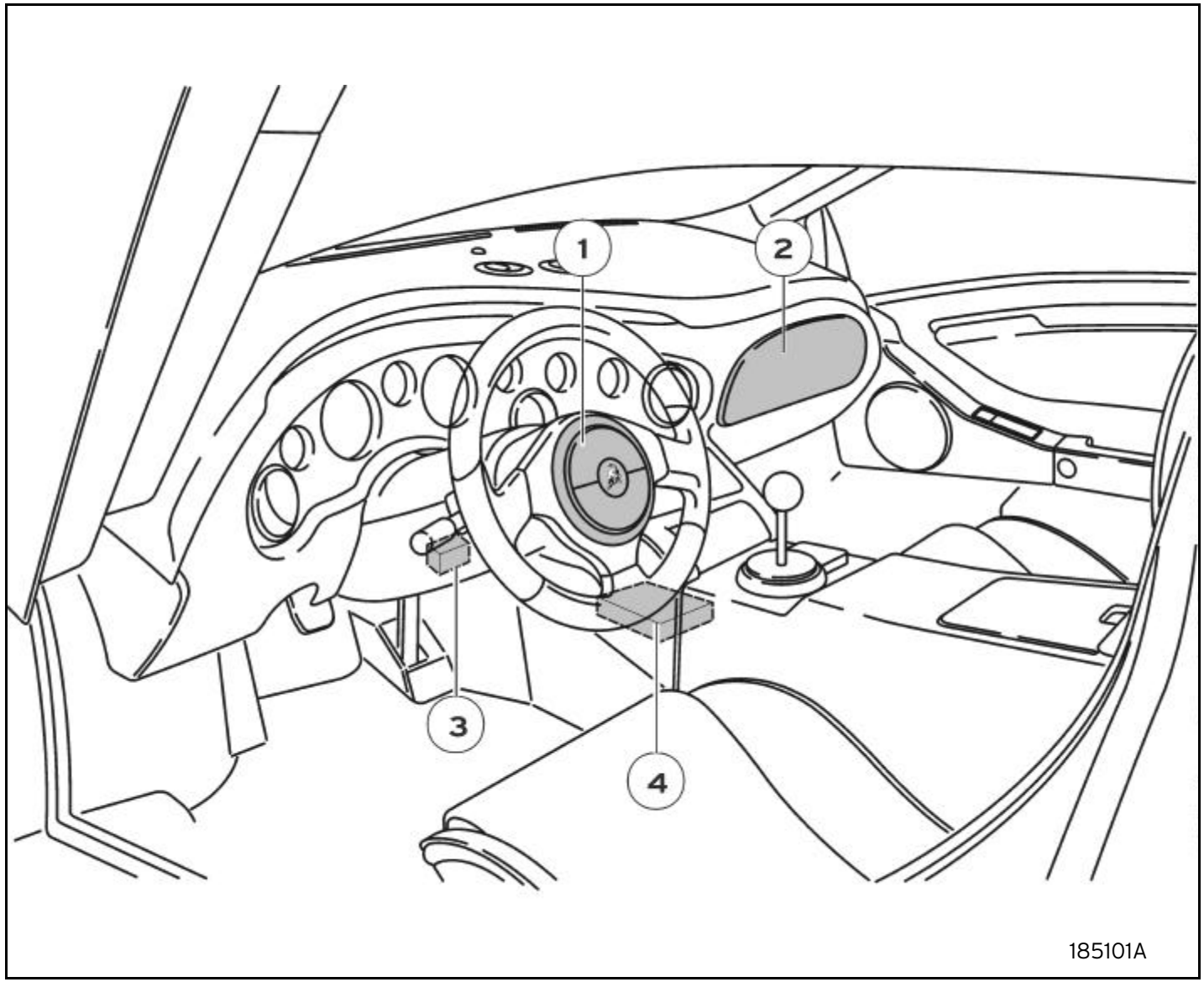


Fig. 1 - Component location

1 Driver's module and clock contact
2 Passenger's module
3 Airbag diagnostic connector
4 SDM control unit

DESCRIPTION

Driver's side airbag module

The driver's side airbag module consists of a gas generator and fitted bag folded into a container which is riveted to a metal plate connecting all these components. The module is fitted in a central position in the steering wheel. The bag (pink or green) is made of silicon coated nylon. Its internal volume when fully deployed is approximately 60 litres. The bag is folded in a special way.
The container is made of black plastic. It has a pre-cut breaking line (film hinge) in horizontal position in the middle to allow the container to break and the bag to be let out when deployed.

The container is made of painted plastic. For this reason, when cleaning. never use acid or abrasive substances nor other products that can damage the surface and effect operation.

The gas generator on driver's side is pyrotechnic and cylindrical. The gas generator consists of the following parts:

- A container consisting of two welded half-casings, one of which is perforated to let out the gas. The following components are arranged inside the container:
- Propellant contained in a sealed metal cylinder: when heated, this substance releases a considerable amount of gas and a restricted amount of solid particulate.
- An electric resistance or trigger which transforms the electric pulse output by the control unit into a spark.
- A primer heats the propellant: it is activated by the spark generated by the electrical resistance.
- A metal mesh filter is used to uniform pressure, withhold solid particulate and cool the gas which fills the bag.

Never disassemble the module for any reason.

Do not subject the module to temperatures exceeding 107 °C or lower than -35 °C to prevent permanent damage to the components with consequent system malfunctioning.

Clock contact
The clock contact is used to transmit the electric signal from the electric wires on control unit side to the airbag module on driver's side, ensuring electric continuity during normal steering wheel use. It is arranged inside the steering wheel stall system for this purpose.

Passenger's side airbag module
The passenger's side airbag consists of a pair of gas generators and a fitted, folded nylon bag. The module is housed and fastened in a metal reaction container by means of a metal plate withholding the bag. The module is fitted in combination with a flap fastened to the dashboard.
The system on passenger's side consists of two separate components:
- an airbag module containing the bag and the gas generator
- a flap fastened to the dashboard.

The pink bag is made of silicon coated nylon. Its internal volume when fully deployed is approximately 120 litres. The bag is folded is a special way. It has an outer cover that protects it and keeps it folded.

Never tamper with the protective cover. Functionality may be effected.

The two identical gas generators on passenger's side are pyrotechnic and cylindrical. Each gas generator consists of the following parts:
- A container consisting of two welded half-casings, one of which is perforated to let out the gas. The following components are arranged inside the container:
- Propellant contained in a sealed metal cylinder: when heated, this substance releases a considerable amount of gas and a restricted amount of solid particulate.
- An electric resistance or trigger which transforms the electric pulse output by the control unit into a spark.
- A primer heats the propellant: it is activated by the spark generated by the electrical resistance.
- A metal mesh filter is used to uniform pressure, withhold solid particulate and cool the gas which fills the bag.

The flap is fitted on the dashboard in front of the module by means of four plastic clips which are an integral part of the dashboard.
The flap consists of a stiff plastic coprinted foam structure covered by film for appearance purposes which is then covered in leather. It presents four metal pins for clip-on assembly to the dashboard.
During deployment, the airbag flap is fastened to the dashboard by means of three straps.

The flap is made of plastic. For this reason, when cleaning never use acid or abrasive substances nor other products that can damage the surface and effect operation.

Do not subject the module to temperatures exceeding 107 °C or lower than -35 °C to prevent permanent damage to the components with consequent system malfunctioning.

Electronic control unit (SDM)

The electronic control unit governs and fires the two airbag modules. To obtain latter function, the control unit continuously monitors the correct operation of all components in the system.
The control unit consists of the following parts:

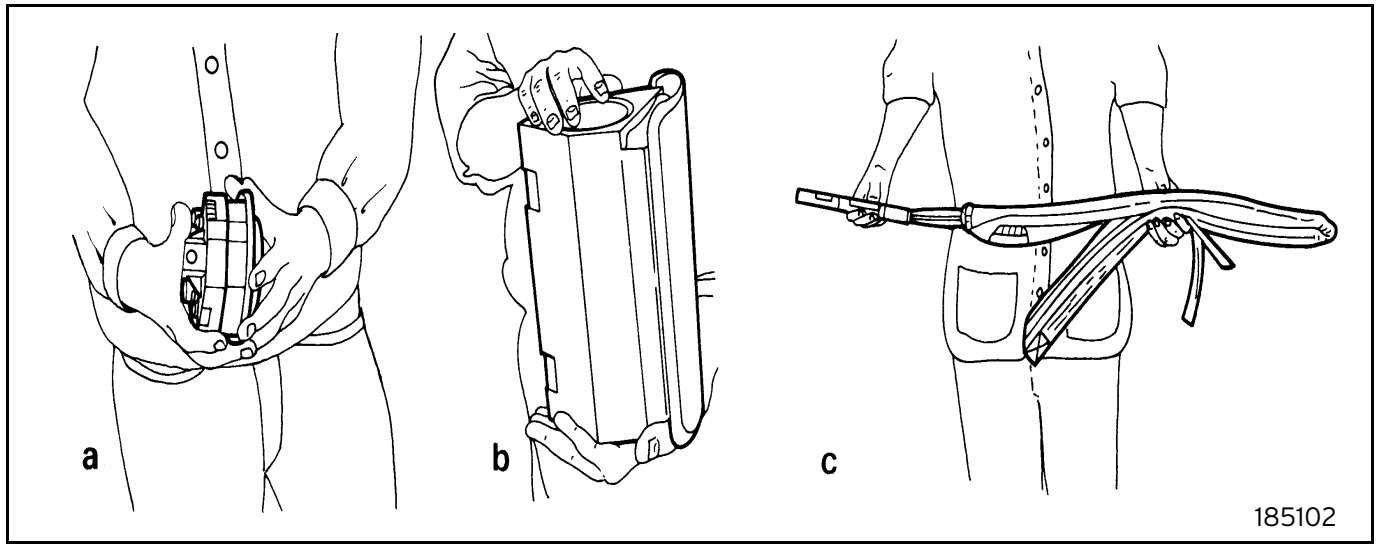
- An aluminium container in which the following are arranged:
- An electromechanical sensor which discriminates the "fire-no-fire" conditions according to vehicle deceleration.
- An electromagnetic safety sensor: both sensors must enable the fire condition for the system to be deployed.
- An electronic board which analyses the signals from the two sensors and deploys the two airbag modules when required.

Furthermore, the electronic board has self-diagnostic features. A test is run when the ignition key is turned to "MAR" to check the correct operation of the entire system. A red warning light will come on the dashboard during the test. The warning light will go out approximately four seconds after the engine is started if the system is working correctly.
The airbag system will need to be attended to at an authorised workshop if either the red airbag warning light on the dashboard stays on for longer than 4-6 seconds after the engine has been started or comes on while travelling.

SAFETY INSTRUCTIONS

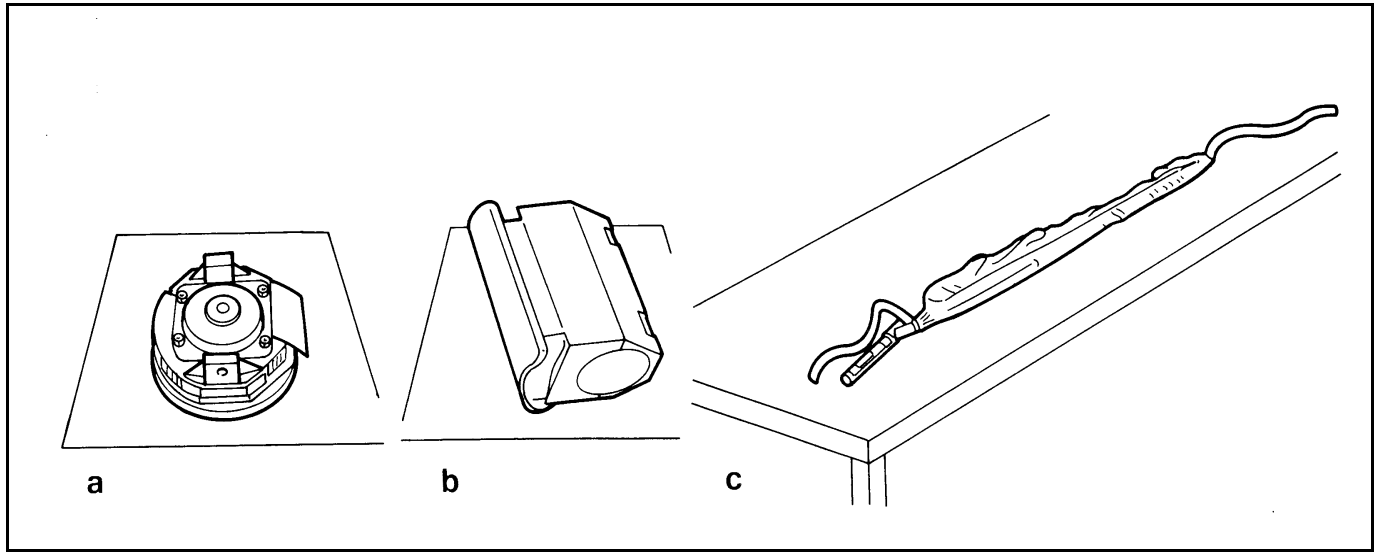
Warnings for using airbag modules
Each airbag system can EXCLUSIVELY be used on the vehicle for which it was designed and calibrated. Consequently, always scrupulously check that the airbag module you are fitting is the correct one for the vehicle.
In general, any attempt to fit an airbag system on a vehicle configured differently from the vehicle for which the module was designed can cause improper system deployment with severe possible effects on the occupants.
Never arrange, attach, stick or approach any object to the passenger's side airbag flap. The same refers to the driver's module. This is because the object could be projected forwards in a hazardous direction if the airbag is deployed and/or the correct operation of the airbag could be effected.
NEVER sit children in restraint systems arranged in the opposite direction with respect to the direction of travel. Deactivate the passenger's airbag for this purpose.
Arrange the seat as far back as possible and ensure correct use of the seat belt when a short passenger is sitting in the front passenger seat (shorter than 1.35 m and lighter than 30 kg).
The combined use of seat belts and airbag will offer the best protection for all types of occupants.

Warnings for handling, storing and fitting airbag modules
Always follow the methods for packaging, fitting, shipping and storing airbag modules set forth by the legislation in force.
The workshop should be clean and tidy during fitting operations. Always make sure that no object or foreign material has got or can get inside or near the module.
Scrupulously follow the safety instructions when fitting an airbag system. Wear protective goggles and heat resistant gloves.
Always arrange the modules with the plastic cover facing upwards while handling.
Always turn the part with the plastic cover or bag (passenger's side module) away from your body while handing a module.



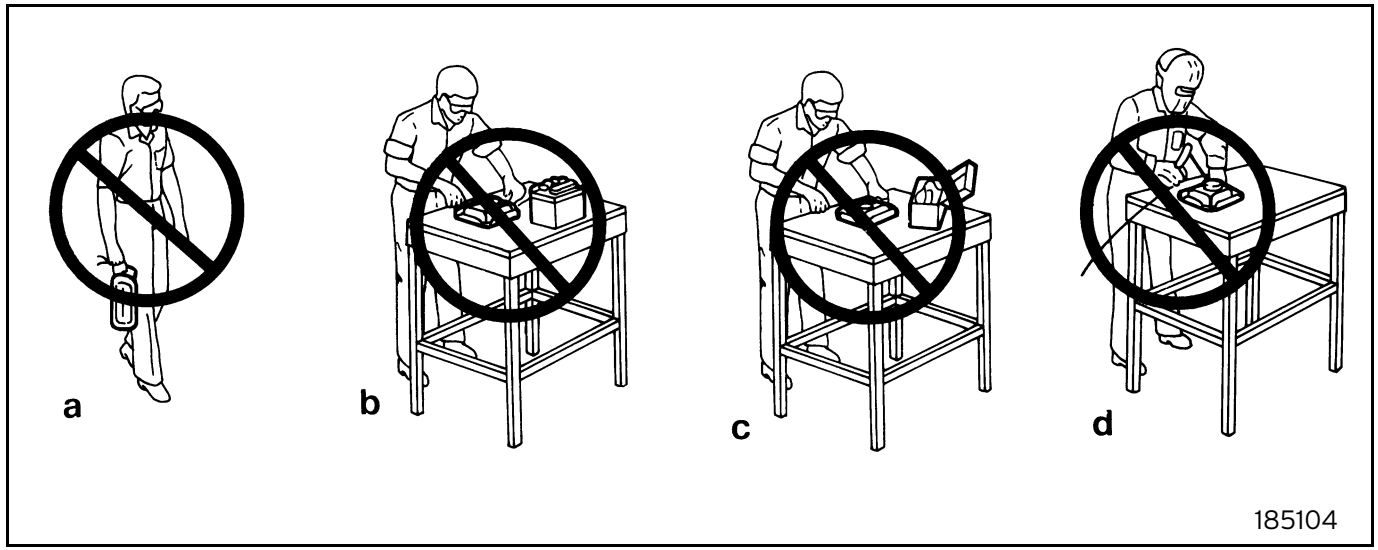
a) Driver's side module
b) Passenger's side module
c) Wiring harness

Fig. 2 - Correct component handling



a) Driver's side module
b) Passenger's side module
c) Wiring harness

Fig. 3 - Correct component positioning



a) Grasp the wiring
b) Connect electric power
c) Use tools (screwdriver, hammer, etc.)
d) Weld

Fig. 4 - Actions NEVER TO DO

Never use tools such as hammers, screwdrivers, blades or other sharp objects which could damage the system.
Do not apply voltage to the airbag wiring, to the module connector and/or to the control unit before it is completely fitted and there is someone aboard the vehicle because an electric system fault could deploy the airbag system.
Do not overheat the components. Do not use naked flames near the airbag components.
Do not drop the module or the control unit. If this accidentally occurs, do not install the module or control unit.
Keep airbag components dry. Do not install the components if they get wet.
Do not tamper with the wires or connectors in the system. Do not cut the wires. Cutting a wire or tampering with a connector could severely effect system safety.
NEVER attempt to open and/or deploy the airbag system.

In the event of an accident
The metal components of a recently deployed airbag are very hot. Do not touch these components for at least twenty minutes after firing.
After a vehicle is involved in an accident, have the integrity of airbag system components carefully checked by skilled personnel directly trained by Lamborghini.
The device should be considered potentially operative following an accident in which is was not deployed. Handle with care.

Scrapping airbag modules
The airbag modules must be deactivated before being scrapped.
Unfired airbag modules must not be scrapped with the vehicle. They must be removed beforehand and sent to specialised firms for disposal.
The device should be considered potentially operative following an accident in which it was not deployed. Handle with care.

First aid
The surface of a deployed airbag and the vehicle interior may be covered in dusty residue. The dust contains by-products of the reaction that generated the gas.
The gas generating material essentially consists of: 5-Aminotetrazole, strontium nitrate and potassium nitrate.
The gas generated by the reaction consists of nitrogen, water and carbon dioxide.
The dust may irritate the skin and the eyes. For this reason, protective clothing, including gloves and goggles, should be worn when removing deployed airbag modules.
Wash with mild soap and water in the event of exposure to the dust. Call a doctor.
The following first aid treatments should be applied following exposure to the gas generating product:
- SWALLOWING: Induce vomit if the patient is conscious.
- CONTACT WITH SKIN: Wash immediately with soap and water. Wash contaminated clothes before wearing them again.
- CONTACT WITH EYES: Rinse immediately under running water for at least 15 minutes. Remove contact lenses to ensure complete rinsing.
- INHALATION: Take the person who breathed in the gas into the open air. Deal with irritations according to the symptoms.

Always call a doctor after any type of exposure to the gas product.

REMOVAL AND REFITTING

The following instructions are given to ensure the correct sequence for fitting the airbag on the vehicle.
The assembly and disassembly operations must always be carried out by skilled, expert personnel authorised by Lamborghini.
Following an accident involving the control unit mount, make sure that the correct dimensional and structural conditions of the mount are restored.
The sensors arranged inside the control unit were calibrated by means of crash tests. Do not change the structural stiffness of the chassis, the bumpers or any other structural component since this could vary the airbag deployment conditions.
Do not subject the airbag modules and/or control unit to knocks or heat, e.g. welding, brazing, percussion, drilling, mechanical machining.
Disconnect the electronic control unit or the battery terminals and wait for at least one minute if you need to carry out jobs on the vehicle involving considerable current variations (e.g. welding).
Never carry out work on the airbag system parts (e.g. module and/or control unit). Send any faulty airbag components to the manufacturer.
The workshop should be clean and tidy during fitting operations. Always make sure that no object or foreign material has got or can get inside or near the module.

Component replacement - traceability

The airbag system components, SDM control unit, passenger's module and driver's module have a label which is split into two parts and a code.
Before replacing these components:

- Remove the detachable part of the label from the new part.
- Apply the label in the space on the form provided with the component.
- Fill in the form providing the required information.
- Send the form to Automobili Lamborghini.
- The form will be attached to the vehicle form by Automobili Lamborghini.

⚠ Be very careful not to stick the detachable part of the label on the part to be fitted.

Electronic control unit (SDM) removal

Proceed as follows:

- Make sure that the system has been deactivated for at least one minute (by disconnecting both battery terminals and insulating them carefully).
- Disconnect the control unit wiring.
- Loosen the three screws with the specific tool and remove the control unit.

New electronic control unit (SDM) fitting

- Remove the traceability label at the bottom of the product label on the back of the control unit and proceed as shown above.
- Using your hands only, fit the control unit on the mount. Make sure that the vehicle direction of travel corresponds to that of the arrow on the control unit.
- Make sure that the control unit does not present signs of wear, scratches and oil. Check that no foreign bodies are stuck underneath the control unit.
- Fasten the three control unit screws at the specific tightening torque (8 Nm).
- Check that the wiring is not squeezed between control unit and mount.
- Connect the yellow-orange Siemens connector to its counterpart on the wiring harness. Turn the retainer tab correctly.
- Power the wiring harness.
- The warning light should come on for four seconds and then go out.
- The passenger airbag deactivation warning light should come on for four seconds, flash for four seconds and then go out.
- In the event of a failure, the warning light will come on for four seconds, go out for 0.5 seconds and finally come on permanently.

Clock contact

The clock contact must be locked when replacing the driver's module, overhauling the steering column and/or the steering box. The clock contact can be locked to prevent it from turning, as follows:

- Engage the steering column lock to disconnect the steering box.
- Remove the steering column panels and apply a clip in the specific clock contact seats to remove the steering wheel or the steering column.

Driver's side module removal

Proceed as follows:

- Arrange the vehicle for straight travel (wheels straight). Avoid turning the wheels or the steering mechanism since this could seriously damage the clock contact.
- Make sure that the module has been deactivated for at least one minute (by disconnecting both battery terminals and insulating them carefully).
- Loosen the two screws behind the steering wheel with a special Allen wrench.
- Slightly extract the module from the steering wheel and disconnect the yellow connector.

Keep yourself by the side of the module during these operations and wear scale-proof gloves.

An identification label indicating the module to the vehicle is stuck on each module. Do NOT fit the module on another vehicle.

Driver's side module fitting

- Inspect the module to make sure it is intact. Visually check that there are no foreign bodies on or inside the module. Do not fit the product if it does not comply. Do not fit the product if in doubt.
- Do not fit the product if the packaging is evidently damaged.
- Take the traceability label with bar-code, Lamborghini drawing number and identification serial number and proceed as previously shown.
- Make sure that the wiring has been powered down for at least 10 seconds.
- Connect the clock contact connector to the airbag module connector until it clicks.
- Using your hands only, fit the module inside the steering wheel. Do not force the module if it does not fit. Do not pull the airbag wiring harness to prevent pulling out the connector.
- Lead in the two airbag module fastening screws. Centre the module correctly, fasten the screws at the specified tightening torque (8 Nm).

Use the two specified screws to fasten the driver's side module, i.e. M6 Allen screws with pre-fit lock washer, 14 mm long.

Passenger's side module removal

Proceed as follows:

- Make sure that the module has been deactivated for at least one minute (by disconnecting both battery terminals and insulating them carefully).
- Remove the flap which is clipped onto the module.
- Loosen the four module fastening screws.

Keep yourself by the side of the module during these operations and wear scale-proof gloves.

An identification label indicating the module to the vehicle is stuck on each module. Do NOT fit the module on another vehicle.

Passenger's side module fitting

- Inspect the module to make sure it is intact. Visually check that there are no foreign bodies on or inside the module. Do not fit the product if it does not comply. Do not fit the product if in doubt.
- Do not fit the product if the packaging is evidently damaged.
- Take the traceability label with bar-code, Lamborghini drawing number and identification serial number and proceed as previously shown.
- Make sure that the wiring has been powered down for at least 10 seconds.
- Lead in the two airbag module fastening screws. Centre the module correctly, fasten the screws at the specified tightening torque (8 Nm).
- Connect the wiring connector to the airbag module connector until it clicks.
- After fitting, make sure the folded bag outer cover is not damaged.
- Clip the flap into the housing on the dashboard and check the flap straps.

Using the wiring after airbag deployment

Inspect the wiring in the areas near the deployed charges for damage to the sheath or other parts of the wiring.
Remove the wiring for a visual and instrument inspection if, following a crash, metal or other material intrudes the areas involving the wiring.
Replace the wiring if scratches and/or cut sheath and/or cut wires are found.
No errors which can be pertinent to the wiring should be stored in the control unit memory after deployment (e.g. short-circuits, resistance out of tolerance).
Visually inspect the airbag connection connectors for crimping quality, signs of abrasion, thermal effects or contamination by effect of the gas generator.
Replace the wiring if any damage to connectors is found. Check the control unit error memory again after repairing the vehicle.
Replace the wiring harness if errors pertinent to the wiring are found.

The clock contact is not considered part of the wiring harness. It must always be replaced after the driver's side module is deployed.

Component electric connection operation sequence and system checks

Carry out the following test and check procedure after replacing system components:

- Connect the control unit to the wiring.
- Connect the dummy resistor.
- Power the system by connecting the battery terminals.
- Check that the warning light on the dashboard goes out after 4-6 seconds.
- Disconnect the driver's side resistor.
- Check that the warning light on the dashboard comes on.
- Connect the dummy resistor again.
- Reset the control unit via computer as shown below.
- Disconnect the passenger's side resistor.
- Check that the warning light on the dashboard comes on.
- Connect the dummy resistor again.
- Reset the control unit via computer as shown below.
- Power down by disconnecting the battery.
- Connect the passenger's side module.
- Connect the driver's side module.
- Power up and check that the warning light goes out after 4-6 seconds.

No-one should be inside the vehicle at this time.

- If a different event occurs during the procedure illustrated above, locate the reason for the system fault.

Resetting the SDM unit
Proceed as follows:
- Turn the vehicle ignition key to OFF and disconnect the battery isolator. Wait at least 10 seconds.
- Position the computer outside the vehicle on the driver and switch it on.
- Connect the RS232 interface first to the OBD II connector and then to the computer. The OBD II connector is located beneath the dashboard on the driver side towards the central tunnel.
- Set the interface switch to AIRBAG.
- Turn the vehicle ignition key to ON.
- Connect the battery isolator. The panel lights up and after the check the airbag warning light stays on.
- Start the AIRBAG diagnostic program.
- Select the language you desire with "1" and "2" (Italian and English respectively) and press ENTER.
- At the end of the diagnostic session the program will ask for a name for the file in which the vehicle's data are to be stored.

⚠ We reccomend using the chassis number plus a letter (a, b, c, ...) to differentiate between diagnostic sessions on the same vehicle.

- The program will ask for further (optional) data about the vehicle. These data are also stored in the diagnostic file and are intended to give supplementary information about the vehicle.
- The system faults screen now appears. The list ends with a prompt to reset the SDM. Answer "Y" (YES) to reset the SDM.
- If the reset is successful the following message is displayed: "Control unit reset".
- Disconnect the battery isolator and turn the vehicle ignition key to OFF.

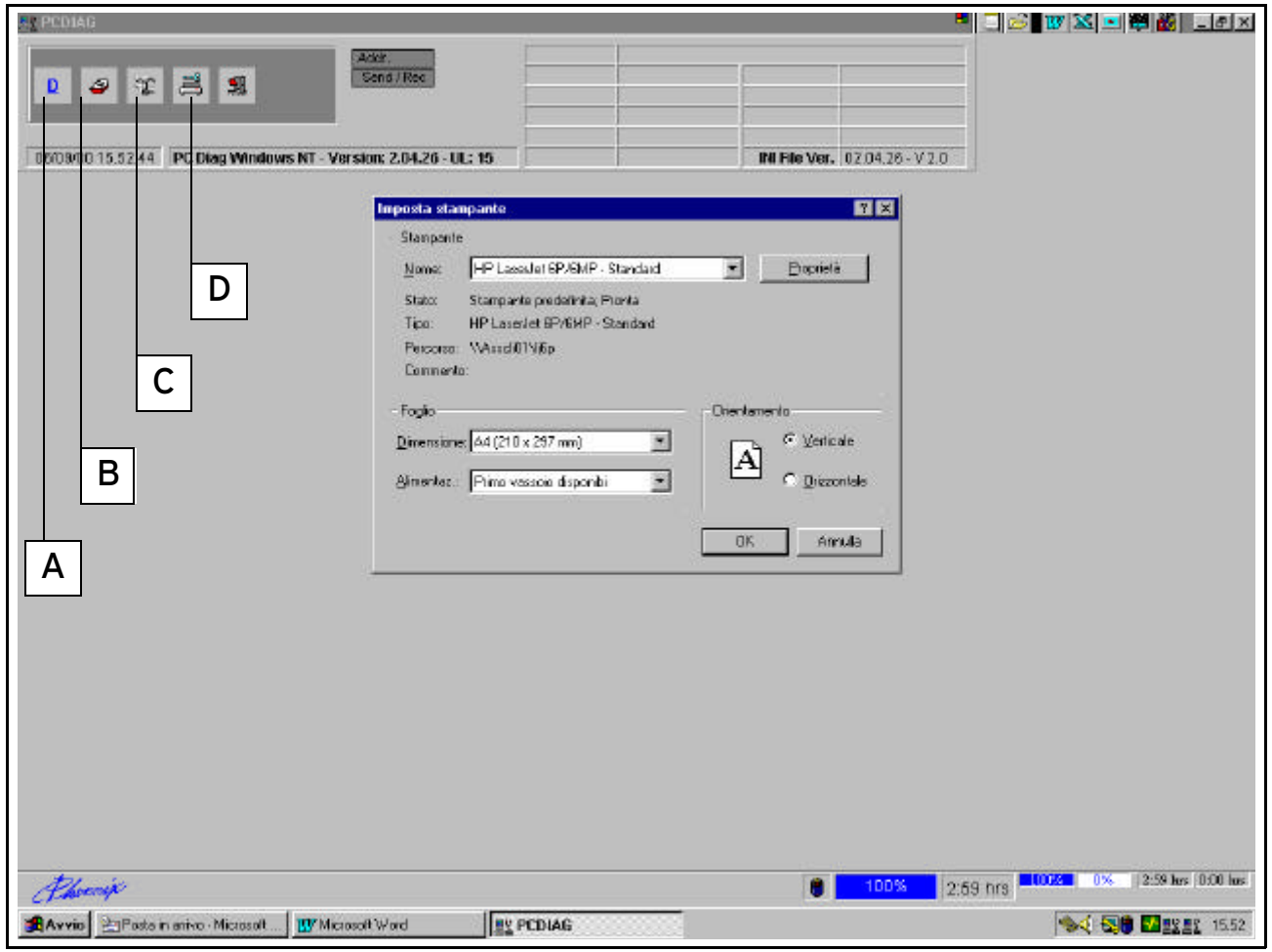
Control unit communications problems
This message is displayed in two different situations: when resetting the SDM (Resetting the SDM unit) or while running the SDM diagnostics (AIRBAG indicator on).
If this occurs check the following points:
- Check that the interface is correctly connected to the OBD II connector and to the computer.
- The interface switch must be set to AIRBAG.
- Diagnostics must be run with the ignition key ON.
- Check the airbag cabling is undamaged and that it is properly connected to the OBD II connector.
- If the computer has more than one serial port, check that you are using the correct one (COM1).
- Is the computer compatible with the program?

DIAGNOSTICS

System configuration

Switch the computer on. Select the airbag menu with the mouse and press Return to confirm.

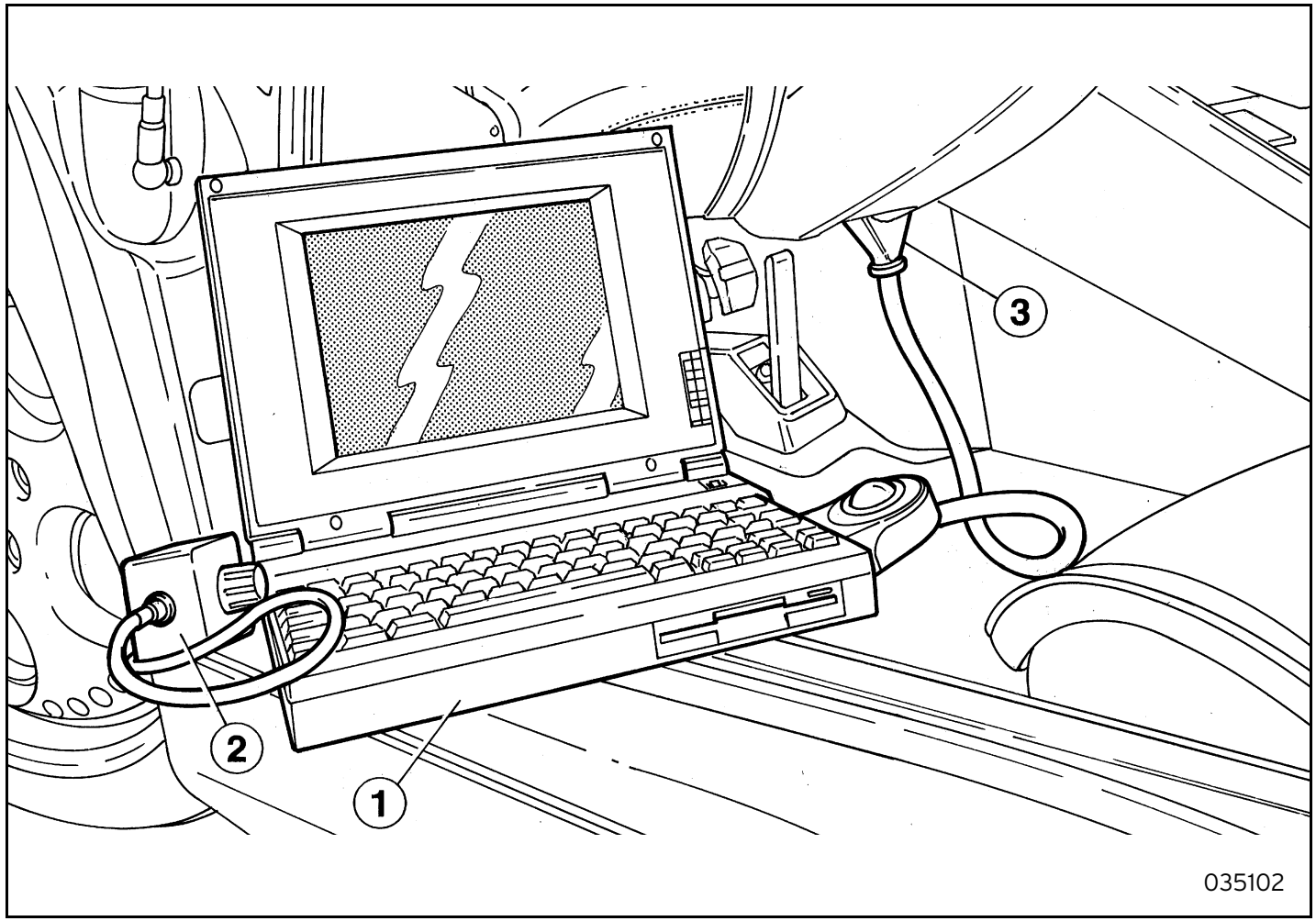
Press PC DIAG to start the program. The following window will appear:



A Press the button to start the system diagnostic procedure.
B Press the card button to start the acquisition file program.
C Press the set-up button (hammer) to configure the serial port.
D Press the printer set-up button to configure the printer.

AIRBAG warning light on

Before working on the vehicle turn the ignition key to OFF, disconnect the battery isolator and for safety's sake wait for at least 10 seconds.



1 Computer
2 ABS/AIRBAG switch
3 OBD II connection

Fig. 5 - Airbag diagnostics connection

In the airbag indicator lights up, check the system immediately:

1 Turn the ignition key to OFF and disconnect the battery isolator. Wait at least 10 seconds.
2 Position the computer outside the vehicle on the driver and switch it on.
3 Connect the RS232 interface first to the OBD II connector and then to the computer. The OBD II connector is located beneath the dashboard on the driver side towards the central tunnel.
4 Set the interface switch to AIRBAG.
5 Turn the vehicle ignition key to ON.
6 Connect the battery isolator. The panel lights up and after the check the airbag warning light stays on.
7 Start the airbag diagnostic program.
8 Select the language you desire with "1" and "2" (Italian and English respectively) and press ENTER.
9 At the end of the diagnostic session the program will ask for a name for the file in which the vehicle's data are to be stored. File names must be no longer than eight characters. We recommend using the chassis number plus a letter (a, b, c, ...) to differentiate between diagnostic sessions on the same vehicle.
10 The program will ask for further (optional) data about the vehicle. These data are also stored in the diagnostic file and are intended to give supplementary information about the vehicle.
11 The system faults screen now appears. The list ends with a prompt to reset the SDM. Answer "N" (NO) to quit the diagnostic program.
12 Disconnect the battery isolator and turn the vehicle ignition key to OFF.
13 Connect the computer to a printer and print out the diagnostic file with a text editor. Use Notepad in WINDOWS 95.
14 Refer to the TROUBLESHOOTING TABLE and replace and damaged components.

After running the diagnostic reset the SDM unit, because even if the system is functioning correctly the airbag warning light is still on. See RESETTING THE SDM CONTROL UNIT.

⚠ If the airbag warning light stays on even after the reset procedure, not all the airbag system problems have been solved. In this case repeat the entire procedure from the beginning in order to create a new fault list on which to base further troubleshooting.

Troubleshooting table

FAULT	REMEDY
SDM faults / Warning light faults / Crash	
Internal SDM fault	Replace SDM unit
Battery voltage < 10V for 10s	Battery discharged or deteriorated
Battery voltage > 16V for 1 min	Alternator charge too high
Indicator LED below high voltage	Possible GFA fault
Indicator LED below low voltage	Possible GFA fault
Insufficient power	SDM not well earthed to chassis
Crash	Replace SDM unit
Air-bag faults	
Driver airbag short circuit with VB	Airbag wiring, short circuit with +12V
Driver airbag short circuit with earth	Airbag wiring, short circuit with earth
Driver airbag resistor >> 2.7 Ω	Driver airbag connector disconnected
Driver airbag resistor >> 2.7 Ω	Airbag wiring, short circuit before connector
Passenger airbag short circuit with VB	Airbag wiring, short circuit with +12V
Passenger airbag short circuit with earth	Airbag wiring, short circuit with earth
Passenger airbag resistor >> 2.7 Ω	Passenger airbag connector disconnected
Passenger airbag resistor >> 2.7 Ω	Airbag wiring, short circuit before connector

FAULT	REMEDY
Intermittent error on: SDM / fault warning light	
Intermittent internal SDM fault	Replace SDM control unit
Indicator LED below high voltage	Possible GFA fault
Indicator LED below low voltage	Possible GFA fault
Incomplete power supply	SDM has bad contact with chassis earth
Intermittent fault on airbag	
Driver airbag short circuit with VB	Airbag wiring, short circuit with +12V
Driver airbag short circuit with earth	Airbag wiring, short circuit with earth
Driver airbag resistor >> 2.7 Ω	Driver airbag connector disconnected
Driver airbag resistor >> 2.7 Ω	Airbag wiring, short circuit before connector
Passenger airbag short circuit with VB	Airbag wiring, short circuit with +12V
Passenger airbag short circuit with earth	Airbag wiring, short circuit with earth
Passenger airbag resistor >> 2.7 Ω	Passenger airbag connector disconnected
Passenger airbag resistor >> 2.7 Ω	Airbag wiring, short circuit before connector
Crash condition	
Crash condition	Return SDM to Automobili Lamborghini specifying crash condition
Internal SDM fault	
Internal SDM fault	Replace SDM unit