

Alfa Romeo



Spider



CHANGES/UPDATES

Date	Ref.	File Name	Description of the change

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1. BRIEFING

1.1 THE CAR

The spider has always had a place of honour in the Alfa Romeo tradition (from the Giulietta Spider of the fifties to the Duetto of the nineties) being the expression of freedom and emotional involvement in motoring. This spirit is captured by the new model, the natural evolution of Alfa Romeo's lasting spider tradition, featuring cars which have always granted strong emotions and ensured top driving pleasure by combining breathtaking design with powerful, flexible engines. The new Alfa Spider is no exception and confirms the essential and simple character of a genuine spider combined with the superior technology of the "new Alfa breed".



Derived from the fascinating Alfa Brera coupe, the new *spider* is a smart, generously sized, two-seater (1830 millimetres wide, 4.396 millimetres long and 1.367 millimetres high) with a modern, appealing front end (similar to that of the coupe from which it derives). The shield set in the middle is the point of departure of the lines running along the hood and drawing the headlights "suspended" over an air vent: this stylish, functional sign is reserved by Alfa Romeo for "absolute sporting" models and gives the impression of an even broader and more imposing front end, where the mudguard shoulder and the front pillar are really thicker and stronger.

From the side, the shorter wheelbase - in combination with the wide hood and the collected, retracted passenger compartment - streamlines the car, enhancing sportiness and dynamism. The elongated rear light cluster and the four tailpipes contribute to this impression of outstanding temperament. But the style of the new spider also presents a romantic trait, a homage to the Alfa Romeo tradition: a light-weight, foldaway soft top and a muscular rear shoulder directly recall the famous Giulietta Spider.





Inside, the Alfa Spider ensures a welcoming, sophisticated environment, thanks to the use of high quality materials and the adoption of superior contents (standard in some versions), that include a two-zone automatic climate control system, radio controls on steering wheel, VDC and cruise control. Two versions to choose from: two JTS petrol powerplants (2.2 185 HP and 3.2 260 HP) combined with two gearboxes (six gear mechanical for both engines and automatic for the 3.2 260 HP, the latter version available after commercial release). In addition to the Alfa temperament, the new car ensures excellent dynamic performance thanks to high front quadrilateral suspensions and rear Multilink suspensions. The Alfa Spider adds a sporty trim and evolved "Alfa Q4" four-wheel driver (available on the 3.2 260 HP version) to high riding comfort. Finally, the new Alfa Romeo Spider's safety features include state-of-the-art electronic dynamic control systems (from braking to traction control).



2. SOFT TOP

2.1 INTRODUCTION

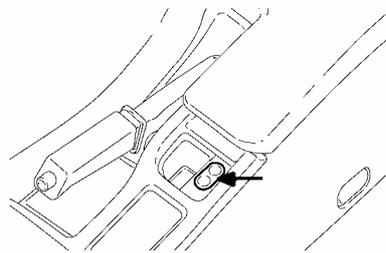
The new Spider is equipped with an electro-hydraulic system for automatically moving the soft top. This means that the driver can operate the soft top opening sequence correctly and rapidly without leaving the driver's seat.

The soft top is operated automatically by pressing the specific button on the central tunnel.

The soft top opening and closing cycle takes approximately 25 seconds.

NOTE:

The button must be held pressed for the entire cycle.



The operation is shown on the panel display (the moving soft top is shown).

A beep will be heard and the message "SOFT TOP OPENING (CLOSING) CYCLE COMPLETE" will appear on the display.



Other error messages may appear on the display in the event of faults to the system. Errors may be temporary (causing the cycle to stop and resume) or permanent. Servicing at a workshop is required in this case.

An manual procedure is provided to close the soft top.

The soft top can only be operated when the car is stationary. The soft top cannot be opened or closed when the car is moving. The operation is automatically stopped if an attempt to operate the system is made while the car is moving.

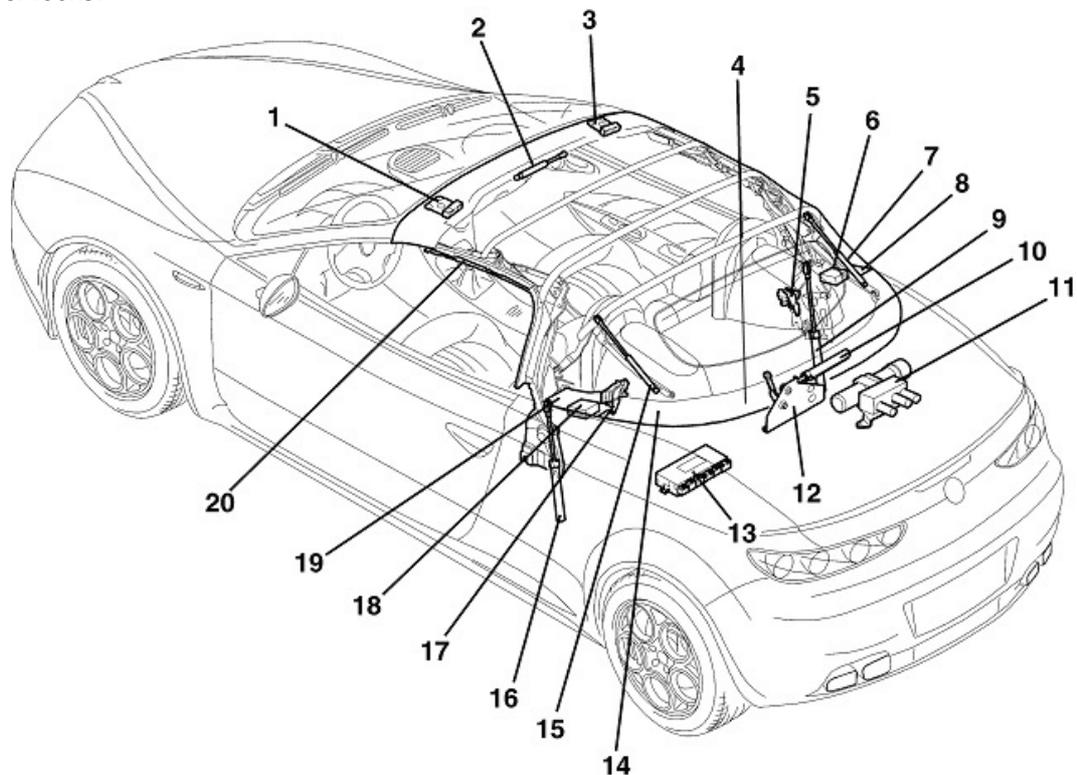


If the soft top operating procedure is started when the car is stationary and the car moves off during the operation, the driver will need to stop the car to complete the soft top cycle.

Check that the door windows are slightly and automatically lowered ("middle drop" function) at the beginning of the soft top opening and closing cycle. If this is not so, release the soft top opening button and lower the windows of both doors by pressing the respective buttons or opening the doors slightly.

2.1.1 System components

The entire electro-hydraulic system is controlled by an ECU which governs the automatic soft top opening/closing cycle. The soft top is operated by pressing the specific button on the central tunnel. Numerous sensors are arranged on the soft top locks, on the soft top cover and on the soft top actuator cylinders. Thanks to the information received from the sensors, the ECU controls the soft top hydraulic system cylinders, the arch, the front locks and the soft top cover and releases/locks the soft top and soft top cover locks.

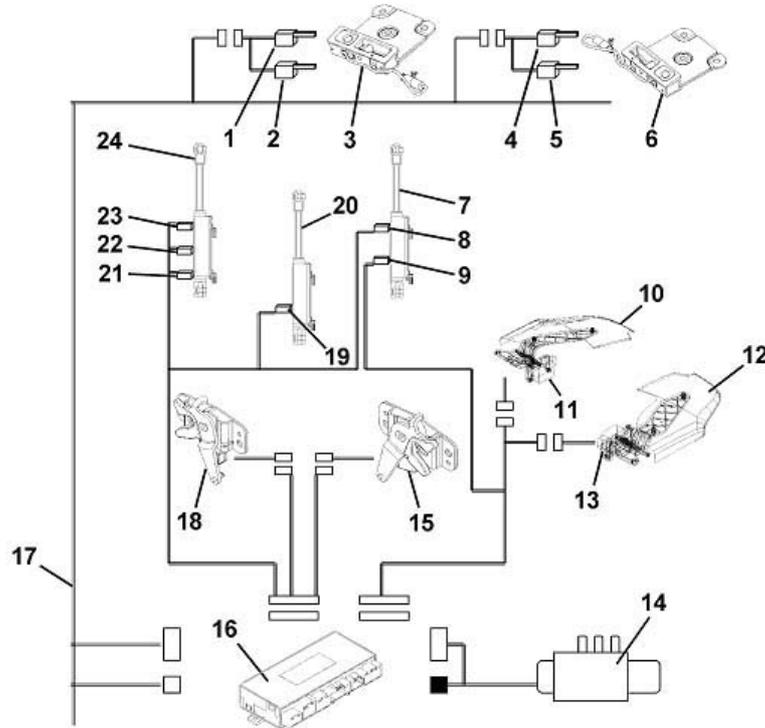


- | | |
|---|---|
| 1. Front left lock | 11. Electro-hydraulic soft top unit |
| 2. Front lock hydraulic cylinder | 12. Soft top cover actuating device |
| 3. Right front lock | 13. Soft top ECU |
| 4. Arch | 14. Soft top cover |
| 5. Right soft top cover structure | 15. Left arch actuating hydraulic cylinder |
| 6. Right flap motor | 16. Left soft top actuator hydraulic cylinder |
| 7. Right arch actuating hydraulic cylinder | 17. Left soft top cover lock |
| 8. Right flap | 18. Left flap motor |
| 9. Right soft top actuator hydraulic cylinder | 19. Left flap |
| 10. Hydraulic soft top cover actuating cylinder | 20. Soft top frame |



2.1.2 Sensors and actuators

The soft top system is governed by an ECU which interfaces on the vehicle CAN B line for receiving signals from sensors and controlling the various opening and closing cycle actuators.

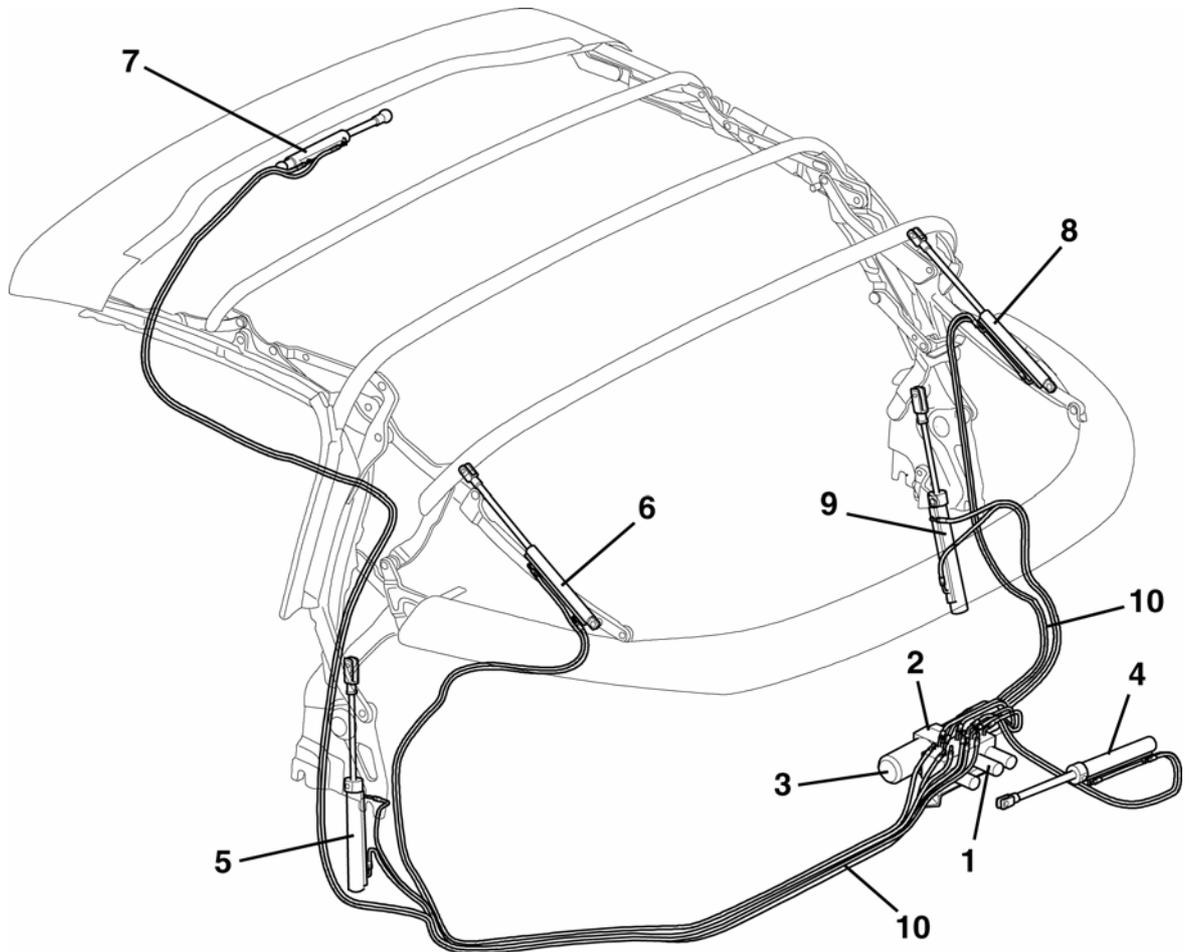


1. Left soft top sensor on windscreen crossmember
2. Soft top front left lock sensor
3. Front left lock
4. Right soft top sensor on windscreen crossmember
5. Soft top front right lock sensor
6. Right front lock
7. Soft top cover hydraulic cylinder
8. Soft top cover up sensor
9. Soft top cover down sensor
10. Right flap
11. Right flap motor
12. Left flap
13. Left flap motor
14. Electro-hydraulic soft top unit
15. Right soft top cover structure
16. Soft top ECU
17. Vehicle wiring
18. Left soft top cover lock
19. Folded soft top sensor
20. Left soft top actuator hydraulic cylinder
21. Arch up sensor
22. Arch sensor in intermediate position
23. Arch sensor down
24. Left arch actuating hydraulic cylinder



2.1.3 Hydraulic system

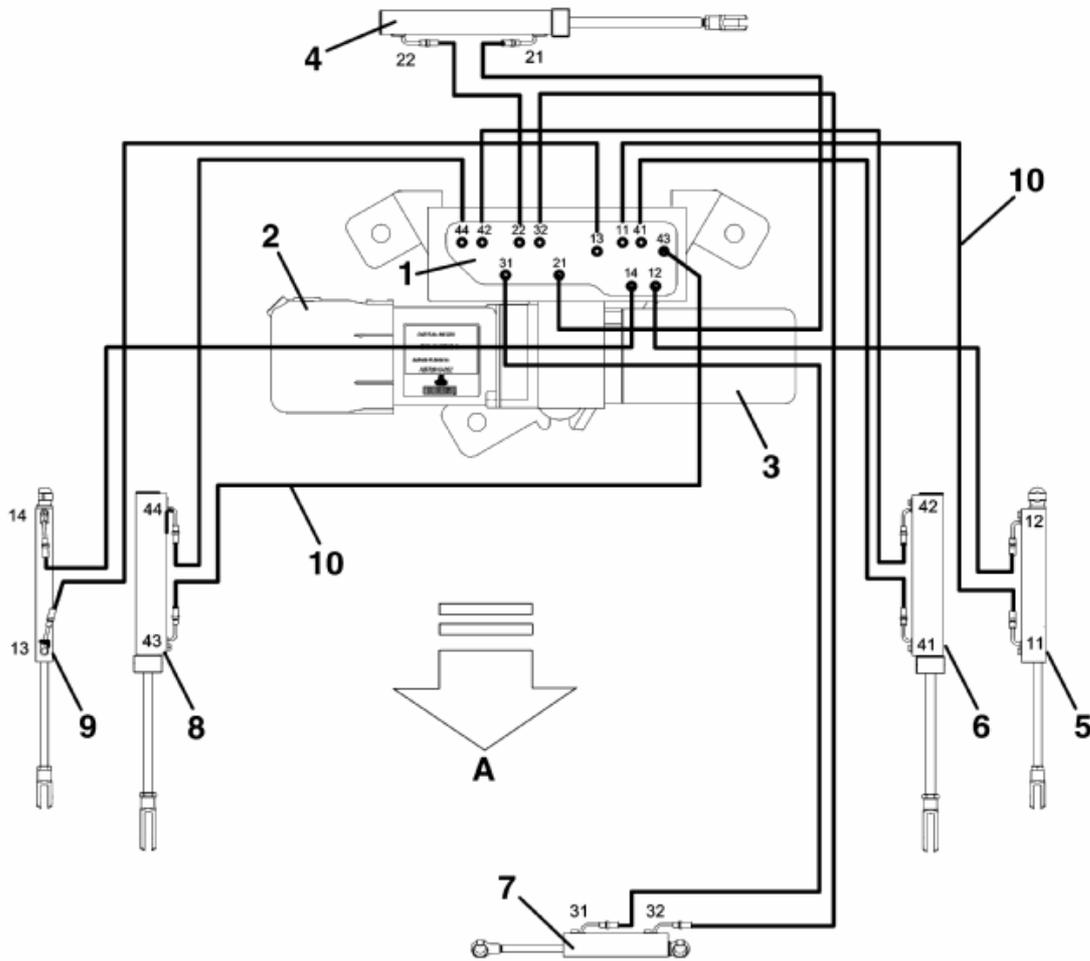
The electro-hydraulic system consists of an electrical pump built into a solenoid valve unit for controlling the up and down movement of the soft top cover, the arch and the soft top itself by means of six hydraulic cylinders. The closed circuit system works at high pressure and is equipped with tubes, fittings and respective safety systems. The hydraulic components, pump and solenoid valves are arranged together with the reservoir-accumulator forming a single unit located on the right-hand side of the soft top compartment.



1. Solenoid valve assembly
2. Pump with electrical motor
3. Reservoir-accumulator
4. Soft top cover cylinder
5. Left soft top cylinder
6. Left arch cylinder
7. Front lock cylinder
8. Right arch cylinder
9. Right soft top cylinder
10. Hydraulic tubes



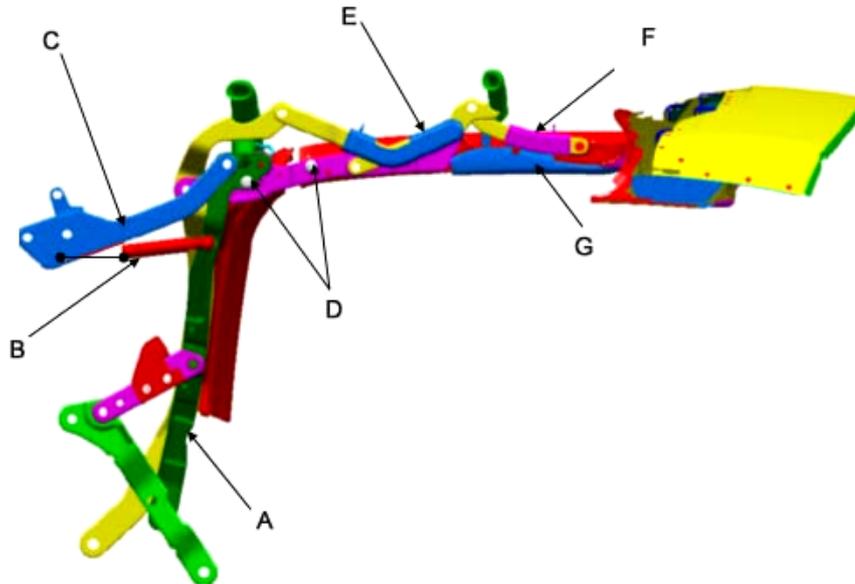
Tubes leading to the various hydraulic actuators branch off from the solenoid valve assembly. The single tubes are numbered as shown in the figure. The numbers are printed on the tubes and on the solenoid valve assembly.



- A. Direction of travel
1. Solenoid valve assembly
 2. Pump with electrical motor
 3. Reservoir-accumulator
 4. Soft top cover cylinder
 5. Left soft top cylinder
 6. Left arch cylinder
 7. Front lock cylinder
 8. Right arch cylinder
 9. Right soft top cylinder
 10. Hydraulic tubes



2.1.4. Features of the components



- A. Main lever
- B. Arch tensioner Stabilus gas springs
- C. Rear arch tensioning upper lever
- D. Pads on pins (caps)
- E. Pads on central lever
- F. Pads on upper front lever
- G. Pads on lower front lever

Frame:

- Protected with black cataphoresis paint.

Components:

- Steel linkages
- Black anodised aluminium hose holders
- Two steel plates for fastening soft top to bodyshell
- Two tubular steel roof ribbings
- One front steel crossmember
- One rear steel arch
- Mechanism with pins, friction bushings and anti-squeak devices

External triple layer cloth:

- Two layers of cloth with rubber layer in between and with a polyurethane layer (7 mm thick) applied on inner side (passenger compartment side) of the cloth for soundproofing purposes.

Rear window:

- Heated glass.
- Thickness 3.15 mm
- Fasten to cloth by means of a co-moulded polyurethane edging seal and finishing.



Weather-strip and finishing seal (soft top side):

- Door window seal in three parts
- Lower side seal sewn to soft top cloth
- Double lobe seal on rear arch.

Weather-strip and finishing seal (vehicle side):

- Seal on crossmember and windscreen pillars
- Seal on soft top cover edging.

ALL SEALS ARE TREATED WITH SILICONE PAINT.

Interior trimmings:

- Front crossmember covered with embossed black ABS
- Upholstery on interior side of roof made of fabric for cosmetic and soundproofing purposes
- Pads for protecting the occupant's head in the event of accidental collision with side linkages.

Closing device:

- Front:

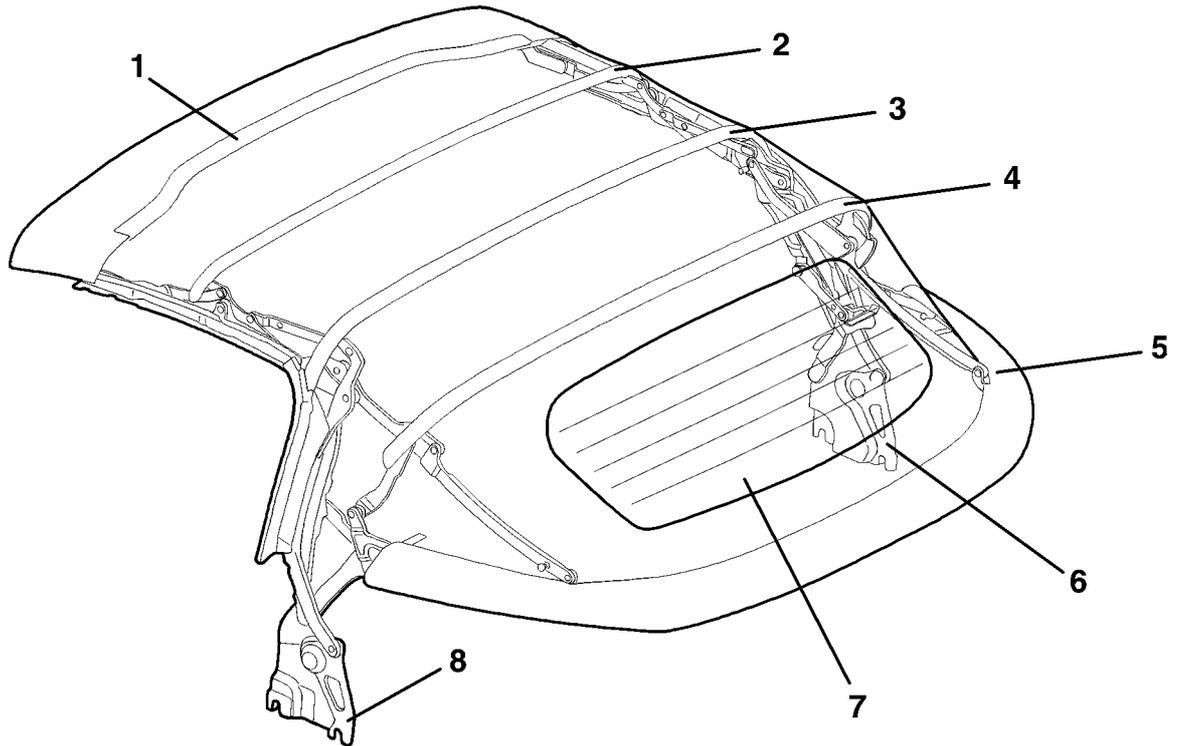
Two locks (on soft top side) and two strikers (on vehicle side) activated by the automatic soft top system (hydraulic/electric) by means of two Hall effect sensors capable of reading the approach of the two lock levers to the correct position and fastening the locks.

- Rear:

System self-tensioning.

Two elastic elements and two Stabilus gas springs on mobile ribbing are present to optimise rear window rotation and ensure that it does not interfere with the roll bars. More precisely, the Stabilus gas springs between the upper arch tensioning lever and the main lever damps the jerk that occurs when the rear arch is released to open and reduces the level of noise.





1. Front crossmember
2. Ribbing 1
3. Ribbing 2
4. Ribbing 3
5. Arch
6. Right anchoring bracket
7. Rear window defroster
8. Left anchoring bracket

Soft top cover

Structure:

- The structure (upholstery and framing) is made of steel.
- The soft top cover is painted in the same colour as the vehicle.

Gooseneck hinges on side:

- Black painted steel.

External trimming:

- Polyurethane foam body covered with black PVC.
- Black anodised aluminium edging in contact with the double lobe seal in the rear arch with the soft top in coupe configuration.

The edging is fastened to the steel structure by means of mechanical fasteners with a bead on sealant (Butyl).

Interior trimming:

- Porous material.



Adhesive rubber pads:

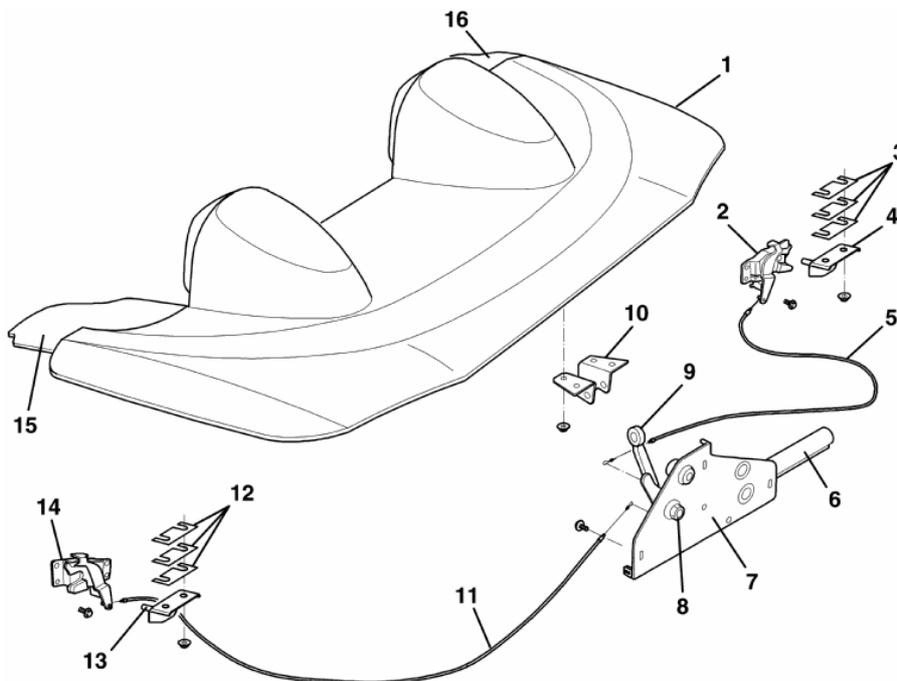
Two pads are applied onto the side of the soft top cover structure frame and are compressed by the soft top linkages when this is folded away and the soft top cover is closed (spider configuration) to limit shaking of the soft top while travelling.

Opening and closing system (structure):

- The automatic hydraulic actuating device whose fixed body is fastened with three screws to the rear wall of the soft top box in central position. Mobile arm is fastened to the soft top cover by means of a joint allowing movement during pushing (soft top closing) and pulling (opening) movements.
- Two front locks (automatic and hydraulic) are fastened to the side end of the front wall of the soft top box (Torsion Box).
- Two pushers fitted on the locks are provided to release the locks from the strikers.

Gas springs (Stabilus):

- The two gas springs (Stabilus) are positioned on the sides and anchored to the soft top cover and to the rear side wall of the soft top box. They stabilise the soft top cover when it is opening and closing.



- | | |
|------------------------------------|-----------------------------------|
| 1. Soft top cover | 9. Lifting lever |
| 2. Right lock | 10. Lever fastener |
| 3. Shims | 11. Left lock control bowden wire |
| 4. Right pin on soft top cover | 12. Shims |
| 5. Right lock control bowden wire | 13. Left pin on soft top cover |
| 6. Hydraulic cylinder | 14. Left lock |
| 7. Soft top cover actuating device | 15. Left flap |
| 8. Lock system fastening nut | 16. Right flap |



Soft top lever side flaps:

The flaps are actuated by two electrical motors controlled by the soft top ECU.

Flap cover:

- Polyurethane foam (R-Rim) body covered with black PVC.

Flap backing:

- Polyurethane foam (R-Rim).

Hinge (mobile and fixed):

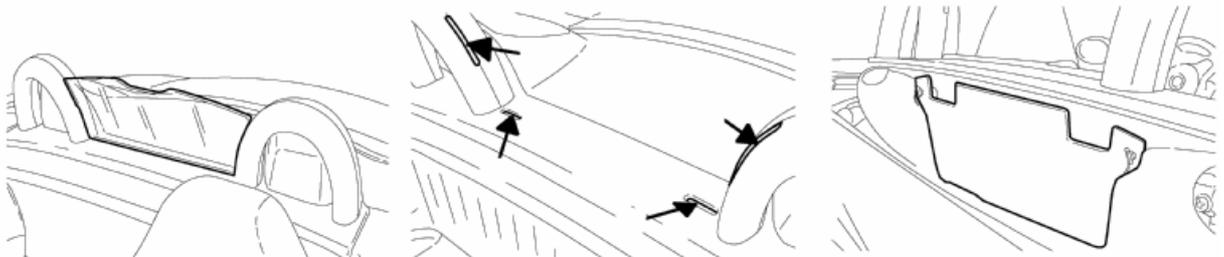
- POM plastic material (acetylic resin).

Electrical motor:

The flaps are fastened to the soft top cover on the fixed hinge side by means of three mechanical fasteners.

Wind Stopper (where fitted)

This transparent guard is positioned behind the seats and is anchored to the roll bar and to the partition. It improves riding comfort at all speeds by limiting the air turbulence created inside the passenger compartment when the soft top is open. The correct assembly position, anchoring areas and stowaway position is shown in the figure.



2.1.5 Emergency operation

This operation is possible to switch from spider to coupe configuration only.

<p>1) Open the compartment behind the right seat.</p>	
<p>2) Pull the wire to open the hydraulic system emergency relief valve.</p>	
<p>3) Open the boot electrically or, if this is not possible, open the compartment behind the left seat and operate the manual boot release wire.</p>	 



- 4) Pull the tab on the vertical trimming of the boot.



- 5) Use the tyre bolt wrench and adapter to turn the nut to open the soft top cover locks.



- 6) Close the boot.
(This operation must be performed before opening the soft top cover).



7) Open the soft top cover.



8) Lift the soft top cover and rest it on the front crossmember. Make sure that the locks are open.

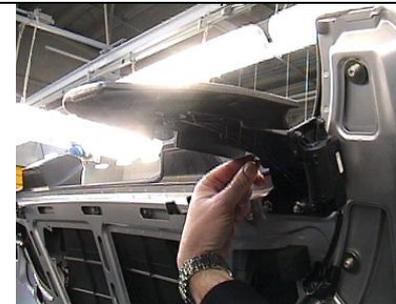


9) Remove the plastic cap from the middle of the trimming.

10) Use the tyre bolt wrench and adapter to turn the nut to lock the front soft top locks.

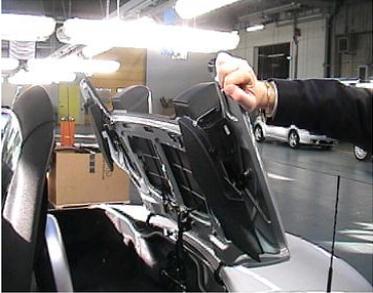
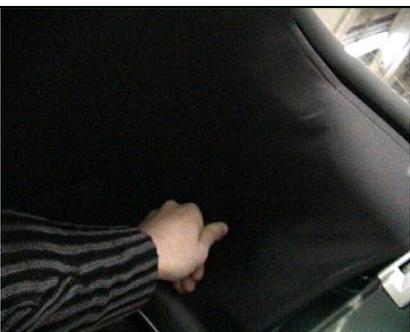


11) Fold the flaps back by turning the lever on the pin to the dead point.



12) Lift the soft top arch.



<p>13) Lower the soft top cover.</p>	
<p>14) Lower the soft top arch.</p>	
<p>15) Open the boot.</p>	
<p>16) Open the soft top cover with the wrench.</p>	
<p>17) Close the arch by applying pressure from the inside of the passenger compartment on the levers (on the right and on the left). Push in the direction shown on the roof with the symbol of a triangle inscribed in a circle.</p> <p>18) At the end of the procedure, drive the car to a workshop to restore soft top system operation.</p>	



2.2 ELECTRONIC SOFT TOP SYSTEM MANAGEMENT

2.2.1 Electronic control system

The boot-soft top node (NVB-C) manages the soft top opening and closing operations. It is found in the left of the passenger compartment on the left-hand side under the soft top box mat. All operations concerning the soft top must be safe and reliable taking all major factors into consideration, such as vehicle speed, battery voltage and other signals.

The boot-soft top node (NVB-C) functions include:

Soft top system control:

- Input from soft top operating button
- Hydraulic movement control (Hall effect sensors)
- Flap movement control
- Limp home strategies
- Alarm condition monitoring, e.g. vehicle speed, internal system errors, etc. informing the driving with messages on the NQS display
- Auto-diagnostic functions for error recovery and input/output signal controls

Interaction with other ECUs for optimal system management:

- NPG and NPP (e.g. middle drop function)
- NCL (rear window defroster and auto/manual operation)
- NBC (logistic mode)
- BOSE (soft top open or closed)
- Data transmission on B-CAN line

Power voltage behaviour

The boot-soft top node (NVB-C) requires key-on to move the soft top. The movement is inhibited during cranking.

Supply voltage	Opening	Closing
$V = 8.6 \text{ V}$	✘	✘
$8.6 \text{ V} < V < 9 \text{ V}$	✘	✘
$9 \text{ V} < V < 10 \text{ V}$	✘	✔
$10 \text{ V} < V < 16 \text{ V}$	✔	✔
$V > 16 \text{ V}$	✘	✘

- ✔ Allowed
- ✘ Not allowed

NOTE: The soft top can only be closed if the boot-soft top node (NVB-C) power is higher than 9V and lower than 16V. All opening and closing cycles are interrupted if voltage drops under 8.6 V.



Bose system

The system adapts the frequency response of the amplifier so to compensate for the low and high frequency loss occurring when the soft top is open. This reduces the difference between closed soft top and open soft top sound perception.

Car mode: Logistic mode/Customer mode

The boot-soft top node (NVB-C) allows only to close the soft top in logistic mode configuration (NBC software configuration).

Limp home

The NVB-C can continue/end the action in progress or start/not start a new operation when errors concerning the sensors occur.

Side window glazing:

Soft top opening cycle:

The system will not operate the soft top if a side window has not reached middle drop position (window lowered by approximately 50 mm) or if one of the respective signals is not periodically received on the B-CAN line.

Soft top closing cycle:

The soft top can be operated also if a side window does not reach the middle drop position or if one of the relative signals is not periodically received on the B-CAN line.

Pump and solenoid valves

Soft top movement is inhibited if the system detects an error concerning the hydraulic pump or one of the solenoid valves. If the error is detected during the opening/closing system, the soft top movement is stopped.

Sensors

An opening/closing system must be completed also if a sensor becomes faulty providing the sensor is not essential to ensure completion of the cycle or correct positioning of the soft top. If one or two sensors providing redundant information becomes faulty, the state of the non-faulty sensor is assumed by the boot-soft top node (NVB-C). This means that the system can complete the action in progress also if a redundant sensor becomes faulty. If only one sensor is faulty and the soft top is completely closed it will not move.

The following sensors are redundant (i.e. they perform the same function on right-hand side and on left-hand side):

- 18 and 15 on the soft top cover locks
- 2 and 5 on the windscreen crossmember
- 1 and 4 on the windscreen crossmember



Temperature control

An NTC sensor for controlling the hydraulic pump temperature is arranged on the soft top electro-hydraulic unit. A similar sensor is arranged inside the boot-soft top node (NVB-C) to measure the temperature of the hydraulic pump final stages. The high external temperature is detected by the driver's door node and is made available on the B-CAN.

The following strategies are used to prevent faults due to low high or low temperatures.

Hydraulic pump temperature (NTC sensor)

TEMPERATURE	Opening	Closing
$T < 90\text{ °C}$	✓	✓
$90\text{ °C} < T < 120\text{ °C}$	✗	✓
$T > 120\text{ °C}$	✗	✗
ERROR	✗	✗

- ✓ Allowed
- ✗ Not allowed

The ECU can work and completely close the soft top if the sensor becomes faulty or the temperature goes out of range.

The hydraulic pump final stage temperature (NTC sensor)

TEMPERATURE	Opening	Closing
$T < 95\text{ °C}$	✓	✓
$95\text{ °C} < T < 110\text{ °C}$	✗	✓
$T > 110\text{ °C}$	✗	✗
ERROR	✗	✗

- ✓ Allowed
- ✗ Not allowed

The ECU can work and completely close the soft top if the sensor becomes faulty or the temperature goes out of range.



External temperature (signal available on B-CAN line from NPG)

TEMPERATURE	Opening	Closing
$T < - 30 \text{ }^{\circ}\text{C}$	x	x
$- 30 \text{ }^{\circ}\text{C} < T < - 20 \text{ }^{\circ}\text{C}$	x	✓
$T > - 20 \text{ }^{\circ}\text{C}$	✓	✓

- ✓ Allowed
x Not allowed

Solenoid valve temperature:

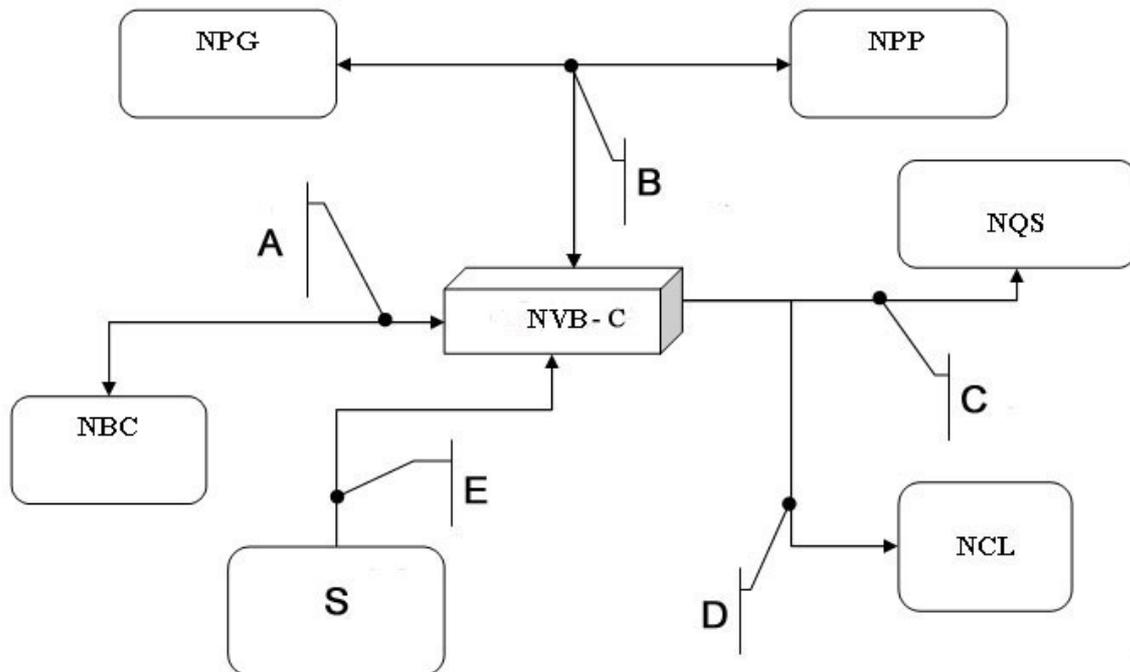
The temperature is simulated by a software algorithm based on activation time of the valves and not provided by a sensor.

Calculated time	Opening	Closing
$T < 12 \text{ min}$	✓	✓
$12 \text{ min} < T < 15 \text{ min}$		
IF SOFT TOP IS ALREADY CLOSED	x	x
IF SOFT TOP IS ALREADY OPEN	✓	✓
$T > 15 \text{ min}$		
IF SOFT TOP IS ALREADY CLOSED	x	x
IF SOFT TOP IS ALREADY OPEN	x	✓

- ✓ Allowed
x Not allowed



Soft top block chart



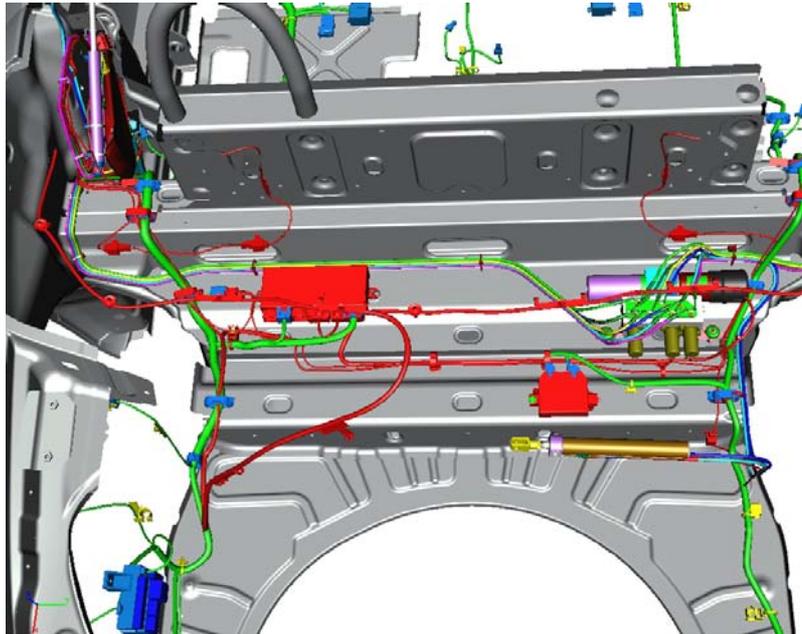
NPG. Driver's door node
 NPP. Passenger door node
 NVB - C. Boot-soft top node
 NQS. Instrument panel node
 NBC. Body Computer node
 NCL. Climate control node

- S. Soft top opening and closing button
 A. Vehicle speed, key state, NBC programming (Logistic Mode) signal acquisition
 B. Window position (middle drop, short drop, any position), external temperature acquisition
 C. Message display on instrument panel
 D. Soft top state acquisition. Deactivates automatic climate control operation and switches rear window defroster off when open
 E. Direct connection (two wires) to NVB-C

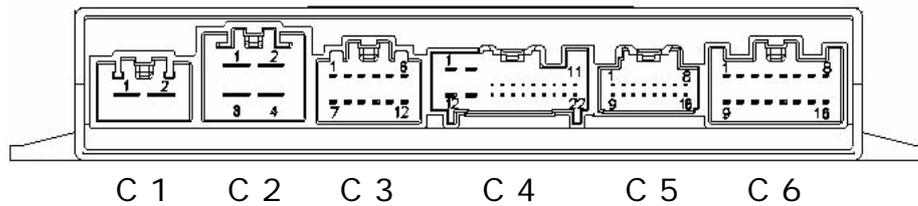


2.2.2 Component location

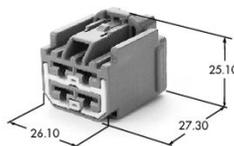
The boot-soft top node (NVB-C) and the soft top electro-hydraulic unit are located under the soft top box mat and the connectors on the side opposite to direction of travel.



2.2.3 Pinout and connectors



C1



C2



C3



C4



C6

Connector 1 (E)

<i>Pin</i>	<i>Description</i>
1	Hydraulic pump (+)
2	Hydraulic pump (-)

Connector 2 (B)

<i>Pin</i>	<i>Description</i>
1	Hydraulic pump exclusive ground (30A) (-)
2	Hydraulic pump exclusive ground (30A) (+)
3	ECU, solenoid valve, flap motor, hall sensor, potentiometer ground (-)
4	ECU, solenoid valve, flap motor, hall sensor, potentiometer ground (+)

Connector 3 (F)

<i>Pin</i>	<i>Description</i>
1	Pump NTC (-)
2	Solenoid valve 1 (+)
3	Solenoid valve 2 (+)
4	Solenoid valve 3 (+)
5	Not connected
6	Not connected
7	Pump NTC (+)
8	Solenoid valve 1 (-)
9	Solenoid valve 2 (-)
10	Solenoid valve 3 (-)
11	Not connected
12	Not connected

Connector 4 (C)

<i>Pin</i>	<i>Description</i>
1	RH flap motor ground
2	LH flap motor ground
3	Not connected
4	Not connected

5	LH flap potentiometer ground
---	------------------------------

6	RH flap potentiometer signal
7	RH flap potentiometer power (+)
8	Not connected
9	Not connected
10	Not connected
11	Hall sensor 9
12	RH flap motor power (+)
13	LH flap motor power (+)
14	Not connected
15	Not connected
16	RH flap potentiometer ground
17	LH flap potentiometer signal
18	LH flap potentiometer power (+)
19	Not connected
20	Not connected
21	Not connected
22	Not connected

Connector 5 (D)

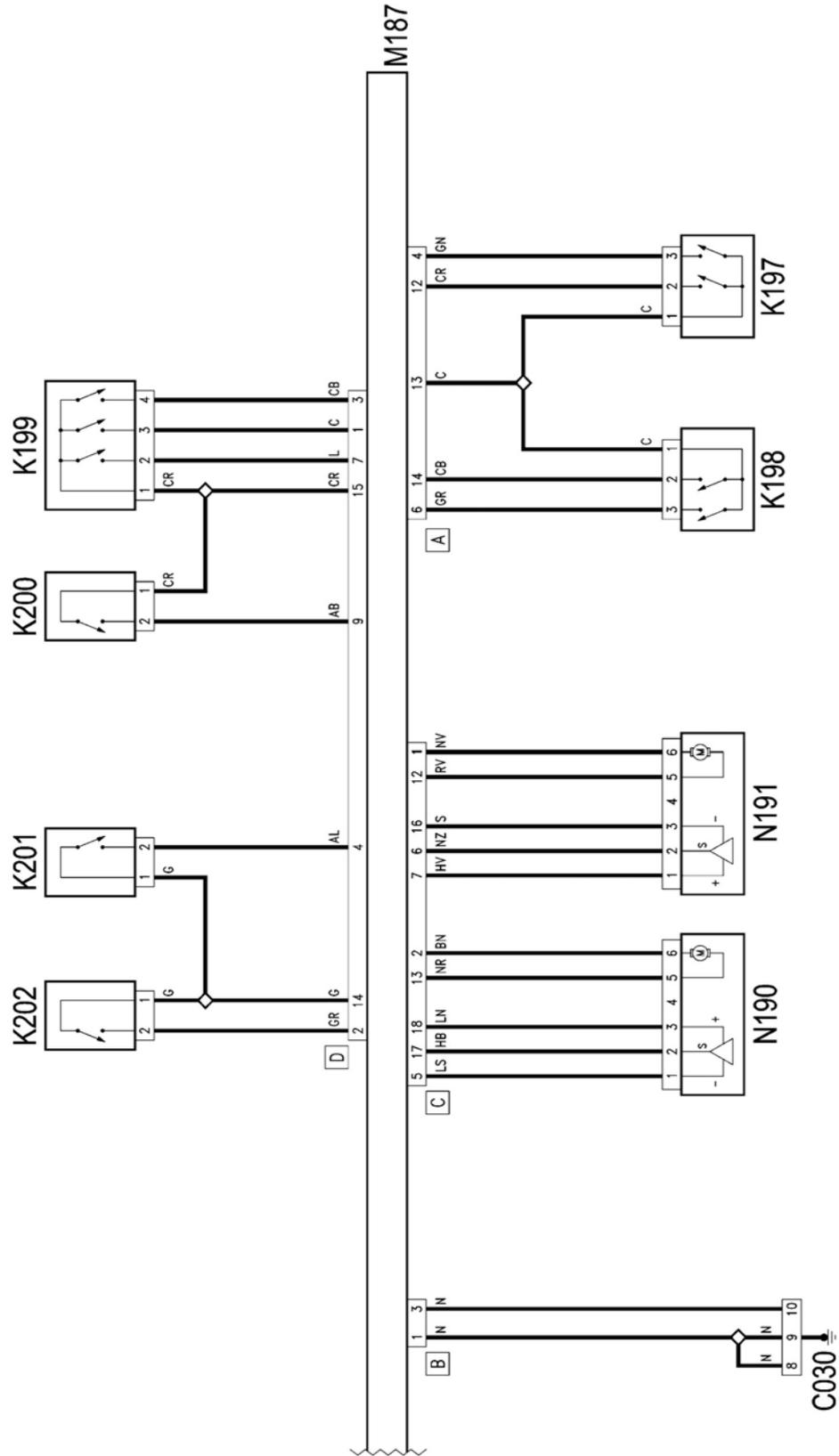
<i>Pin</i>	<i>Description</i>
1	Hall sensor 22. Arch sensor in intermediate position
2	Hall sensor 15. Right soft top cover structure
3	Hall sensor 23. Arch sensor down
4	Hall sensor 18. Left soft top cover lock
5	Not connected
6	Not connected
7	Hall sensor 21. Arch up sensor
8	Hall sensor 8. Soft top cover up sensor
9	Hall sensor 19. Soft top folded
10	Not connected



11	Not connected
12	Not connected
13	Not connected
14	Hall sensor 18, 15 power (+)
15	Hall sensor 23, 22, 21, 19 power (+)
16	Hall sensor 8, 9 power (+)
Connector 6 (A)	
<i>Pin</i>	<i>Description</i>
1	CAN_H
2	Not connected
3	Soft top operating button closed position
4	Hall sensor 5. Soft top front right lock sensor
5	Not connected
6	Hall sensor 2. Soft top front left lock sensor

7	Not connected
8	Not connected
9	CAN_L
10	Not connected
11	Soft top operating button open position
12	Hall sensor 4. Right soft top sensor on windscreen crossmember
13	Hall sensor 1, 4, 2, 5 power (+)
14	Hall sensor 1. Left soft top sensor on windscreen crossmember
15	Not connected
16	BOSE amplifier outlet



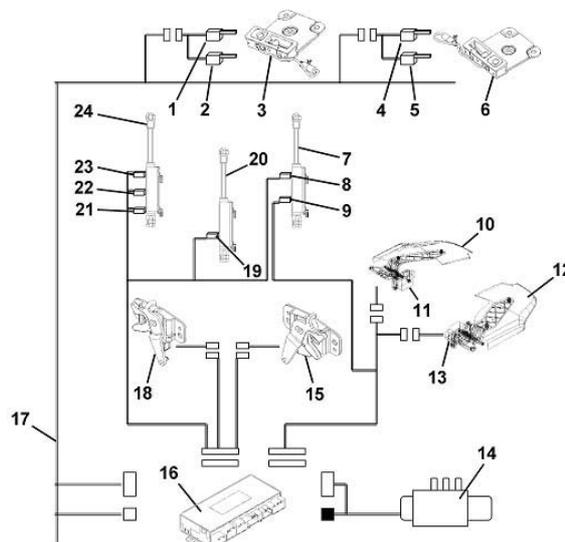


Component key

H130	Soft top open/close control
K197	Right soft top closing lock sensor
K198	Left soft top closing lock sensor
K199	Soft top arch position sensor
K200	Folded soft top sensor
K201	Left soft top cover closing lock sensor
K202	Right soft top cover closing lock sensor
K203	Soft top cover position sensor
M187	Soft top ECU
N190	Left soft top flap motor
N191	Right soft top flap motor
N192	Electro-hydraulic soft top unit

2.2.5 Operating sequences

NOTE: Refer to the diagram below for numbers identifying sensors and actuators in the open and closing cycle descriptions.



- | | |
|--|---|
| 1. Left soft top sensor on windscreen crossmember | 12. Left flap |
| 2. Soft top front left lock sensor | 13. Left flap motor |
| 3. Front left lock | 14. Electro-hydraulic soft top unit |
| 4. Right soft top sensor on windscreen crossmember | 15. Right soft top cover structure |
| 5. Soft top front right lock sensor | 16. Soft top ECU |
| 6. Right front lock | 17. Vehicle wiring |
| 7. Soft top cover hydraulic cylinder | 18. Left soft top cover lock |
| 8. Soft top cover up sensor | 19. Folded soft top sensor |
| 9. Soft top cover down sensor | 20. Left soft top actuator hydraulic cylinder |
| 10. Right flap | 21. Arch up sensor |
| 11. Right flap motor | 22. Arch sensor in intermediate position |
| | 23. Arch sensor down |
| | 24. Left arch actuating hydraulic cylinder |



NOTE:

“Soft top opening” means opening of the car roof with folding of the soft top inside the rear box.

“Soft top closing” is the reversed position, that is closing of the car roof with soft top stretching and fastening onto the windscreen.

The OPENING and reversed CLOSING sequence occur in the step sequences shown here.

Opening cycle:**1. Windows down.**

The windows following the soft top opening cycle request are lowered to middle drop position to avoid interference with the moving soft top. Middle drop position is approximately 50 mm from completely closed position. The procedure is only possible if the windows are either completely closed or if the open space is less than 50 mm. The NPG and NPP nodes for actuating the middle drop function acquire a signal required by the NVB-C from the B-CAN.

The NVB-C node sends the **opening cycle** signal when the soft top opening or closing command is received from the specific button (key-on). If the windows are fully closed or in an intermediate position between all closed and middle drop position, the NPG and NPP nodes move the windows to reach middle drop position.

When middle drop position is reached, the NPG and NPP nodes change the window position state on the network thus allowing hydraulic operation of the soft top.

If one or both of the windows is already in middle position or in a position included between middle drop and all open position, the window winder is not operated automatically. If the window winder button is pressed while the soft top is moving and the window is in middle drop position, the window winder control will be ignored and middle drop position will be maintained. If instead the window is in a position included between all open and middle drop, it can move up to reach middle drop position. In this case, when the soft top opening cycle is completed, the window will be closed to its upper closed position. Windows can always be opened regardless of the soft top state.

2. Arch up.

The pump is electrically turned rightwards and valve F3 is operated. The arch cylinders are moved in this way. This movement concerns in sequence Hall sensors 21, 22, 23 on the LH cylinder thus allowing the boot-top node (NVB-C) to monitor the correct lifting sequence.

- Flaps are in inside position.

3. Soft top cover open, front locks released on windscreen crossmember and flaps in intermediate position.

The pump is electrically turned rightwards and valves F1 and F3 are operated. This moves the respective cylinders and releases the front locks on windscreen crossmember and the soft top cover. Consequently, the Hall sensors 1, 4, 2 and 5 on the windscreen crossmember and the sensors on the soft top cover locks 18 and 15 change state informing the boot-top node (NVB-C) that the respective locks have been released. The cylinder stroke continues, concerning first Hall sensor 9 indicating that the soft top cover is resting on the locks to reach complete opening (confirmed by Hall sensor 8).



- The flaps are positioned in intermediate position 1 and then intermediate position 2 when the soft top cover is fully open.

4. Arch down to intermediate position and flaps in external position.

The pump is turned electrically rightwards and valves F1 and F2 are operated allowing the arch to descend to intermediate position confirmed by Hall sensor 22 on the left-hand cylinder.

- The flaps are taken to external position where they remain until the soft top is fully open.

5. Soft top opened and folded in box.

The pump is turned electrically leftwards and valve F1 is operated allowing the soft top to descend into the box (confirmed by Hall sensor 19 located on the LH top cylinder).

6. Soft top closed.

The pump is turned electrically leftwards and no valve is operated thus allowing the soft top cover to descend concerning first Hall sensor 9 on the soft top cover cylinder and thus allowing the soft top cover cylinder to complete its stroke to ensure complete closure (confirmed by Hall sensors 18 and 25 located on the soft top cover locks).

7. Windows up.

When the soft top opening cycle is complete, the NVB-C changes the soft top state from fully closed to fully open and the NPG and NPP nodes return the windows to the original position. If the windows are lowered from middle drop position during the soft top opening cycle, the windows are kept in the current position.

8. Bose system.

When the soft top is open, the NVB-C sends to the Bose system a signal (12V) so that this can change equalisation of the audio system enhancing both low frequencies and high frequencies to compensate for losses due to volumetric variation of the acoustic environment.

9. Climate control system.

When the soft top is open, the boot-top node (NVB-C) sends the open top signal on the network. The climate control node NCL learns this information and switches from automatic to manual (air flow and distribution). The full auto button is deactivated.

NBC deactivates the rear window defroster (top is open).



Closing cycle

1. Windows down.

The windows following the soft top closing cycle request are lowered to middle drop position to avoid interference with the moving top. Middle drop position is approximately 50mm from completely closed position. The procedure is only possible if the windows are either completely closed or if the open space is less than 50 mm. The NPG and NPP nodes for actuating the middle drop function acquire a signal required by the NVB-C from the B-CAN.

The NVB-C node sends the **closing cycle** signal when the soft top closing command is received from the specific button (key-on). If the windows are fully closed or in an intermediate position between all closed and middle drop position, the NPG and NPP nodes move the windows to reach middle drop position.

When middle drop position is reached, the NPG and NPP nodes change the window position state on the network thus allowing hydraulic operation of the soft top.

If one or both of the windows is already in middle position or in a position included between middle drop and all open position, the window winder is not operated automatically. If the window winder buttons are pressed and the window is in middle drop position while the soft top is moving, the controls are ignored and the windows are maintained in middle drop position. If on the other hand the window is in a position between all open and middle drop, the windows can be wound up to reach middle drop position. In this latter case, the windows will be closed to the upper end of stroke at the end of the soft top opening cycle. Windows can always be opened regardless of the soft top state.

2. Soft top cover opened.

The pump is electrical turned leftward and valve F1 is operate, allowing movement of the respective cylinder, releasing first the soft top cover locks (confirmed by Hall sensors 18 and 15). The soft top cover cylinder continue to maximum opening position confirmed by Hall sensor 8.

- Flaps are maintained in external position.

3. Soft top closed.

The pump is turned electrically rightwards and valve F1 is operated allowing the soft top to move completely up (confirmed by Hall sensor 19) until it rests on the front crossmember (confirmed by Hall sensors 1 and 4).

- Flaps are maintained in external position.

4. Arch up and flaps in intermediate position.

The pump is turned electrically rightwards and valves F1 and F3 are operated allowing the arch to rise to intermediate position confirmed by Hall sensor 21 on the left-hand cylinder.

- The flaps are taken to intermediate position.



5. Flaps in internal position, front locks closed on windscreen crossmember and soft top cover closed.

The pump is electrically opened rightwards and valve F3 is operated. This allows the front lock cylinder on windscreen crossmember to move (confirmed by Hall sensors 2 and 5, with arch all raised). The cycle continues allowing the soft top cover downward movement, concerning first Hall sensor 9 on the soft top cover cylinder and then allowing the soft top cover cylinder stroke down to complete closure (confirmed by the Hall sensors 18 and 15 on the soft top cover locks).

- The flaps are taken to internal position. They must be fully folded when the soft top cover rests on the locks (Hall sensor 9).

6. Arch all down.

The pump is electrically turned rightwards and valve F2 is operated. The arch moves down completely passing from intermediate position (movement confirmed first by Hall sensor 22 and then by Hall sensor 21 both on the left-hand arch cylinder).

7. Windows up.

When the soft top opening cycle is complete, the NVB-C changes the soft top state from fully open to fully closed and the NPG and NPP nodes return the windows to the original position. If the windows are lowered from middle drop position during the soft top closing cycle, the windows are kept in the current position.

8. Bose system.

When the soft top is closed, the NVB-C provides a signal (0V) to the Bose system to equalise the audio system to setting more suitable to a closed environment.

9. Climate control system.

When the soft top is closed, the boot-top node (NVB-C) sends the open top signal on the network. The climate control node NCL learns this information and switches from manual to automatic (air flow and distribution). The full auto button is re-activated. NBC re-activates the rear window defroster (top is closed).

Interruption of the movement

The movement is automatically interrupted as soon as the soft top operating button is released. The movement can be resumed by pressing the button again in the required direction (opening or closing). The side windows can be closed from middle drop position automatically when the soft top opening or closing operation is complete.

