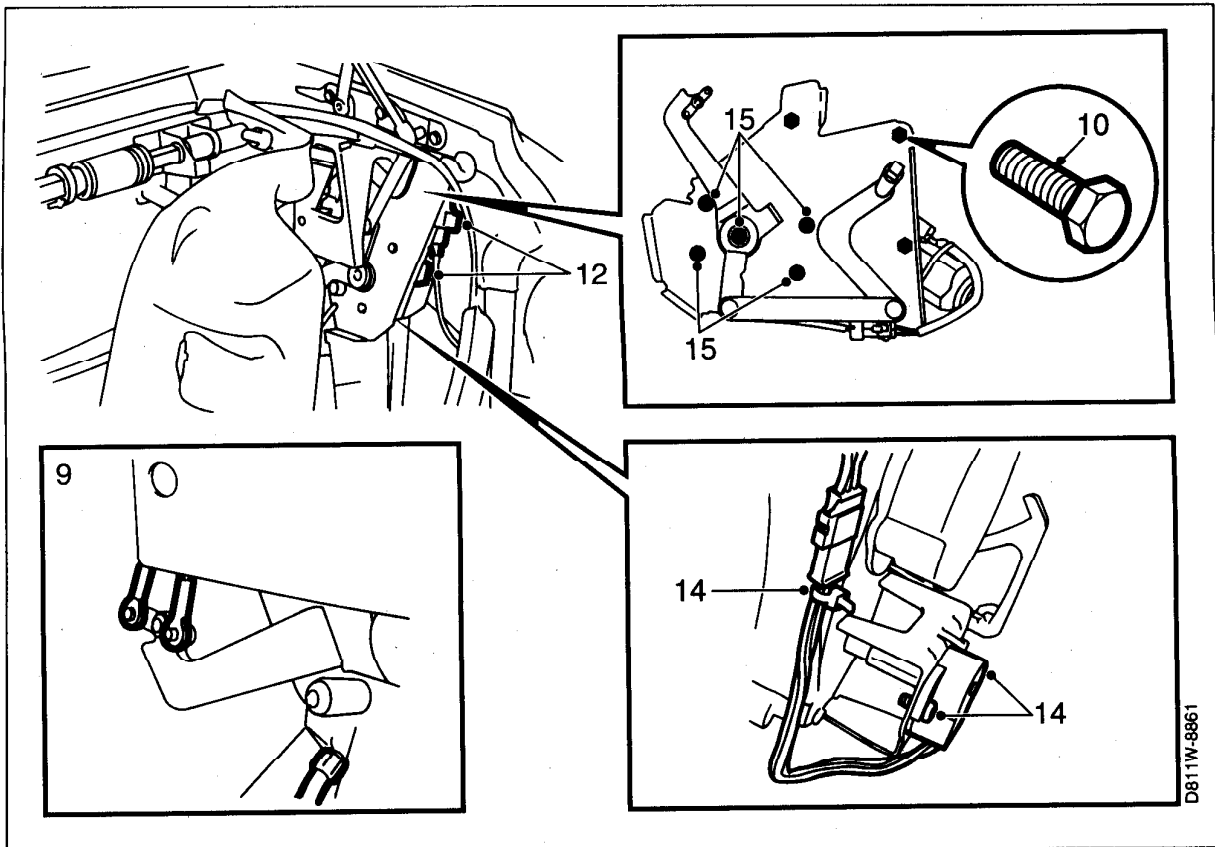


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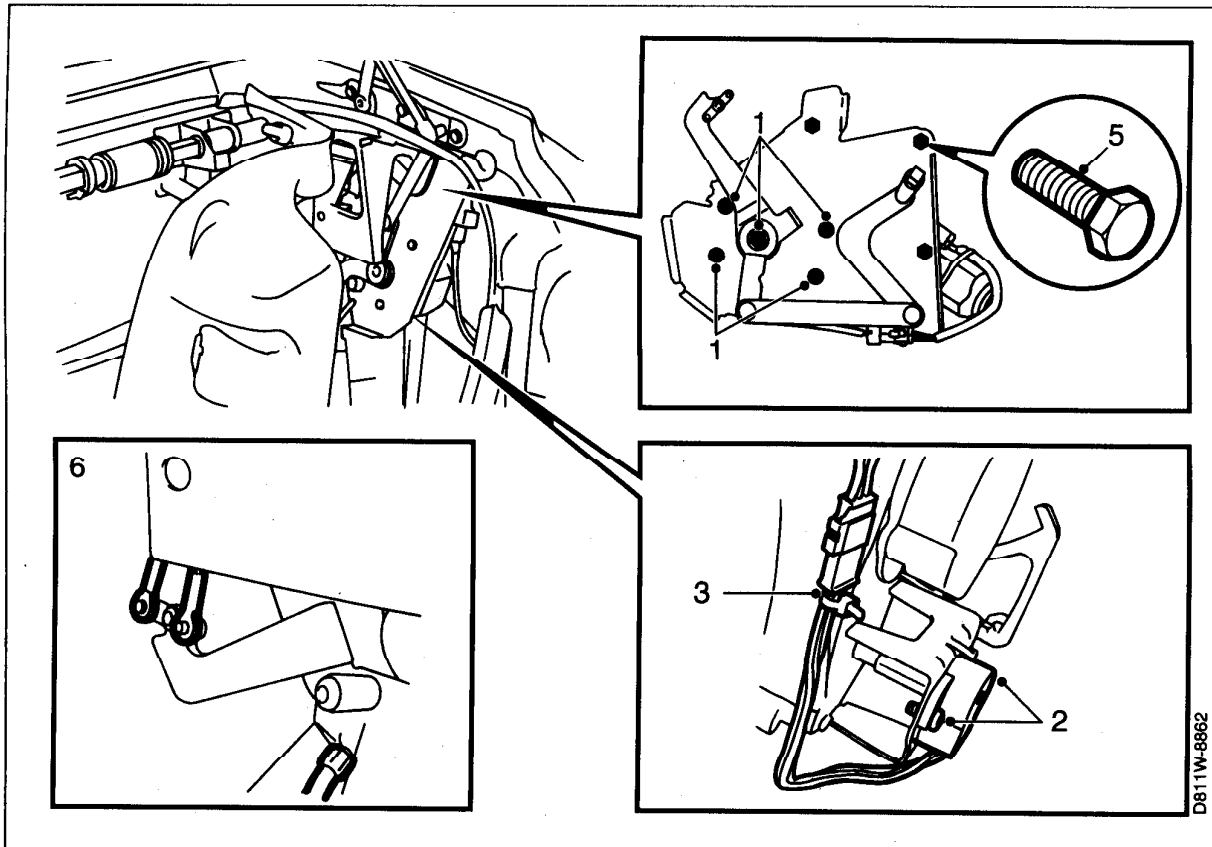
Tonneau cover motor

To remove

- 1 The tonneau cover should be lowered when carrying out this work.
- 2 Tip the rear-seat backrest forward and pull up the emergency hood-raising handle.
- 3 Fold the boot carpet towards the front of the car.
- 4 Remove the scuff plate.
- 5 Detach the boot lid seal on the right-hand side and bend it aside.
- 6 Loosen the boot trim on the right-hand side and bend it outwards.
- 7 Remove the right-hand light cluster.
- 8 Remove the universal joint's two retaining screws.

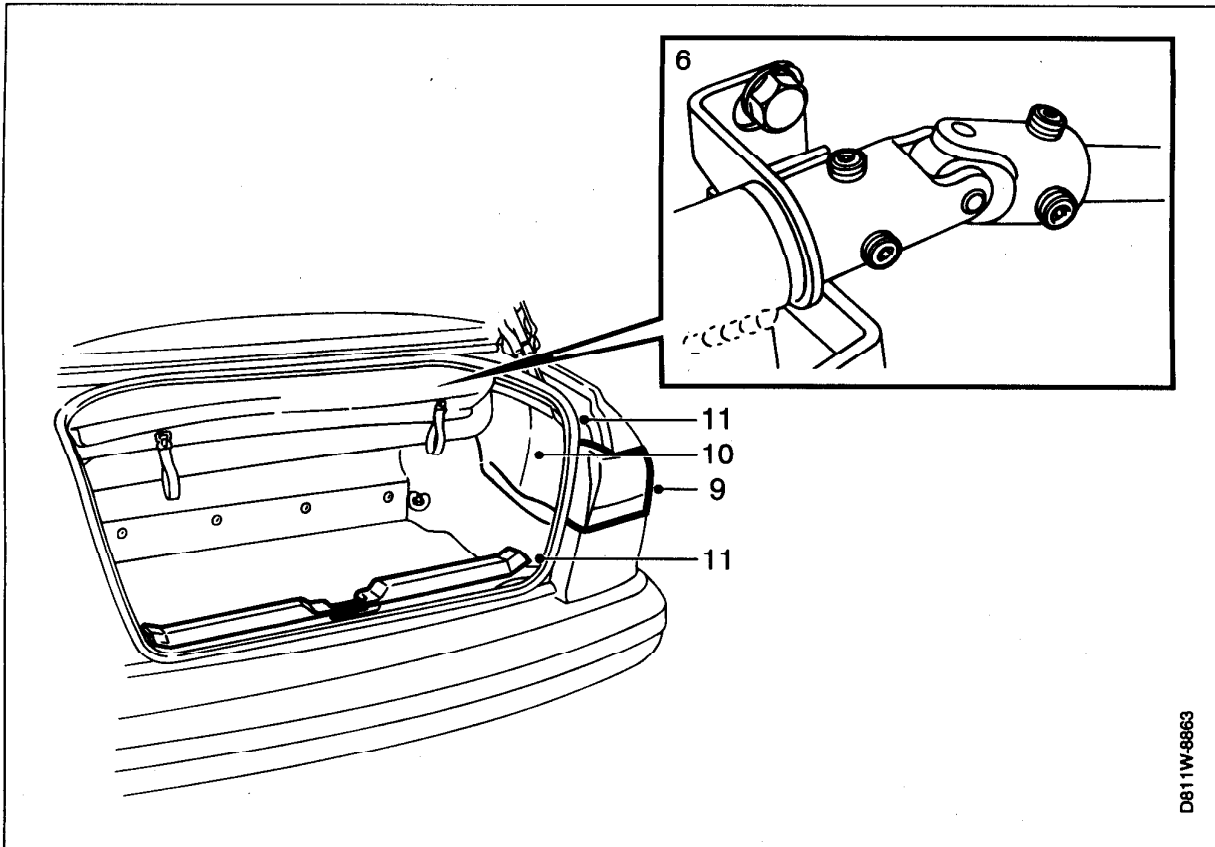


- 9 Detach the tonneau cover latch operating cables from the bracket and operating arm.
- 10 Remove the bracket's three retaining bolts.
- 11 Remove the emergency hood-raising cable from the bracket.
- 12 Unplug the wiring connectors.
- 13 Lift out the bracket with motor.
- 14 Snip the cable ties and remove the potentiometer.
- 15 Remove the motor's four retaining bolts and the bolt in the motor shaft.



To fit

- 1 Bolt the motor to the bracket.
- 2 Bolt the potentiometer in place.
- 3 Plug in the wiring connectors and fit a new cable tie.
- 4 Fit the emergency hood-raising cable to the bracket and operating arm.
- 5 Press the shaft into the universal joint and tighten the bracket retaining bolts.
- 6 Fit the tonneau cover latch cables to the bracket and operating arm. Apply Loctite or the equivalent to the universal joint locking screws and tighten them.



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- 7 Press the emergency hood-raising handle back into place.
- 8 Raise the rear-seat backrest to its normal position.
- 9 Refit the right-hand light cluster.
- 10 Refit the boot trim.
- 11 Refit the boot lid seal and scuff plate.
- 12 Press the boot trim back into place.
- 13 Check the operation of the tonneau cover motor by lowering (opening) and raising (closing) the hood twice.
- 14 Connect an ISAT Scan Tool, clear any diagnostic trouble codes and then program the control module. See "Programming control modules" in the Fault Diagnosis section.

20. Raise the soft top cover until special tool 82 93 177 can be located as illustrated.
21. Make sure the soft top cover latch striker goes freely into the latch without touching the tool. Listen for a "clicking" sound when the microswitch is activated. If the latch striker touches the tool, the latch must be adjusted towards the front of the car.

22. Adjustment:

Remove the relevant side trim. See "8. Convertible, Adjustment and replacement, Rear side trim" → .

Loosen the two nuts securing the latch and adjust the latch forwards. Tighten the nuts.

Return to step 21 and check the adjustment.

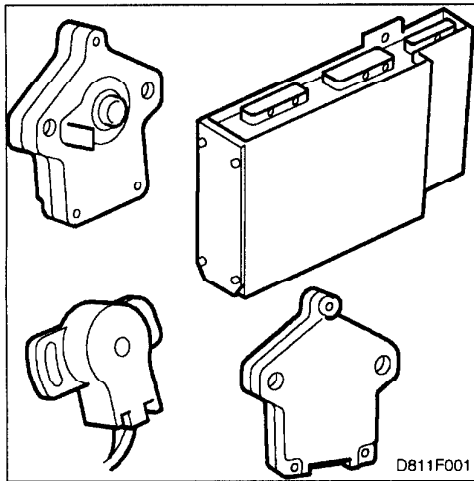
When being closed, the soft top cover can "knock" against the latch. In this is the case, adjust the latch slightly so that the seals buffer the soft top cover.

Refit the rear side trim. See "8. Convertible, Adjustment and replacement, Rear side trim" → .

23. Connect the diagnostic tool, clear any diagnostic trouble codes and then program the control module. See "8. Convertible, Fault diagnosis, general, Programming the control module" → .

General information on programming control modules

The control module must be programmed after performing the following work on the system.



- Changing a potentiometer
- Changing a control module
- Removing/fitting a complete soft top

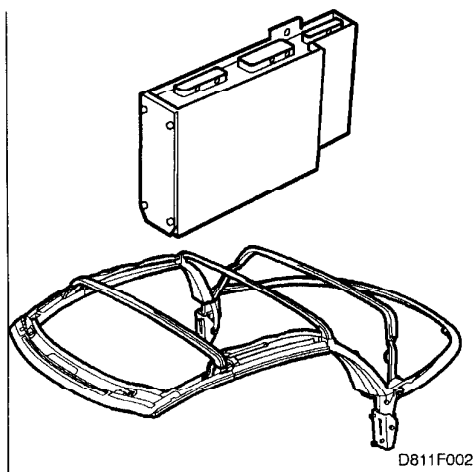
IMPORTANT

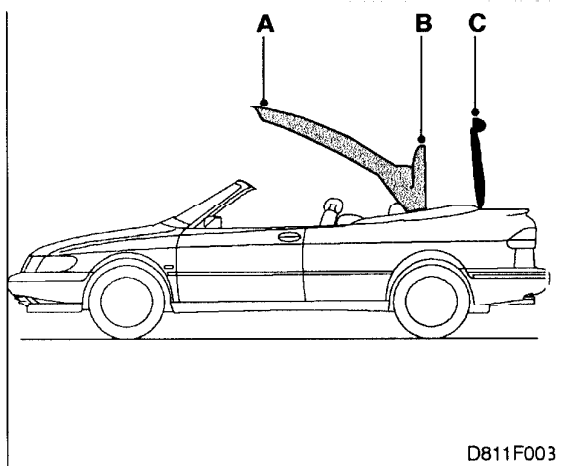
Mechanical adjustment must be carried out before commencing electrical adjustment with the diagnostic tool.
See 

It can sometimes be necessary to reprogram the control module when certain other components have been removed. This is noted after each component replacement in the section "Adjustment/replacement".

IMPORTANT

This description applies to control modules 45 58 144, 46 10 812 and 46 95 961. If the car is fitted with control module 43 07 450, it must be rectified according to the description in SI 812-1566.





The three main movable soft top components

- A Soft top
- B Fifth bow
- C Soft top cover

Mechanical end positions

There are three main movable soft top "components" in the soft top system: The soft top (A), the fifth bow (B) and the soft top cover (C). The maximum movement of each of these is mechanically limited in the soft top system. Some of the mechanical end positions can be adjusted within certain limits. For example, the end position for raising the soft top can be adjusted with a mechanical stop located where the soft top mechanism is mounted on the body.

Programmed end positions

The TSAS control module operates motors that drive the various components of the soft top mechanism. The control module must be informed when any of the components reaches a mechanical end position. Otherwise, the control module will continue to operate the motor against the end position, which will result in the control module eventually breaking the circuit to the motor and generating a diagnostic trouble code for excessive current consumption.

The mechanism has three potentiometers (position sensors) to give the control module continuous information on the precise position of the soft top mechanism. One is for the soft top, one for the fifth bow and one for the soft top cover. The potentiometers deliver a value between 0 - 255, depending on the position of the soft top mechanism. The potentiometer values that correspond to the mechanical end positions are programmed into the TSAS control module. In this way, the control module is aware of when the mechanical end positions have been reached and can stop operating the motors.

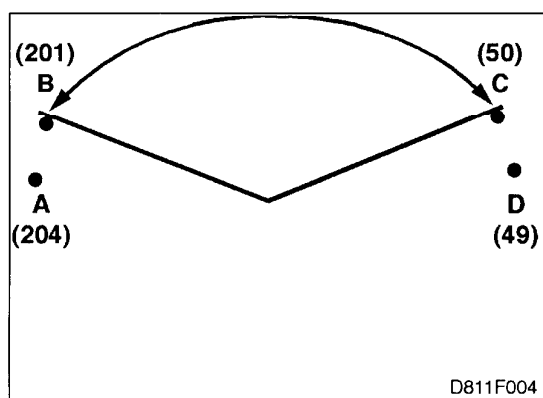
Interplay between mechanical and programmed end positions

It is evident from the description on the previous page that the programmed end positions must never lie outside the mechanical ones. If they did, the control module would continue to operate the motor in question despite the mechanical end position having been reached. The control module would eventually break the circuit to the motor and generate a diagnostic trouble code for excessive current consumption.

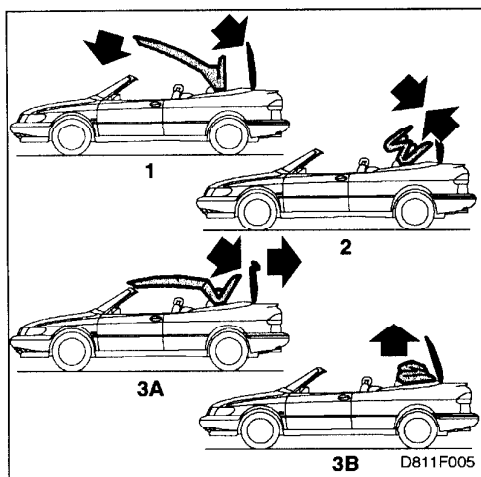
End positions must instead be programmed just inside, or in certain cases equal to, the mechanical end positions. The motor in question will then stop before the mechanical end position has been reached, giving the motion a smooth retardation. For example, if the main motor potentiometer indicates a value of 204 when the soft top has reached its upper mechanical end position, i.e. when it is completely raised, the control module should be programmed with the value 201. By deducting 3 units, the main motors will stop just before the mechanical end position has been reached and the soft top will stop smoothly against the windscreen frame.

For lowering the soft top, 1 unit should instead be added to the value indicated by the potentiometer when the soft top has reached its bottom mechanical end position. If the bottom end position corresponds to a potentiometer value of 49, the control module should be programmed with the value 50. When the soft top is lowered, the control module will then count down from 201 (the programmed top end position) to 50. The main motors will then stop and the soft top will be lowered by its own weight to the mechanical end position (potentiometer value 49).

In the diagnostic tool, the top end position is called "HIGH LIMIT" and the bottom end position "LOW LIMIT".

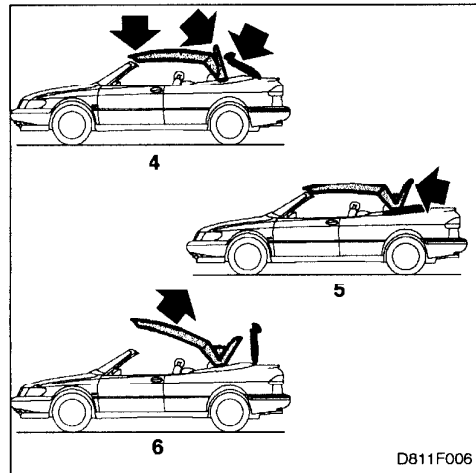


Overlap positions



To enable the soft top to be raised and lowered quickly and smoothly, the TSAS control module must control two different movements in the soft top system simultaneously. For this to be done without the risk of the various parts of the soft top system colliding, the TSAS control module must be aware of exactly when to commence each movement. To supply the control module with this information, the control module has been programmed with two more values for each part of the soft top system besides the two end positions. These values are called overlap positions, one high and one low. For example, when the soft top reaches the top overlap position while being raised, the TSAS control module will start to lower the fifth bow. The function of the different overlap positions is illustrated in the following table.

It is very important that the overlap positions are correctly programmed. Incorrect values may result in the various parts of the soft top system colliding with each other and being damaged.



1 High soft top overlap position	When the main motor reaches this position while raising the soft top, the control module starts to lower the fifth bow.
2 Low soft top overlap position	When the main motor reaches this position while lowering the soft top, the control module makes sure the fifth bow is in its highest position. If it is not, the control module will stop the soft top motion and raise the fifth bow to its upper position.

3 High soft top cover overlap position	A. When lowering the soft top: When the soft top cover motor reaches this position, the fifth bow starts to be lowered (past the soft top cover) so that it clears the head restraints. B. When raising the soft top: When the soft top cover motor reaches this position, the main motor starts its upwards motion.
4 Low soft top cover overlap position	When the soft top cover is closing and it reaches this position while raising the soft top, the fifth bow starts to be lowered.
5 High fifth bow overlap position	When the fifth bow motor reaches this position while lowering the soft top, the soft top cover latches will open.
6 Low fifth bow overlap position	Here, the main motor will start its downward motion while lowering the soft top at the same time as the fifth bow changes direction.

Table for calculating potentiometer values

Make a copy of this table and use the copy to calculate the new potentiometer values.

Row	Position	Reading	Conversion factor	New value
A	Soft top, high limit "MAIN MOTOR HIGH LIMIT"		- 3 =	
B	Soft top, overlap high limit "MAIN MOTOR OVERLAP HIGH LIMIT"		$\pm 0 =$	
C	Soft top, overlap low limit "MAIN MOTOR OVERLAP LOW LIMIT"	B (MAIN MOTOR OVERLAP HIGH LIMIT)	- 6 =	
D	Soft top, low limit "MAIN MOTOR LOW LIMIT"		+ 1 =	
E	Soft top cover, high limit "TONNEAU MOTOR HIGH LIMIT"		- 9 =	
F	Soft top cover, overlap high limit "TONNEAU MOTOR OVERLAP HIGH LIMIT"		± 0	Fixed value (*) 118
G	Soft top cover, overlap low limit "TONNEAU MOTOR OVERLAP LOW LIMIT"		± 0	Fixed value (*) 112
H	Soft top cover, low limit "TONNEAU MOTOR LOW LIMIT"		+ 1 =	
I	Fifth bow, high limit "#5 BOW MOTOR HIGH LIMIT"		- 2 =	
J	Fifth bow, overlap high limit "#5 BOW MOTOR OVERLAP HIGH LIMIT"	K (#5 BOW MOTOR OVERLAP LOW LIMIT)	+ 8 =	
K	Fifth bow, overlap low limit "#5 BOW MOTOR OVERLAP LOW LIMIT"		$\pm 0 =$	
L	Fifth bow, low limit "#5 BOW MOTOR LOW LIMIT"		$\pm 0 =$	

(*) On cars with box B5 on the modification identity plate marked or with VIN S7013203 and higher, the soft top cover overlap position is fixed. Use the fixed values in the table.

Table for calculating potentiometer values

Make a copy of this table and use the copy to calculate the new potentiometer values.

Row	Position	Reading	Conversion factor	New value
A	Soft top, high limit "MAIN MOTOR HIGH LIMIT"		- 3 =	
B	Soft top, overlap high limit "MAIN MOTOR OVERLAP HIGH LIMIT"		$\pm 0 =$	
C	Soft top, overlap low limit "MAIN MOTOR OVERLAP LOW LIMIT"	B (MAIN MOTOR OVERLAP HIGH LIMIT)	- 6 =	
D	Soft top, low limit "MAIN MOTOR LOW LIMIT"		+ 1 =	
E	Soft top cover, high limit "TONNEAU MOTOR HIGH LIMIT"		- 9 =	
F	Soft top cover, overlap high limit "TONNEAU MOTOR OVERLAP HIGH LIMIT"		± 0	Fixed value (*) 118
G	Soft top cover, overlap low limit "TONNEAU MOTOR OVERLAP LOW LIMIT"		± 0	Fixed value (*) 112
H	Soft top cover, low limit "TONNEAU MOTOR LOW LIMIT"		+ 1 =	
I	Fifth bow, high limit "#5 BOW MOTOR HIGH LIMIT"		- 2 =	
J	Fifth bow, overlap high limit "#5 BOW MOTOR OVERLAP HIGH LIMIT"	K (#5 BOW MOTOR OVERLAP LOW LIMIT)	+ 8 =	
K	Fifth bow, overlap low limit "#5 BOW MOTOR OVERLAP LOW LIMIT"		$\pm 0 =$	
L	Fifth bow, low limit "#5 BOW MOTOR LOW LIMIT"		$\pm 0 =$	

(*) On cars with box B5 on the modification identity plate marked or with VIN S7013203 and higher, the soft top cover overlap position is fixed. Use the fixed values in the table.

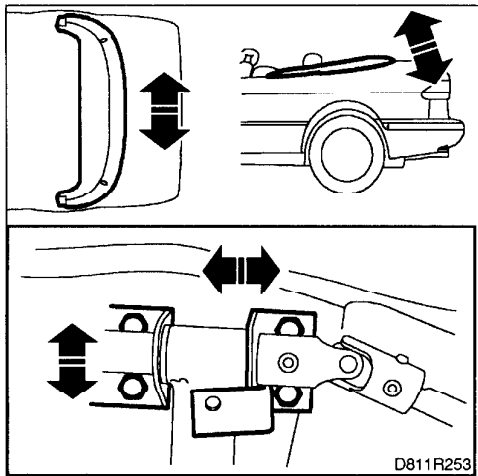
Adjusting the soft top cover

A Soft top cover lengthways and sideways adjustment

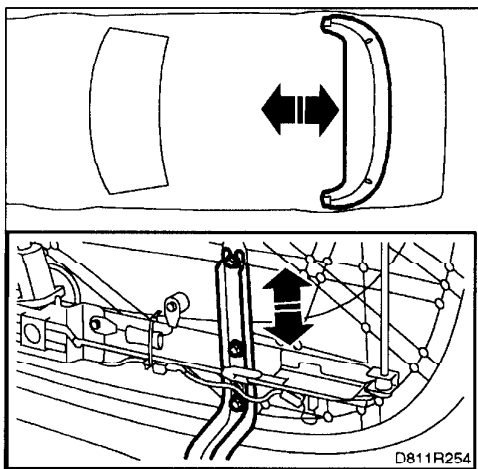
The soft top cover can be adjusted lengthways and sideways as well as in height. This adjustment is made to give the soft top cover an aesthetic fit against the body and the boot lid.

Only the various adjusting points are given below. The order in which they should be carried out depends entirely on how the soft top cover is adjusted when work commences.

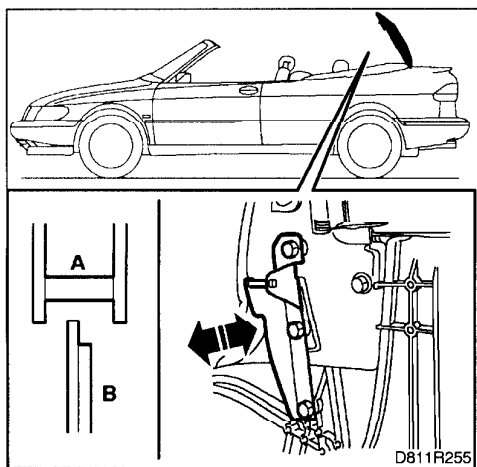
- 1 Sideways and height adjustment is carried out on the hinge mounting on the body. Loosen the screws and adjust.



- 2 Lengthways adjustment is carried out on the soft top cover mounting on the hinge. Loosen the nuts and adjust.

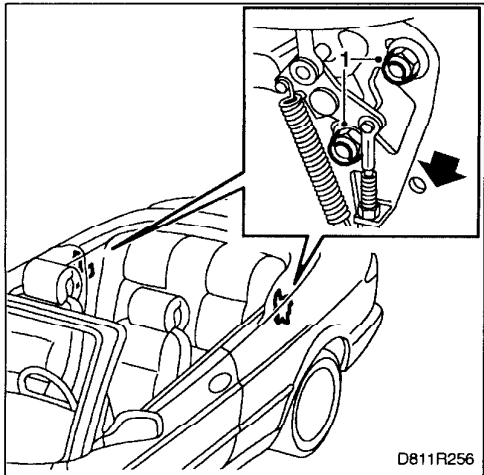


B Lock fittings sideways adjustment



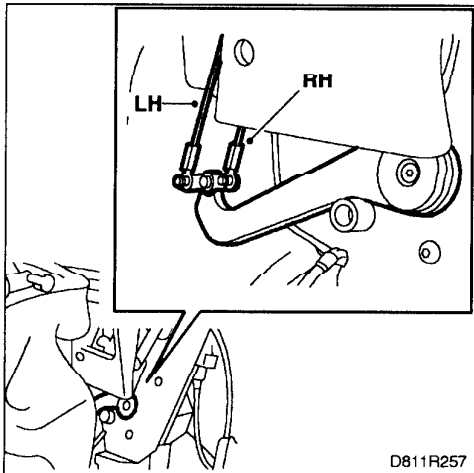
- 1 Loosen the nuts holding the latch fittings to the soft top cover.
- 2 Close the soft top cover and adjust the latch fittings (A) so that they are positioned in the centre of the latch (B).
- 3 Tighten the nuts securing the latch fittings.

C Latches sideways adjustment and height



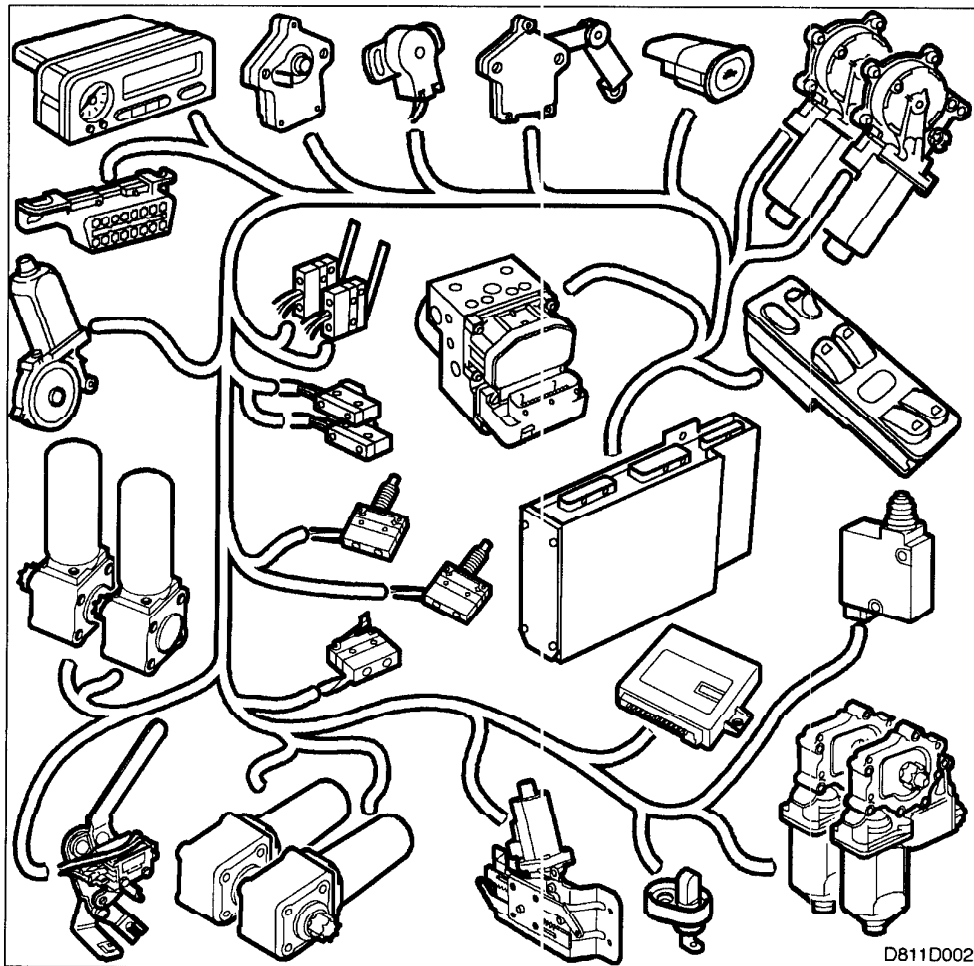
- 1 Loosen the nuts securing the latches to the body.
- 2 Close the soft top cover and let the latch fittings on the soft top cover adjust the latches.
- 3 Pull down the latch fittings vertically and tighten the nuts securing the latch with the soft top cover closed.
- 4 Make sure the latch fittings do not jam or stick.

D Soft top latch cables



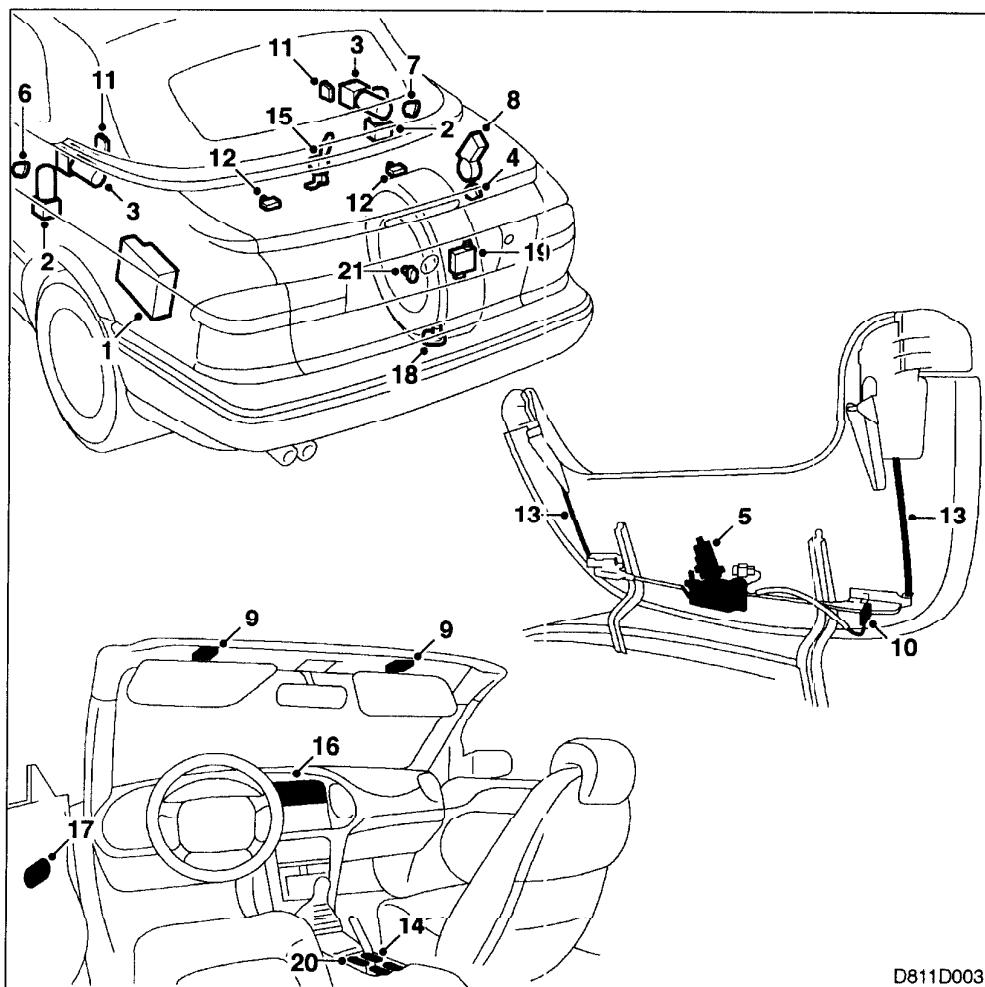
- 1 Adjust the cables so that the lever on the soft top cover motor is as close as possible to its horizontal position when the latch is in its locked position.

System overview, TSAS soft top system



The TSAS (Top Stack Actuation System)

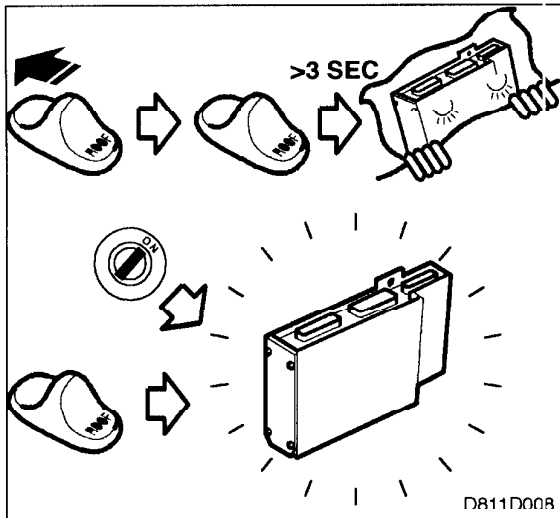
Main components



- 1 Control module
- 2 Main motors (2 pcs.)
- 3 Fifth bow motors (2 pcs.)
- 4 Potentiometers for soft top cover motion
- 5 Fifth bow latch motor
- 6 Potentiometer for main sequence
- 7 Potentiometer for fifth bow motion
- 8 Soft top cover motor
- 9 Microswitch in latch fittings in windscreen member (2 pcs.)

- 10 Microswitch for fifth bow latch
- 11 Microswitch for soft top cover latches (2 pcs.)
- 12 Microswitch on soft top storage (2 pcs.)
- 13 Torsion wire to soft top rotating cover
- 14 "ROOF" switch
- 15 Emergency opening handle
- 16 SID
- 17 Boot lid release button
- 18 Boot lid switch
- 19 Boot lid lock motor
- 20 Window lift switches
- 21 Speed signal from right rear wheel, via ABS control module

State of rest



If the control module processor is inactive for longer than three seconds it takes its state of rest, the control module turns off the processor. This is done to avoid EMI (Electro Magnetic Interference) on principally the radio reception. No self-diagnosis is performed in a state of rest. Any faults that occur will be detected when the processor becomes active again.

The processor leaves its state of rest in the following situations:

- When the ignition is turned to ON.
- When the "ROOF" switch is activated to operate the soft top.
- When any or all of the window lifts are operated with any of the five switches in the centre console.

The processor does not take its state of rest in the following situations:

- If the soft top, fifth bow or soft top cover are between two end positions.

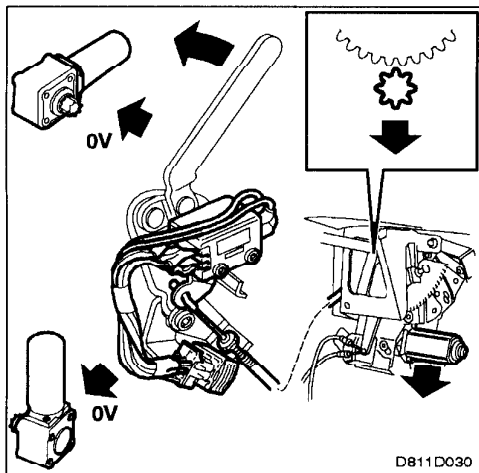
When the processor is in its state of rest, it is not possible to establish communication between the control module and the diagnostic tool. To "wake up" the processor, one of the window lift switches can be operated, for example.

Emergency closing

It is not normally possible to operate the soft top or soft top cover manually. This is due to the EMF (electromotive force) that is created in the motors when an attempt is made to change their position. To enable raising (closing) the soft top even when there is a fault in the system, such as when the battery is flat, there is an emergency closing function integrated in the soft top system.

There is an emergency closing lever located on the right-hand side behind the rear seat cushion. Moving it from its vertical to horizontal position will activate the emergency closing function. The circuit to the soft top main motors and to the fifth bow motor is cut by a switch on the emergency closing lever at the same time as the soft top cover motor is disengaged from the ratchet in the soft top cover driving mechanism.

Emergency closing is performed as follows:

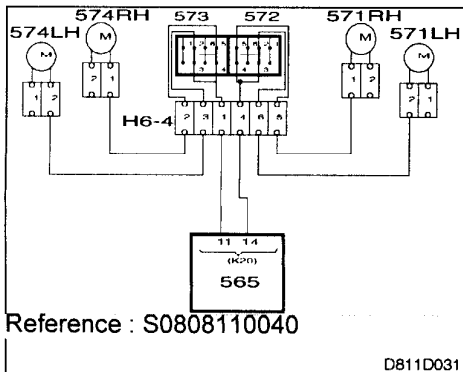


- Put the emergency closing lever in its horizontal position.
- Raise the soft top cover.
- Raise the soft top without locking it to the windscreen frame.
- Lower the soft top cover.
- Lower the fifth bow as far as it will go.

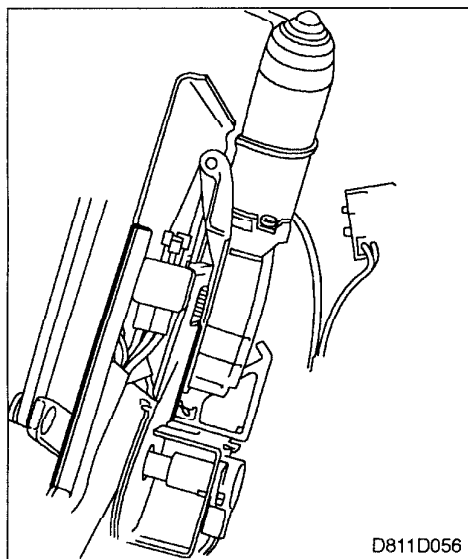
IMPORTANT

The fifth bow cannot be locked during emergency closing. It is kept in position by the EMF created in the fifth bow motor once the emergency closing lever has been returned to its vertical position.

- Press down the soft top cover as far as it will go while at the same time returning the emergency closing lever to its vertical position.
- Lock the soft top to the windscreen member



Resetting



- Remove the luggage compartment trim on the right-hand side and, if necessary, the right-hand lamp cluster so that it is easier to reach the soft top cover motor.
- Re-engage the soft top cover motor in the ratchet in the soft top cover driving mechanism.

IMPORTANT

The soft top cover motor must be engaged in the ratchet.

- Make sure the emergency closing lever wire is slack
-
- Read the diagnostic trouble codes.
 - Rectify

IMPORTANT

There is no emergency lowering (opening) function for the soft top.
