



Mercedes-Benz

Vario Roof



P00.00-3593-00

Model R171

Objectives

At the end of this session, you will be able to:

1. Explain how roof can be operated
2. Explain operation of front and rear windows
3. Identify and locate the major mechanical, hydraulic and electrical components
4. Perform an emergency closing procedure of the roof and rear windows
5. Identify the tools required for hydraulic testing
6. Successfully attach hydraulic tools
7. Perform diagnosis of an inoperative vario roof

These technical training materials are current as of the date noted on the materials, and may be revised or updated without notice. Always check for revised or updated information.

To help avoid personal injury to you or others, and to avoid damage to the vehicle on which you are working, you must always refer to the latest Mercedes-Benz Technical Publication and follow all pertinent instructions when testing, diagnosing or making repair.

Illustrations and descriptions in this training reference are based on preliminary information and may or may not correspond to the final US version vehicles. Refer to the official introduction manual and WIS when available.

Copyright Mercedes-Benz USA, LLC, 2004

Reproduction by any means or by any information storage and retrieval system or translation in whole or part is not permitted without written authorization from Mercedes-Benz USA, LLC or its successors.

Published by Mercedes-Benz USA, LLC

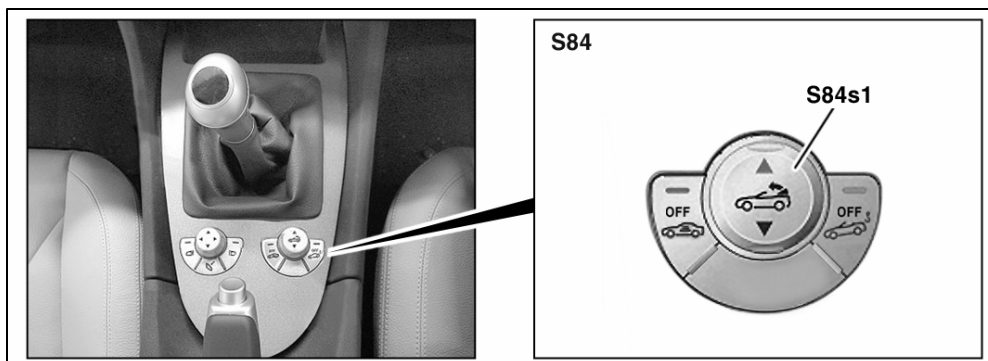
Printed in U. S.A.

Contents

Roof operation	4
Window operation	7
Mechanical components	11
Hydraulic components	16
Electrical components	23
Emergency closing procedure	30
Appendix	31

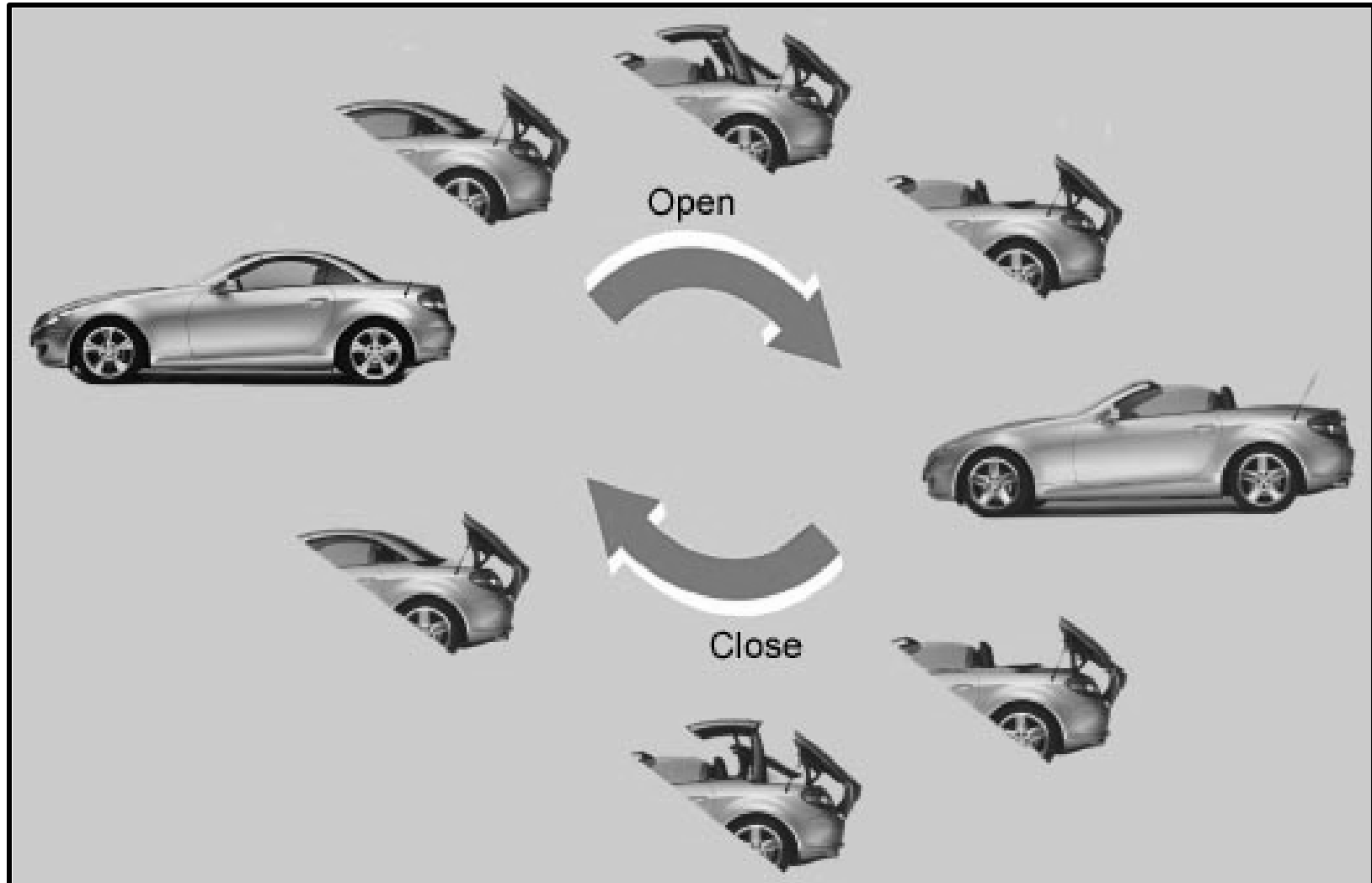
Customer Operation of Roof

- Via Vario Roof switch (S84s1)
 - Trunk partition and trunk lid must be closed
 - Vehicle speed must be <3 mph
- Via Infrared remote control
 - Only with “Premium Package” option which includes infrared sensors on exterior door handles (base vehicle: no sensors)
- Simultaneous operation of all windows during roof operation
- Messages displayed in multi-function display: “Close trunk lid”, “Close trunk partition”, “Hardtop open”, “Hardtop closed”, “Hardtop in operation!”, “Visit Workshop”, “Lock Vario Roof”, Visit Workshop”



S84 Vario Roof/ATA switch group
S84s1 Vario Roof actuation switch

Roof Operating Sequence



Duration of Open or Close operation: 22 seconds each

Stop Mode

When operation is interrupted before reaching fully open or closed position, the Vario Roof will only hold its position temporarily:

- for 7 minutes if ignition is ON
- for 15 seconds if ignition is switched OFF!

(15 second rule also applies when operating via infrared remote)

(audible warning is heard before pressure is released and gravity takes over)



Operation of Windows

- 3 Methods of operation:
 - Switches on interior handles : Front windows only
 - Express Open and Close
 - Recirculated air switch: all 4 windows
 - Press and hold switch
 - Vario roof switch: All 4 windows using roof switch
 - Express Open / *Manual* Close
 - Front side windows are automatically operated during Vario Roof operation to avoid damage to windows or seals
 - Closed windows will be lowered slightly
 - Windows already open will stay open

Operation of Windows via Roof Switch

- Tap switch twice within 0.5 second in the desired direction
(when closing, continue to hold switch forward)
 - Opening: All open in express mode
 - Closing: Front windows close first, then rears close
- Door switches can't be used to close windows while Vario Roof is being operated



Rear Side Windows

- Rear window motors are operated directly by Vario Roof control module
- Vario Roof control module has master control over any other rear window requests *during* roof operation
- Roof operation affects rear windows as follows:
 - Roof Open or in operation = Rear side windows will be open
 - Roof Closed = Rear side windows will be closed
- Emergency closing through VR actuations in DAS or by applying 12V& ground at window motor connector(s) in trunk

Review

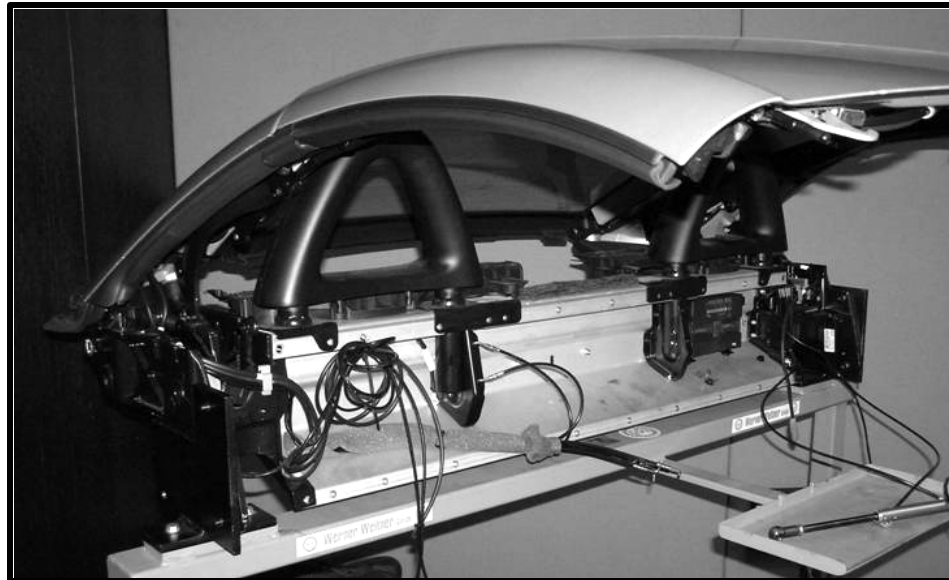
1. Which method of operating the roof is available only with the “Premium Package” option?
2. Besides using the window switches, describe another way of operating the SLK windows.
3. Can all four windows be lowered with the top closed?

Mechanical Components

Roof panels
C-pillars
Rear window
Cross member
Rear cover
Trunk lid
Tubular frame

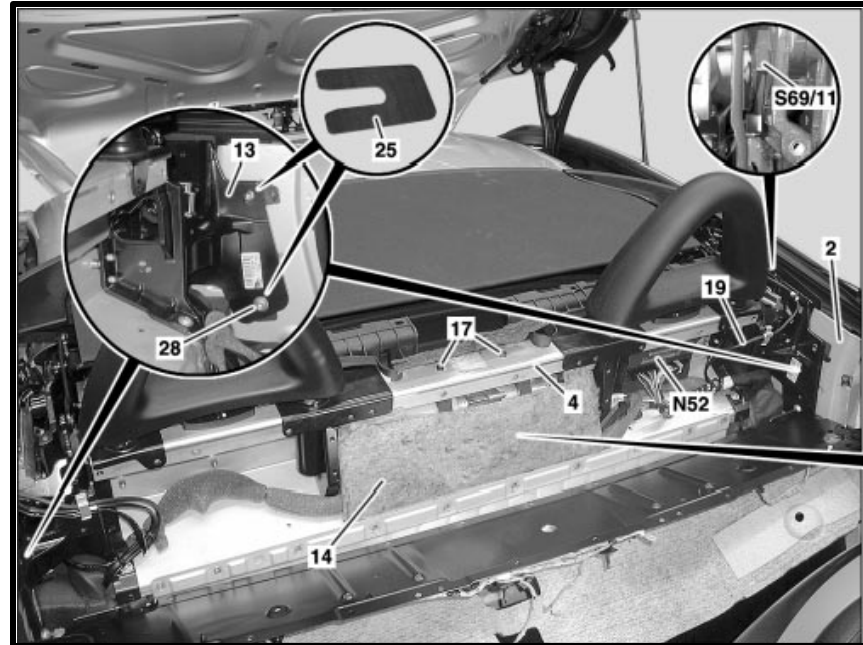
Vario Roof – Complete Assembly

- One unit with all necessary attachments from supplier
 - Two-panel steel roof elements
 - Two C-Pillars with interior and exterior panel in steel
 - Rear window of 3mm thick heated single-pane safety glass
 - Rear window heater only works when roof is closed
 - Rear shelf and two side flaps



Cross Member

- Cross member details
 - Roof mechanism main bearings (13) are stabilized by an aluminum cross member (4) bolted to the Center pillar (2)
 - Fixed roll over bars
 - Shims (25) – tape in place to keep in proper location when removing



Pump

2 Center pillar

4 Vario roof cross member

13 Main bearing

14 Insulating mat

17 Bolts

19 Electrical line

25 Spacer

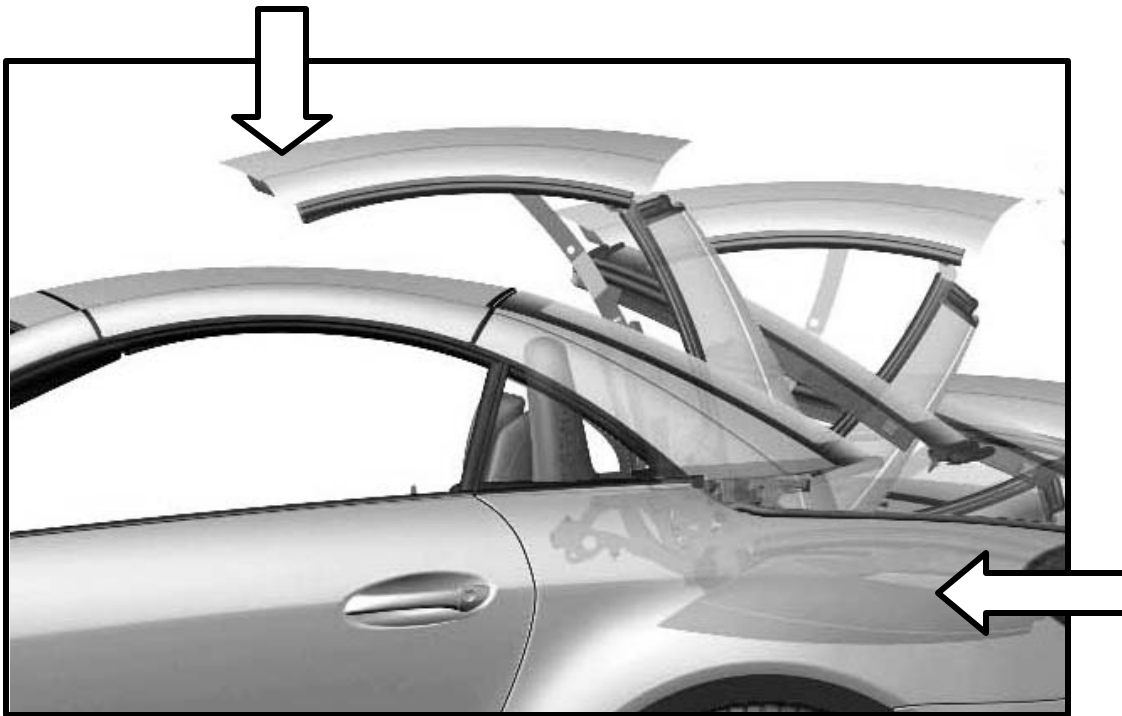
28 Bolt

N52 Power soft top control unit

S69/11 Vario roof open/lowered limit switch

Roof Panels, C-Pillars & Rear Cover

1 Hydraulic cylinder
operates 2 latches at
front of roof



Rear cover raised and
lowered mechanically

2 Hydraulic cylinders
lower and raise roof
panels & C-pillars

Tubular Frame



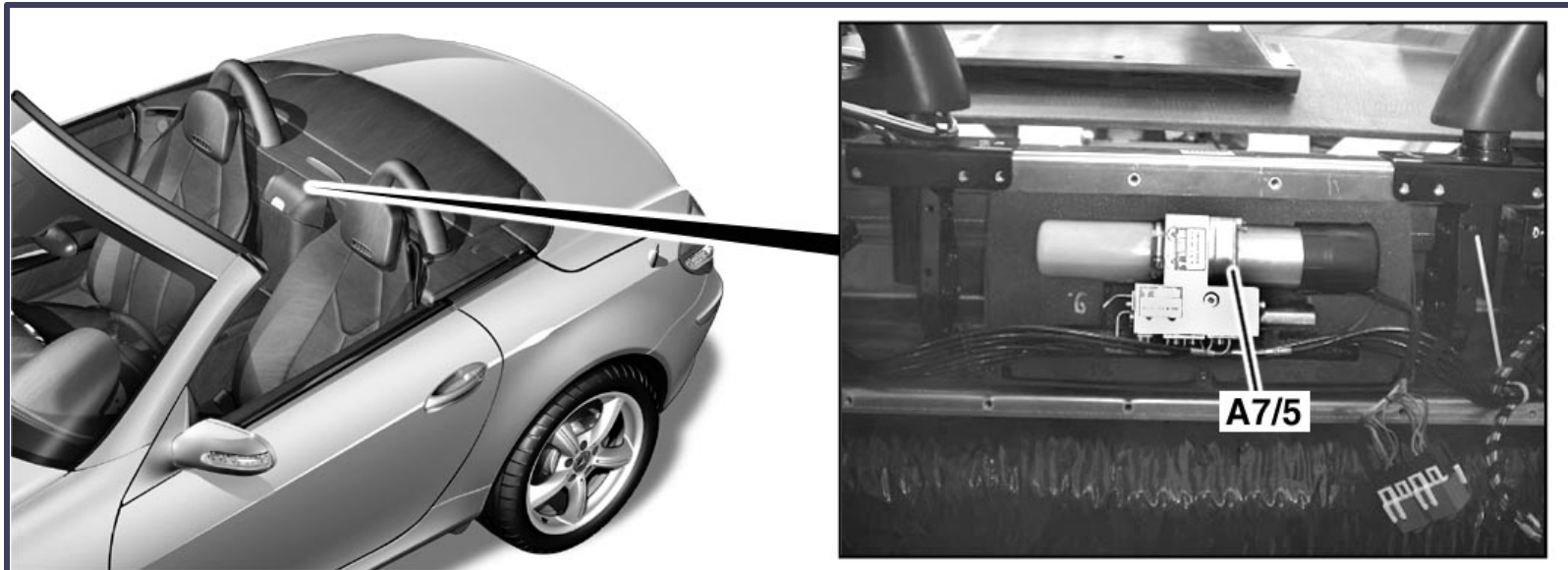
2 hydraulic cylinders open and close tubular frame. Design allows trunk lid to move rearward when opening and forward when closing

Hydraulic Components

Hydraulic unit
Connecting lines
5 hydraulic cylinders

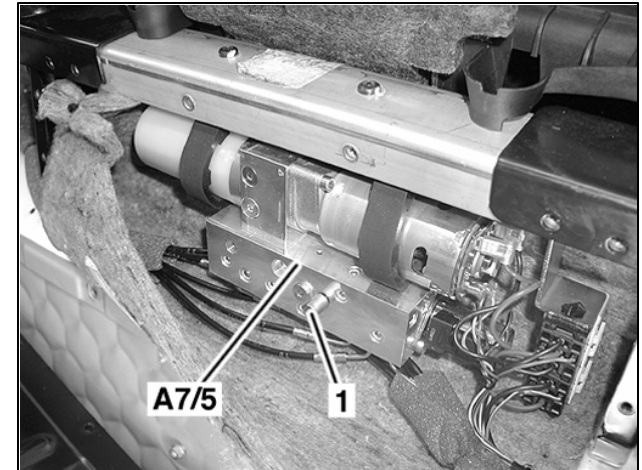
Hydraulic Unit (A7/5)

- Contains:
 - Hydraulic pump motor
 - Hydraulic reservoir
 - 1 solenoid valve
 - Check & control valve block

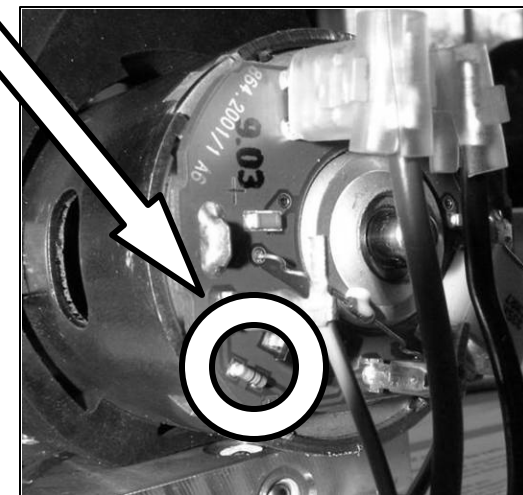


Hydraulic Unit Pump

- Reversible electric pump motor
 - Pump changes direction of rotation during operation
 - Pump pressure 140 ± 10 bar (2030 psi)
 - Motor temperature monitored via PTC sensor on pump circuit board (A7/5b1)



1 Emergency release valve



A7/5b1 Temperature sensor

Open Vario roof from closed non-actuated state:

Enable < 75 °C (167°F)

Disable/Interrupt >85°C (185°F)

Subsequently close or relock Vario roof:

Enable < 85 °C (185°F)

Disable/Interrupt >90°C (194°F)

Hydraulic Unit Oil Reservoir

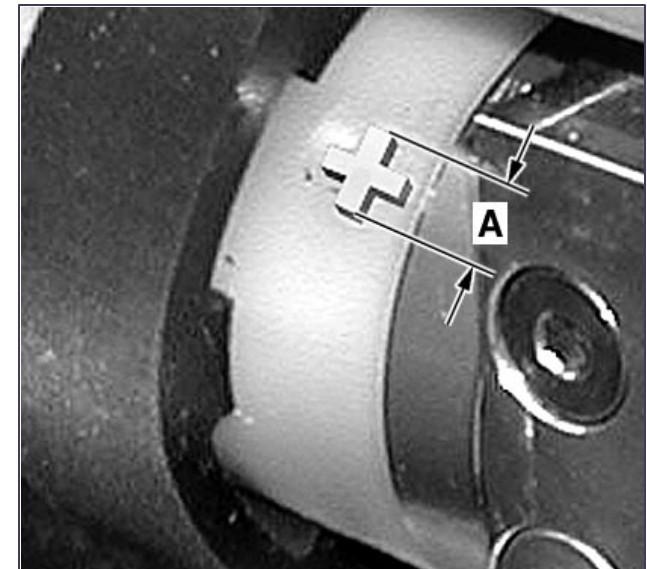
Checking oil level:

- Oil level must be within the marking (A) on reservoir with roof open

If level is too low, look for leakage.

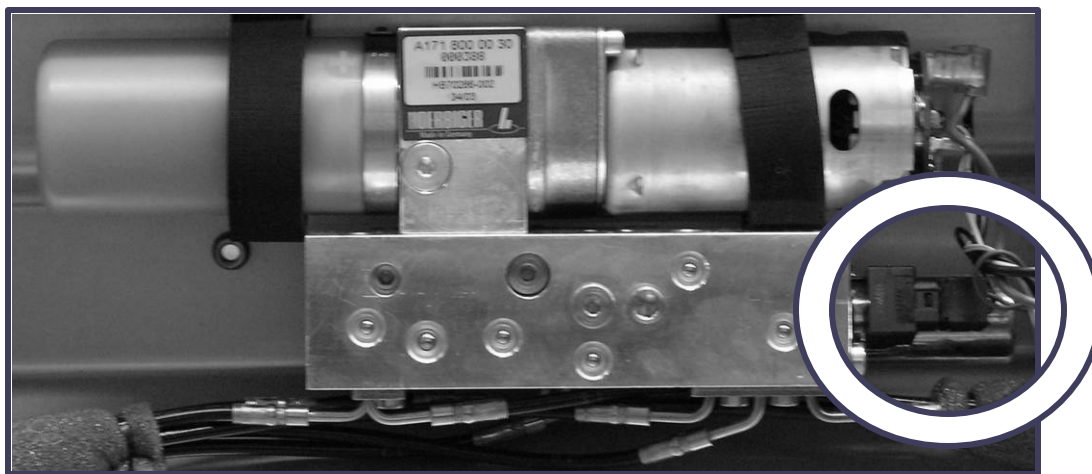
Adding oil:

- Remove hydraulic unit (A7/5) from bracket
- Turn until filler screw (6) can be unscrewed without losing oil
- Add oil
- Recheck in installed position

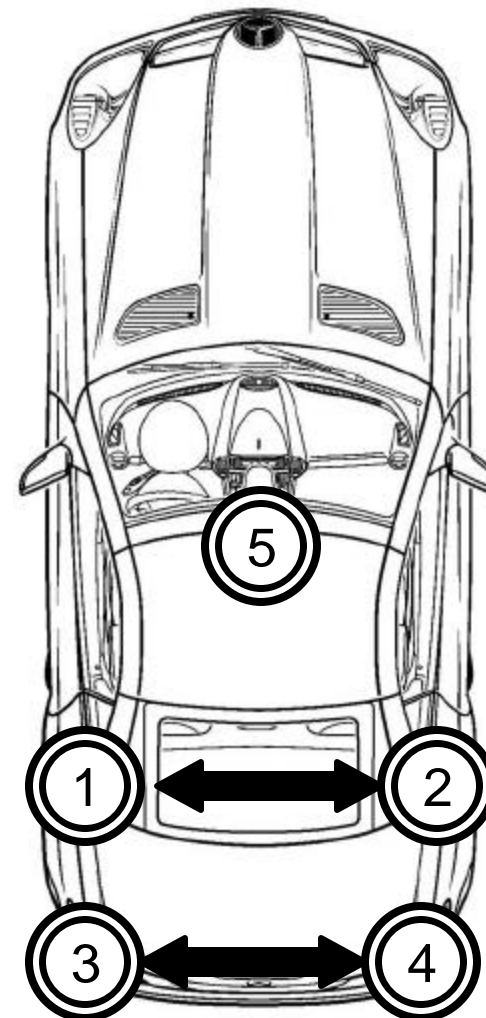
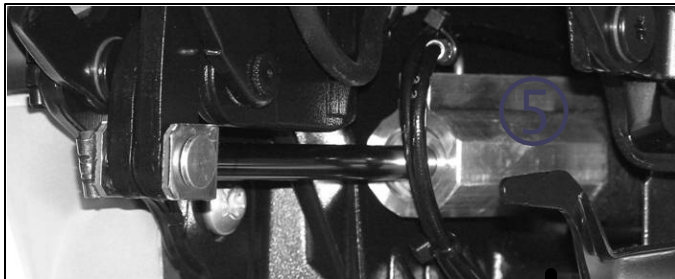
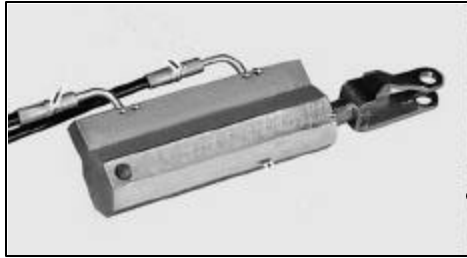


Solenoid Valve (A7/5y1)

- Routes oil pressure to respective side of tubular frame and front lock cylinders
 - Rest position to close trunk lid and front lock
 - Power is applied to open trunk lid and front lock
- Used during Stop Mode to hold the cylinders in hydraulic lock



5 Hydraulic Cylinders



roof latch

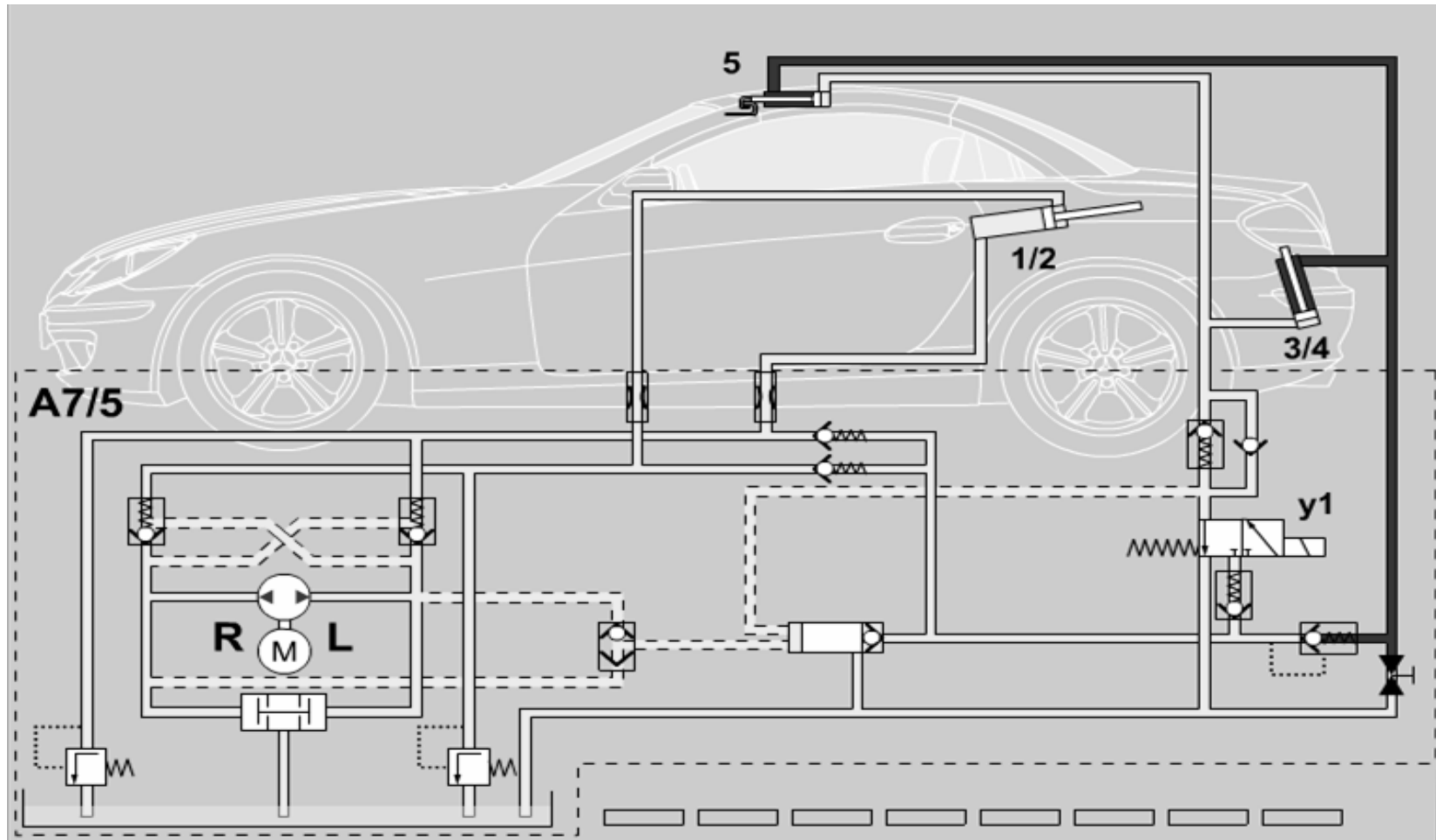
roof

trunk lid

21

Note: cylinder numbers refer to diagram on next page

Check & Control Valve Block



1/2 Hydraulic cylinders - Vario Roof

3/4 Hydraulic cylinders - Tubular Frame

5 Hydraulic cylinder - Vario Roof lock at front

A7/5 Vario Roof hydraulic unit

A7/5y1 Vario Roof - solenoid valve

Electrical Components

Fuses

Control Module

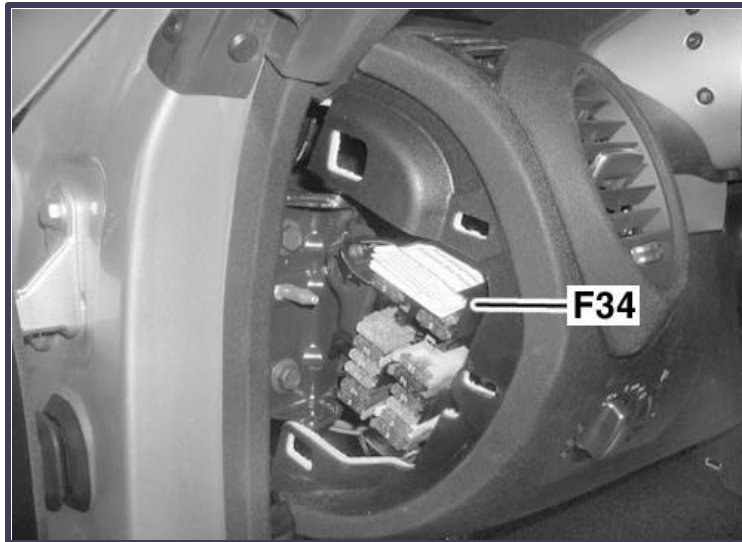
Relays

Solenoid valve (covered previously)

Limit Switches

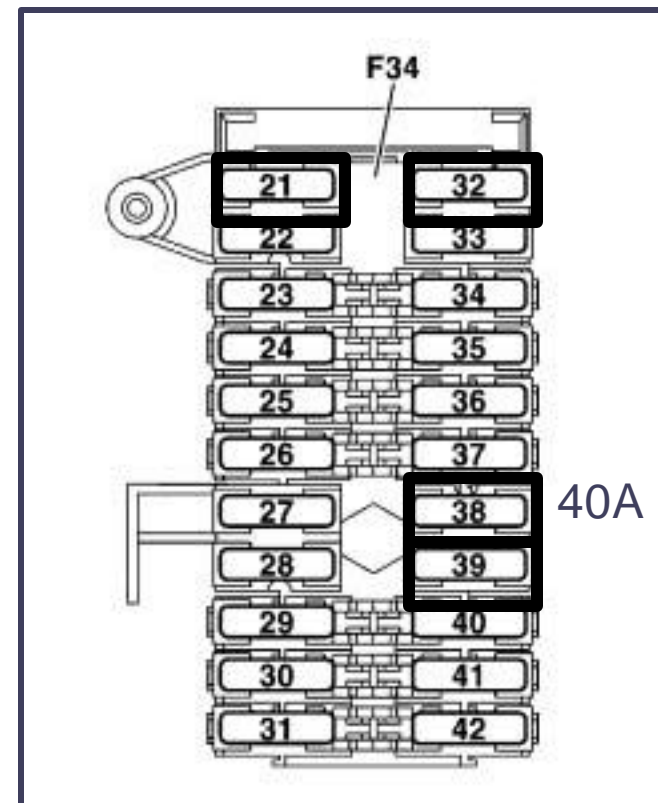
Fuse Location

F34 (interior fuse box)

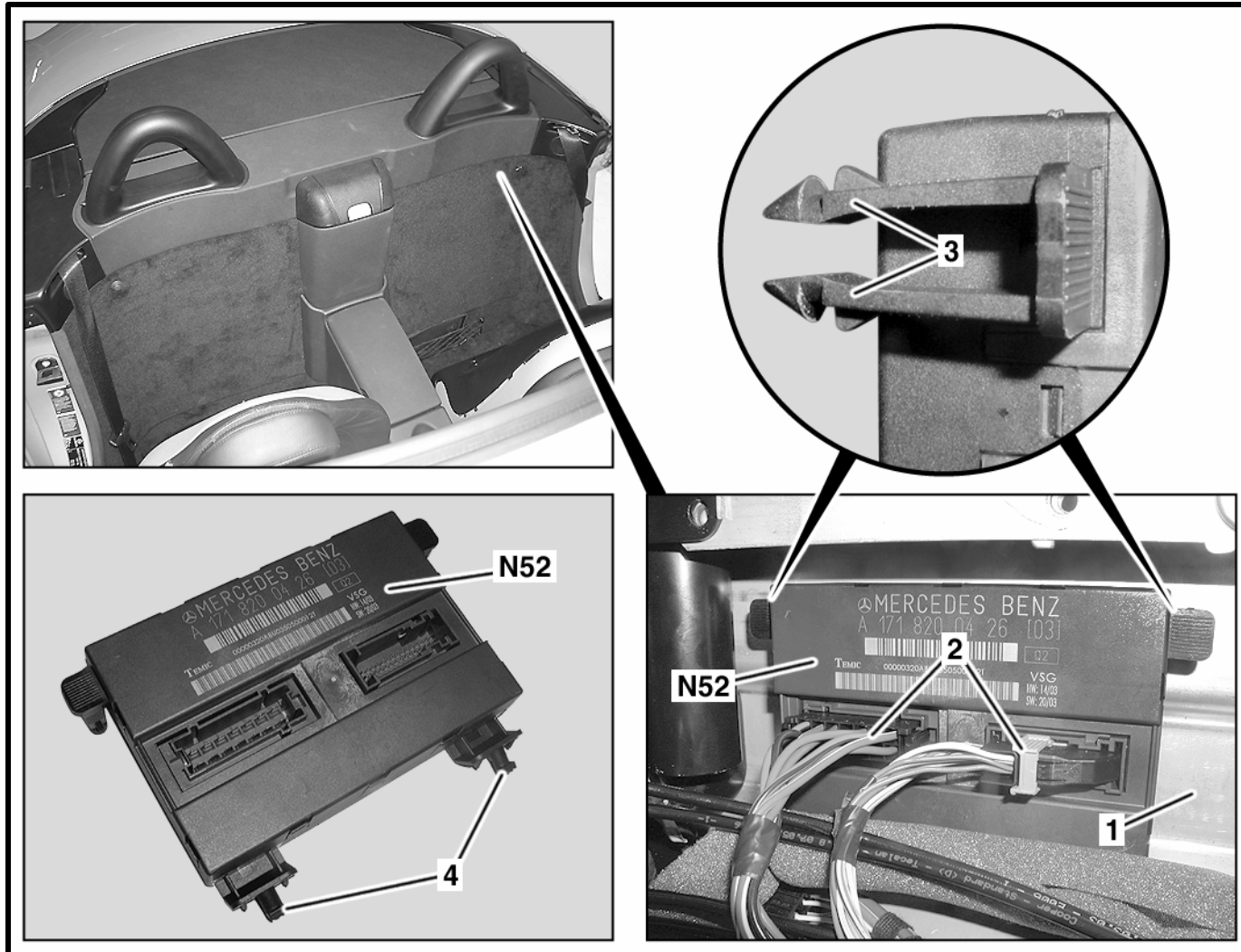


f21 }
f32 } VR Control unit (N52)
f39 }

f38 – VR Hydraulic unit



Control Module (N52) Location



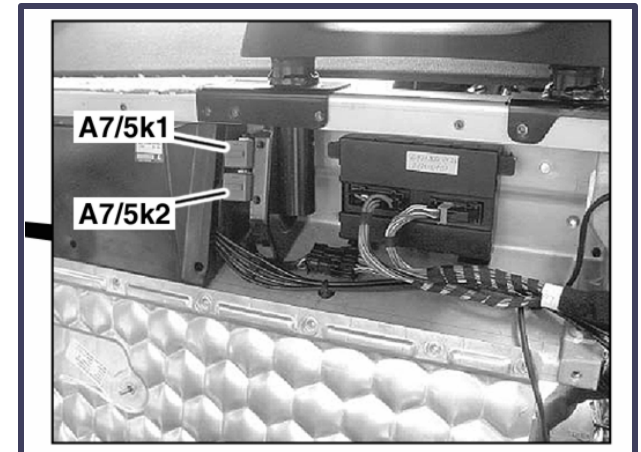
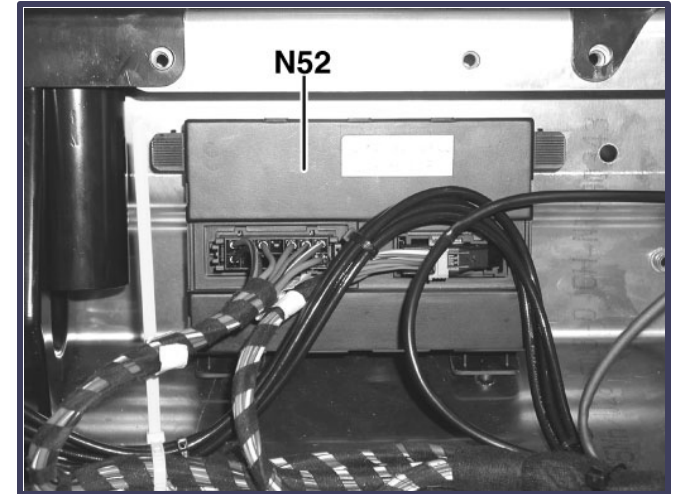
1=Cross member

2=Connectors

3&4=Mounting tabs

Control Module & Limit Switches

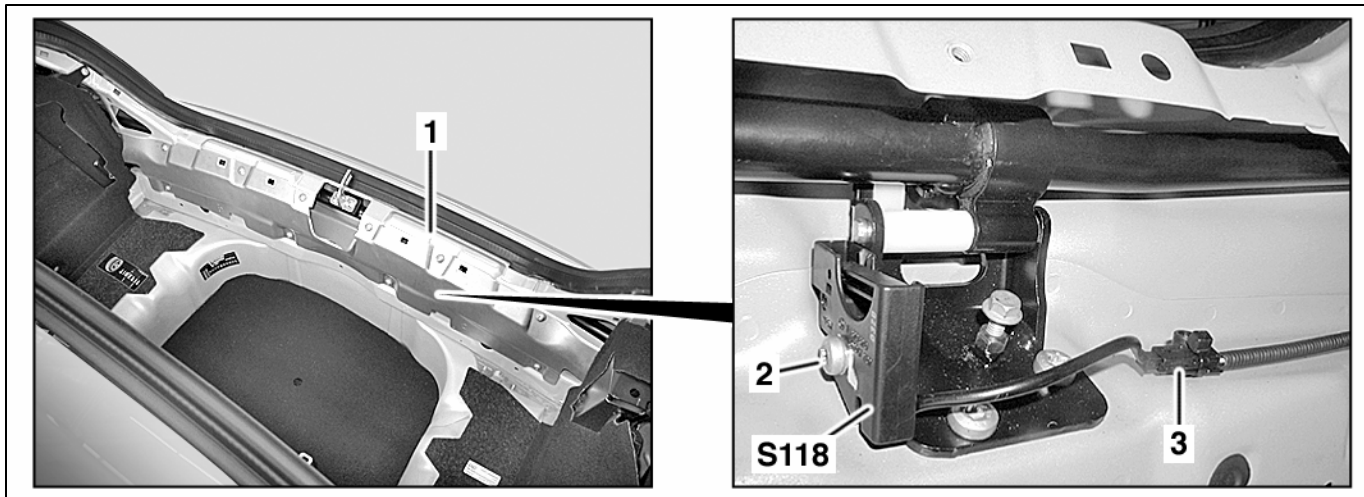
- Control Module (N52) tasks:
 - Control of hydraulic unit
 - Control of rear side window motors
 - Send function and warning messages over CAN B
 - Read switch position and sensor values
 - Control Vario Roof Hydraulic unit relays to change direction of pump motor rotation
 - A7/5k1 & A7/5k2
- 5 limit switches indicate position of roof components.



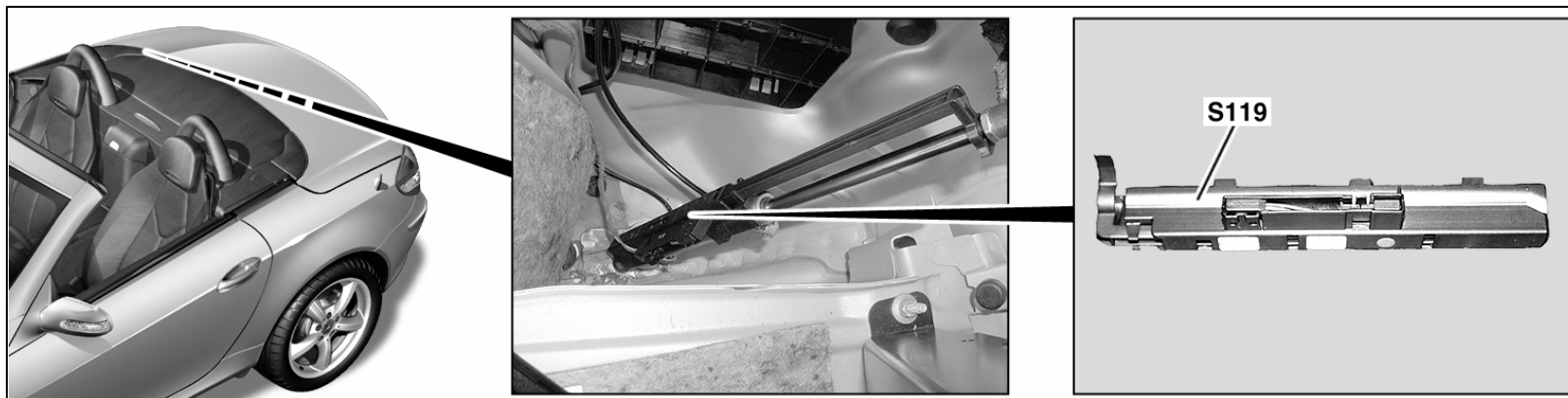
Note: High amperage consumers (windows/pump) are switched on with 80ms time delay

Tubular Frame Limit Switches

Tubular frame "locked" switch (S118)

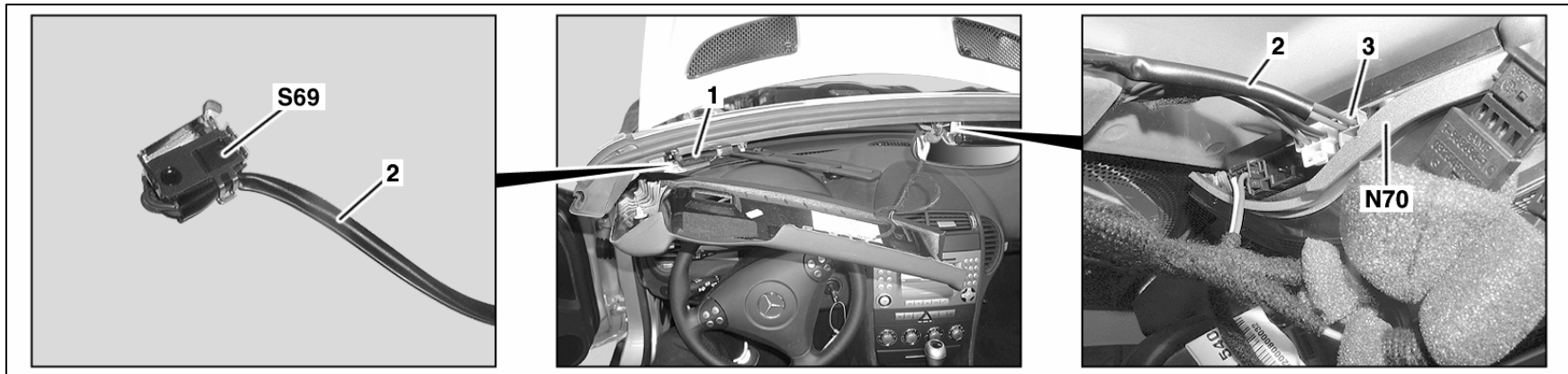


Tubular frame "open" switch (S119)

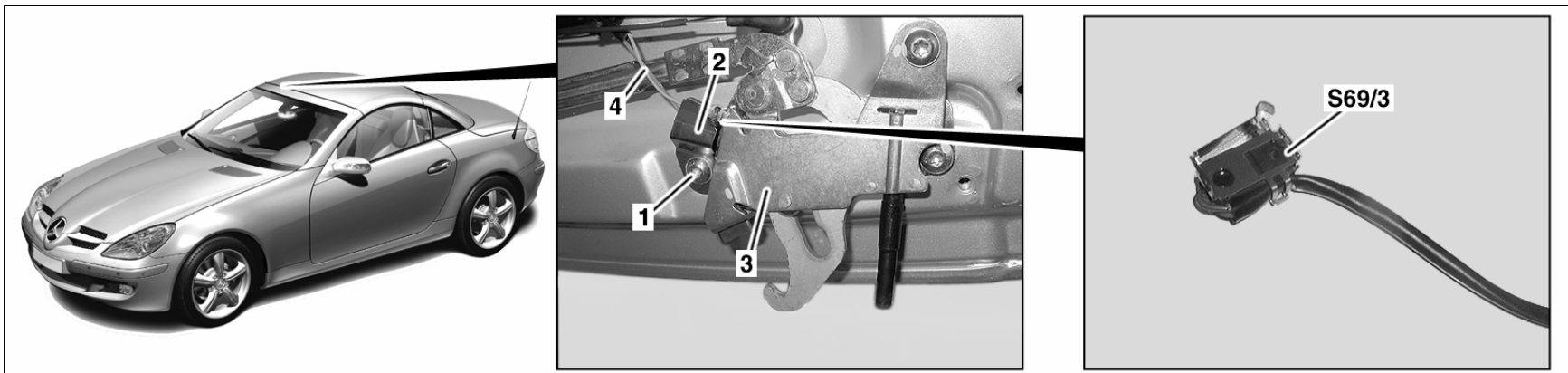


Roof Closed & Locked Limit Switches

Vario Roof "closed" switch (S69) → CAN B input to N52 from Overhead Control Panel (N70)

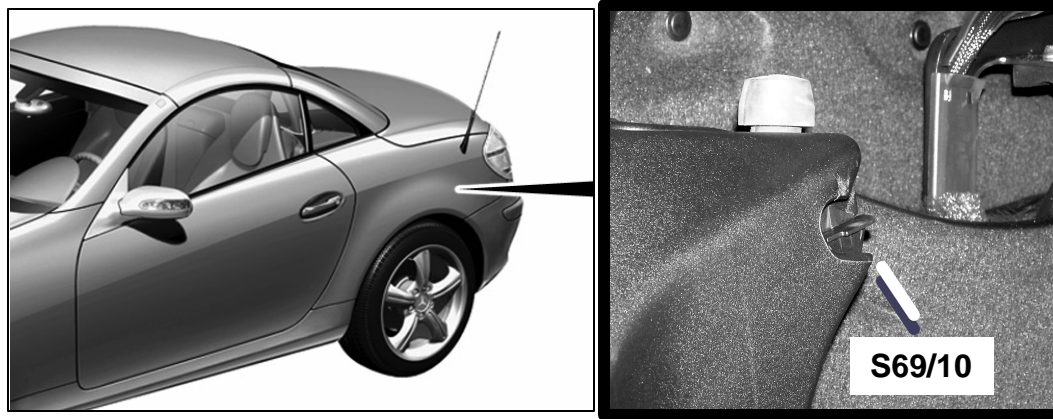


Vario Roof "locked" switch (S69/3)

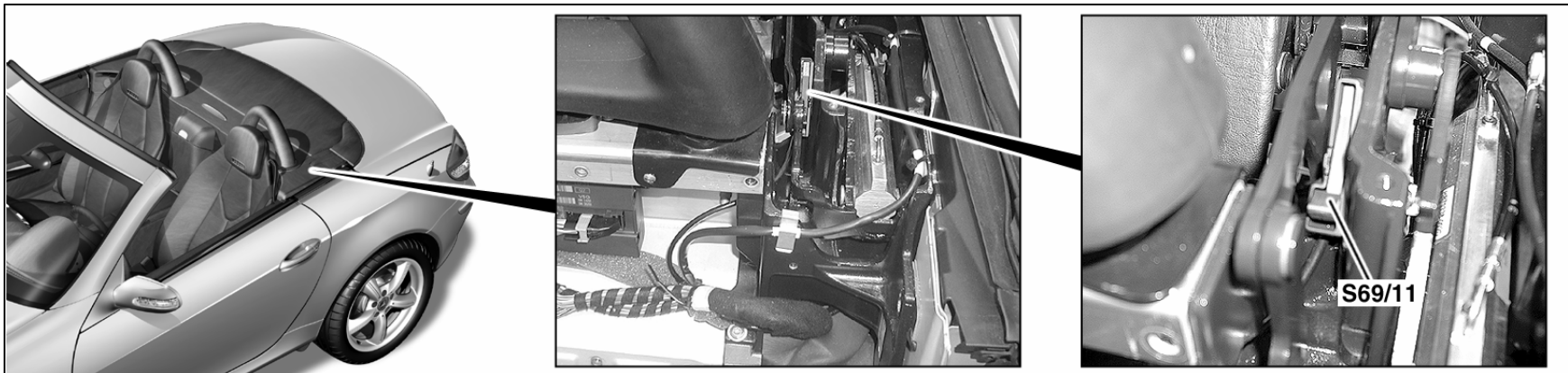


Trunk Partition & Roof Open Limit Switches

Trunk partition "closed" switch (S69/10)



Vario Roof "open/lowered" switch (S69/11)

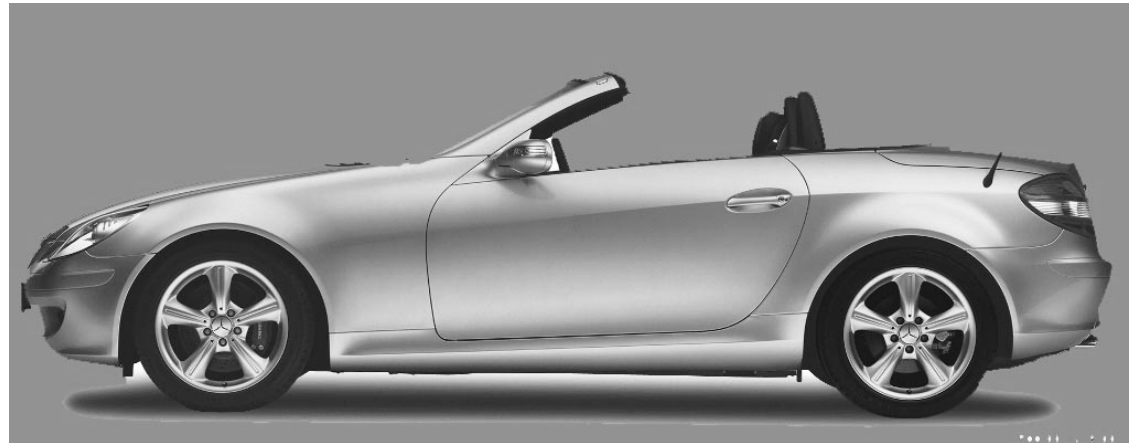


Trunk lid must also be closed –CAN B input to N52 from rear SAM

Emergency Closing

Requirements:

- Job Aid 03-1 “Vario Roof Emergency Closing”
- 6mm hex wrench
- Pry tool to remove cylinder spring tab
- Vehicle’s emergency key (to operate trunk latch)
- 2 people
- SDS/DAS equipment or jumper wires (to close rear windows)



Vario Roof Appendix

Other VR tools

Roof Adjustment Tools

