Astra G Cabriolet Roof – Tips and Tricks

System overview

The convertible roof on the Astra G is a relatively simple eletro-hydraulic system which is quite easy to work on and is mostly quite well built. The mechanism comprises the following key components:

- Roof ECU mounted in the boot compartment behind the trim panels near the right-hand rear light cluster. This ECU controls all functions of the roof, including the boot lock, all four electric windows, and the heated rear window as well as the hydraulic pump, valves and the electric motor in the front edge of the roof.
- Roof pump located just below the roof ECU. The pump includes the hydraulic fluid reservoir and is self-purging if any air does get into the system. The pump supplies the hydraulic pressure required to operate the five rams which move the roof through a series of flexible hydraulic lines. Each ram can both "push" and "pull", thus has two hoses connected to it.
- The two main hydraulic rams are located behind the rear door cards and lift and lower the entire roof mechanism. The right-hand ram includes sensors to report to the ECU when it is fully extended or retracted. These rams are generally very reliable and the hoses to them rarely burst as they are not subjected to much movement.
- The two rear "tension bow" hydraulic rams are located in the roof mechanism one on each side of the rear windscreen. These rams raise and lower the rear edge of the roof. The right-hand ram includes sensors to report to the ECU when it is fully extended or retracted. In the lowered position, this rear edge puts tension on two wide straps which run the entire length of the roof and apply tension to the mechanism to keep the roof taut. These rams sometimes seep a little fluid this can be seen on the top surface of the tonneau cover. The hoses are liable to damage as they pass along the roof hinge mechanism where they can become chafed, and they have to flex quite a lot as the roof moves.
- The single tonneau cover ram is located on the left hand side of the tonneau cover. It includes a sensor to signal when the ram is fully extended. The lower end of the ram is attached to a mechanism which mechanically latches the front edge of the tonneau cover when closed by pulling on two cables similar to those used for the brakes on a pushbike. This mechanism includes a microswitch which reports to the ECU when the cover is latched. The hoses to this ram can burst as they are subjected to a lot of movement when the cover opens and closes, and one of them is routed through a tight 180° bend.
- The boot lid includes a microswitch which reports to the ECU when the boot is closed.
- The boot lock reports to the ECU when the boot is locked and unlocked.
- The front edge of the roof mechanism includes an electric motor and two mechanical latches which hold the roof closed. The left hand latch includes two hall-effect (magnetic) sensors which report when the latches are fully engaged and fully released. The latches also drive a pair of forks, one on each side rail of the roof, to "flip" the front edge up or down.
- The windscreen surround has two recesses for the front edge latches to engage with, and two holes for guide pins to ensure proper alignment. The left hand guide pin also pushes on a microswitch to signal to the ECU when the roof is closed.
- There is a beeper in the passenger footwell hidden inside the centre console just in front of the gear lever. This bleeps once at the end of the roof open/close cycle. It bleeps 12 times if any malfunction occurs.
- There is a small microswitch under the handbrake to confirms that the handbrake is applied.

Roof automatic sequence

Text in **bold** describes an action which takes place, while text in *italics* describes the expected state checked by the ECU at the end of the step. The ECU also applies a maximum permitted time for each step – if the required signal isn't received within this time, the roof will stop moving.

Step	Handbrake	Boot	Windows	Front latches	Roof	Tension bow	Tonneau cover	Main rams
0	Applied	Shut		Latched	Closed	Down	Locked	Up
1	Applied	Lock & shut	Lower					
2	Applied			Open & unlatched	Not closed			
3	Applied	Shut				Raise & up		
4	Applied	Shut					Raise & open	
5	Applied	Shut				Lower & down		
6	Applied	Shut		Close & latched				Lower & down
7	Applied	Shut					Close & locked	
8	Bleep	Unlock	Raise					

Opening

Closing

Step	Handbrake	Boot	Windows	Front latch	Roof	Tension bow	Tonneau cover	Main rams
0	Applied	Shut		Latched	Not closed	Down	Locked	Down
1	Applied	Lock & shut	Lower					
2	Applied	Shut					Raise & open	
3	Applied	Shut		Open & unlatched				Raise & up
4	Applied	Shut				Raise & up		
5	Applied	Shut					Close & locked	
6	Applied					Lower & down		
7	Applied			Close & latched	Closed			
8	Bleep	Unlock	Raise					

Manually opening the roof

- **1.** Lower the windows. This is important and easily forgotten. Failing to lower the windows can damage the roof mechanism and may even result in the windows breaking.
- 2. Open the roof latches using the supplied hex tool through the grommet in the centre of the front edge. It takes a lot of turns, so be patient, and the latches appear to stop moving a long time before the mechanism has fully opened the side "flipper forks" move during this time to raise the front edge of the roof by about 10cm. When the latch is fully open, the mechanism should feel a little stiffer, but don't force it as this will break the plastic blocks or damage the flexible drive shafts! Do <u>NOT</u> use a power tool to drive the mechanism this will almost certainly break the latches.
- 3. Open the boot.
- 4. Push the release lever on the left-hand side of the boot fully forward and wedge it there.
- 5. Close the boot lid.
- 6. Raise the rear windscreen.
- 7. Open the tonneau cover and clip the Vauxhall/Opel supplied plastic clip onto the ram (or some other means) to keep it open.
- 8. Lower the rear windscreen.
- 9. With a helper, slowly move the front edge of the roof up and backward until the roof folds into the storage compartment.
- Close the latches again, this takes a lot of turns. Make sure the latches are pointing at each other since they will hit the tonneau cover and damage it if they are pointing upwards.
- 11. Loop about a 1.5m length of string around the base of the tonneau cover hydraulic ram (circled in green in the image to the right) and leave both ends on the left-hand rear window trim – this string will be used to pull the locking mechanism into the locked position when the tonneau cover is lowered.
- 12. Close the tonneau cover.
- 13. Open the boot.
- 14. Remove the wedge from the release lever.
- 15. Gently but firmly pull on both ends of the string you should see the front edge of the tonneau cover pull down slightly and here a "clunk" noise as the latches engage fully.
- 16. Check that the tonneau cover is securely locked driving with the roof down and the cover unlocked will cause significant damage as the cover will open into the wind.
- 17. Pull on one end of the string to remove it from the mechanism.



Manually closing the roof

Starting from the position of the roof being fully open, this is the sequence to close the roof manually.

- **1.** Lower the windows. This is important and easily forgotten. Failing to lower the windows can damage the roof mechanism and may even result in the windows breaking.
- 2. Open the boot.
- 3. Push the release lever on the left-hand side of the boot fully forward and wedge it there.
- 4. Close the boot lid.
- 5. Open the tonneau cover and clip the Vauxhall/Opel supplied plastic clip onto the ram (or some other means) to keep it open.
- 6. Open the roof latches using the supplied hex tool through the grommet in the centre of the front edge. It takes a lot of turns, so be patient, and the latches stop moving a long time before the mechanism has fully opened the side "flipper forks" move during this time. When fully open, the mechanism should feel a little stiffer, but do NOT force it this will break the plastic blocks or damage the flexible drive shafts! Do <u>NOT</u> use a power tool to drive the mechanism this will almost certainly break the latches.
- 7. With a helper, lift the front edge of the roof out of the storage compartment and move it toward the "almost closed" position with the front edge about 10cm above the windscreen.
- 8. Raise the rear windscreen fully.
- 9. Lower the tonneau cover.
- 10. Lower the rear windscreen.
- 11. Gently close the latches using the hex tool. The first part of the motion should flip the front edge of the roof down using the forks on the side-rails, then the latches pull the roof into the fully locked position.

Resetting the roof

If the roof malfunctions, or is manually opened or closed, it will need to be reset before the automatic open/close functions will work again. To reset the roof, use the manual opening and closing instructions above to get the roof to the stage where:

- The front edge is unlocked and about 10cm above the windscreen
- The rear window is vertical
- All four side windows are at least 5cm down
- The tonneau cover is closed but not latched
- The release lever is NOT wedged

The roof is then reset simply by starting the engine (to ensure the battery isn't drained) and holding the "close roof" button until the roof is fully closed.

Refilling the hydraulic fluid

The hydraulic fluid reservoir is part of the pump located in the boot on the right hand side behind a cover near the rear lamp cluster. The level should always be checked with the roof fully open as it will look low if the roof is closed. As the system is completely sealed, a loss of fluid is rare, but if you've replaced a hydraulic hose after a burst you will need to replace the lost fluid. There are three ways to fill the fluid, bearing in mind the filling port is below the minimum level:

- 1. The Vauxhall/Opel way un-bolt the pump, tilt it, refill it, refit it. This is by far the best method, but is a lot of work.
- 2. Jack the rear corner of the car up to cause the fluid to tip. It works, but you have to jack the car up a LONG way to do this again, not really recommend. It is better if you can find a steep driveway to use park the car nose-down and the process should be easier.
- 3. Use a syringe or a length of clear plastic pipe to slowly add as much fluid as possible while the roof is completely closed, then replace the sealing bolt and open the roof to check the level. The fluid level will rise slightly, and should now be just about on the minimum mark. This method works, but only gets the level to the minimum having a sloping driveway as well will allow the level to be increased a little more, which is definitely an advantage.

Note that the whole system is self-bleeding, so if you've lost a lot of fluid, you may need to top up the fluid several times before all the air is purged from the system. If a lot of fluid has been lost (e.g. replacing an entire hydraulic ram with both hoses) then the roof may stall partway through the opening or closing cycle. Don't panic – this is normal. Simply close the roof manually (as above) and add some more fluid, then reset the roof and try again. It might take half-a-dozen attempts before you've got enough fluid in the system after changing one ram, even more if you've changed several.

Broken wires

Like any electrical system, the roof mechanism relies on wires to link the various bits together. Since the roof moves, these wires have to move, and after many thousands of operations, this movement can cause the wires to break. When this happens, the electronics in the roof notices and stops the roof. Repair the wires, reset the mechanism, and it should all work again. In the Astra roof, there are two bundles of wires which seem very prone to breaking.

Roof loom

The roof loom runs from the ECU in the boot, through the roof stowage compartment, up the righthand main hinge, toward the rear of the car along the lower roof surround, then all the way forward inside the roof between the inner and outer fabric to connect to the front latch motor and the hall sensors on the left-hand latch. The same loom also carries the wires for the heated rear window and the rear bow position sensors on the right-hand hydraulic ram. The loom tends to break just by the main roof hinge on the right hand side of the car where it has to flex twice on each cycle of the roof. The loom is protected by a black nylon braid which has to be removed before the wires can be inspected. If broken, a repair can be effected by lengthening the wires slightly and using heat-shrink sleeving to insulate the joints.



Boot loom

The other wiring loom which often seems to break is on the left-hand side of the car and runs from the boot lid to the main body of the car. Just behind the left-hand boot liner is a connector block and an earth stud – the wires usually seem to break here. If the wires fail, the first symptom is usually that the central locking stops working on the boot, and the heated rear window is disabled (because the roof ECU can't tell whether the roof is open or closed). Movement of the roof is also usually inhibited – but not always!

Front Roof Latches

Taken from http://www.astra-cabrio-forum.de/thread.php?threadid=27142

Full credit goes to "JR__" on the Astra Cabrio forum for the original work.

The Problem

The Astra Convertible roof front edge is held closed by two metal latches. These latches are driven by a centrally mounted electric motor and a pair of sliders on a worm-gear. These sliders are made of plastic and are prone to sheering. When this happens, the roof can no longer be opened or closed. If the roof is fully closed, opening it can be tricky, and unfortunately this is the first step to repairing.

The Repair

JR____ came up with a really neat and strong repair, replacing the weak plastic block with a metal unit. Unfortunately, the original plastic block runs on a worm gear with a very peculiar thread, so rather than having this tapped directly into the repair, the original block is cut down to fit inside a "cage". This clever step keeps the cost of the repair much lower – the two cages can be made for about £30 in a local workshop, but tapping the thread would cost about £100 each. The two latches are slightly different as the left-hand latch also includes the Hall-effect position sensors which allow the roof ECU to decide when the latch is fully open, fully closed, or in transit. The threads are also opposite to each other, so if you are repairing both, make sure not to swap the blocks and worm gears over!

Step 1 – Partially open the roof and remove the cover

To remove the plastic cover, you need the front edge of the roof to be unlocked and then position the roof mid-way through the opening cycle such that the front edge is positioned vertically. This is the only way to get to the screws that hold the front edge cover in place. If the roof can't be got to this position manually or electrically, I fear you're going to have to cut away the plastic cover.

- 1. Manually or electrically position the roof in the part-open position, with the front edge vertical. Secure the roof in this position it should pretty much stay there, but be safe.
- 2. On the closing face of the cover there are four crosshead screws holding the cover in position. Remove these screws.
- 3. About halfway along the vertical section of the roof side rail, there is a T25 Torx screw (one each side) holding a check strap for the outer roof fabric. Remove these two screws to allow the roof fabric to be moved away to improve access.
- 4. Between the inner and outer roof fabric, on the rear edge of the plastic cover, there are nine small crosshead screws. Remove these with a stubby screwdriver.
- 5. The plastic cover should now be easy to remove, revealing the mechanism underneath. The front latch mechanism comprises a central motor, two flexible drive shafts, and two latch mechanisms.
- 6. Inspect the two catches to determine which part(s) need to be repaired.



Step 2 – Make the cage(s) and sensor probe

Once you have determined that the block has broken, and before doing anything more on the car, get the cage(s) and sensor trigger you need ready.

Cage

This is the dimensioned drawing for the cage – one of these is required for each latch you want to repair. Note that the diagram does NOT include the tapped hole required on the left-hand latch to mount the sensor trigger. The cage is best made in aluminium or other non-magnetic material.



Trigger

This is the trigger for the Hall-effect sensors – only needed on the left-hand latch. It must be made from a magnetic material – i.e. steel not aluminium.



Step 3 - Remove the latch

The latches include the push-rods (green) which drive the forks on the side arm which "flip" open the front edge of the roof. The plastic block (red) in the middle of the mechanism is prone to breaking – the one in this picture is cracked and will probably break soon.



You will need to remove the latch from the car to repair it. To do this:

- 1. Unplug the two Hall-effect sensors (left hand latch only not shown). The connector is near the motor and has a small clip which needs to be lifted before it can be removed.
- 2. Remove the retaining clip (dark blue) from the grooves at the end of the pushrod using a screwdriver to slide it out of position.
- 3. Pull the splined drive shaft free from the splined worm gear shaft (light blue).
- 4. Undo the three four retaining bolts (magenta).
- 5. Remove the latch from the vehicle.

Step 4 – Repair the latch

You need to remove the worm gear shaft and slider mechanism from the latch by removing the circlip on the shaft near the splined drive, and removing the crosshead screw from the underside of the slider carrier. The latch should then come apart quite easily, the objective being to remove the slider (red in the picture below) and the remains of the block (blue). Remember that you need to reuse the threaded part of the block, so don't just smash it! In this picture, the block had broken completely, so the slider could be removed without taking the worm gear out, but you will need it out later on anyway, so you might as well take it out now.



The next step is to cut the threaded portion of the block down until it will fit into the cage, such that the worm gear will eventually thread into the complete assembly.



Once the worm gear is put back into the latch (don't forget to grease it lightly!), the two tapped holes in the cage should be lined with the two holes in the slider and secured with a pair of short M6 bolts – don't forget the Loctite! On the left hand latch only, you will also need to fit the trigger for the hall sensors. Take care to mark where this needs to go, then drill and tap a hole to allow a bolt to be used to secure it as below. The Hall sensor is the small black cube just above and to the left of the metal tab in the picture below.



Step 5 – Refit the latch

Re-fitting the latch to the car is the reverse of removal. Before connecting the flexible drive shaft, make sure to set both latches to the same position. Once you think everything is in the correct place, and the wiring has been re-connected, operate the latch mechanism using the hex key with the roof open at least twice over the full range to make sure that the two latches move at the same time. If they don't, remove one of the drive shafts, adjust the latches to the same position, and try again. Failure to get the two latches synchronised properly will result in the mechanism failing to work correctly, and may damage the motor or latches. Once you're happy the latches work correctly, I also recommend manually opening and closing the whole roof twice to make sure that everything works properly. If all checks out, reset the roof and enjoy your newly repaired convertible roof!

Schematics

The schematic for the Astra-G soft-top is split into two parts with many parts identified by codes. The electric window and central locking schematics are also significantly different to that found in other models.





Roof schematic – part 2



Window schematic



Central locking schematic



Systems

- CDL: Central door locking
- FH-CV: Window lifters (Convertible)
- ST: Soft top

Components

- A12: Control unit Central locking
- A51: Control unit Soft top
- B127: Buzzer, soft top
- K89: Relay Hydraulic pump, soft top
- K91: Relay Window lifter, rear quarter left, up
- K92: Relay Window lifter, rear quarter left, down
- K93: Relay Window lifter, rear quarter right, up
- K94: Relay Window lifter, rear quarter right, down
- M2: Motor Central locking, driver door
- M2.1: Motor Central locking
- M2.2: Switch Central locking
- M3: Motor Central locking, front passenger door
- M4: Motor Central locking, rear door, left
- M5: Motor Central locking, rear door, right
- M6: Motor Central locking, lid trunk
- M7: Motor Central locking, flap, fuel filler
- M8: Motor Window lifter, driver door
- M9: Motor Window lifter, front passenger door
- M60: Motor Hydraulic pump, soft top
- M61: Motor Front header latch
- M62: Motor Window lifter, rear quarter, left
- M63: Motor Window lifter, rear quarter, right
- P6: Hall sensor Front header latch, open
- P7: Hall sensor Front header latch, closed
- P8: Hall sensor Front header latched
- S17: Switch Window lifter
- S17.1: Switch Window lifter, driver door
- S17.2: Switch Window lifter, front passenger door
- S17.3: Switch Window lifter, rear door, left
- S17.4: Switch Window lifter, rear door, right
- S18: Switch Window lifter, front passenger door
- S127: Switch Soft top
- S128: Switch Window lifter, convertible
- S129: Control switch First bow enable
- S130: Control switch Lid trunk lock, soft top
- S131: Control switch Tonneau cylinder, latched
- S132: Control switch Tonneau cylinder, up
- S133: Control switch Main cylinder, soft top
- S133.1: End position up
- S133.2: End position down
- S134: Control switch Bow cylinder, soft top
- S134.1: End position up
- S134.2: End position down
- Y49: Solenoid valve Tonneau cylinder
- Y50: Solenoid valve Main cylinder

• Y51: Solenoid valve - Bow cylinder

Connectors

- X1: Instrument panel & Body rear
- X3: Body rear & Driver door
- X4: Body rear & Front passenger door
- X9: Body rear & Door rear, left
- X10: Body rear & Door rear, right
- X14: Tailgate & Switch lamp trunk
- X24: Body rear & Tailgate
- X25: Body rear & Lid Trunk
- X32: Instrument panel & Body rear
- X61: Body rear & Control unit Anti-theft warning system & Central locking
- X62: Body rear & Control unit Anti-theft warning system & Central locking
- X82: Body rear & Soft top
- X83: Body rear & Extension harness, front header
- X100: Body rear & Control unit Soft top
- X101: Body rear & Control unit Soft top
- X102: Soft top & Control unit Soft top
- X3: Body rear & Driver door

Grounding points

- 4: Bracket steering column/cross member
- 6: Panel rear
- 8: Central locking
- 16: Panel rear, right
- 32: Instrument panel & Body rear

Other Abbreviations

- 15: Ignition voltage
- 30: Constant voltage
- 31: Ground
- ASP: Outside mirror
- CP: Coupé
- CV: Convertible
- DIAG: Diagnostic link
- DWA: Anti-theft warning system
- FA: Full automatic
- FH: Window lifters
- HA: Half automatic
- HSH: Heated back window
- INS: Instrument
- LHD: Left-hand drive
- MUT: Multitimer
- NB: Notchback
- RHD: Right-hand drive
- SD: Sun roof

- ST: Soft top
- TKS: Door contact switch
- W: W-contact
- ZV: Central door locking

Colour codes

- BK: Black
- BKBU: Black-Blue
- BKRD: Black-Red
- BKWH: Black-White
- BKYE: Black-Yellow
- BN: Brown
- BNBK: Brown-Black
- BNBU: Brown-Blue
- BNRD: Brown-Red
- BNWH: Brown-White
- BNYE: Brown-Yellow
- BU: Blue
- BUGN: Blue-Green
- BURD: Blue-Red
- BUWH: Blue-White
- BUYE: Blue-Yellow
- GN: Green
- GY: Gray
- GYGN: Gray-Green
- GYRD: Gray-Red
- GYWH: Gray-White
- GYYE: Gray-Yellow
- OG: Orange
- RD: Red
- RDBU: Red-Blue
- RDWH: Red-White
- RDYE: Red-Yellow
- WH: White
- WHYE: White-Yellow
- YE: Yellow