

# Sunroof

Technical Information and Restoration Parts for the 928

## Sunroof Overview

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The sunroof is at the same time one of the more complicated yet elegant parts of the 928. If you are lucky enough to have this option you owe it to yourself to insure it is operating at its optimum if for no other reason that you stay dry on rainy days.

The sunroof is made of a number of components all of which must work perfectly. The roof slides on the tracks with the aid of two motorized cables. At the front of a roof is a wind deflector which folds down as the roof closes. The sunroof itself is made of cast metal (early cars) and has a non-sealing rubber gasket. Attached below the sunroof is a sliding interior panel. In addition to the various components are a number of critical adjustments and sliders that all must work together. Since the sunroof is designed to leak the body of the car has four drains to expel any water getting past the seal. In this article I will deal first with each component, then a complete tear down followed by detailed instructions for installation and adjustment.

### Sunroof Cover and Gaskets

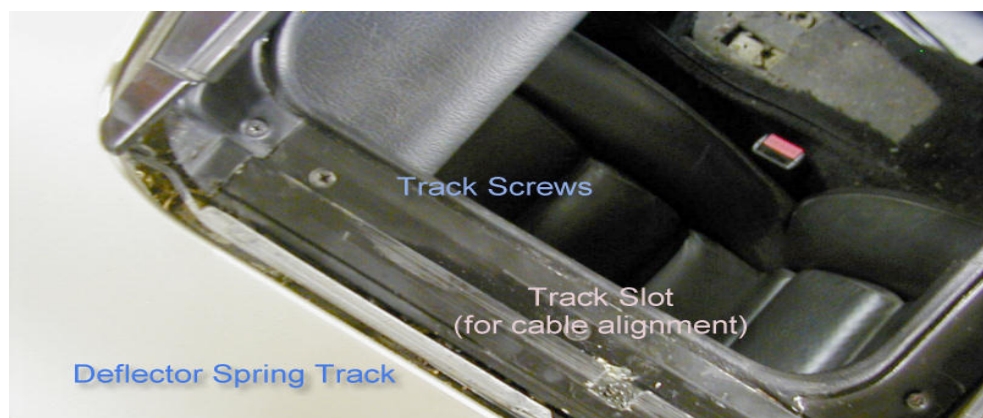


The sunroof cover is made of a cast metal alloy. As such it is common to see the paint on the sunroof deteriorate faster than the rest of the car. Before refinishing the paint it is advisable to remove any existing finish. I found a good chemical stripper very effective. Like the front and rear bumpers the thickness of the paint on the sunroof itself is critical for clearance.

A rubber gasket fits into a groove on the edge of the sunroof. The gasket is coated with a light frocking to give it an appearance of fabric. This is a German thing as many of the early cars had fabric gaskets. The worn frocking can be cleaned off with a little effort and some lacquer thinner. It is rare to see gaskets completely destroyed by the sun. Since the gasket is not designed as an absolute seal there is little reason to replace the gasket. Re-frobbing kits are available if you want to maintain the original look without going to the expense of new gaskets. Frocking is also used on the two door panel storage compartments and the dash glove box.

sunroofs leaks caused by a bad gasket is a myth. Even a perfectly fitted new gasket will leak water into the inner drain tray. This excess water is then vented to the exterior of the car through four vent tubes - one on each corner. Over time, debris and dirt combine to clog these drain holes. Water having no other place to vent leaks into the interior. It is critical these drain holes be clean annually to avoid leaks.

### Tracks and Cables





The sunroof operates on two parallel slides. The front of the roof is attached to a front slide bar while the rear of the roof is attached to flexible cables. A motor driven gear box causes the cables to move the sunroof in either direction. The cable ends terminate at adjustment blocks at the rear of the roof which are responsible for moving the back of the sunroof up and down to clear the roof. Attached to the sides of the front slider are a pair of plastic guide shoes. As the sunroof slides forward the guide shoes push down on the the wind deflector guides causing it to collapse below the sunroof panel.

The sunroof motor is bi-directional with the direction controlled by the switch. The motor is attached to a transmission by a rubber connector. The transmission uses a gear to contact and move both cables simultaneously.

## Removal

The order in which sunroof components are removed is critical in order to avoid damage.

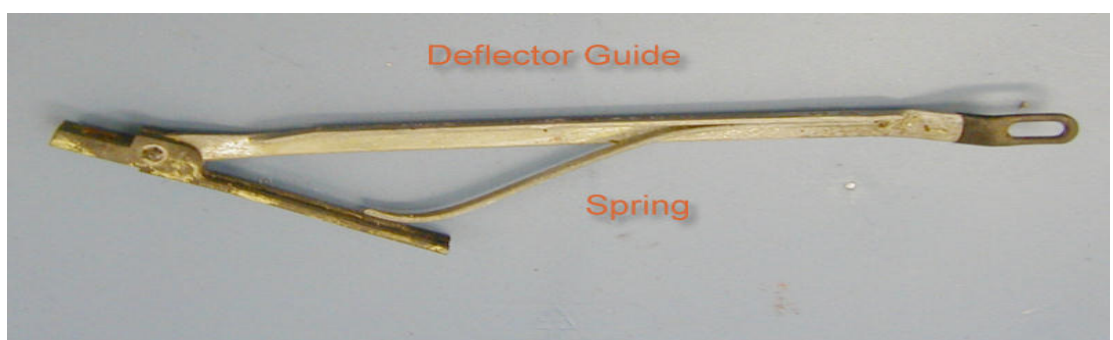
**Interior Panel:** Open the sunroof three quarters of the way. Use a light to locate the three screws holding the interior panel to the sunroof. The screws are recessed a couple of inches from the front lip of the panel between the interior panel and the sunroof. A magnetic Phillips screw driver works best. Once the three screws are removed pull forward on the interior panel sliding it all the way to the front of the opening. At this point hold the panel and open the sunroof to the maximum. The panel should then slide out and down.



**Sunroof:** Once the interior panel is removed close the sunroof. At this point you should see all of the workings. The sunroof is attached with four bolts in the front and four bolts two on each side. Remove the bolts holding the front of the panel. These are attached to what looks like long hinges. Between the two bolts are a couple of adjustment screws. They can be accessed through the holes in the hinge. To make removal easier use a small screw driver to back the adjustment screws completely out.

At the rear of the sunroof attaching to the moveable blocks are a couple of other bolts. On the older cars these are Phillips head screws. Only remove the ones on either side - not the one in the middle. At this point the sunroof will be free and lift out easily from the outside.

**Wind Deflector Guides:** The wind deflector is held in place with two pivot pins and by two spring guides - one on each side of the sunroof. The spring guides are held in place by a single screw towards the middle of the opening. Remove this screw and lift up on the retainer until they can slide off the end of the wind deflector. A cir clip holds the pivot pins in place. Unless the deflector is damaged or not moving freely there this no reason to remove it.



**Sunroof Tracks:** The two side tracks are secured by three Phillips screws. Remove these and then use a screw driver to pry the tracks up on each side at the front by about an inch. A small piece of wood wedged under each track will hold them up. Once the track is elevated slide the front sunroof support forward until it comes out of the track on both sides. Be careful not to twist the front support as the plastic guide shoes on the ends can easily break.

**Motor and Transmission:** To remove the cables it is necessary to remove the transmission. The transmission is attached to the roof by two 6 MM rubber seated mounting studs. Before removing the the nuts holding the transmission remove the two nuts holding motor to the mounting bracket and slide the motor back so that it disconnects from the transmission. Remove the two nuts holding the transmission and drop it down vertically from the cables.

**Cables:** Once the transmission is removed and the tracks have been elevated at the front the cables can be slide forward and out of the tracks.

## Inspection

Most sunroof problems can be cured with some cleaning and lubrication. However a through inspection of the components are in order if you are to avoid future trouble. At the very minimum the interior panel should be removed.

The most common and subtle places where the sunroof runs into trouble are the wind deflector guides and the cable guides. You guessed it. Both these components rely on plastic parts and break easily. On the end of the front bar just on the outside of the track are two rectangular plastic bushings or guide shoes. The guide shoes slide over the end of the front guide bar and are held in place by an indent on the end of the bar. The purpose of the guide shoes is to push down on the wind deflector tracks as the sun roof closes causing the deflector to retract out of the way. If one of these bushings is missing the deflector will still close, but will cause one side of the sunroof to hang up and either slow down or stop. If both guide shoes are missing the wind deflector will not retract and will prevent the sunroof from closing completely.

The second most common point of failure is the vertical alignment at the rear of the sunroof. It is common to see sunroofs with scratches in the paint from hitting on the roof while opening and closing. The cable end attaches to a three inch bar or retainer that rides inside the track. The purpose of the retainer is to both attach the cable to the sunroof and to raise the rear of the sunroof when it closes.

Attached to the retainer by a Phillips screw is, you guessed it, another plastic guide. These small guides ride inside the track until they reach a slot in the middle of the track. The resistance of the roof closing forces the tabs up through the slot in the track raising the rear of the sunroof into the closed position. The purpose of the plastic guide is to cause the sunroof to ride evenly in the track. Without the plastic guide the sunroof can be adjusted too high in the rear causing it to drag on the roof and hence the scratches. The presence and condition of these guides can be inspected when the sunroof is closed. There is a slot in the track into which the bushings slide to allow the back of the sunroof to close. They can be viewed when the sunroof is completely closed.

Unfortunately, I do not show a spare part number for the plastic guide pieces, so it is likely the only way to purchase them is with the rest of the attachment block.

## Assembly and Adjustment

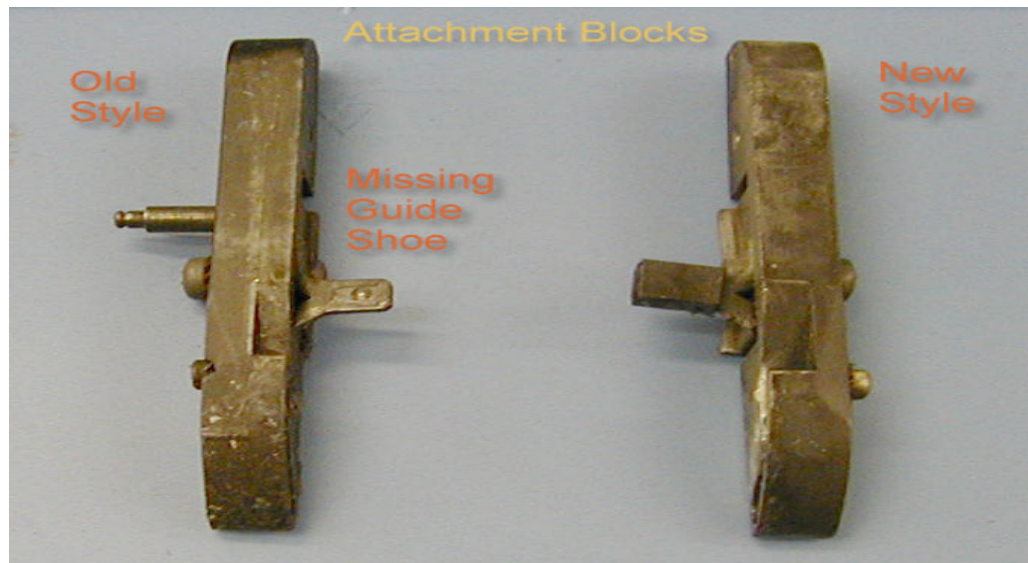
**Warning: When working on the sunroof be sure the power is off. Only connect the power once the roof is operating manually.**

There are a number of adjustments on the sunroof and they have to be done in the correct order. Here it is assumed the sunroof is completely disassembled. However there is no reason to do a complete disassemble to make the proper adjustments. The best use of this section is to just jump in at the current state of your project.

**Vents:** There are four water drains - one on each corner of the sunroof. The rear drains can be seen when raising the rear hatch. There are two holes located at the top of the inside of the hatch - one on each side. The best way to clean the drains is with a flexible plastic rod and compressed air. Tap Plastic sells some flexible plastic rods or tubing that is ideal for the job. The two front drain holes are located at the front of the deflector. After cleaning the drains be sure to test them with a little water.

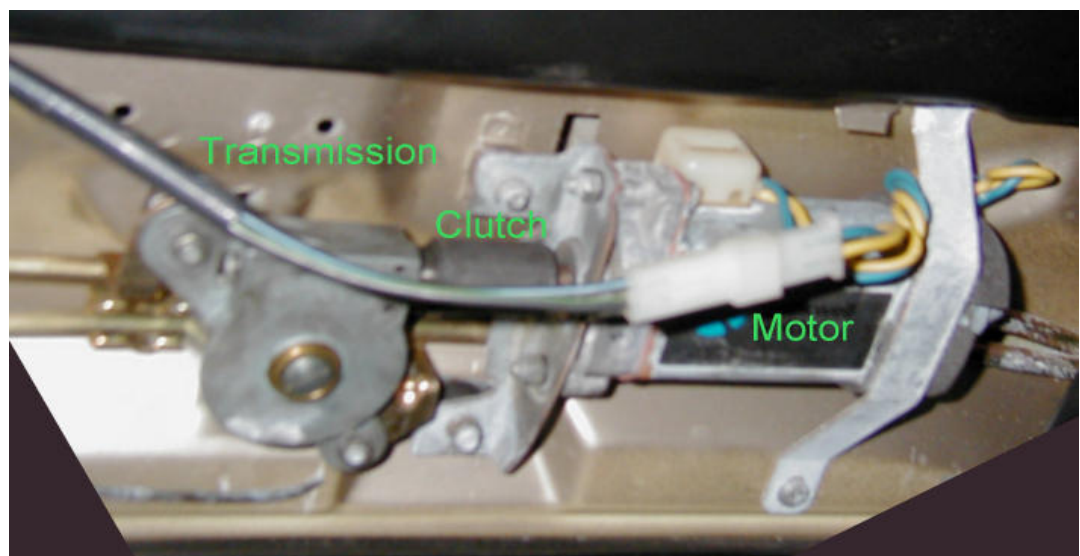


**Cables:** Once the tracks are raised on the front and the transmission is removed the cables just slide out. They should be cleaned completely with a good solvent and checked for wear or kinks. A combination of white grease and motor oil works well for lubrication. While cleaning the cables be sure to clean the tracks too.



Re-assemble the cables by sliding each one into the track making sure it slides freely. Align the cable end with the slot in the track. It is important that each cable is positioned at the same point or the sunroof will bind when closing. Once each cable is positioned on the track opposite each other install the transmission to lock them in place. Before installing the transmission inspect the gear for wear and free movement. If the transmission does not turn freely in can be disassembled, clean and packed with grease. Put a dab of white grease on the transmission gear before re-assembly.

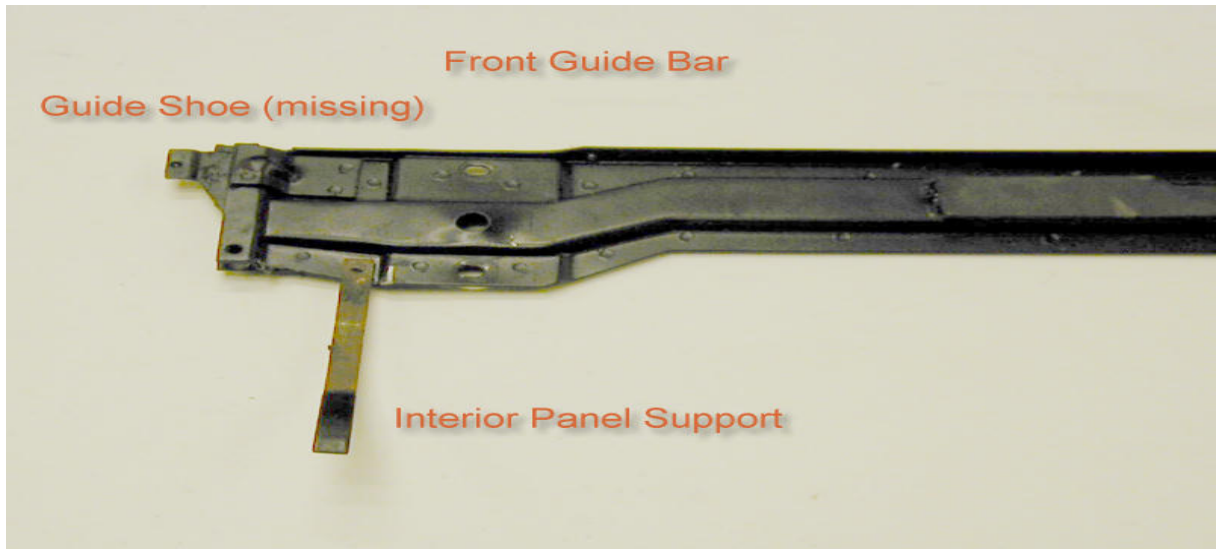
**Motor:** Before reconnecting the motor operate the switch to make sure that it runs smoothly in both directions. The 928 is notorious for broken switches. A large portion of the time the switches are just dirty and do not need to be replaced. Caig makes a [DeOxit](#) product that works miracles on switches, cleaning the contacts and treating them with a protective coating that keeps them working for years. As part of routine maintenance and to insure reliability the sunroof switch and all of the window and seat switches should be cleaned periodically.



Re-assemble the motor by first inserting the rubber connector onto the transmission and then sliding the motor forward to mate with the bushing. Test the operation of the cables by running the motor forward and backwards insuring the ends of the cables stop in the same position every time. If one cable is binding or skipping teeth then the track may be bent, the cable worn or kinked, or the transmission gear worn or loose. Before proceeding to the next step correct the problem.

**Front Guide Bar:** The front guide bar must be installed from the front of the roof opening insuring that it is installed evenly without putting pressure on the plastic guide shoes at each end. If either guide shoe is missing or broken it must be replaced. New ones are available (928-564-268-03) for very little money. I found even new guide shoes easy to break when installing. Warming the guide shoe with a heat gun allows it to slip

on to the front roof guide.



Inside the ends of the front guide are a couple of plastic sleeves. These can be removed, cleaned and lubricated. The sleeves when removed will appear to be cracked or worn through, but this is the design.

The front roof guide has three metal straps with plastic tips extending to the rear. Typically these strips are bent and twisted. They are really made of spring steel and can be flattened out with a body hammer and anvil. The purpose the straps are to put tension the inside sunroof liner. It is best that the straps do not catch on the inside of the roof when moving back. The front roof guide bar should be slide front to back to insure it slides freely and the metal straps to not hit and bind on the opening.

There are some rubber spacers attached to the front roof guide. Check to make sure these are firmly in place. if not use some contact cement to reattach them.

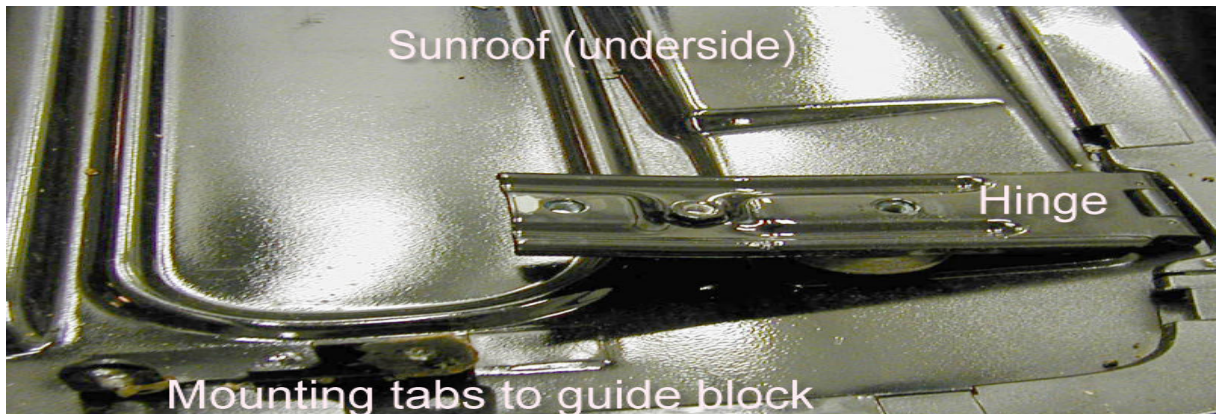
Once the the front roof guide bar is in place and operating smoothly by hand replace the three screws one each of the tracks. It is a good idea to use a little windshield rope at the end and under the track to insure no water seeps under the track and into the car. Do not use so much that the track is deformed or fails to seat evenly.

**Wind Deflector:** The wind deflector is held in place by two pins and a couple of cir clips. Since water gets into this area and since it is common to see cars with the drains plugged, the pins will rust up preventing the wind deflector from moving up and down freely. The pins can be removed by driving the out with a drift. The ends of the deflector are secured by two guides. The guide have springs that forces the wind deflector into it up position. Pushing down on the guides collapses the wind deflector.

Re-assemble the deflector by first installing the pins and cir clips. Clean the pins with some 320 sand paper and put a little white grease on them to lubricate them and keep them from rusting in the future. With the deflector in the up position attach the guides at each end. The guide is held in place with a single short screw into a post inside the sunroof drain channel. Before installing the guide put a little white grease on the top of the guide and under the spring portion.

Once in place test the deflector by siding the Front Roof Guide Bar forward evenly insuring the deflector collapses smoothly and evenly.

**Sunroof:** The sunroof is attached to the car in four places. There are two hinge brackets on the front and two tabs on the rear sides. The hinges are a source of problems and should be checked to insure they move freely. A drop or two of oil on each hinge will keep them working freely. The hinges attach to the front guide bar with two 5 mm bolts. In the center of each hinge is a large flat head slotted adjuster bolt. Before installing the sun roof insure the adjuster bolt is screwed completely into the hinge, but left only finger tight. A drop of oil on the adjuster screw is also helpful later on in the adjustments.



Around the edge of the sunroof is a rubber gasket. The rear gasket is held in place by a plate bolted onto the rear of the sunroof. The plate can catch on the edges bending and preventing smooth operation. Since the gasket is not designed to be a weather proof seal there is no reason to glue it in place. If the frocking is coming off the remainder can be removed with a little lacquer thinner. Before installing the sunroof be sure the rubber gasket is securely in place.

Re-assemble the sunroof by sliding it in from the rear first lowering the front to the closed position. Before installing the sunroof position the cables in the closed position just before the two slots in the track. Fit the rear guides on each side of the track with the pin on the cable inserted into the guide blocks. A little white grease applied to the blocks further reduces friction making for a smooth operation.

Lifting up on the front of the sunroof slide the front guide bar in place positioning it with the bolt holes. The adjusting screws should drop down into the holes on the guide. Put all four bolts into the hinges on the sunroof but do not tighten them up yet.

Lifting the rear of the sunroof and using an awl position the bolt holes on the side guide blocks with the tabs on the sunroof. For an initial adjustment set the rear bolts about half way in the middle of the slot in the tabs. At this point the sunroof should operate and be ready for the final adjustment.

**Adjustment:** Either by turning the motor by hand or by using the emergency tool operate the sunroof forward and backward making note of the space between the sunroof and the roof. As the sunroof moves forward it should hit on the wind deflector preventing it from moving to the closed position. Loosen the four bolts on the front sunroof hinges. Insert a small slot screwdriver through the holes on the front guide bar and back up the adjustment screws just so they touch the frame. Re-tighten the bolts on the hinges and work the sunroof forward until it clears the deflector. The clearance should be just enough, but not too much as to make the front of the sunroof not match the roof and possibly scrape the paint when opening all the way.

Once the sunroof is moving freely and operating in its full range engage the motor. The sunroof should operated smoothly and with no hesitation. Once closed the rear height of the sunroof can be adjusted. Loosed the four bolts on the rear tabs and adjust the closed height so that it matches the roof. The adjustment should be about half way in the slot on the rear bolts and towards the top of the slot on the front bolts.

**Inner Trim Panel:** The interior panel slides into place when the sunroof is open. Before installing it be sure the covering is glued in place without any loose ends.

Re-assemble the panel by first sliding it in place and then moving the sunroof forward a couple of inches. There are three screws that hold the panel to the sunroof and the front of the panel. The rear of the panel just floats in place. The three screws are difficult to install and should be install with the washers. Push the panel up tight on the sunroof and install the screws with a little bit of grease or a magnet on the end of the screw drive to hold the screws while installing.

**Testing:** The sunroof should be operating smoothly and perfectly at this point. If there is binding check for the cables not being parallel or the front of the roof too low and hitting the deflector.

## Advanced and Miscellaneous Issues

**Guide Tubes and Mounts.** The cables go into a pair of guide tubes towards the rear of the roof. To access these tubes the headliner must be removed. It is possible in extreme cases of rust or damage that the guide tubes can prevent the cables from operating properly.

**Sunroof Motor Cover:** The cover for the sunroof motor has two tabs on the front that slide onto the headliner and a wire spring clip holding up the rear of the cover. Removal is by sliding backwards on the sunroof motor cover and allowing it to drop down and hang from the wire. Over time and with abuse the wire clip can bend causing the cover to come loose or even fall off while driving the car. The rear of the headliner can also warp with moisture and changes in temperature again with the same result. A quick and fairly neat approach to a sagging headliner is to use some upholstery screws to attach the liner to the roof.

**Rubber Mounts:** The motor and gear box are mounted on rubber bushings. A rubber bushing mounted to two metal bolts end to end have a high failure rate on the 928. While I have not seen any of the mounts for the sunroof motor fail, there are certainly many other places where these mounts fail.

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