

Electrical: Lighting, Horns

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For information regarding instrument panel and interior lamps, see the [Electrical: Instruments](#) file.

Circuit Maintenance:

Caution When Working on Car. When working on the car, there is a temptation to lean on the headlamp or foglamp capsules. Don't do this, lest you break off the fragile [adjustment screws](#) and have to special order the replacements from Volvo.

Lighting Circuit Preventive Maintenance. Outside of routine maintenance, there's one thing that needs to be done periodically: remove the headlight grounding spades (behind the headlamps on the inside fender) from the grounding strips and clean the contact points. These crud up (oxidize) and create some weird and funky problems with the headlights. Protect them with a conducting grease such as OxGard.

Silicone Dielectric Grease Application. Regular application of silicone grease (NOT conducting grease) whenever you replace a bulb will keep the sockets and bulb bases from corroding and oxidizing.

Bulb Failure Warning Sensor. [Editor's Note:] See <http://www.mikeponte.com/volvo/bulbsen.htm> for Michael Ponte's discussion of how the bulb failure warning sensor operates. This sensor is located in the relay panel shown at [Relay Locations](#). For information on brake light failures and this relay, see [Lights Don't Work: Bulb Out Relay](#)

Sensor Illuminates Even When All Lamps Are Operating Correctly. [Inquiry] My bulb out indicator light is on when I apply the brakes, but all of the bulbs are functioning. I replaced all of the bulbs (including 3rd brake light) with new ones, but it still happens.

[Response] Clean and deoxidize the contacts in the bulb holders using electrical contact cleaner such as CRC or (better) [DeOxIt](#). If you see brown/black deposits, use a toothpick or unlighted match as a base for some very fine sandpaper to gently remove deposits. After you clean out the sockets, apply silicone dielectric grease to the bulb contacts before reinserting them to protect them from further oxidation.

Headlamps:

How to Replace Headlamp Bulbs . [Kane] Carefully disconnect the headlamp wiring connector by slightly bending the locking tab up. Around the bulb is a black plastic collar ring. Twist that until it's loose (you'll feel it), and the bulb and ring may be eased out. Often, you will need just a little extra effort, as there's a rubber o-ring on the base of the bulb that helps hold it in place too. Do not touch the glass portion of the bulb when handling/reinstalling: the oils from your skin will kill it in a short time. When reinstalling, it helps to use silicone dielectric grease on the electrical connectors to prevent corrosion.

Headlamps Burn Out Frequently. [Inquiry:] The halogen headlamps burn out on my '93 Volvo every 3 or 4 months. Does anyone else have this problem? The dealer assured me that there is not a short in my car. As a matter of fact, the dealership went as far as to blame it on moisture.

[Response 1:] When you install the light bulb if it is touched at all by your hands or anything oily or if it is scratched it has a very high potential of burning out or even exploding. Also, water vapor inside the headlamp due to a hole or badly sealed headlight will cause bulb failure. You might want to check all seals in the headlight area. The bulbs will go out rather fast once the seal has been breached or there is a crack in the glass.

[Response 2:] I have had the same problems with two Volvos we bought and found that the voltage regulator had an intermittent fault. One day I noticed that suddenly the lights were very bright for a few seconds and then back to normal, bulbs don't like that. I replaced the voltage regulator on the alternator. This solved the problem. These screw-on voltage regulators are not expensive (US\$25) and are available from your Bosch agent.

Headlamps Flicker and Die. [Inquiry] My head lights decided to flicker, then die.

All the other lights in the car work, and my brights work as well. The brights only work if you hold the lever in position though. Just the tail lights and the head lights are all out.

[Response: John Sargent] Relay K is energized by the headlight switch, and supplies electricity to the dimmer switch and fuses 21 and 22. Fuses 21 and 22 supply all lights except the headlights. The high beams work because the momentary position of the high beams is supplied with electricity by fuse 2. For a better description of the loads for fuses 21 and 22, see the listing on the back of the fuse cover which is behind the ash tray. Relay K is the second relay from the left in the row of relays nearest the Central Electrical Unit. The CEU is in front of the ash tray. Since all the lights work except the headlights, either the dimmer switch is bad, or one pole of relay K.

To determine if it is relay K, remove it and install a jumper from socket 1 to socket 5 of the relay base. The sockets in the relay base are numbered, but if you can't see the numbers, socket 1 mates with terminal 30 of the relay, and socket 5 mates with terminal 87b of the relay. If you have lights with the jumper in place, the headlight relay is bad. If the headlights still don't work, the dimmer switch is bad.

Headlight Circuits/Relay Won't Function. [Symptom 1:] My lights are out. The car is a 760 turbo '86. The parking lights work fine but not the beams, although I can flash the hi-beams. I've checked the fuses already as well as the wires.

[Diagnosis:] Funky headlight behavior is a KNOWN bug in 700 series cars. First thing to try is removing and cleaning the headlight connections at the headlights and, more importantly, removing the wires (spade lugs) at the grounding strips located on the interior fender well behind each bank of headlights and giving them a good cleaning (sanding is suggested). If that doesn't clear it up, it's likely you have a bad headlight relay which is typically located on the relay panel behind the lighter/ashtray assembly. Consult a manual or the chart on the back of the ashtray for the proper relay. I'll lay odds that the ground points are the problem.

[Symptom 2:] My 85 740 has a problem with the headlights blinking. I've traced this down to the relay, which is getting so hot that the plastic insert in the fuse panel is melted. One of its terminals must have been heating up substantially, to the point of major discoloration of the relay terminal, and rusty-looking gook in the socket, only for the one terminal blade.

[Fix:] Replace relay at relay panel. However, I found a Volvo TSB on headlight and fuel pump relays that described this problem, and indicated that the fix was replacement of the relay, its' socket, AND the wire terminals which connect to the socket.

Headlights Cause Engine to Stop: Poor Grounds. [Inquiry:] My 740 is doing something odd. I turned on my high beams tonight, and immediately the engine stopped producing power - and once it reached lower RPMs it stopped running. After turning the car off and starting it again, it did not show any problems until the high beams were switched on again. When the high beams are put on, the drivers side turn signal indicator light goes on (dimly) and the whole drivers side

headlight cluster shuts off (including the parking light) while the other side remains functional. The volt meter stays put - at 12 volts of charge - even while the gremlin has taken over. Visual inspection revealed nothing - but there are a lot of wires and harnesses, and I could use a hint as to where to check for a short.

[Response: Abe Crombie] Raise the hood and look behind each headlamp on side inner fender panel and you will see a multi-spade ground strip bolted to inner fender. Tighten up the bolts on both of these and your problems will cease. If the bolt or inner fender is corroded you will have to remove the strip and clean the area.

Headlight, Driving Light, and Foglight Aiming. The following notes apply to North American market cars. Euro and Japan employ different reflector and aiming methods.

1. Headlamp Aiming:

Adjustment Mechanism:

[Tip from John] Look for plastic + bits that operate plastic shafts that go down/over to bevel gears that rotate horizontal screws that move the upper and lower corners of the headlight assemblies. Of course, these screws are invariably corroded and difficult to turn, therefore the plastic bevel gears strip when you try to turn the + bits. I've found it helps to spray the screws with WD-40 and then drip/spray some synthetic oil on them. Don't strip the bevel gears or you'll end up buying big bux parts or haunting a junkyard for parts. If the shafts/screws won't turn easily, about all I can suggest is removing the entire headlight assembly and freeing it up by hand at the screw. It might entail disassembly and chasing/lubrication of the adjustment screw.

Aiming:

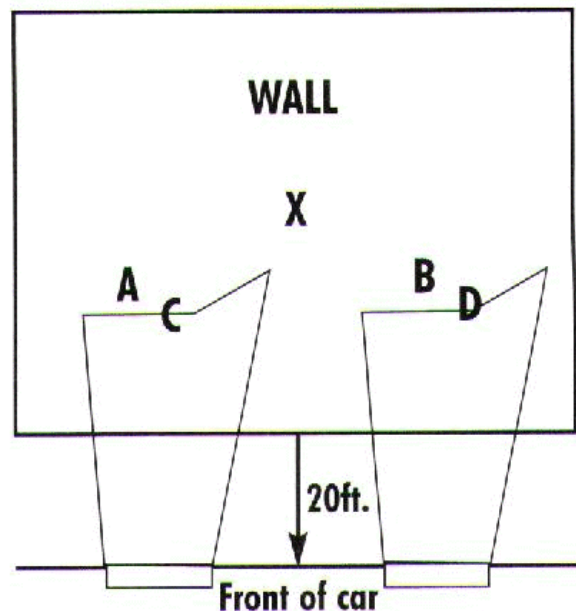
[Procedure and illustration courtesy of [IPD](#) and [Daniel Stern](#)] Check and adjust the aim of your headlights at least once a year to ensure maximum performance and to make sure that they are not blinding other drivers. If you don't have easy access to a shop with the proper equipment, you can adjust the headlights yourself, following the steps below. You'll need an assistant, 25 foot tape measure, masking tape and a large black felt tip marker and a flat blade screwdriver if your Volvo does not have adjusting knobs.

Most Volvos 1960 to 1985 have adjusting screws which are accessed by removing the headlight trim. Most 1986 and newer models have adjustment knobs that are accessed from the back side of the headlight in the engine compartment. Before you begin, make sure that your car has dose to a full tank of gas, that the tires are properly inflated and that there is nothing heavy in the trunk or cargo area that is not normally carried in the car. This will provide the best accuracy under normal conditions.

1. Find a nice flat parking area with a smooth light colored wall, preferably a place where you won't be disturbed or have to move your car during the procedure. Some ambient lighting helps; just make sure that you can clearly see your low beams shining on the wall (often your driveway and garage door will work well). Park your car perpendicular to the wall, making sure your

headlights are 20 feet from the wall. Use a tape measure to get it close. Mark the position of the car's wheels in case you have to move or need to readjust. Rock the car a little bit to settle the suspension.

2. To determine the position of your car's vertical centerline on the wall, put a small piece of masking tape in the very center of the windshield and the back window (use the tape measure for accuracy). Now stand behind the car and use the masking tape marks to "sight" a spot on the wall where the exact vertical centerline of the car is aimed. Have your assistant place masking tape on the wall at this point and then mark it with an "X" using the black marker.
3. Now back at the car, measure the height from the pavement to the center or axis of your low beam headlights. The "axis" is often marked with a dot, cross, bulb type designation or name brand, but if not, it is directly in front of the bulb. Also measure the distance between the two light axes. Transfer these measurements to the wall using the vertical centerline you previously marked on the wall. You now should have marks A and B on the wall that closely correspond to the center axis positions of your headlights.
4. Make a mark on the wall about 3.5 inches to the right and 1.5 inches below the point where your headlight marks are. This will give you the proper aiming points. See the diagram for an example of what you should have on the wall. (As viewed from the front of the car.)



- X** = Mark on wall corresponding to the vertical centerline of car
- A** = Driver side headlight position as measured on car
- B** = Passenger side headlight position as measured on car
- C** = Driver side low beam adjustment target (1-1/2" below and 3-1/2" to the right of A)
- D** = Passenger side low beam adjustment target (1-1/2" below and 3-1/2" to the right of B)

- **LOW BEAM AIMING** Turn your lights on low beam.. Now, have your helpful assistant stand in front of the passenger side lamp while you aim the other driver side lamp so that the point where the horizontal cutoff begins to sweep upward hits point C on the wall. Now do the same for the passenger side using point D. Slight leftward aim (-1") increases seeing distance down the road, but excessive leftward aim increases glare to oncoming traffic. It is not necessary to aim the high beams on cars with only 2 headlamps as the high beam is correct once the low beam is aimed properly.
- **HIGH BEAM AIMING** This only applies to cars that have 4 head light systems as once the low beam is set, the high beam should be good on cars that have only 2 headlamps. On 4 headlamp cars, aim the center of the separate driver side high beam hot spot at position A on the wall. For the passenger side aim for position B. Cover or disable the hi-low lamp to prevent it from interfering with the separate high-beam adjustment. This sets the high beam a bit higher than your low beam setting for maximum distance. You may want to experiment with setting the high beam hot spot 3 to 4 inches out board of the

above settings to light up the sides of the road a bit more.

6. Take the car for a test drive. If they aren't quite right, return to the aiming point and park in the exact spot where you marked where your wheels were located during the aiming process and adjust as necessary.

2. Driving Lamps, High-Beam-Only Lamps in 4-Lamp Systems, and Euro-Code High-Beam Lamps These instructions apply to ECE high beam headlamps, US DOT high beam headlamps marked "VO", and all driving lamps. These must be adjusted so that the bright, center "hot spot" of the beam is straight ahead of the lamp in both the vertical and horizontal planes. Use the intersection of the horizontal and vertical lines at points A and B for each headlamp as "cross-hair sights" to center the high beam hot spot. Make sure to work on one lamp at a time. It is best to disconnect the power to the headlamp you are not working on, so light from the other lamp's beam pattern doesn't mislead your eyes. Also be sure to disconnect or cover the adjacent high/low beam lamp when you are aiming its high-beam-only neighbor.

3. Fog Lamps. Fog lamps are aimed using a procedure very similar to that used for low beam headlamps, but the vertical drop is different. Follow the vehicle-preparation and wall-marking instructions given above for low beam headlamps, substituting "foglamp" for "headlamp", but with the following changes: If the fog lamps are mounted below the bumper, your C-D line should be 2" below the fog lamp axis height. If the fog lamps are mounted above the bumper, your C-D line should be 4" below the fog lamp axis height. Fog lamps produce a wide, bar-shaped beam of light. Horizontal aim is much less critical than it is with headlamps. The fog lamps should be pointed straight ahead, not leftward or rightward.

Glass Headlamp Protection. [Tip:] Use clear plastic laminating sheet, available from office supply stores, to protect your glass headlamps and lenses from sand and stone chips. [Editor's Note:] I have tried these and they are not too effective against larger stones, and the adhesive tends to craze over time. Unless you are on a tight budget, try [Stongard](#) instead: they are custom fit to the lens and use a thick 3M clear urethane that is amazingly tough. They cost around US\$ 60 for a kit with covers for the headlights and corner markers. Another alternative is to buy 3M Scotch Brand 300LSE Hi Strength Adhesive and cut to fit. [Tip] For less expensive vinyl protectors, try <http://home.earthlink.net/~vicrocha/>

Plastic Headlamp Clarity. [Problem:] Is there any way to deal with the loss of clarity/yellowing in those plastic lights in the late model 240s/7xx/9xx? I was able to re-seal the leaks, but all that water in there for such a long time seems to have made the lenses somewhat opaque.

[Fix 1:] I use two products called Meguiar's Plastic Cleaner and Polish, available from auto stores. It cleans and polishes plastic. Use it with a random orbital buffer and clean terry buffing cloths. This product is not very aggressive in terms of grit. Another choice is Meguiar's Plastx Plastic Cleaner and Polish.

Fix 2:] [Kevin] I use Mother's aluminum paste cleaner. After polishing the lens with this compound, wash with a liquid dish soap and water and let air dry. Then, if you wish, use a high quality clear spray paint to protect the lenses and keep them clear for years. This technique is faster than Fix 1 above.

[Fix 3:] Next time you replace them, use a sheet of iHg from 3M. It's a 1/8" thick, flexible, ultra-clear, UV-stabilized polyurethane sheet with 3M ultraclear adhesive on the back. You clean the lens with rubbing alcohol and press the stuff in place, and it disappears. Its flexible surface shrugs-off the rocks and stuff, and if it ever gets damaged, you can peel it off and replace it. It's available for many makes and models of cars (and even has the three little cutouts for the three little pips on the lens if you buy the pre-cut kind) or in bulk sheets. Anyone running a post-85 US spec Volvo should consider covering up those headlight assemblies. Very spendy, and you don't want them absorbing the road-grit/rock impact. There is a company in Bellevue WA that specializes in clear [protective automotive films](http://www.stongard.com) (Stongard, 800-350-4897 www.stongard.com) They sell a 3M film that's supposed to be fairly easy to apply. Their stuff is very popular with the local Porsche Club(since the way the front end of a 911 is shaped, it collects a *lot* of rock hits, and those round H1/H4 headlights are an amazingly spendy integrated unit), and the 9004 headlight is a pretty common shape, so they've probably got pre-cut sheets for them already. 1990 740: Headlamp kit 76-04-70 \$59.95.

Headlamp Unit Cleaning. [Inquiry:] How do I clean the insides of one-piece plastic headlamps? [Randy Starkie] Don't even think about touching the reflective surface with any cloth or wipes because as soon as you touch it... it is gone.

[Response:] Note that headlamps can be cleaned. This is when the lenses or reflectors have not yet deteriorated, but there is an accumulation of dirt or film on the insides of the units. The degassing procedure is rather simple: Remove the headlamp from the vehicle, taking careful note of the locations (number of turns in or out from "seated") of any aiming screws you must remove. Write this info down.

Remove the bulb and have the lamp on a towel on the counter near the sink, lens down. Pour each lamp 1/4 full of 50/50 mix distilled water and rubbing alcohol. Add ONE small drop of liquid dish detergent (Joy, Dawn, etc.). Put the palm of one hand over the bulb hole, grasp the lens firmly with the other hand, and shake/slosh the lamp vigorously, being careful not to drop it. Pour the liquid down the drain and repeat. Then do it twice more, the same as above, but WITHOUT any soap. If you heat the water first, the lamps will dry much faster. Dry them in the open air, bulb hole facing down but not blocked. If you're in a hurry or there are crevices that won't dry, place the lamps in a CLEAN oven, hole down, and close the door. Set the oven on bake-300 for 60 seconds, then switch off. Leave the oven door closed. The lamps will be dry in about 30-45 minutes. [Jerry Casey] I removed the headlamps from the car and cleaned them internally as explained in the FAQ. What a difference! Doing them one at a time shows how much the reflector shines up; it is amazing and I now have actual headlights. They could be better still and I may put in some relays so they get full battery voltage, but there is a clear difference.

Headlamp Capsule Loose. [Inquiry] I leaned on my headlamp and broke an adjuster screw; now it is loose.

Single Unit (No Fogs) [Response] These screw adjusters come in an assembly. The up-down axis is adjusted by Volvo p/n 3534201-3; the side axes by p/n 3534202-1. They cost about \$20 each. Carefully prise off the headlamp capsule from the broken adjuster screw and replace from the front. It helps to lubricate the plastic screws with spray lube before you adjust the headlamp directions.

Headlamp with Fogs. [Response] The lamp capsule frame is held by small ball cage nuts (Volvo p/n 1392718) in fittings on the back of the capsule frame. The adjusters screws are similar to those above: side axis for both headlight and fog is adjusted by Volvo p/n 1392717-3 (left) or 1392731-4 (right); up-down by Volvo p/n 1392716-5 (left) or 1392730-6 (right);. To remove the adjuster units, first remove the W-shaped plastic springs holding the vertical torque rods in place by pushing on one side with a screwdriver: the springs are located right under the thumbwheels. Then withdraw the vertical rods. To remove the ball cages, push each of the sides inwards while pulling the capsule out, which will disengage the ball. Use spray lube to help things along.

Headlamp Replacement.

Headlight Assembly Replacement. [Inquiry] How do I remove the headlamp and its mounting frame?

1. Pop hood
2. Remove grille by pulling off the spring tabs located at top left and top right.
3. Remove 2 Torx screws holding plastic radiator air director.
4. Remove 2 bolts located on the inboard side of the headlight frame
5. Pop out turn signal housings by squeezing the tabs and pulling out.
6. Remove bulbs and pull the assembly out.

Headlamp Housing Change: 940 with no fog lights next to grille. [Jay Simkin]

- Remove the grille, by compressing the "V" clips with your fingers and lifting the clips straight up. Remove the grille by moving the top edge forward, so that the clip openings clear the forward edge of the cover panel. Lift the grille gently, so that the bottom tabs can come out of their slots.
- Remove the "cover panel". This is a piece of flat black plastic secured by four large, flat-head plastic fasteners, with 3/8"-long slots. To remove the cover panel, turn the fasteners by 90 degrees, so that each fastener's slot is parallel with the side of the engine bay. Lift up the cover panel (with fasteners) and set it aside.
- Remove the three Torx-20 screws that secure the flexible rubber panel on

the light housing bracket, closest to the grille opening. This rubber panel need not be removed. It should be moved only enough to allow access to the two 10mm hex head bolts, that secure the light housing bracket.

These bolts are about 1.5" (37mm) long. Remove these bolts.

- Remove the turn signal housing, by pressing the tab - on the side of the assembly closest to headlamp housing – and pushing the turn signal housing forward (towards the front of the car). To remove the turn signal bulb, turn the bulb socket $\frac{3}{4}$ turn.
- Remove the two 10mm hex-head bolts, the heads of which were exposed by removal of the turn signal housing. These bolts are about $\frac{3}{4}$ " (20mm) long.
- Remove the headlamp (bulb), by turning the locking ring, and pulling gently on the bulb-holder. If the bulb is in good order, there's no need to remove the bulb, from the bulb-holder. If you need to change the bulb, use a flat-blade screw-driver to lift the locking tabs, and pull the burned-out bulb from the bulb-holder. When installing a fresh bulb, do NOT grip the bulb with your fingers. Put on gloves, or use a dry, clean paper towel to grip the bulb. Finger oil will greatly shorten the bulb's working life. Finger oil can be removed with glass cleaner or brake cleaner – sprayed onto a clean towel – so long as the bulb is cold.
- To remove the headlamp housing from the frame, use the adjusters (16 mm hex fitting at the top of the frame) to separate the ball-tip of the adjuster from the socket on molded into the lamp housing. To do this, turn the adjuster – using a ratchet and 16mm socket – so that the lamp housing is pulled toward the frame.

As you turn the adjuster, you should see more the square adjuster shaft, protruding from the gear on the reverse side of the frame (the side that faces towards the engine bay). As you narrow the gap between the housing and the frame, by turning the adjuster, the ball-tip at the front end of the adjuster shaft will separate from the plastic socket (white or black plastic) in the lamp housing. The third connection, between the housing and the frame, is fixed-position. This ball-tip is at the end of a brass stud, that screws into the frame. To free the lamp housing from the frame, grip the housing and pull hard. The stud should pop-loose, leaving the black plastic socket in the lamp housing. It is possible that the black plastic socket, in the lamp housing, will break. If your new lamp housing does not have the black plastic socket installed, it is Part #3534198: Carrier, fixed)

- To install the new lamp housing, position the housing so that the ball-tips at the end of adjuster shafts – and the fixed position stud – are at the openings of the white or black sockets at the back of the lamp housing. Using the flat of your hand, strike the face of the housing, to that each adjuster's ball tip is pressed into the socket on the lamp housing. Do not use a hammer or a mallet to seat the housing's socket onto the ball tips. A hammer or mallet will likely break the plastic and ruin the housing.
- Re-assembly simply involves reversing disassembly steps.
- To aim the newly-installed headlight, await nightfall. Park the car facing a garage door or a wall. Turn the adjusters until the center point of the newly-installed lamp's beam matches that of the in-place lamp's beam.

Lens Replacement. To remove the old glass or plastic front lens, try a heat gun. It softens the caulk and allows you to scrap and dig at it with a knife. Open the seam as much as possible this way and then use the heat to soften the adhesion all the way around the lens. Then take a putty knife and insert in the groove and turn it to apply pressure to move the lens from the body of the assembly. Another approach might be to try the "caulk remover" paste tubes sold at home improvement stores to remove silicone caulk from bathtubs. If you remove the lens, avoid the temptation to "clean" the silvered reflector surface with anything other than low-pressure compressed air. It is sprayed on, is VERY fragile, and will be destroyed if you rub it with anything, even a sponge and water.

960/90 Headlamp and Wiper Assembly Removal. [Tip from Warren Bain] After removing the bolts holding the capsule in place as above, you can then remove the lamp and wiper assembly. The headlight wiper and washer motor shaft goes through the plastic bumper cover. To save time, I cut the top piece above the shaft. No one can see the cut. The old one comes out with some twisting and turning. The wiper motor is attached to the bottom of the headlight housing. I swapped the metal clips and the wiper motor from the old headlamp assembly to the replacement unit. Make sure the electrical pins on the new headlight are the same as the old ones. If not, swap the harness inside the housing. Use slip joint pliers to free the headlight electrical connector on the back of the housing. It takes some work to get the old connector out but it can be done. On mine, the new pins were shoved back inside the connector and the lights would not work. I had to swap the internal harness. Replace the housing and the electrical connectors including the wiper motor, and put the turn signal back in. See also the FAQ section on [960 Wipers](#).

Headlamp Reflector Re-Chroming. [Symptom] My headlamp reflectors are losing their reflective chrome. [Editor] While it may not be as good as the OEM vacuum-deposited chrome surface, you might try Eastwood Chemical's spray on paint: [Almost Chrome](#).

Parking and Other Lamps:

Parking Lamp Capsule Removal. 740/940:

[Inquiry] How do I replace the front parking light lens on my 94 940?

[Response: Dan Ray] Behind the parking light assembly you will find a tab of white colored plastic, gently push it towards the fender while pushing it forward. This tab snaps in to secure it. Once pulled away you turn the socket to have access to the bulb.

960:

[Response: Tom Irwin] The corner lamp assemblies have a little plastic lock tab at the rear. When they are installed in the fender, that plastic lock tab

engages a metal tab inside that fender and it click-locks in place. Using a strong flashlight, look from inside the engine bay, behind the corner lamp and find that plastic tab. Using a screwdriver, push down on it slightly and you can withdraw the entire lamp housing from the car. From there, getting to the bulbs is cake. By the way, if you have odd flashing patterns, pull every turn/hazard bulb on the failed side and inspect the contacts of both the bulbs and sockets for overheat. If those contacts melt together it can cause bulbs to flash together incorrectly or not at all. Turn the bulbs over and check the contacts visually. They should be hemispherical, not flat and pushed together. They are made of a lead alloy and melt at a low temp

Parking Lamp Failure. My left indicator light was on but not blinking. Moving the indicator tree back and forth doesn't do anything: light still stays on. Right indicator light works fine. [Bill Foster] Replace the bulb in the left front corner lamp. The solder on the base tends to melt together.

Rear Brake Lights.

Bulbs. Has anyone else out there tried the Wagner #3275 Krypton brake light bulb for their Center High Mount Brake Lamps or lower brake lights? I had the CHMBL light go out on my 90 740T and put in the #3275 because it's supposed to have a higher lumen output (it does and it is hotter) and last longer. It's lasted for over a year and hasn't melted the plastic (at least any worse than it already was distorted) and looks kind of like a fog light in the rear window!

Sockets. [Carl Millard] It appears as though the brake light sockets are specific to each side and that the white socket fits on the right. If reversed, current will flow to the parking lamp and not the brake.

Center Stop Lamp.

Sedan/Saloon. [Inquiry] The high-level brake light (the one that sits in the rear window) is dead in my car. I can't seem to figure out how to access the bulbs. The manual has an unhelpful picture of a screwdriver underneath the cover with the description: depress the catch with a screwdriver. I can't seem to find this catch.

[Response: Bob] For 740/760 sedan cars, there should be a hole in the bottom side of the cover. The catch is tricky to find. Keep probing and push up with a screwdriver while wiggling the cover. For 940/960 sedan cars, try to spread the stop lamp cover outward to release the hooked catches on the sides that hold it to the lens assembly, which in turn is secured to the chassis mount screwed to the package shelf. Once the cover is off, reach up beneath the lens assembly and locate the hooked tab on the chassis mount below the center bottom of the lens assembly: depress this tab and pull off the lens. Be careful: the plastic can embrittle from UV exposure.

Wagon/Estate. [Response: Jay Simkin] **To remove the brake light housing cover:**

1. put the tips of your index fingers at the "sharp" corners of the housing, which are closest to the window
2. put the tips of your thumbs at the rounded corners of the housing, closest to the sharp corners.
3. using the tips of your index fingers, pull each side of the housing outwards about 1/16" (i.e., towards the gas struts that hold up the hatch)
4. pull the housing downwards (i.e., straight towards the ground). You should feel it release. It will come free. Set it aside.

To remove the brake light bulb holder:

1. You will see two black plastic tabs sticking downwards (towards the ground) from the brake light assembly
2. Using a thumb and index finger grip each tab and press inwards about 1/16" (i.e., towards each other) while pulling downwards gently
3. You will see and feel the bulb housing release from the mounting.

To remove the brake light bulb:

1. Grip the bulb gently and press downwards gently (as if you were trying to press the bulb into its fitting). You should feel some "springiness".
 2. Turn the bulb. If it does not move, turn it in the other direction. It should release and "pop" free.
 3. Replace the bulb, with an exact replacement.
-

Backup Lights Not Working: Neutral Safety Switch. If your backup lights stop working, your transmission neutral safety switch has most likely failed. See the [FAQ file](#) for repair information.

Brighter Brake and Tail Lights. [tip from Ceferino Lamb] Just in time for the Christmas drunk driver tailgating you season, here's a handy tip. The tail and brake lights on our classy older cars are not quite as big or bright as those of newer cars are. Some of us believe that brighter lights are a bit safer. Here's how to remedy things.

1. **CLEANING FRENZY.** Clean the reflectors and lenses with a can of compressed gas such as that for cleaning computer keyboards or circuits. That should get rid of accumulated dust. In cases of heavy dust/dirt, you can clean manually with alcohol and soft rags or big Q-tips, but be very careful not to scratch the reflectors or remove the reflective coating. If that coating is poor, buy new light clusters or disassemble completely and repaint the reflectors with silver paint. If there is heavy dirt in there, find out why and fix it. The gaskets sealing the exterior may be "perished" (as the Brits would say). You can replace crumbling gaskets with silicone seal - apply a thin bead to the seating groove, then lightly oil the lens side and mate them while the silicone is still soft but has skinned over slightly. If you can't get the taillight clusters apart to clean them, one trick is to put raw rice and soapy water in there, shake it around, drain, rinse repeatedly with distilled water, then air dry for 24 hrs.
2. **CHECK CONNECTIONS.** Check the condition of the various electrical connections to the bulbs back there. Often there is room for

improvement, especially in Volvos. Benz connections are usually OK in my experience. In some cases, a better connection at the bulb base is as easy as bending the spring connections deeper toward the bulb, so that it exerts more pre-load against the bulb when it's installed. Many Volvos have fragile connections molded into the reflector assembly and there is no practical way to repair them. Benz connections are often ferrous, so accumulated moisture in the trunk causes rusting which in turn causes resistance in various places. Renew or clean thoroughly.

3. WIRE UP UNUSED BULB SOCKETS. Many of our cars have unused rear fog lamp sockets in the tail light cluster. One trick to get brighter brake lights is to use those reflectors as additional brake lights. You may have to install a socket first, because there usually is none. This is especially easy in Volvos due to the twist-in bulb sockets - find one at a junkyard. Then connect the new socket in parallel with the existing brake lights. Make sure that your brake light fuse and wiring is sufficient to handle the extra load. I've been doing this for years and never had a wiring problem or blown fuse.
 4. IF YOU HAVE ONLY DUAL-FILAMENT BULBS, STOP HERE. I'm not aware of any way to replace dual-filament tail/brake bulbs (1034 or 1157) with brighter ones. If you have any tips, please let me know.
 5. BRIGHTER TAIL LIGHT BULBS. Replace the stock single-filament tail light bulbs with #105 bulbs. 105 is the number that Sylvania/Osram uses, and I suspect that it's a standard in the US. Don't worry that it says they are for trunk/courtesy/map lights - they don't run too hot such that they would damage your reflectors or lenses. I've been doing this for years. This takes you from 4-6 watts up to 10 watts of light, making them noticeably brighter. There are also 20-watt bulbs available in about the same size that will fit, but I don't recommend that because of heat and the fact that your taillights will be about 50% as bright as your brake lights. However they might be useful for your front market lights if you want a pseudo-DRS look (why anybody would want DRS is a mystery to me).
 6. BRIGHTER BRAKE LIGHT BULBS. Replace the stock single-filament brake light bulbs with #3497 bulbs. These are relatively new from Sylvania/Osram, and their high price makes me suspect that they are halogen. They're about 30% smaller than the stock bulb, but rated at 28 watts instead of 21 watts. The smaller size should keep any additional heat away from the plastic lenses. Just the same, I would monitor the lenses closely for a few months, because this is a new setup for me and I'm generally cautious when trying out hotter bulbs.
-

Replacement Lenses. [Question: Who sells used/new Volvo lenses (I need the front passenger wraparound turn light - white?) [Answer:] Check out Matt's Lenses:

<http://www.internetcarparts.com/> MailTo:
volvo@internetcarparts.com volvo@internetcarparts.com

[Another source:] I have had good luck (and good prices) from Hirsch Industries. They are out of Arizona. Check out their website for more info - <http://www.hirschindustries.com/> . I got a replacement for \$6-7 plus \$4-5

shipping.. It was brand new and came with instructions. They also have the whole taillight assembly (if you had lost any other cover, you would have had to get the whole new thing back there) for under \$45 or so..

[Note:] Don't buy USED 700 series corner markers....the faulty part of these units is the adhesive (holding the lens to the housing) and if it's been around, it WILL fall off. If you do get a used unit with the lens intact, epoxy it for a safety measure. So far it's worked for me on the one *new* unit I have on my car.

[Problem 2: any solution to the falling out backup light problem; i.e., a source for the white plastic lens?]

[Fix:] Just go down to your local Volvo dealer and buy a new clear backup light lens for about \$4 to \$6 and glue it in with silicone sealant. Volvo knows they had a product problem with these lenses and came up with a fix much cheaper than replacing the entire tail light assembly.

[Brad Grimes] The Volvo part numbers for these are: left lens: 271447; right: 271448. . See also [Re-Glueing the Lens Components](#)

Rebuild and Repair of Parking/Tail Light Lens

Re-building the Lens from Components. [Tip from Robert Adriaansen] Volvo taillights are extremely expensive (something like \$180 for the 740 wagon) and are glued together so that they cannot be disassembled. I decided that it would be an interesting project to try to put together good parts from two different sets of lenses. In my specific case matters were complicated by the fact that both the donor and the recipient taillights had broken lower red lenses, though thankfully they were broken in different places.

[Tip from Rob Bareiss] The clear reverse lens is the only one available separately for about \$7. The others can't be removed but the clear lens does come out (falls out, usually) and can be replaced individually.

Here is how I went about it:

1. Using a soldering iron with a flat (ie cutting) tip, I cut out the part that I needed from the donor lens making sure to cut it about 1/8" oversize. I couldn't find a way to unglue the lens from the black plastic back of the lens, so I cut that also using the same method.
2. Using the soldering iron, a utility knife and a Dremel tool, I removed the black plastic back and the glue so as to remain with only (part of) the lens itself.
3. Using the same method, I removed the glue and broken pieces from the recipient taillight.
4. With files and the Dremel tool, I adjusted the donor and recipient parts until they fitted together perfectly. Obviously there is no need to do this if you have a whole good lens.
5. Once everything fitted, I glued together the 2 parts of the lens with plastic glue (more flexible than epoxy) and glued the transplanted lens to the black plastic back using silicon sealer. I used black but would

recommend transparent since you do see some of it through the lens.

6. I used a permanent red marker to cover up anything that didn't look quite right and with a fine brush filled the seams with... my wife's transparent nail polish.

That's all there is to it. Unless you're specifically looking for where the two pieces of lens are glued together, it now looks just like any other taillight in good condition. The whole matter took me about 2 hours, half of it figuring out how to go about it. It shouldn't take much more than half an hour if you transplant a complete good lens.

Loosening Old Adhesive. [Tip from Dave Jenkins] Try 3M Release Agent, an aerosol spray used to release adhesives on weatherstrips.

Re-Glueing the Lens Components. [Inquiry] You know those clear back-up lenses (cemented onto the the rear lights housing) on 900 and 800 models that tend to pop off at the car wash? What is the best cement for sticking them back on?

[Response: Tom Irwin] Remove all the old adhesive, clean the surfaces with denatured alcohol, PRIME both surfaces with a cyanoacrylate primer such as loctite #770. Then a thin viscosity cyanoacrylate (super glue) adhesive on ONE surface. Press into place for 30 secs.

[Response: Jim Bowers] I used clear RTV adhesive sealant to put the one back on my old 745. It held for more than 5 years.

[Response: Dave Stevens] The Volvo replacement lens comes with a small tube of clear RTV silicone sealant and it seems to hold well. Best to choose an exterior/marine grade sealant with UV inhibitors. Clean the mating surfaces with something like isopropyl (rubbing) alcohol or 3M Adhesive Remover for good adhesion.

[Tip from Terry] To re-attach the front cornering lamp lens on my 87 745t (luckily, it came off in my hand while washing) I removed the assembly, used a product called "GOOP" (the one specified for marine applications as it had UV tolerance) and a lot of rubber bands to allow a 24 hr cure time. It has held for 5 years and is still tight and the car is never garaged.

Repairing Cracks and Holes in Lens. [IPD](#) is now selling the Plastifix Lens Repair system, consisting of three colored epoxies which effectively repair holes and cracks in amber, red, and clear lens. Each costs \$20. [ITW](#) has an adhesive sheet Plastic Lens Repair product that covers cracks and is virtually invisible. \$14.

Repair of Rear Lamp Circuit Boards. See the [notes](#) above about corrosion and cleaning the connections and bulb sockets. [Walt Lear] Rear lamps can fail due to breaks in the printed circuit board mounted to the lamp assemblies (see photo right). These are mounted to plastic and impossible to solder, but you might be able to repair the break by

installing a metal screw at the break to bridge the gap. The alternative is a used or new assembly from the dealer or an aftermarket supplier such as [Lamps and Lenses](#). Note that some aftermarket parts do not fit, are poorly bonded, or are of low quality.



Water in Taillamp Lenses. [Symptom:] My tail lights (85 740T) are half-full of rainwater from el nino. After much frustration from changing gaskets repeatedly with no results and making repeated trips to the dealer to buy the replacement bulbs, I am contemplating drilling small drain holes in their bottoms. Is this advisable?

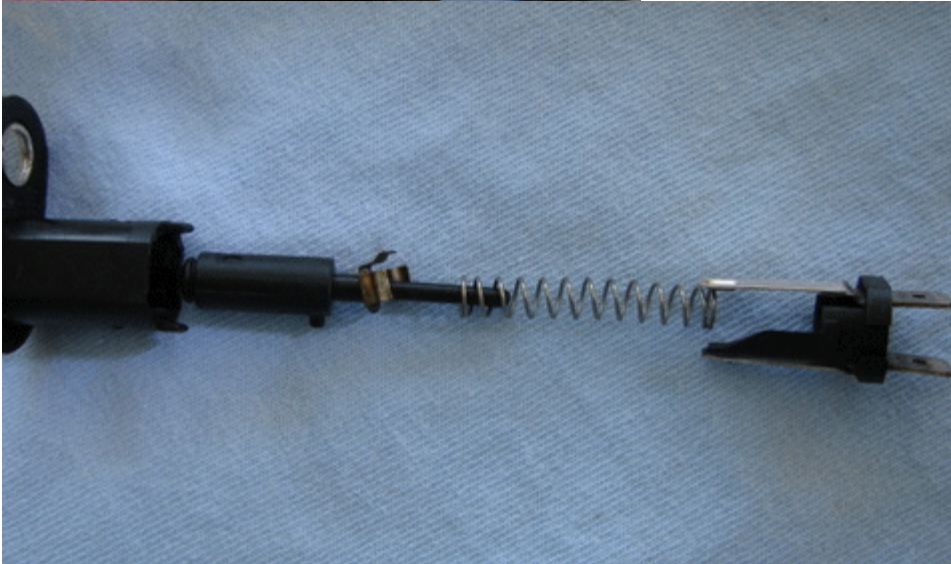
[Fix:] I had this problem more than a year and half ago. I drilled such holes, and never had a problem since. I live in England where the weather is wet more often than dry, all year round.

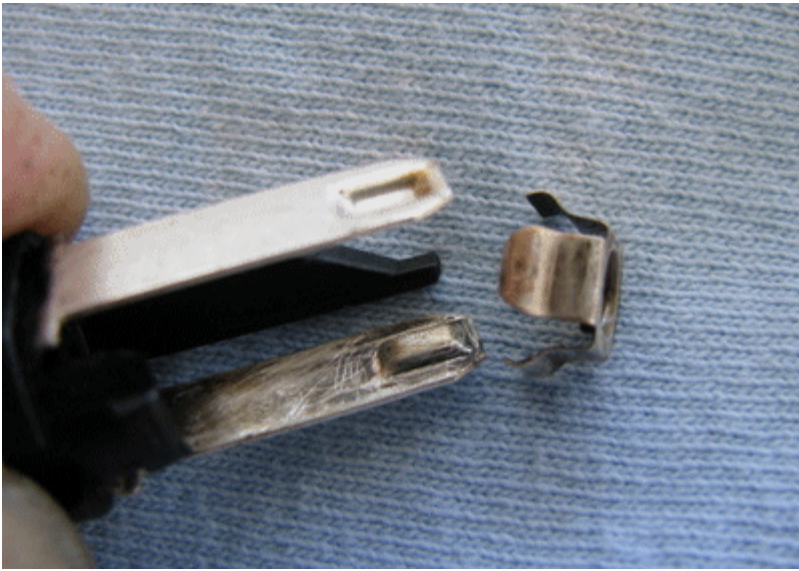
[Scott Jackson] I've had this problem as well. It's actually due to a leaky trunk seal. Mine was cracked at the part near the rear window. If water gets into the hollow part of the seal through those cracks it will drain into the trunk, usually near the tail lights. The water is coming in from the trunk and that's why replacing the lens won't fix the problem. Check the wells on the side of the trunk for signs of water and you've found the culprit. It's an expensive seal to replace, but I put a few layers of black electrical tape over the cracks in mine and haven't had the problem since.

Door Contact Switches. [Editor] The door contact switches on the door hinge frames, operating the overhead lights and key warning indicator, can corrode and stop operating. They can be rebuilt. Disconnect the battery negative. Remove the switch by unscrewing the grounding/earthing screw on the bottom of the switch. Carefully pull it out and remove the rubber boot and the connectors. At your bench, pry up on the plastic locks on each side, remove the spring and the plunger along with the side and center contacts. Watch carefully the orientation of parts so you can reassemble it correctly (see photos 4 and 5). The ground or earth contact point (the middle blade on the center connector) is usually pitted: sand this down with very fine sandpaper. Coat the middle connector blades with a light coat of silicone dielectric grease. Reassemble. The side contacts go in the slots on each side with the button pointed inwards. The center plunger has a pin: engage this in the slot. The center contact has three blades: the middle one contacts the ground. Insert the spring and then the back cover. Reinstall the rubber boot. Now is a good time to replace the screw with a stainless steel screw to prevent corrosion, since that is your ground path. Coat the screw, the metal ground contact, and the chassis hole with OxGard conductive grease, then insert the connectors

and screw it in. See the series of illustrations below and the notes by wanding your cursor over the photos.







Interior Lighting:

Overhead Lighting. How do I get to the interior light bulbs in the overhead fixture in the headliner? The 15 year old plastic does not look too resilient right now and I am concerned about breaking it. [Mark Holton] Very carefully remove the whole fixture for access to the bulbs: pull straight down and hope the legs don't snap. The legs on this can break too so eventually you should visit a salvage yard and grab a couple of replacements. I broke mine by applying too much force when I pressed it back in place.

Wagon/Estate Cargo Area Lamp. [Editor] Be careful when removing the cargo area lamp cover and assembly as you can easily snap off the ears holding it in place. See the [FAQ section](#) on removing the lamp assembly.

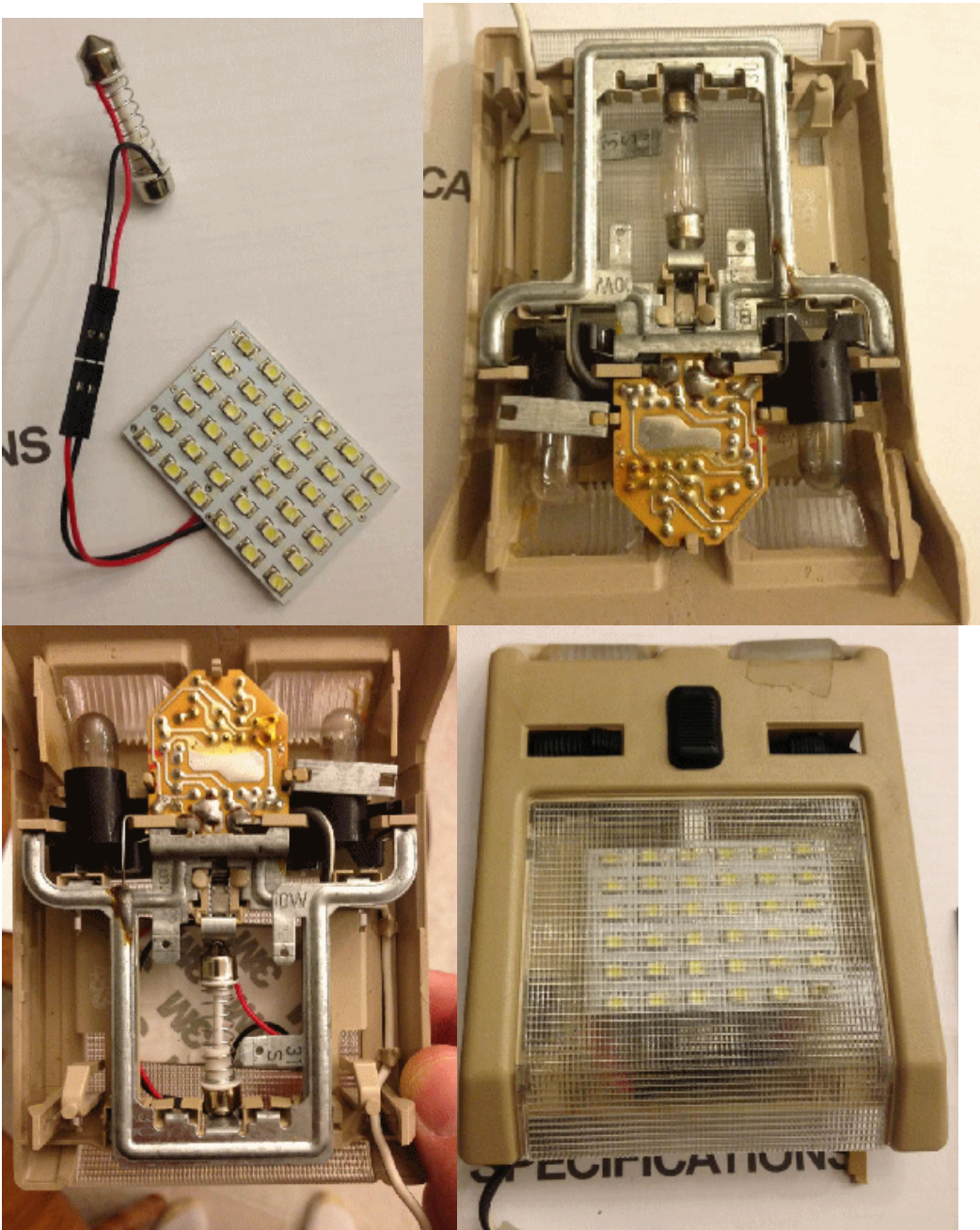
Dome Light Upgrade. [Nick Heiny] The stock dome light was pretty useless at actually lighting up the interior of the car, especially at night making finding dropped toys and other detritus was difficult at best. I started thinking about dome light upgrades. I thought a replacement festoon LED insert would throw off extra light without drawing too many amps or creating unwanted heat, so I got a LED panel from Amazon for ~\$3.00 that included a bullet style bulb adapter (picture below). The specific part is a NEEWERA T10 36 SMD LED light festoon Dome Bulb 12V. After install, it is a major improvement.

Steps:

- Remove the interior light fuse number 5 before disconnecting the dome light wiring.
- Gently remove dome light (four clips total; 2 each on driver and passenger sides). I discovered two of the four clips on the cover of the light were already broken (the map lights were inoperable when I got the car), but I got them working while out. The switches are shot, though.
- Remove dome light bulb.
- I couldn't insert the LED panel from the top, so I pulled off the clear plastic cover by very gently pushing in the four small clips holding it to the beige plastic mount, inserted the LED panel, and reassembled. I

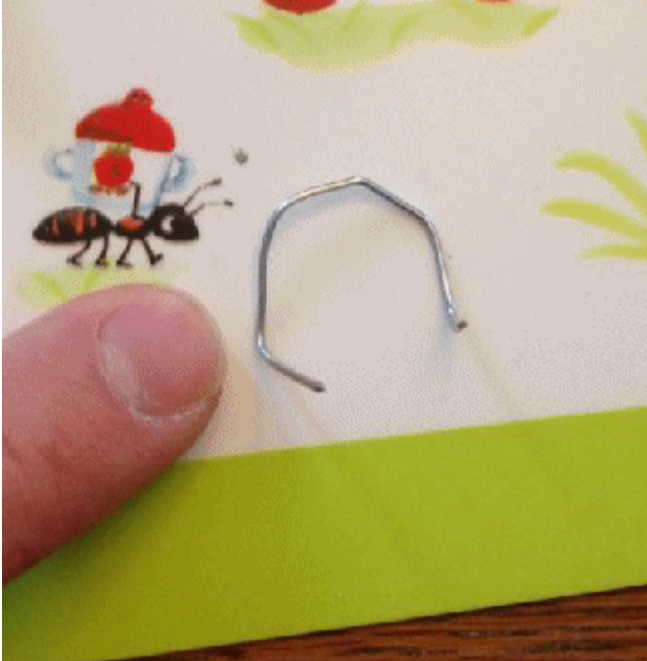
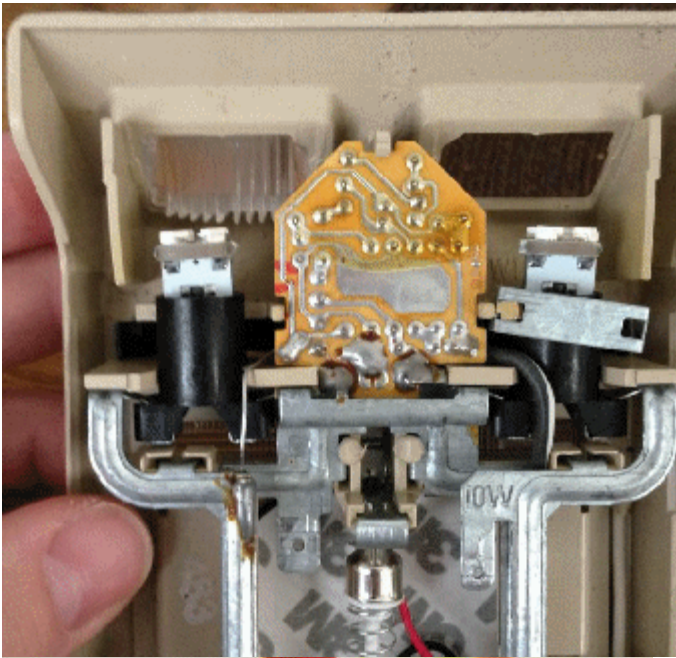
thought about using the adhesive backing on the LED, but the panel press-fit nicely with no play.

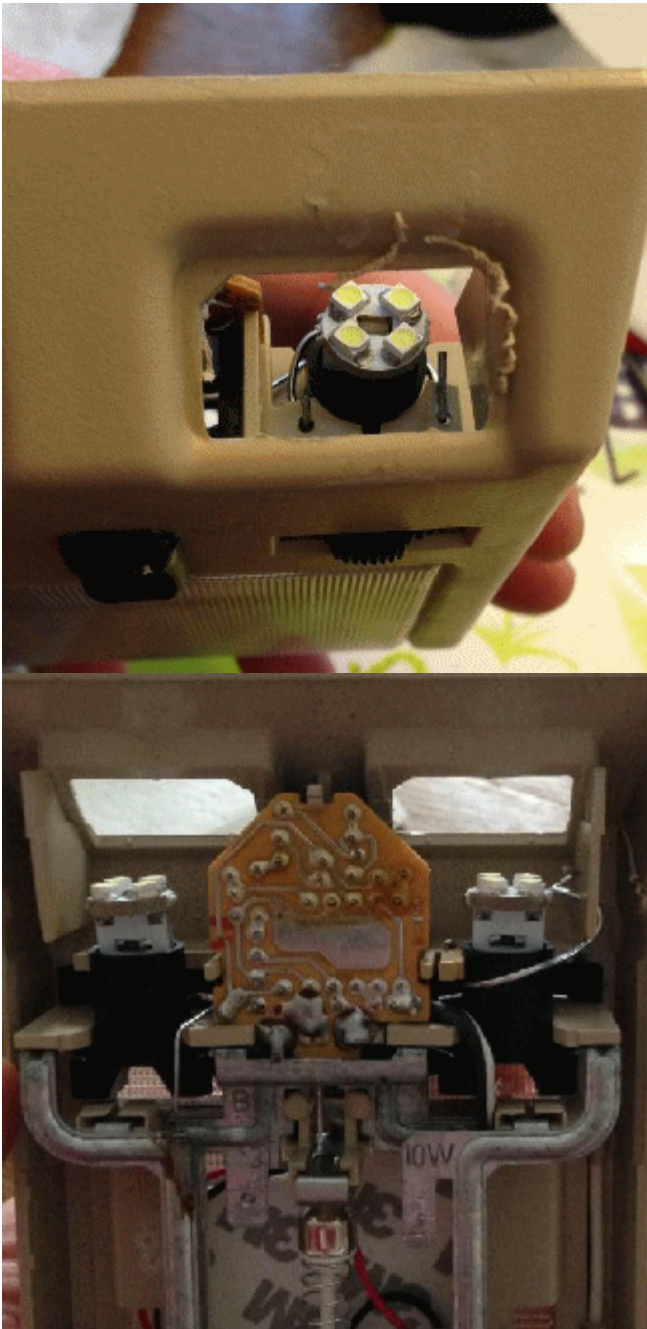
- Insert the lamp power connector into the space formerly occupied by the bulb. Red is ground on the rear connector; black is +12V.
- Reattach dome light cover.
- Enjoy the light! Photos don't show it well, but I'd say the LED throws off at least twice the amount of light and is a vast improvement.





Reading Lamp Upgrade and Switch Repair. [Nick Heiny] To upgrade the map light, I used the following 194/T10 wedge bulbs: [JTech Britelites 194](#). My map light switches were pushed up into the body of the dome light and inoperable. The map light switch was held in by a pot metal bracket attached to plastic posts that allegedly would keep the switch in place when someone pushed on it. The switch is a 3 position switch that rotates side to side, but people naturally press up to get friction on the switch to rotate side to side so the map light switch needs to be held in place on the vertical axis. I decided forming a band out of a thick paperclip to hold the map light socket in place secured by drilling some holes in the plastic body would be the simplest solution. Any repair would have to allow the map light switch to rotate and not interfere with the contacts at the back of the socket. I figured free-forming something out of a paperclip would give me the adjust-ability I needed rather than trying to re-glue or re-attach missing parts. The interior of my dome light was pretty rough. One map light was missing an upright to support the original metal bracket, and the other was broken off on both sides. I seated the map lights and bent the paperclip to fit using a pair of small needle nose pliers and trimmed off excess wire with a pair of snips. Be careful: the map light lenses will fall out if any of the 4 original clips are broken, so use caution if you're taking them off. Regardless how you mount the paperclip holders, you must be careful to ensure that the map light switch can rotate freely after the paperclip bracket is installed.





Horns:

Horn Failures.

Location. Horns are mounted on the left side of the car, just behind the front bumper.

Horn Wiring. If the horns fail, note that fused +12V is supplied to the yellow wire connector on the windshield wiper wash switch, then directly to the horns. These in turn are then grounded through a blue-black wire back through the steering column to the collector ring, thence to the horn button, thence to ground at each button.

Horn Buttons and Button Rebuild.

Removal. [Inquiry] How do i pull off the horn buttons on the wheel to clean

and check power to the horn switches? [Response: Dick Riess] Disconnect the battery before attacking. Use a small flat blade screwdriver and push under the the button between the steering wheel and the 'button'. Pull up at the same time to release the unit. Take your time and be gentle.

[Wade] The buttons are held in place with an upper and lower snap-in retainer that can be easily pried out of the wheel with care. I found that an up and down (front to rear) motion works a lot better than a side-to-side one because of the orientation of the clips. The button pulls away from the wheel easily, held down only by two wires with blade type connectors that slide free with a little work but no tools of any sort. One wire comes off the side at an angle and one comes straight out of the back of the button and there is enough slack in the wires to do this without fear of pulling anything loose.

Horn Button Rebuild. [Wade] Inside the button, there are four clasp points, two of which are like little ledges that the other parts nests beneath and two that are obviously snap-in locks. I opened up the button with a pen knife to the retainers on the snap-in side and the cover came off with zero problems. There are essentially three parts that you need to be concerned with. first is the button itself, then the bottom half and then there is the copper plate. The copper plate is easy to remove. But the two retainer bits on the plastic base need to be figured out so that you can remove it without damage. I used a small round file in one of the two holes in this plate. It is curved and has a small contact point on the reverse that meets up with a larger contact point on the plastic base. The curvature makes the thin plate act as a spring while conducting current at the same time. And that spring that carries juice gets hot. The button cover has a plastic protrusion that contacts the copper plate/spring and they eventually melt from this heat and slowly squish down until it only makes contact when you have the button depressed. When you use your horn the plastic heats up and deforms a tiny bit, eventually leaving a gap that allows your button to become loose and wobbly feeling. If your buttons are no longer working and they are showing this jigglyness then this is probably your problem. You need something inside this setup that takes up the slack and makes contact between the melted button nub and the copper plate/spring.

I decided to fill the button cover with a brass piece that will fill the entire void of the button cover and serve as a heat sink rather than putting all on the tiny contact point that bears the entire force of our pressing. A small stack of .5mm sheet brass shims cut to fit into the plastic button cover will do the job of filling the gap permanently and acting as a good heat sink. [Randy Starkie/Hal Levkovitz] You can use a small brass nut or a lump of epoxy to achieve the same buildup, in both cases sanded down to the correct height.

Horn Failure Mode. [Randy Starkie] I find bad horn buttons many times on the 700 series cars. I think the circuit carries too much amperage for the contact size in the horn button. The heat causes the raised plastic nipple inside to go flat (a sure sign that this is probably the case is if you find the horn button to be loose and easily moved around). You can test the horns while they are in place with some 12v leads (+ and -). If you can get the horn to sound with those I will wager a cold Guinness that you have bad horn buttons. If your car is like the 700 series horn buttons they can carefully be pried out without removing the airbag. But make SURE you disconnect the battery

negative ground first.

Horn Corrosion. [Inquiry] The horns on my wife's 945 are rusted out to the point where one of them is completely gone and the other is hanging on for dear life. What is a good replacement for these? I think anything from the local auto store will rust out in one New England winter under there. The Volvo parts cost about \$60 each. [Editor] [IPD](#) has dual replacement FIAMM horns for \$29. [John Horner] Local pick-n-pulls here in Northern California have plenty of Volvos and charge \$6.99 each for good used horns with 30 days guarantee to work. Rust is only minimal surface rust.[Gene Stevens] If you buy aftermarket horns, you need to find isolated coil type - two terminals. The more common one-wire horn will not work unless you add a horn relay. [Editor] The Bosch replacement horns are: low frequency (335 kHz) 0.320.043.147 and high (420 KHz) 0.320.043.148. They go for around \$60 each online. Volvo OEM horns are less expensive at FCPGroton or Borton Volvo (\$55 each); both (6846320 and 6846321) are drop-in replacements.

Horn Replacement. [Editor] To replace the horns, remove the 13mm fixing bolts. Rotate the electrical connectors to free them up, then try to pull them off after squeezing the lock tangs. If they won't budge, pry them up with a narrow screwdriver in the slot on the plastic barrel. Spray the connectors with DeOxit or contact cleaner to remove corrosion and then fill them with silicone dielectric grease. Install the new horns, reinstall the connectors, and you are all set.

Lighting and Horn Upgrade:

Euro Side Marker Lamps.

Installation. See the separate [file](#) describing these side marker lamps and their installation.

Removal. Just use your fingers to push the light forward (towards the front bumper) it will then come free on the back side and then it's loose.

Daytime Running Lamps. DRLs have been standard in some markets for years, but in the US only arrived in the 1993 model year.

Installing DRLs in an Earlier Volvo. [Editor] You can install a DRL module to an earlier Volvo by purchasing a module from [DesignTechInternational](#) or [IPD](#). Easy installation.

Removing DRL Function.

1. Later 960 Cars. [Sam] The daylight running lights on later cars can be disabled (or enabled) by turning that small screwdriver slotted switch at the 5 O'clock position. It has two positions. ---daylight on-daylight off.

2. Other Cars. [Dave Stevens] If DRL bothers you, replace the headlight switch with one from an earlier model 740 or 940 that doesn't have permanent DRL mode. The switches are a direct fit and there will be no need

to change vehicle wiring. My favourite is the '89 (or thereabouts) 740 switch with 4-lugs on the back side (standard for the Canadian market in those years). It gives you DRL when the switch is left in the ON position, but you can manually still select PARK or OFF as desired. There was also a 5-lug switch with a visible set screw in the switch body that allows you to select permanent or switched DRL mode. If you search the archives here I think there's even instructions on which way to turn that screw. This switch was commonly used in the U.S. during the late 80's and early 90's. Note that the stock switch varied by year and market and maybe model, so be sure to look at the switch for the features I mentioned. You should be able to pick up a used one for about U\$10. Tips: You will need to pull the switch knob off the shaft and they are often stuck on pretty good, so pry evenly with something suitably padded so as not to mark the dash panel or knob (which you may want to re-use). Slip an appropriately sized socket (forget the ratchet or nut driver handle if you don't have deep sockets) over the knob to remove the nut (pliers tend to slip and nick the dash). Unless you enjoy working upside down with the brake pedal in your ear and all the blood rushing to your head, you will probably want to remove the knee bolster panel for access behind the dash. Although you don't need to pull the light switch panel to change the switch, it makes it far easier to remove and replace the connector on the back of the switch if you do. It also makes it easier to find and replace any burnt out dash bulbs at the same time. Before beginning removal, note that the light switch panel is pushed out at the left which is retained by a side mounted spring clip -the right side is held by tabs which only disengage once you've swung the panel out a bit. To avoid almost inevitable damage to the dash opening if you try to pry it out from the front, reach up behind the dash and press the aforementioned retaining clip firmly inward (to the right) as you start to push the panel out.

Headlamp Upgrades

Glass Headlamps with Fogs. To replace your plastic US-spec headlamps with the glass units with integral fog lamps, you will need not only the headlamp units themselves but also the corner lamps for headlights with integral fogs, the trim under the headlights, the narrow grill, headlight brackets and associated grill brackets, and the plastic piece above the grill. The parts will need to come from a 740 or 940 with fogs. You will also need the dual foglight switch in the dash and the small blue or orange relay for the fogs. The corner lamps use different bulb holders (the style found on early 960s or from the dealer); the wiring plug is also different and its the same one that the Radio Suppression Relay relay uses.

Euro-Code Headlamps. [Inquiry:] What is involved in installing Euro-Spec headlamps in my car?

[Response 1: Jason Kneier] You can get Euro units (all glass), but you'll have to get the turn signal assemblies, too (they're incompatible w/US ones)

[Response 2: Mike Sestina] There is no rewiring involved if you open up a 9004 bulb for use as a plug and wire to its connectors. It will just plug into the North American wiring harness so you can unplug to restore NA style

when you sell the car. See detailed headlight technical article in Oct 99 ROLLING by Duncan LeBay on installing E-code (Euro) lights in a 240. I have installed E-code lights on our 945. One must replace the corner lamps. Corner lamps are Clear/Yellow. The upper Clear lens is for the Daytime Running Lamp and the Yellow is for the turn signal. I had to swap out the standard OEM 945 grill, because my car came without foglights. The E-code main lights come as one integral assembly combining the 3 beams into lo/hi/fog lights. See the photo. The 960 grill is made for these European lights because the North American 960 normally came with fog/headlamps. OEM parts came from Verrigni at a price close to \$400 each side though. These lamps were the best upgrade to the car, second only to the IPD bars

[Response 3: Stoney] All Volvo ECode headlamps and turnsignals are available from Verrigni Marine at 800-888-6586. See also <http://www.eurosporttuning.com> for a \$495 package of everything needed.

Auxiliary Lighting Upgrade Information. Check out Daniel Stern's [website](#) for good information on headlamp upgrades. See [Susquehanna Motor Sports](#) for a good selection of premium lighting equipment.

Basic Upgrade Information. [Inquiry:] What kinds of after market fog/driving lamps are you guys using? I need suggestions on a good pair for my 1990 740. I'm not too afraid of drilling and all that other stuff, so what would be the place to mount them?

[Response: Daniel Stern] This question has no real "correct" answer, but it has a whole bunch of INCORRECT ones, so let's get those out of the way first.

Don't waste your money on the trendy little "eyeball" or "flat oval" shaped junk from e.g. Blazer, Tenzo, Catz, or any of many copycat companies. They're toys, meant primarily for kids who want to think their car looks "kewl". (Nobody has ever given me a definition for "kewl"...I'm still waiting...) Now, to answer your question with a question: What is your goal? You're dealing with *ROTTEN* original-equipment headlamps, so neither your low beams nor your high beams are much of any good. My first and loudest suggestion would be for you NOT to buy any auxiliary lamps at all--from me OR anyone else--and instead to save your money up for a European-code ("E-code") headlamp changeover. This will not be inexpensive, but will make tremendous improvements *EVERY* time you drive your car at night. Adding auxiliary headlamps to rotten main headlamps is a band-aid; replacing the lousy main headlamps with real working ones puts auxiliary lamps back in the category they belong in: Additional supplements to handle special situations, not necessary stopgaps. The E-code headlamp changeover can be had at favorable prices from Verrigni.

Suppose, though, that you are fully aware of your current headlamps' low performance, but you also have determined that you will not spend the money--now OR later--for the E-code headlamp changeover. In that case, your task becomes one of making the best of a bad situation and choosing your auxiliary lamps wisely. You need to be discriminating not only on the basis of lamp performance, but also on build quality (skip the low-end

"consumer grade" plastic stuff...find units made out of glass and metal) and on long-term serviceability (find lamps that have replaceable lens-reflector units so you're not stuck shelling out the cash for a complete new lamp assembly when a rock takes out a lens or when 10 years' hard use deteriorates the reflectors.) There is, as I say, no need to uglify your car with the odd-shaped black plastic stuff on the market; there's also no call to plaster great big chrome lamps on the front of your car (unless that's the look you're after). Sufficient stylistic variation exists in the realm of *good* lamps that you can find something that will integrate well with the front end of your car AND work well.

I imagine you'd want rectangular lamps on that car (though I may be wrong; maybe you prefer rounds). If in fact rectangulars are what you have in mind, I recommend two pairs of Cibie 35s. One pair of yellow fogs, to be mounted below the bumper as far apart from each other as practicable. One pair of clear drive beams, to be mounted above the bumper just inboard of each headlamp. The fogs would fill-in the black hole left on the road foreground by the low beam headlamps and add width to the coverage. The driving beams would add punch to the high beams.

Other alternatives exist...Marchal 950s, Cibie 95s or 175s, Hella 220s...make sure you know what you're getting, though, because some of the widest-available manufacturers (I'm thinking of Hella here) make a random mix of junk and good stuff.

New High Performance Headlamp Bulbs. There is test of PIAA, Philips, Osram bulbs. It is first issue in OctoberAutobild "Heft 39" under "Produkttest und Glühlampen" title.

Brief translation of article from Marc:

Tag line: In headlights there are a variety of lights, yellow, blue, etc, that promise more light, but not all deliver light brightly....

For the last 27 years, approximately, driver's haven't had to think about what kind of bulbs to use. If you were using H4 lamps, you just stuck in another H4; the only real choice was which manufacturer's bulb you used (Osram or Phillips). But for the last two years there is motion in the bulb market, in the form of Xenon lights, with their blue cast. Purists will roll their eyes and claim that they're not blue, but rather produce true daylight spectrums. This is true, but compared to other lamps, it seems blue. It's also the target lighting type that various individuals and firms want to make happen with regular [H4?] type bulbs, by using different methods. Shortly after the decision to go with real Xenon lights in the BMW 7 series in 1991, there were aftermarket laquers that could be painted onto regular headlights to supposedly provide "trouble-free Xenon effect". There are supposedly actually people out there who seemed to believe these claims... Then comes the next chapter of the story: after the painting on of the laquer, when the headlights first were turned on, the heat from the bulb was to vaporize the laquer and the resulting mist coated the reflector and the glass of the housing; as a result, the light was truly blue, but also much too dark. The problem cured itself inevitably, as when the car had to go through TUV, the inspectors would mandate a complete

headlight assembly swap to get rid of the problem (TUV = German vehicle inspection -- comment by Marc: the toughest inspection I've ever seen/been through). We have to add here that in writing this article, that we received a pair of blue Xenon-Caps; these blue plastic caps fit over the headlight to supposedly give the Xenon-look, but the plastic got smokey/opaque/warped/melted the first time we turned on the lights, and the off-gases ruined the reflector and glass. Even so, we had our reason to be happy: had this happened in the testing device at Phillips, the cost to fix their tester would have increased the damages by some 20,000 DM (about \$14,000), and they had been nice enough, as the leading provider of automotive bulbs, to provide us free access to their quality-assurance group & the test equipment. The test equipment (called a light-globe/marble/ball) did it's job, which is to measure the actual light emitted by a headlight lamp in Lumens, as well as where that light ends up (vs. the raw amount of light emitted). The should-be-produced light amount from a manufactured H4-lamp should be 1000 lumens (+/- 150 lumens). Therefore we took the lamp in a normal headlight assembly and pointed with the light-globe at a measuring wall. This allows us to see the beam pattern and to measure the actual output at any point directly. On this surface, on the left above the center, is where on-coming traffic would be exposed to light; this portion of the light pattern can not be very strong, otherwise the blinding of on-coming traffic is too strong. By contrast, the right side can never be bright enough; the light thrown to the right side, about 50 meters out from the car is important for the driver's identification of road hazards and foot traffic. In order to have good light there, the geometry of the bulb must be correct, sending the light to the right spot. We also check for this in our comparisons/testing. But before testing, each of the twelve candidate bulbs have to burn in for an hour. For this purpose, Phillips has cabinets full of the right connectors; the doors covered with a fine mesh steel grill, to protect you in case one of the bulbs should happen to shatter. It never came to that, but one of the four PIAA Super White and Blue Laser Light bulbs didn't survive the burn-in period.

Generally, the the test bulbs fell into five catagories:

1. standard bulbs, including GE and Osram - reasonable quality at low costs
2. 100-watt-bulbs, including the Jahn brand. In open headlight assemblies (Marc's comment - headlight assemblies where the bulb can be changed independently of the reflector casing), this are not permitted under German law, but every car parts store seems to carry them;
3. Premium bulbs - to this end, Philips has the majority of the market, with the Osram Super being the competitor -- these lights supposedly produce 30% more light
4. Super-All Weather - yellow bulbs, which inherently produce less light make up for it by concentrating on a wavelength that is more visable. The Osram Allseason Super should at least take care of bad lighting conditions
5. Xenon-imitations, divided into two catagories: those not permitted under TUV rules and those that are certified for use. The first type can't be used in regular street traffic and is therefore hereby listed as "not worthy of recommendation". The other type provides a bluer light than a regular bulb and can be considered as an alternative to a regular bulb. The price

differences are very wide. The best price/performance ratio is the Jahn Superblue, although it failed the test for where the focus was directed. Point to be made: in none of the listed bulbs was the focus geometry correct/perfect.

Brief translation of the summary from Ross Gunn:

In summary: "If you want really good light, use Osram Super or Philips Premium. If you would like to lend a legal xenon Touch to your auto, try True Blue or Blue Vision. If you only would like to replace a defective lamp, buy a name brand original equipment quality lamp. The remainder is simply junk and not worth the cost of the packing it is in."

Auxiliary Lighting and Wiring Information. [Tip from Mic:] Check out the following link for information on installing and wiring replacement headlights and auxiliary lights: <http://catalog.com/susq/other/useful.htm>

Fitting Higher Wattage Bulbs in Existing Frames/Reflectors. While you can easily install higher wattage bulbs in your existing lamp reflectors, most users have reported that the reflectors melt after a short time due to thermal overload. The earlier four-lamp sealed beam frames do not melt. However, in both cases you will have to upgrade wiring and relays.

Driving Lamp Mount on Front Bumper.

[Inquiry:] Has anyone mounted driving lamps on top of front bumper on a 90 744T? The mounts I have (CIBIE 175) have short (1.5" or so) bolts (non hex head for clearance, probably can't change to longer bolts without a hassle) and I don't want to go punching holes in the bumper cover without knowing what's under there. I've looked under the bumper through the spoiler access holes (two plastic covers left and right) but the solution doesn't jump out at me. Or is this just a case of fabricating a bracket and mounting it to the bumper mounting studs? Is there a factory bracket for Volvos for mounting auxiliary driving lights above the bumper?

[Response: Mats Walroth] Here in Sweden Volvo has a mounting bracket for driving lights on top of the bumper. I have it on my 90 940. You don't have to drill a single hole to put it on, it is clamped. It also comes with wire harness relay switch and stabilizer bars. The Volvo part number is 3529 080 Price in Sweden is 645 krs which is about \$80. For lamp aiming instructions, see [Headlamp Aiming.](#)

Mounting Foglights to 90+ 740. [Inquiry:] How do I mount foglights to a 740/940?

[Response: Steve Seekins] The 740 through 89 had the foglight that mounted on a plastic bracket that bolted to the bumper and the light came through a cutout on the airdam. In 1990, the bumper, airdam, grill, hood, fenders, and headlights were all changed. The headlights were single plastic lens units and the air dam was a smoother unit with a grill in the center portion. For aiming

instructions, see [Headlamp Aiming](#).

1990+ OEM Foglights:

The OEM accessory foglight kit for these cars uses a molded plastic piece that fits the contour of the airdam and has a custom shaped reflector and lens that is faired with the mount and it all fits snugly against the bottom of the bumper - much nicer looking than the earlier version and also a bit less prone to damage as it does not extend down so far. In mounting the foglights for the 90- 700 series on the spoiler, you will need to cut the spoiler according to the patterns included in the instruction booklet. You will also need torx driver as the mounting screws are torx head. Wiring will pass through the firewall using an existing harness grommet which has spare ports. Some stiff wire and wire pulling lubricant will be very helpful. You will need to pull out the relay tray in the center console to install the new relay and hook up the wiring to the fuse connections. There are about 4 different wiring options and a couple of different relay options depending on what jurisdiction you are in. I used the European option which allows the fog lights to be ON with parking, low, or high beam. I often use the fog lights during the daytime with the parking lights (in metro DC area you need all the visibility you can get!). The local rule here is that you can have no more than 4 lights lit on the front of the car, so since the headlights are single beam, you can run the fogs with either low or high. With a quad light setup, you must wire fogs to come on only with the low beams. These lights make for a very nice installation on the 90- 700s, and they seem to be very good quality lights. However, being low and under the bumper, they are prone to sand and gravel damage. Get some of the heavy adhesive clear vinyl protection sheets (available from IPD and others) and apply it to the lenses. This will stop all but the biggest stones. Then, you will have to be careful about high curbs and parking lot stops.

1990+ Aftermarket Foglights:

[Editor:] You can mount Hella or Bosch fog or driving lamps in the small cutout on either side of the lower airdam. Fabricate a rectangular bracket from stiff steel plate or 3/8 inch ABS (to minimize vibration) that is approximately 2 inches by 6 inches. Drill two holes for bolts in the bottom front of the bumper shock frame mounting tube (the part of the frame to which the bumper shocks are mounted.) Rustproof the holes, then mount the bracket to this tube (tight fit for the bolts and nuts!) and then drill the mounting hole for the foglight in the center of the bracket. Hang the foglight from the bracket and wire it up. The location is not ideal: it is low down, limiting the effectiveness of the lamps and subjecting them to stone and curb damage, but cosmetically it is superior.

Fog Lamp Upgrade Information. [More good tips from [Daniel Stern](#):] For lamp aiming instructions, see [Headlamp Aiming](#)

A fog lamp, in general, is a lamp which produces a beam with a horizontal cutoff at the top of the beam, above which minimal light is thrown.

A **GOOD** fog lamp produces a very even, very wide beam with minimal "hot spot" effects, with a sharp upper cutoff and with a bulb shield or other method used to eliminate or reduce upward stray light.

The function of a fog lamp is to illuminate evenly the foreground area of the driver's field of view, without creating backdazzle in the rain, fog or snow. In other words, the idea is to throw a wide, even beam of light UNDER the rain, fog or snow. Fog lamps are most effective when vertical separation is maximized between the lamps and the driver's eye height. This means it is best to mount fog lamps low to the ground. The benefit of correct (low) fog lamp placement is double, because a low-mounted fog lamp can be aimed with the cutoff at the same height as the lamp unit. This gives maximal illumination range. A fog lamp mounted where driving lamps should be, at headlamp level or above, must be aimed with the cutoff at a declination of at least 3 inches in 25 feet (1 percent) to avoid creating glare to oncoming traffic and backdazzle to the driver. This declination limits the illumination range of the fog lamps, however, since the cutoff hits the road at a defined point which can be determined using simple right-triangle geometry. The factory fogs on my 164 are in the wrong place, inboard of the headlamps. They're soon to be replaced with driving beams, and good round fogs placed under the bumper.

Selective-yellow fog lamps are widely held to perform better in adverse weather conditions. There is controversy on this point in the lighting and regulatory communities, as little proper research has been done to confirm or refute the poor-weather benefits of selective-yellow light. There are physical reasons why selective-yellow light should not be any better in conditions found on the road, but there are physiological reasons why the eye should be less affected by glare and backdazzle with the selective yellow light color. So the controversy continues! Bulbs in funny colors with bogus performance claims (PIAA "SuperWhite" and similar) can be dismissed right out of paw.

The central issue, however, is beam pattern. Many of the "fog lamps" found on vehicles in North America are cheaply made and rather worthless, with low-output bulbs and unsophisticated optics. Those plastic jobs on some 700 and 900 series cars DEFINITELY qualify--and they're in the wrong place, too. These lamps do little to improve foreground illumination, do even less to help in bad weather, and often create dazzling glare for oncoming traffic.

How can a low-performance lamp do that? It's because most fog lamps are rather small, but contain halogen bulbs which create enough light to be painful to look at, even if not enough to do much for road illumination. The small reflector and bright-enough-to-glare bulb create *high unit luminance*. That's the technical way of saying that the reflector reflects a lot of light per unit area, and so creates a very bright *signal image* (what we see when we look at the operating lamp*. This is true even for correctly-aimed fog lamps, and it's why the fog lamps of an approaching vehicle often appear much brighter than the low beam headlamps, even though the fog lamps always use bulbs that produce about the same amount of light as the low beam headlamp bulbs.

The reason why fog lamps are wired to switch off when the high beam headlamps are activated is because high beam headlamps create a *lot* of upward light (which is not considered "stray" in a high beam or driving beam when you need to see for a long distance down the road), and are therefore worthless in bad weather. Therefore, if you're using high beam headlamps,

you've no need of fog lamps because your vision is not impaired by poor weather. At least, that's the supposition in the minds of the same folks who insist that we in North America use headlamps with minimal (some would say "insufficient") foreground illumination on low and, often, high beam.

There is recent research indicating that in poor weather conditions, a lighting combination of front, rear and side position marking lamps (parking lamps, sidemarkers and taillamps) plus fog lamps WITHOUT headlamps can be advantageous due to reduced backdazzle for the driver. Many of us who modify our vehicles' stock lighting systems already know that! However, before such a change becomes advisable, we'd want to see an increase in the minimum performance requirements for fog lamps in North America.

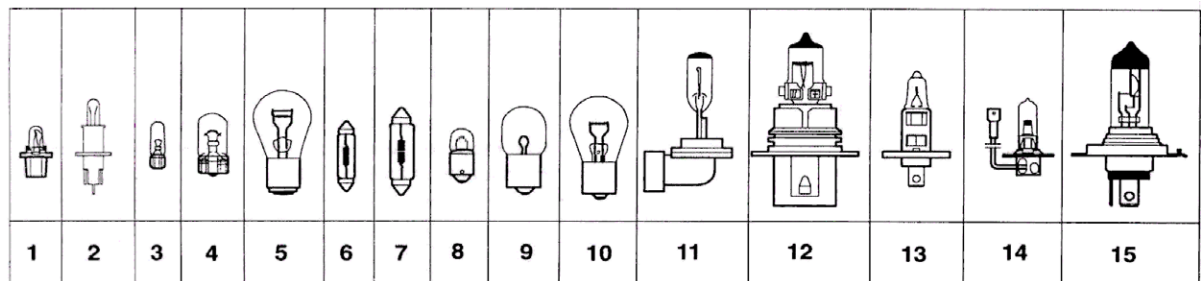
Louder Horns. If you want a set of loud electric horns, cheap, pull a pair from a late model Audi 100/200/5000 series vehicle. These horns sound similar to the brand name aftermarket ones I bought a while back...I *think* they were Fiamm.

Lamp Reference Diagram:

Lamp Diagram and Part Number Charts.

For common American sizes, see the online Sylvania [lamp selector](#). Some of the odd OEM bulbs may be had from [IPD](#), a dealer, or on EBay.

Bulb Diagrams:



Bulb Descriptions and Ratings: [refer to figure above]

Bulbs for:	Fig No.:	Rating:	Socket:	Code USA:
Headlights	15	60 / 55 W	P 43t-38 / H4	
Headlights / auxiliary high beams, 780	13	55W	P 14.5s / H1	
Headlights USA/Canada, outer bulb	—	35 / 35 W	"Sealed Beam"	H 4656
Headlights USA/Canada, inner bulb	—	50 W	"Sealed Beam"	H 4651
Headlights USA/Canada, 1988- 760 / 780	12	50 / 70 W	"Semi - sealed"	9004/HB1
Headlights USA/Canada, outer bulb 1995-	11	51W		HB4
Headlights USA/Canada, inner bulb 1995-	11	60W		HB3
Fog/spot lights	14	55 W	PK 22s / H3	
Foglight 760 1988- USA/Canada	11	27 W		GE 881
Parking / day running lights (certain markets)	5	21 / 5 W	BAY 15d	
Parking lights (all other markets)	5	5W / 4 cp	BA 15s	
Parking lights 780	8	4 W	BA 9s	
Parking lights 780 USA/Canada	4	4 W	W 2.1 x 9.5d	
Turn signals front	10	21 W / 32 cp	BA 15s	
Turn signals front 1995-	10	21 W gul	BAU 15s	
Turn signals front 1995- USA / Canada	5	24 / 2.2 cp gul	BAY 15d	1157 NA
Turn signals side	4	5 W	W 2.1 x 9.5d	
Parking lights front 1995-	4	5 W	W 2.1 x 9.5d	
Turn signals rear	10	21 W	BA 15s	1156
Turn signals rear 1995-	10	21 W gul	BAU 15s	
Tail lights	9	5W / 4 cp	BA 15s	
Brake/tail lights 5-D	5	21 / 5 W	BA Y15d	
High level brake lights 1987-	10	21 W / 32 cp	BA 15s	
Rear foglights	10	21 W / 32 cp	BA 15s	
Reversing light	10	21 W / 32 cp	BA 15s	
Side marker lights, rear 780 USA/Canada	9	5W / 4 cp	BA 15s	
Side marker lights, rear 740/760 USA /Canada	8	4 W	BA 9s	
License plate lights	8	4 W	BA 9s	
License plate lights 1995-	4	5 W	W 2.1 x 9.5d	
Roof light	7	10 W	SV 8.5	
Courtesy lights 960	4	5 W	W 2.1 x 9.5d	
Reading light, front and rear	4	5 W	W 2.1 x 9.5d	
Vanity mirror light	6	3W / 1.2W	SV 7 / SV 5.5	
Glove compartment light	8	2 W	BA 9s	
Door open warning lights	4	5 W	W 2.1 x 9.5d	
Engine compartment / trunk lights	7	10 W	SV 8.5	
Courtesy light 780	7	5 W	SV 8.5	
Instrument panel lighting				
Indicator and warning lights VDO	1	1.2 W	*	
Indicator and warning lights Yazaki	3	1.2 W	W 2 x 4.6d	
Instrument lighting	4	3 W	W 2.1 x 9.5d	
Control and panel lighting	2+3	1.2 W	W 2 x 4.6d together with *	
Fusebox light, only 760/960 1988 - 1994	---	1.2 W		

* With integral holder.

Lamp Part Number Table:

Bulb Diagram	Part Numbers	Descriptive Notes
Number	Volvo	Osram

1	966326		VDO panel: bulb soldered into base
1		2721	Yazaki panel: bulb with separate base
2	1363149-4		Panel switch lamps
Similar to 2 with two metal prongs	9130288		Blue 1.2 Watt lamp with holder: ashtray
3		2721	Yazaki panel: bulb without base
3	1323462-0		Blue 1.2 Watt lamp without holder: dash
3			Blue 1.2 Watt lamp with holder: ashtray
4		2821	Instrument panel illumination 3 Watt
4			4 Watt
4	949671		5 Watt
7		6418	5 Watt
7		6411	10 Watt roof/engine/trunk lamp
14		H3	55 Watt Fog lamp

960/90 Interior Trim and Panel Lamps. See the [FAQ section](#) describing these bulbs.

[Volvo Maintenance FAQ for 7xx/9xx/90 Cars](#)
