Repairing Composite Headlamps

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It's your first chance in months to get out of Dodge. It'll be great to pack up some cold ones, a couple of fishing rods and some old clothes and escape to the country for a day or two. But as you leave the mercury-vapor-illuminated metroplex, you realize what you forgot--carrots, lots and lots of carrots, because you can barely see the road in front of you in the starlight of the countryside. Relax, it's not your failing eyesight. It's a burned-out headlamp.

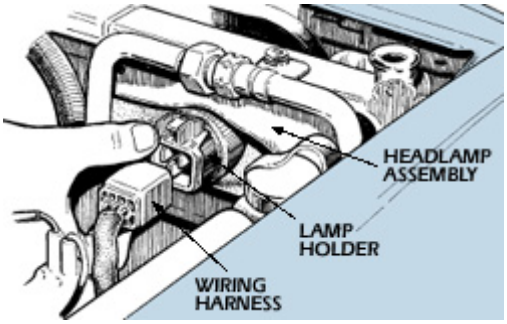
Replacing a broken headlamp assembly is straightforward. Most of the fasteners and mounting hardware will have to be transferred to the new housing.

Older Ways

For generations, American cars, and any car sold in the United States, had the same kind of headlight--a sealed-beam, either in a single or a quad arrangement. This fragile blown-glass envelope was filled with an inert gas and worked pretty well until it burned out. It had only modest performance, but the Department of Transportation mandated its use.

Most modern cars use what's called a composite headlamp--a plastic reflector bonded to a plastic or glass lens and fitted with a bulb. The bulb is of a quartz-halogen design. The "glass" bulb is actually made of silica quartz, which is highly resistant to heat. The filament is engineered to run at a much higher temperature, producing more light and heat. The silica envelope is filled with a mixture of halogen gases (iodine or bromine) to scavenge evaporated tungsten filament from the inside of the quartz, keeping each bulb's brightness constant until it fails.

Simply replacing a bulb is easy. A socket holds the bulb in place at the back of the reflector assembly. Unscrew it and pluck the bulb out. New quartz bulbs are always packaged in a bag or sleeve. This is to prevent the oils on your fingers from contacting the quartz. Temperatures at the surface of the bulb are high enough--several hundred degrees--that the oils will carbonize onto the surface, creating a localized hot spot. This hot spot will overstress the silica, resulting in a crack that lets air into the bulb, blowing the filament out within minutes. Never allow your fingers, or anything that isn't squeaky clean and dry, to touch the bulb. If you do, clean the bulb with alcohol and a clean cloth. The easiest way to avoid problems is to leave the protective sleeve on until the bulb is in the socket and ready to reinstall. When reinstalling the lamp holder, a small smear of silicone grease over the O-rings will help it slide back in and keep moisture away.



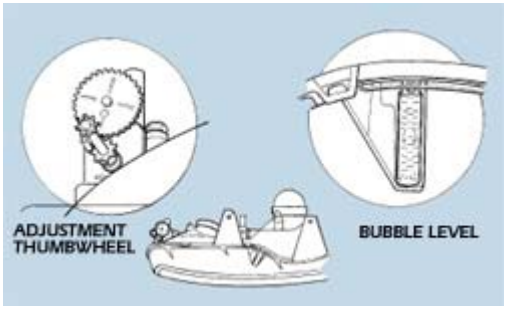
The first step to replacing a lamp is to disconnect the wiring harness from the lamp holder. Never touch the glass with your fingers.

Foggy, Foggy Nights

Both of your headlights are lighting up but you still can't see? Are the surfaces of your headlamps fogged? Plastic lenses are covered with a special UV-resistant coating. After years of exposure to pollution and UV-containing sunlight, it can fog. Using rubbing compound to remove the haze is a short-term solution. With the coating polished off, the lens will yellow and haze. Your only solution is to replace the entire assembly.

If moisture has crept into the assembly and fogged the interior, you may have a problem with the housing's vent system. Look for collapsed vent hoses, or hoses plugged with mud, insects or rustproofing.

If the vehicle has been immersed in muddy water, you'll need to remove the entire housing and flush it out. Dry thoroughly inside and out before reassembly. Corroded plating on the inside of the reflector is grounds for replacement.



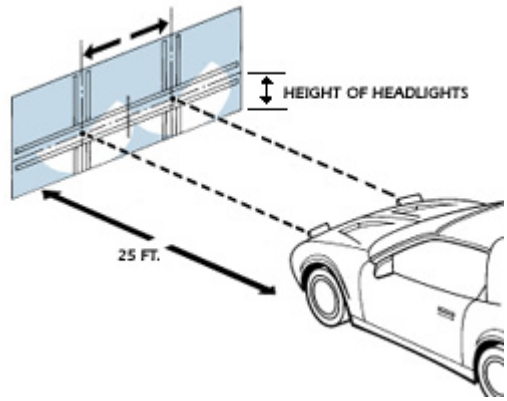
Many modern headlamp assemblies have a bubble level to assist in aiming the light beam. You'll still need a marked wall to see the beam pattern.

Aim High

Be sure to set the aim correctly.

Old-style sealed-beams were not fussy about aiming, but the modern quartz lamp in composite headlamps has a very sharp horizontal cutoff to keep light out of the face of oncoming traffic. Consequently, the aiming of the beams is critical.

Sealed-beam lamps used a relatively crude aiming mechanism that required a Phillips-head screwdriver to turn adjusting screws, which invariably got more difficult to turn as the socket aged and corroded. Sooner or later, the heads of the screws stripped, and you



It's critical to keep both headlight beams' cutoff below the line at the bulbs' height from the pavement. Check this on level pavement.

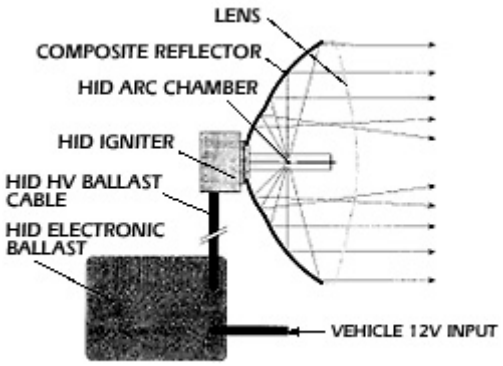
aimed your headlights poorly or not at all.

Some headlamp assemblies are adjustable by means of a large Phillips-head screw accessible from the front of the vehicle through holes in the grille. Others may have thumbwheels that you simply crank up and down and left and right without any tools. Vehicles vary, so you'll need to check your owner's manual or the shop manual for specifics--but here are the generic instructions.

Park your car in front of a light-colored wall in a dark spot indoors, or outdoors at night. Position the car so that the headlights are 25 ft. from the wall, and be sure the car is parked at right angles to the wall. Measure the height of the center of the headlights from the ground. Make a line on the wall with a marker or masking tape at this same height. Now mark a pair of vertical lines directly in front of each headlight. With the adjustment thumbwheel, you can now slue the beam up or down and left or right. If you have trouble visualizing one beam because the other obscures its light, try pulling that lamp's connector, or just covering it with your jacket.

The specific numbers vary with each vehicle manufacturer, but at the very least, the left and right beams should be the same with respect to their individual centerlines. The cutoff line should be just below the line at the headlamps' center. The kickup to the right of the beam should start just to the right of the centerline. Do all the adjusting with a trunkful of luggage, a tankful of gas and a warm body in the driver's seat.

Many late-model cars incorporate a small bubble level directly into the headlamp housing. Observing the level will help you to make adjustments when you are aiming the light beam. Remember that this is only an initial adjustment. You'll still need to visualize the beam on a wall to trim out the correct alignment. This is because manufacturing tolerances don't always place the filament in the lamp in exactly the same position relative to the lamp's metal base--which can make the beam's alignment quite different when the lamp is replaced. The level will let you make headlamp adjustments when you have to drive a heavily loaded vehicle. Check the settings on the bubble levels, load up the trunk, reset the bubble levels and go. Don't forget to raise the beam after you unload.



HOW IT WORKS: High Intensity Discharge Lighting

Some high-end vehicles are available with an extremely bright, tightly focused type of lighting known as High Intensity Discharge (HID). Unlike conventional lighting, there is no filament to burn out, as the light is generated by incandescent gases in a quartz tube. How hot is it? Hot enough to create a plasma of the molecules by stripping the electrons away from their nuclei. This requires, at least initially, nearly 20,000 volts to discharge across electrodes in the bulb. The plasma envelope's shape is easier to focus than a springy tungsten wire, so less stray light goes into oncoming traffic's windshields and more, far more, goes onto the verge of the roadway. There's nothing to burn out, so the lamp should outlast the vehicle. Aftermarket retrofit kits are available to upgrade your vehicle. We've installed a Xenarc low-beam kit from Sylvania on one of our vehicles, and it has given us a new appreciation for the number of deer browsing near the side of the road at night.

Just remember that correctly aiming these types of lights is far more critical than conventional lamps, because their intense light can potentially blind oncoming traffic if they're aimed too high.

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