Audi UrS4/S6 TT HID Low Beam Retrofit

Semi-Obligatory Weasel Words

This write-up will tell you how to retrofit HID projectors into UrS headlights. Knowing the laws and regulations of the jurisdiction in which you live, it's up to you to decide whether you should retrofit HID projectors into your UrS headlights.

Low Beam Upgrade Options

The low beams in the OEM DOT lights on the North American Audi UrS4 and UrS6 tend to be marginal for serious night driving. These lights use the 9006 bulb in the low beam (with the exception of the 1997 UrS6 sold in Canada; it has the H1 bulb in the low beam). Higher wattage 9006 bulbs are very difficult to source. Options to upgrade these lights are:

1. Replace the lights with Euro lights using H1 bulbs in low and high beams. Very expensive (~$1000) with only a marginal improvement in low beam lighting.
2. Replace the 9006 bulb with the corresponding HIR bulb. Low cost and reportedly a good increase in light output. One lister has reported that the HIR bulbs melted his low beam reflectors.
3. Replace the 9006 bulbs with a HID "hack kit". These kits re-base the HID capsule in a 9006 base. Light output is considerably improved and the cost is moderate (~$200-$500).
4. Replace the low beam projector with a HID low beam projector from an Audi TT. The cost is moderate if used TT lights are purchased (~$200) and the lighting improvement is excellent.

TT HID Projectors vs HID "Hack Kits"

I have experience with a HID "hack kit" in the Euro lights on my '94 UrS4 and have installed the TT HID projectors in my '97 UrS6. The TT retrofit is the better choice because the TT reflectors are shaped to project the light in a wide flat disc in front of the car, significantly increasing visibility to the side. Photo 1 shows the OEM H1 low beam reflector compared to the TT HID reflector. Note the elliptical shape of the TT reflector compared to the hemispherical shape of the H1 reflector. Photo 2 shows the light pattern from each reflector. Note that the TT reflectors project a wide beam with a good centre overlap whereas the H1 reflector projects more of a "spot" beam under the cut-off. The beam from the 9006 reflector will be similar to the H1. Installing a hack kit in the 9006 reflector greatly increases light output and results in "hot spots" in the light pattern where the light beams overlap and in very bright lighting where the beam first hits the road in front of the car. In addition, if the capsule re-base doesn't get the HID arc in the exact same location as the 9006 bulb filament, the lights will be out of focus.

Sourcing Audi HID Projectors

A retrofit is possible in the UrS cars because they were fitted with low beam projector lights rather than using a reflector that was integral to the light housing. The projector package consists of a glass lens mounted to a reflector and bulb assembly. A metal mask is fitted between the bulb and lens to cut off the upper part of the light beam to avoid

glare for oncoming traffic. Subsequent Audi HID low beam lights used similar projector designs. The projectors from the 2000 – 2005 Audi TT are the smallest of the Audi projector assemblies and are similar in size to the projectors used in the UrS cars. The HID projector from an A6 is larger in size and a tight fit into the UrS light housing.

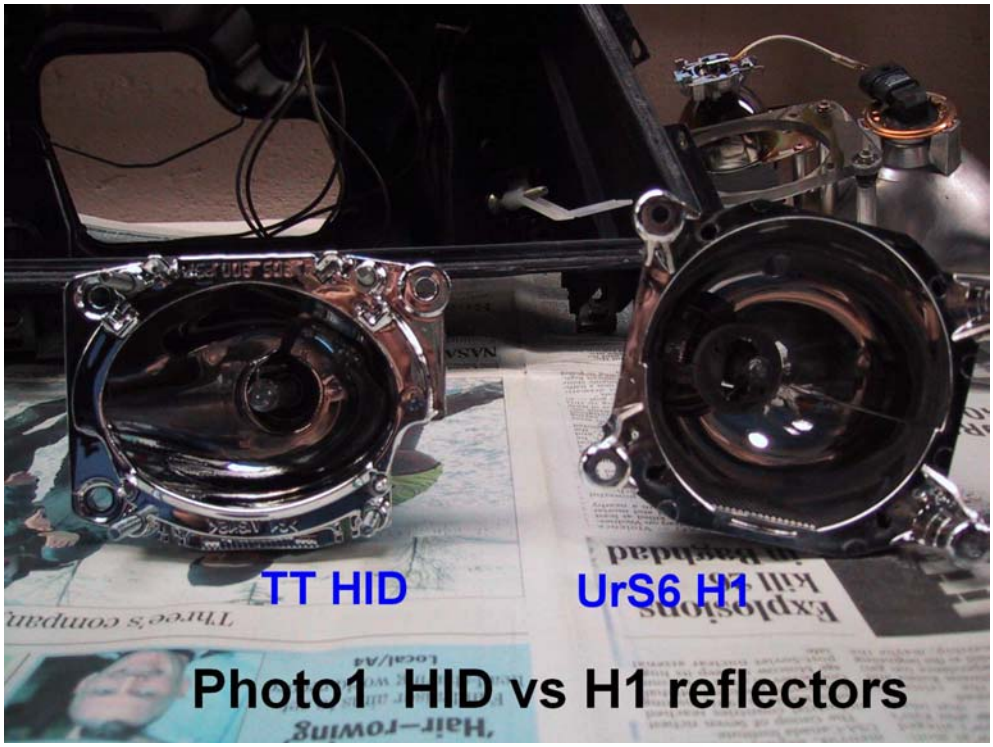
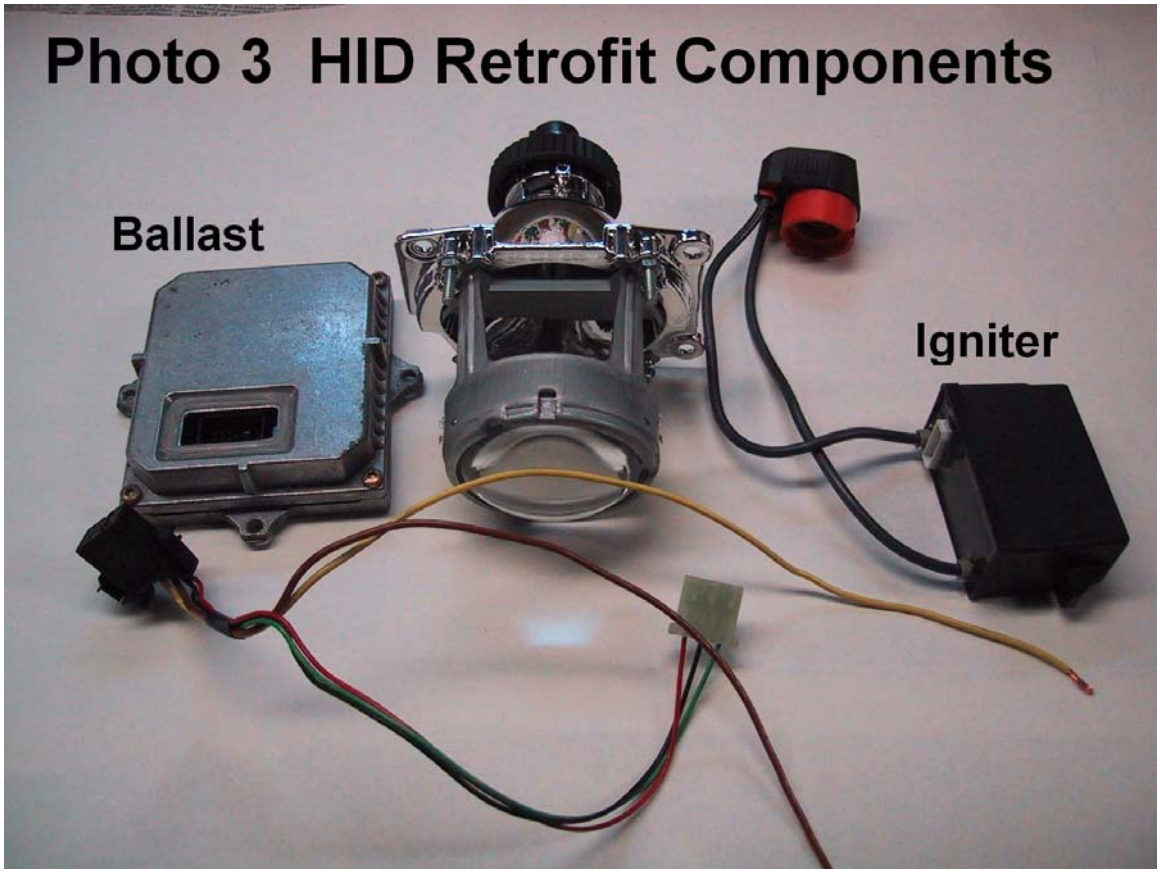


Photo1 HID vs H1 reflectors

Photo 2 Beam Pattern H1 vs HID

The A6 and TT projectors use the same gas discharge bulb. The A6 projector has a larger diameter lens, but it sits behind the smaller opening in the chrome faceplate in the UrS light housing, so any potential increase in lighting is masked. The TT projectors fit nicely into the UrS housing and the lens diameter is close to that in the OEM UrS projectors.
I sourced complete left (8N0 941 003, off a 2002 TT) and right (8N0 941 004, off a 2001 TT) DOT TT headlight assemblies off eBay. Look for "parts" lights with broken mounting tabs or fogged outer lenses. The lights I bought cost $80 for one and $100 for the other. Make sure the lights come with the bulbs, ballasts, and igniters and that the HIDs are in working order. Some eBay sellers remove the components and sell them as a retrofit "kit". Make sure you get everything you'll need: HID projector with capsule (bulb), ballast, igniter, and wiring harness for the ballast and igniter (see Photo 3).



Removing HID Components from TT Lights
The TT lights are disassembled in a similar fashion to the UrS lights.

1. Remove the securing clips for the outer plastic lens and remove the lens. Audi uses a sticky semi-solid sealant rather than a gasket, so you have to exert a steady force to pull the lens off the housing.
2. Remove the ancillary bulbs from the housing. Open the rear cover and disconnect the wiring to the low beam, high beam, and fog light bulbs. Remove the two screws securing the lower chrome trim/reflector and remove it.
3. Turn the headlight adjusters until the adjusting screws release the low beam/high beam housing. Remove the housing.

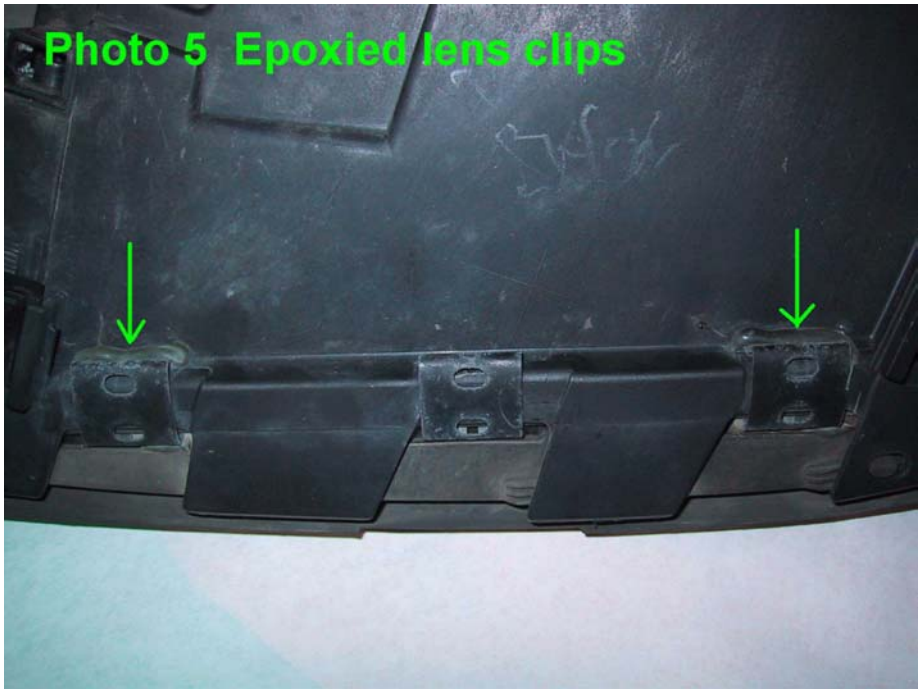
4. The low beam HID projector is attached to the housing frame with three Torx screws. The newer lights use security screws with a pin in the centre. You'll have to get a matching security screwdriver or Dremel the pin out of the screw. Remove the projector and mark it left or right depending which light it came from.
5. The igniter is secured inside the headlight housing with two Torx screws. Remove the igniter.
6. The ballast is secured to the outside of the housing with three Phillips screws. Remove the ballast. The ballast connector unclips from the housing. The larger yellow and brown wires in this harness are positive and negative power wires respectively. You can cut these at the main headlight connector and remove the ballast wiring harness intact.
7. You should now have all the components shown in Photo 3.
8. I cut the ballast mounting section out of the TT headlight housing and used it to mount my ballasts. This allows the ballasts to be easily changed and provided a convenient mounting solution.

Disassemble UrS6 DOT Lights

Note that the projector low beam in my '97 UrS6 uses the H1 bulb. All previous years of DOT lights used the 9006 bulb. Since I have no 9006 projector for comparison, I can only surmise the Audi did not make a special frame and mounting system for the H1 projector and that the 9006 projectors use the same mounting system. Disassembly of UrS4 lights is similar with some minor differences in construction and wiring.

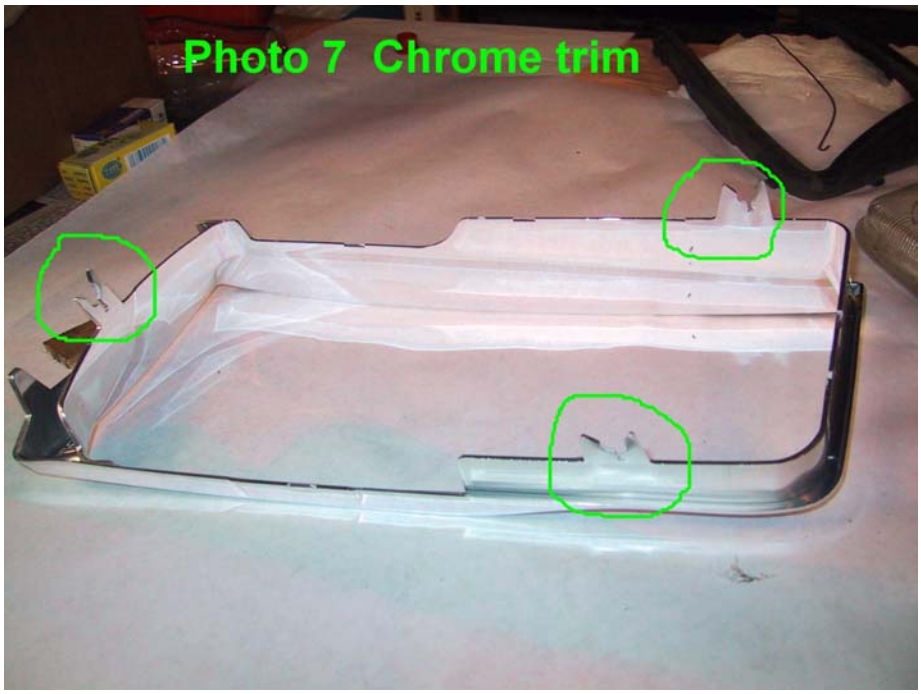
1. Remove the rubber gasket that goes around the outside of the outer glass lens. On the UrS6 lights there is a spring wire which has to be removed before the gasket can be removed (see Photo 4).

2. The outer glass lenses on the Audi UrS lights were intended to be removable. On the North American DOT lights, three of the lens clips are epoxied to the lens and housing to prevent lens removal (see Photo 5).

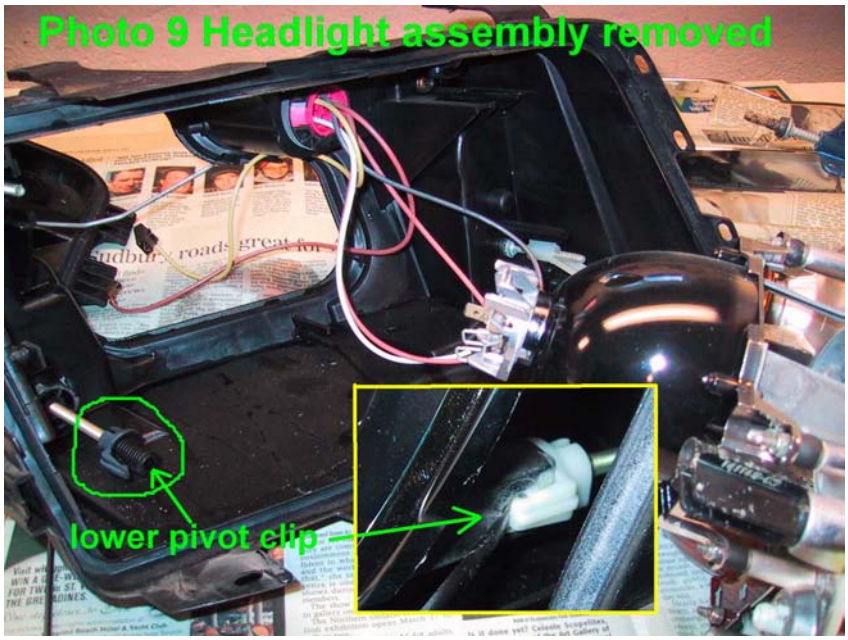


3. Use a Dremel or similar tool to grind off the epoxy and release the clips (see Photo 6). If you have Euro lights, the clips won't be epoxied.

4. Remove all the lens clips and gently pry off the glass lens. It is sealed to the housing with a soft rubber gasket. The glass will probably be stuck to the gasket.
5. Gently remove the chrome trim ring from around the headlight assembly. It is secured by three clips (see Photo 7). The clips are easily broken, so pull gently to remove them. The housing with the trim removed is shown in Photo 8. The approximate locations of the clips are circled. Note the typical fogging on the low beam and fog light projector lenses.



6. To remove the headlight assembly, back out both headlight adjusters. Release the clip securing the lower pivot rod to the headlight frame (see Photo 9). Back the adjuster screws right out of the assembly and remove the assembly from the housing. On both of my headlights the vertical adjuster gears were stripped on the screw shafts. I cleaned up the shafts and epoxied the gears back onto the shafts. Remove any wires still connected to the bulb holders and remove the headlight assembly.



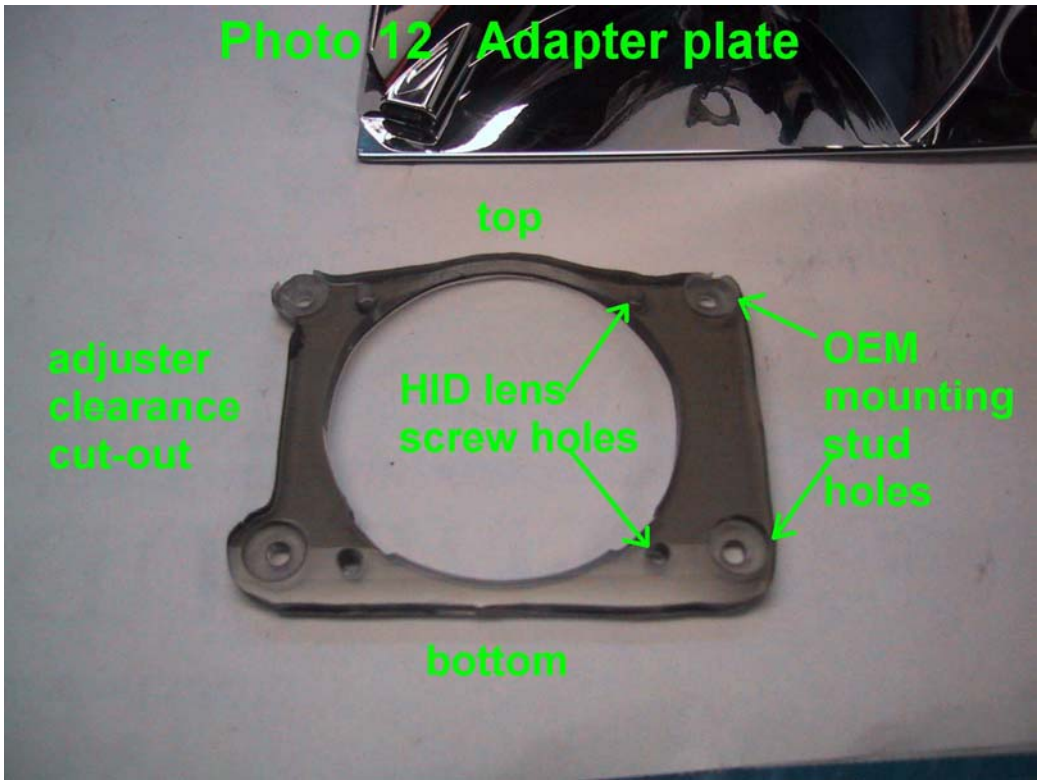
7. Remove the four 7 mm nuts securing the low beam projector to the headlight frame and remove the low beam projector (see Photo 10).

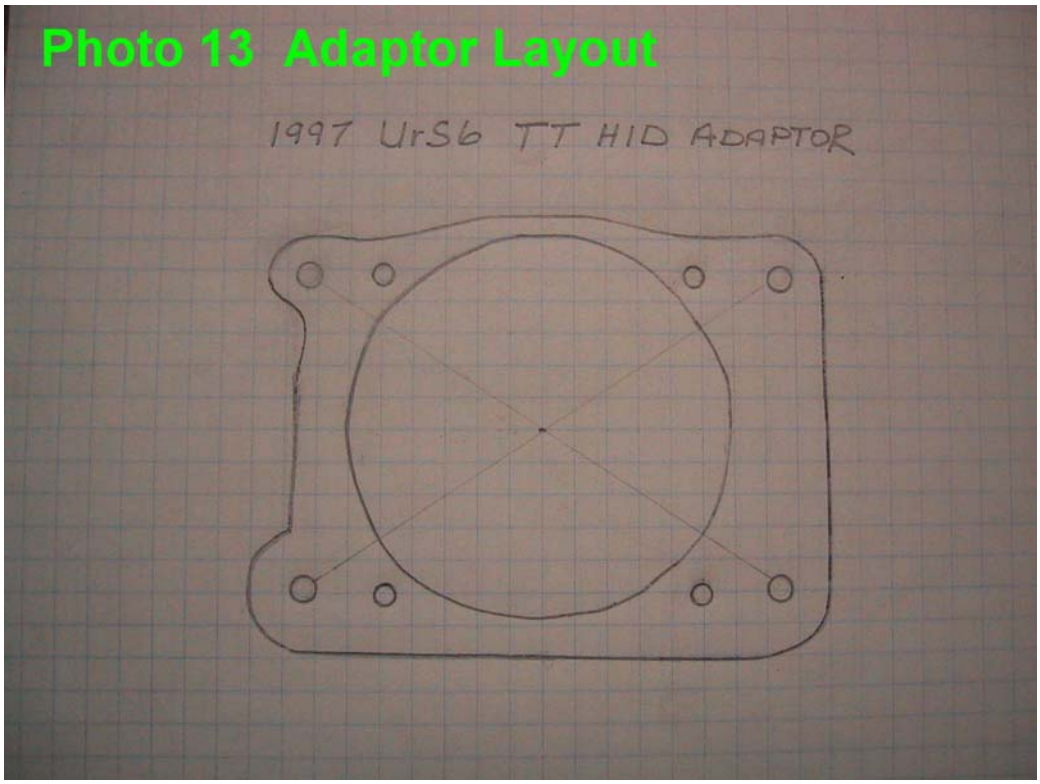
Install TT HID Low Beam Projector
I make retrofits reversible where possible, and the method I used to install the TT projectors allows them to be easily removed and the OEM projectors re-installed.

1. The TT HID and OEM H1 low beam projectors are shown side-by-side in Photo 11. Note that the TT projector is a little shorter than the H1 unit. This allows it to fit inside the UrS headlight housing and the rear cover to close even with the larger HID bulb connector installed. The TT projector has a metal body and reflector whereas the H1 unit is plastic.

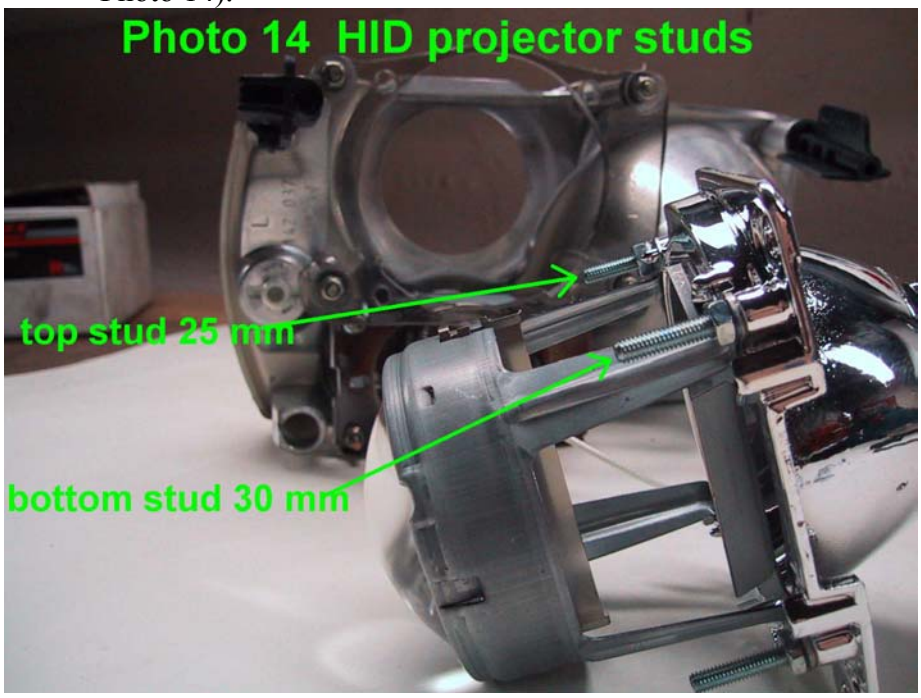
2. The TT projector has three mounting holes instead of the four on the H1 unit; one mounting hole has been eliminated to clear the headlight adjuster assembly. The bolt pattern on the mounts is not exactly the same, but it is close enough that an adapter plate using the original TT mounting holes is not feasible. I built adapter plates out of ¼" Lexan that bolt to the front of the TT projector using the lens mounting screw holes and bolt to the headlight frame using the H1 mounting studs (see Photo 12). The top of the plate has to have a low profile to clear the inside of the headlight housing. The basic adapter setup is to locate the H1 mounting holes on a template and cut a 3" hole centred on the mounting hole pattern. The top two HID projector-mounting holes are set parallel to a line connecting the top two H1 mounting holes. A notch has to be cut out of one side of the adapter to clear the headlight adjuster. The ¼" plate had to be counter-bored 1/8" to allow the stock nyloc nuts to be used. The adapter is flipped for use in the other light and the counter-bores made on the other side of the adapter. A layout sketch on ¼" graph paper is shown in Photo 13. This can be used as a guide. I found the hole spacing for the HID lens screws was slightly different on each projector and required a bit of custom fitting of the adapter plates. A lister (Corey Kirzinger; c_kirzinger@hotmail.com) can supply steel adapter plates. I

believe his bolt on to the back of the HID projector using the lens screws but I've never seen a set.

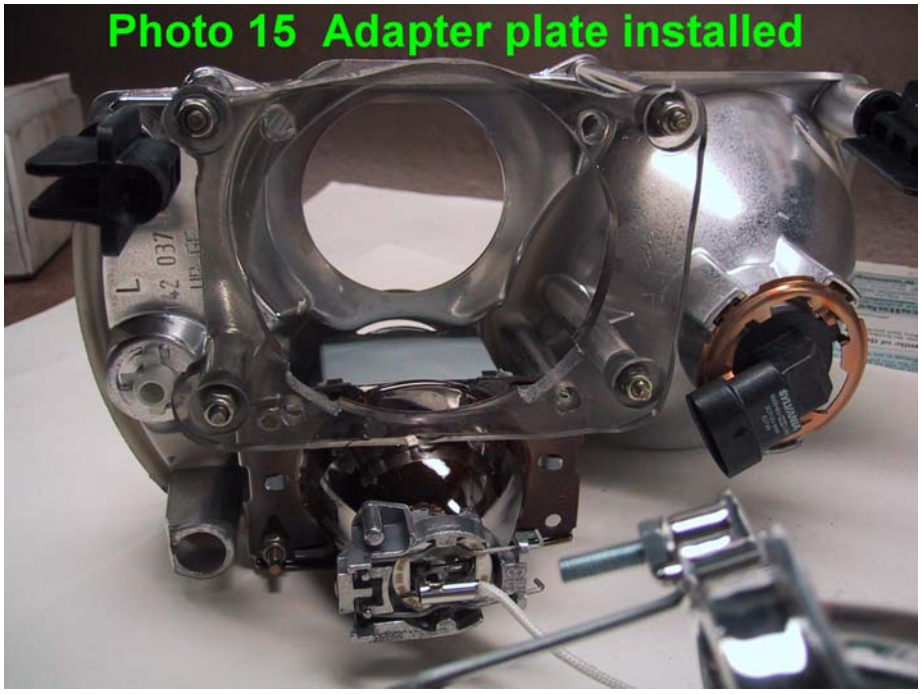




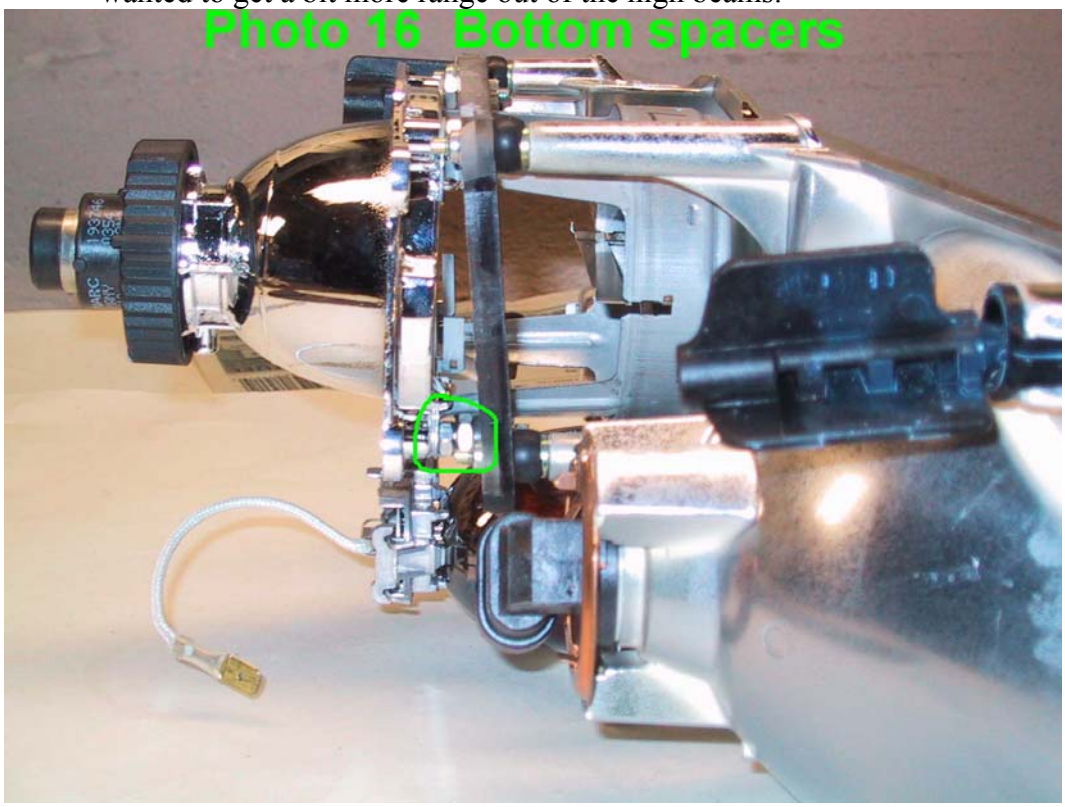
3. Remove the HID projector lens frame mounting screws and replace with 25 mm long (top) and 30 mm long (bottom) M4 x 0.7 threaded studs (cut the heads off 30 mm long M4 bolts). Use nuts to secure the lens frame to the projector body (see Photo 14).



4. Install the adapter plate on the OEM mounting studs on the headlight frame using the original 7 mm nyloc nuts. Tighten the nuts enough to get a decent compression on the rubber compression washers under the plate. If these nuts are left too loose, the lights will vibrate on rough roads (see Photo 15).



5. The top and bottom H1 projector mounting lugs are not in the same plane; the bottom lugs are 5 mm further forward than the top lugs. This is obvious from the angle on the adapter plate when mounted (see Photo 16). Install the HID projector to the adapter plate using 5 mm shims on the bottom studs to line up the low beams with the high beams (see Photo 16). I used 5.5 mm spacers because I wanted to get a bit more range out of the high beams.

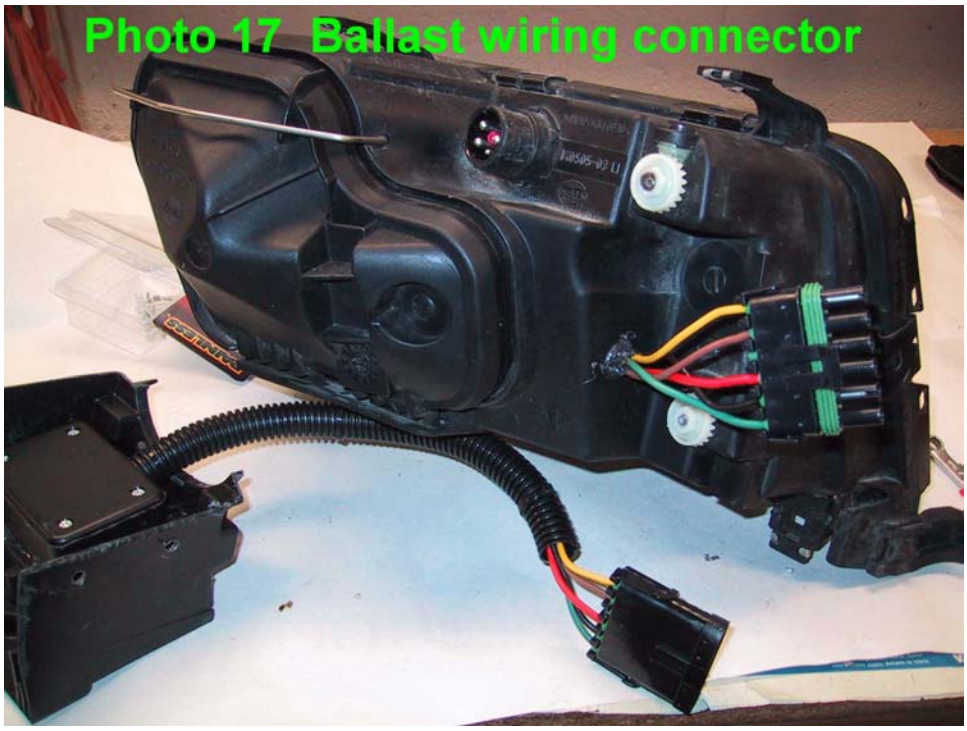


Wiring the HID Retrofit

The ballast takes power input (yellow wire positive, brown wire negative) and feeds power to the igniter through three wires (red, green, and black). The igniter generates the high voltage required to ignite the arc in the capsule and feeds power to the capsule through two heavily insulated wires.

To simplify the wiring, I used the OEM low beam yellow (positive) wire as the power feed and the OEM low beam brown wire as the ground. This connects the HID light through the OEM low beam fuse and circuitry. The HID light is compatible with the "lamp out" warning system, so no changes are required there. The ballasts have to be remotely located on the UrS cars, so this means five wires will have to be routed through the headlight housing to the ballast (yellow, brown, black, red, green…hey, Red Green…but I digress). I used 6-gang Weatherpak connectors to allow the ballast wiring to be disconnected at the headlight housing for headlight removal. You'll need at least a 5-gang connector or 5 connectors (weatherproof) for each headlight.
The igniter I located inside the back cover of the headlight housing.

1. Drill a suitably sized hole in the headlight case for the wiring and fit a grommet. The location of the holes in my case can be seen in Photo 17. Pass 5 wires through the grommet; yellow, brown, black, red, green. Anything 18 gauge or heavier will be adequate, although it wouldn't hurt to use 16 gauge for the yellow and brown wires. Seal the grommet and wiring with suitable goop.



2. Inside the housing, crimp a male spade terminal on the end of the yellow wire that goes through the grommet. This will plug into the OEM low beam bulb connector. Cut a couple inches off the end of the OEM low beam ground wire and crimp on an insulated female spade connector. Crimp a matching male spade connector on the brown wire that goes through the grommet. Also crimp a male spade connector on the short section of OEM low beam brown ground wire that has the OEM ground connection; this will allow you to easily re-install the OEM projector if desired. Cut the igniter connector off the HID harness leaving several inches of wire, and splice it on to the black, red, and green wires that go through the grommet. The internal wiring is shown in Photo 18. I tape all connections to prevent separation or potential short circuits.
3. Outside the housing, attach the wiring to a weatherproof connector (see Photo 17). I used a 6-gang WeatherPak connector and left one connection blank.
4. The igniter fits nicely inside the rear housing cover. It will cover the vent hole, so cut some shallow grooves to allow the housing to vent under the igniter (see Photo 19). I used hot melt glue to secure the igniter to the back cover. The igniter must be positioned such that the connecter for the igniter wiring faces up and towards the large end of the cover (see Photo 20).
5. Connect the wiring and close the cover (see Photo 20-A).

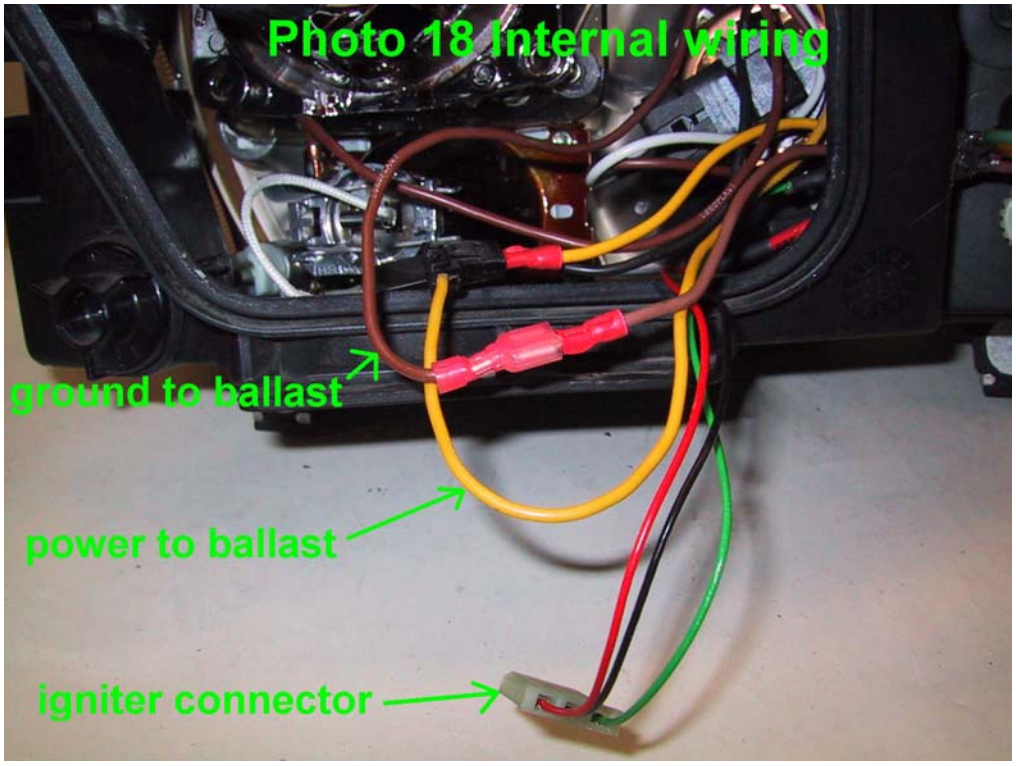


Photo 18 Internal wiring
ground to ballast
power to ballast
igniter connector


Photo 19 Vent hole modifications


Photo 20 Igniter mounting
igniter wiring


Photo 20-A Wiring
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Ballast Mounting and Location

The ballast mounting for this retrofit can pose a bit of a problem in that the ballast connector assembly is not weatherproof; heck, it's not even weather resistant…well, actually, it's wide open. The ballast is meant to seal onto the TT headlight case with the silicone rubber gasket integral in the ballast case. I resolved the mounting/sealing problem by cutting the ballast mounts out of the TT headlight housings and mounting them on my car. I used Radio Shack plastic project boxes to seal the ballast connector to the ballast mount. The ballast then screws into the ballast mounts as per original design. I mounted the left side ballast to a bracket installed on the back of the windshield washer container. The right side ballast is mounted on a bracket installed to the left of the right suspension tower.

1. Cut the ballast mounts out of the TT headlight housings. Photo 21 shows the cut lines I used to extract the mounts.
2. Obtain two small plastic project boxes from Radio Shack or similar supplier (I used Radio Shack 2" x 3" boxes p/n 270-1801). Cut a hole in the closed end of the box to match the ballast connector mounting hole in the ballast mount. Bolt and seal the box to the back of the ballast mount. Drill a hole in the box and fit a grommet for the wiring pass-through. Cut the ballast connector off the HID harness and install it through the box into the ballast mount. Run yellow, brown, green, red, and black wires through the grommet and splice onto the ballast connector wires (see Photo 22). Seal the grommet with your favourite sealant. I used RTV silicone to seal the grommet and to seal the lid on the box. The completed assembly is shown in Photo 23.

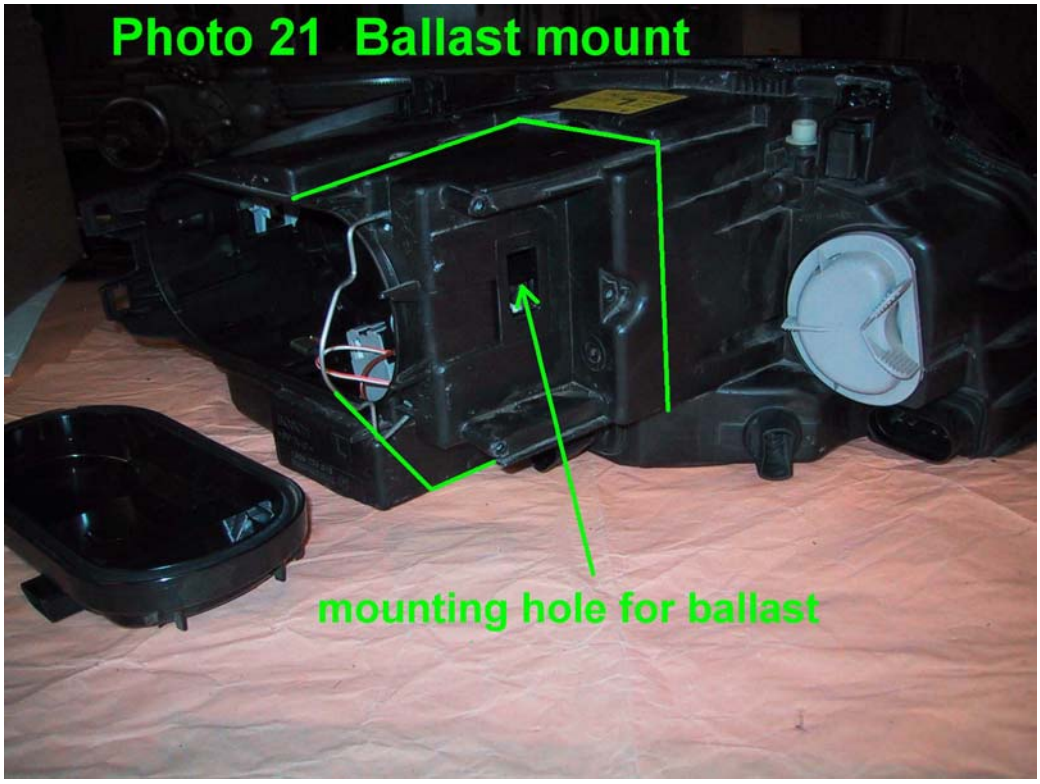

Photo 22 Ballast mount wiring

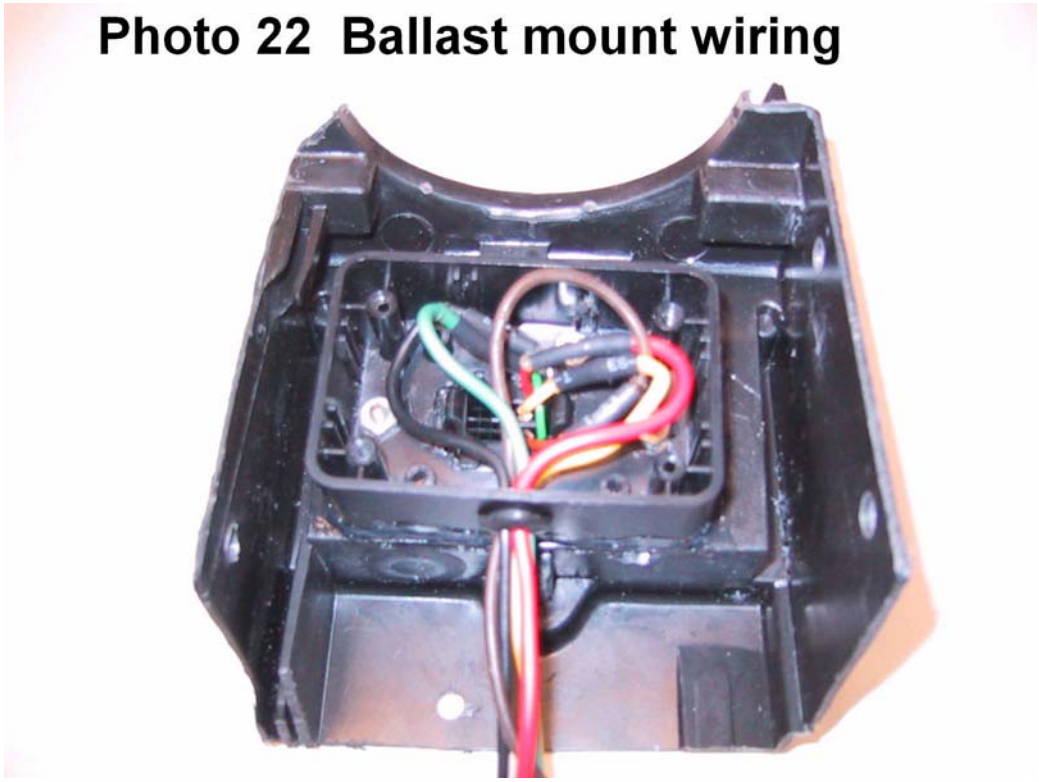

Photo 23 Completed ballast mount

3. I located the right ballast mount to the inside of the right strut tower (see Photo 24).

4. I located the left ballast behind the windshield washer container (see Photo 25).

Headlight Installation and Aiming

Install the headlights and connect the wiring. If you have a Canadian car with DRL's (Daytime Running Lights) you will have to disconnect the DRL resistor and jumper the connector. The DRLs feed power through a resistor to reduce voltage to the headlights, thereby extending halogen bulb life. This voltage will be too low to reliably ignite the HIDs, so removing the resistor will feed full voltage to the HIDs at all times. The resistor is a tan coloured cylinder about 2 inches long located in the mess of wiring under the driver's side dash. I used a 1" wire with two male spade ends to jumper the DRL resistor connector after disconnecting the resistor.
Typical aiming is to have the lights pointing down such that the beam drops about 1 inch in 10 feet. The cutoff will hit the road about 300 feet in front of the car. Since there are no levelling motors on this retrofit, make sure the lights aren't aimed too high. These lights are dazzling to oncoming drivers, so the lights have to be aimed low enough that normal bounce over road irregularities won't flash the full beam into the eyes of oncoming drivers.

Enjoy the new lights!

Fred Munro
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