How to Change a Headlight Bulb

Submitted to:
College Students
Corvallis, OR

Submitted by:
xxxxxxxxxxx
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How to Change a Headlight Bulb

The following instructions will show you how to replace a headlight bulb in a simple sealed beam car headlight. Headlights are an important part of a vehicle, especially when driving at night, and it is illegal to drive without functioning headlights.

**WARNING:**

Attempting to replace a bulb while the lights are still turned on could lead to electric shock. Please turn lights off before servicing.

**Materials:**

- New headlight bulb
- Flashlight (optional)
- Flat blade screwdriver (pictured)

**Disclaimer:**

Process time: ~5 minutes

Injuries to hands and fingers are likely if tools are used improperly or excessive force is used.

Read Owner’s manual for more information.
Directions:

Step 1. Begin by checking that the headlights are off, and pulling the hood release lever (Fig 1). Hood releases are typically located in the lower left part of the dashboard, near the pedals, they are labeled with the word “Hood”, or a picture of a car with an open hood.

Step 2. After pulling the release lever, the hood will be partially open. To fully open the hood, there is typically a small lever underneath the hood that must be pressed or pushed to release the catch. If necessary, use prop in engine bay to hold the hood open, the prop will be brightly colored and go into a labeled hole in the hood itself.

Figure 1. Hood release marked with arrow.

Figure 2. Hood after pulling release lever

Figure 3. Location of secondary hood catch, push up.
Step 3. Locate the headlight bulbs. They are at the front of the vehicle, located in the headlight housings. As a check there should be three wires leading to each bulb (Fig 5 & 6).

Figure 4. Engine bay

Figure 5. Close view of right headlight bulb.       Figure 6. Close view of left headlight bulb
Step 4. Use the screwdriver to pry the catch on the bulb upwards. Once the catch is disengaged, pull the plug straight backwards.

Figure 7. Before prying

Figure 8. After prying, locking cap marked with arrow.

Step 5. Twist the locking cap, shown in figure 8, to the left (counter-clockwise) while pulling slightly towards the back of the car to remove it.

Figure 9. Locking cap.
Step 6. Gently pull the bulb straight back to remove it.
Note the orientation of the old plug.

Figure 10. Headlight bulb.

WARNING:

DO NOT touch the glass part of the bulb.
Only handle the plastic end.

Step 7. To install the new bulb, simply slide it into the opening, keeping the plug at the same angle the old was at. There are small grooves in the plug that should match up with grooves in the headlight housing (Figure 11).

Figure 11. Headlight bulb with grooves highlighted.
Step 8. To replace the locking cap, first make sure the small catches, shown below, are towards the back of the vehicle.

Figure 12. Locking ring with catches marked.

Step 9. Line up the catches of the ring with the grooves from figure 11, and slide the ring around the bulb. Once it is in the grooves, turn it to the right, clockwise, until it stops, which will be very noticeable.

Step 10. Check that the ring is secure by pulling on it gently towards the rear of the car. If it comes off, try step 9 again.

Step 11. Plug the electrical connector you disconnected in step 4 back into the bulb. Most connectors are shaped and will only go on one way.

**WARNING:**

**DO NOT** force the connector on, this could damage the connector or bulb and require replacement of the damaged part.

Step 12. Check that the lights work.

Step 13. Remove all tools from the engine bay, and close the hood.

**Congratulations! You have just replaced a headlight bulb!**
Lab Report

Introduction
Many students, and indeed people of all ages, have never learned how to maintain their vehicles. These instructions, “How to Change a Headlight,” are meant to help people of all ages learn how to perform one kind of basic maintenance on a vehicle. There are several high-quality pictures of the process to show the location of all the parts involved. I had five volunteers perform usability tests to discover good parts of the instructions, and areas that needed improvement.

Methodology
I conducted five usability tests on May 11th, 2014. Each test was carried out in my driveway, where I supplied the instructions, car, and a replacement headlight bulb. One tester chose to use their own car, so they simply removed and replaced the same bulb. Four of the testers are students at OSU, and one is a student at Chemeketa Community College in Salem, Oregon. The results were based on whether or not the light functioned, and if the locking cap was properly secured.

Recommendations
For future tests, have multiple sets of instructions, they tend to get dirty quickly when around engines, and have testers fill out their own test reports by hand. I had a single copy and had each person enter their answers electronically, and then transcribed them onto the actual sheets.

Results
The first tester has had a fair amount of experience working on cars, and had no issues with any of the steps. His time was by far the fastest, at about 3 minutes. His advice was to break up the step 8 into several parts.

The second tester had never even opened the hood of her car before, but nonetheless started and only ran into one issue with the screwdriver. She managed to figure it out on her own, and completed the test in just over 6 minutes. Her advice was to add pictures or words explaining the idea of prying the connector out.

The third tester has done minor work on vehicles before, but never actually changed bulbs. He had no problems with any of the steps, and finished in just over 4 minutes. He suggested clarifying step 8, and possibly adding a note to check the owner’s manual for more information.

The fourth tester asked if she could use her own car, and after checking to make sure it was compatible with these instructions, she did. Despite never doing any work on it herself previously, she had no problems locating and removing the bulb. Though had a bit of a problem with step 8, and suggested clarification or making more steps out of it. The test took her approximately 5 minutes.

The final tester has actually helped me work on my car before, so he pretended not to know what he was doing for the sake of the test. The only problem he had was at step 8, where he got confused on what exactly he was to do. His test took 6 minutes.
**Expenses/Time**

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**Conclusion**

*Reflection*

Most of the testers seemed to be a bit confused by the, “if necessary, prop the hood up” part of step 2, since my car has a spring loaded hood that holds itself up automatically. Some of the pictures, such as those marking the locations of the headlights and the hood release, were almost never used, while those showing the grooves in the bulb and housing were looked at for a lot longer than I thought they would have been.

Revision of instructions didn’t take too long, and the lab report section went fairly quickly. Compiling the usability test reports into the same file was the more laborious and difficult part of the report.

The usability tests were incredibly helpful in locating issues with the instructions, typically minor things I wouldn’t think of since this kind of stuff is second nature to me. They also showed me, and some of my testers, that with a bit of assistance most people can do basic maintenance on vehicles without any special training or fancy tools.

**Major Changes**

- Added figure designations
- Split step 8 into 3 separate steps
- Added note about owner’s manual
- Fixed typos
- Adjusted location of arrows in several figures
- Added clarification for hood props
Appendix

Usability Test Log Sheet

Fill out one sheet per user and then insert the findings in your Lab Report

Tester = you, the person with the draft instructions; tester may also be the observer unless there is another person to serve in that role.

Users = people trying to follow the instructions to see where to improve; If user is not physically present, send the test log sheet for them to fill out and return

1. Fill out one sheet per user
2. Each user should be given the identical pre-test talk, including:
   a. test is voluntary and unpaid,
   b. users should talk aloud about each step as they attempt to follow the directions
   c. users’ results will be tabulated and used for revising and improving the instructions
   d. users should give the tester suggestions for improvement
   e. users may stop at any point, especially if safety is involved

3. Users should talk aloud and/or write notes on this Log Sheet as they attempt to follow the directions
4. Tester/Observers should record user’s progress and problems, and not answer any questions unless safety is a factor
5. Record data from all 5 test logs in the final lab report.

***

Instructions for what product/process: Replacing a headlight bulb

User’s name: Andrew Herman
Tester/Observer(s) name(s): Aaron Kellogg
Location of test (room #, building, etc): My (and Aaron’s) driveway.
Date of test:
Start time of test: 1:03 pm
End time of test: 1:06 pm

Results: User’s comments to fill out:
Describe your attempt and degree of success:
   Everything was pretty straightforward, total success.
Please give advice on the instructions:
   Step 5 is a bit confusing, color instructions would be better.

Results: Observer to fill out:

Notes for revision:
   Step 5 is way to long.

For testing about an online program, you can use some of these questions:
   - What paths did the tester follow?
   - Where did the tester get stopped?
   - How often did the tester use the back button (an indication that the tester could not find the information wanted)?
   - Identify changes that can be made easily.
Usability Test Log Sheet

Fill out one sheet per user and then insert the findings in your Lab Report

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*****

Instructions for what product/process: Replacing a headlight bulb
User’s name: Sarafban Rostami
Tester/Observer(s) name(s): Sam Raza
Location of test (room #, building, etc): Room 212, Building D2
Date of test: May 10, 2014
Start time of test: 10:07
End time of test: 1:13

Results: User’s comments to fill out:
Describe your attempt and degree of success:

Had issues with computer, but confused with step 8. But I got it.

Please give advice on the instructions:

Explain what is meant by “floor up on the computer.”

Results: Observer to fill out:
Notes for revision:

Prying is scary, I assumed everyone knew it should not assume

For testing about an online program, you can use some of these questions:

* What paths did the tester follow?
* Where did the tester get stopped?
* How often did the tester use the back button (an indication that the tester could not find the information wanted)?
* Identify changes that can be made easily.
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*********

Instructions for what product/process: Replacing a headlight bulb

User’s name: Edward Peters

Tester/Observer(s) name(s): Anna Johnson

Location of test (room #, building, etc): Dining

Date of test: Aug 1st, 2014

Start time of test: 1:10

End time of test: 1:17

Results: User’s comments to fill out:

Describe your attempt and degree of success:

For example, why was kind of a pain but it worked.

Please give advice on the instructions:

The directions for the way are wrong and you can’t really get it.

Results: Observer to fill out:

Notes for revision:

add note about owner’s manual.

For testing about an online program, you can use some of these questions:

• What paths did the tester follow?
• Where did the tester get stopped?
• How often did the tester use the back button (an indication that the tester could not find the information wanted)?
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****

Instructions for what product/process: Replacing a headlight bulb
User’s name: Cassidy Thomas
Tester/Observer(s) name(s): Avery Roberts
Location of test (room #, building, etc): 2nd Floor (Lab 100)
Date of test: May 10, 2019
Start time of test: 1:00
End time of test: 1:25

Results: User’s comments to fill out:
Describe your attempt and degree of success:

Went really, really slowly because at different cars, same steps
Please give advice on the instructions:

Step 8 is never seen, so the it should be 9 a 5 steps

Results: Observer to fill out:
Notes for revision:

Change Step 6, Fact 5 uses a dumb body change prog

For testing about an online program, you can use some of these questions:

• What paths did the tester follow?
• Where did the tester get stopped?
• How often did the tester use the back button (an indication that the tester could not find the information wanted)?
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Instructions for what product/process: Replacing a headlight bulb

User's name: Andrew Tomlinson
Tester/Observer(s) name(s): Ann Bolinger
Location of test (room #, building, etc): Lane 7 House
Date of test: Apr 16 2019
Start time of test: 3:10
End time of test: 7:10

Results: User's comments to fill out:
Describe your attempt and degree of success:

Please give advice on the instructions:

Results: Observer to fill out:
Notes for revision:

For testing about an online program, you can use some of these questions:
- What paths did the tester follow?
- Where did the tester get stopped?
- How often did the tester use the back button (an indication that the tester could not find the information wanted)?
- Identify changes that can be made easily.