

**2014 - 2017  
Mercedes-Benz & Freightliner Sprinter  
2500 and 3500 Series**

## **Low-Beam Headlight Upgrade**

**OEM H7 Halogen  
to  
XtremeVision H7 LED**

January 24, 2018

**Ray Iddings**

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## Disclaimer

This document discusses the process that the author used to upgrade a personal vehicle from OEM low-beam headlights to LED low-beam headlights. No other purpose is intended.

The author shares this information with other persons who may be interested in this topic. The author makes no statement regarding the safety or usability of this process on any vehicle, or about any persons ability to duplicate or implement this process. The author makes no statement regarding the legality of this process, or the legality of using LED low-beam headlights on any vehicle. The author makes no statement regarding how this process might affect your vehicle's manufactures warranty.

**English Translation of Disclaimer:** *It's not my fault if something goes wrong or if it doesn't work out for you; proceed at your own risk.*

## If You Wish to Help

Comments, suggestions, corrections and recommendation are helpful and encouraged. Please send to [1.ray.iddings@gmail.com](mailto:1.ray.iddings@gmail.com). Please be constructive and helpful, problems without solutions are still problems. I always give proper credit and will include that credit if an updated version is published. Thank you for your assistance.



## About this Document

Do not let the size of this document lead you to believe the project is too complicated. The project is actually very easy. You'll probably spend more time reading this document than it takes to complete the project. I originally envisioned three or four pages with a few photographs. Certainly, this could be described sufficiently in a few pages. As I began writing, however, I decided to include some of my research notes. Also, some of the work must be done by feel, rather than sight, because the lamps are located in a small space oriented such where you cannot actually see into the space while replacing the lamps. For this reason I decided to include many large photographs. A skilled mechanic may think that I have over done this write-up. I won't argue that point, but on the other hand, it is better to have too many photographs, where you can simply disregard the ones you don't want, rather than beg for the missing one you need. I think a lesser automotive-experienced person might appreciate the extra details included in this project description.

Both Mercedes-Benz and Freightliner, Sprinter 2500 and Sprinter 3500, model years 2014 through 2017 use the same headlight assembly so this procedure should be equally valid on those vehicles.

I extend a special thank you to a person known as "SprinterWisc" on the *Sprinter-Forum* web discussion. In the discussion, *Has anyone installed LED headlights on their 2014-Sprinter?*, contributing member, SprinterWisc provided very useful information and also found the L16 H7 Adapter from Headlight Experts that facilitate LED Lamp installation. You should read their comments on this subject before proceeding. I found their entire conversation very useful while doing my research and while upgrading my vehicle before I wrote this document. Visit that conversation at: <https://sprinter-source.com/forum/showthread.php?t=60685>.

## Why Upgrade

It is my opinion that the OEM low-beam headlights on my 2015 Mercedes-Benz 3500 Sprinter provided dangerously poor illumination of the highway during night driving in conditions where low-beam headlights are required. In fact, the author believes that this poor highway illumination caused several situations where serious accidents were avoided only by God's great mercy, other alert drivers, or pure luck.

The author's vehicle came equipped with the following Original Equipment Manufacturer's (OEM) headlights shown here:

**Table 1: OSRAM 64210 H7 Halogen Lamp**

<b>Ratings (low-beam &amp; high-beam – each lamp)</b>				
	Voltage:	12 – 13.6	volts	
	Current:	4.2	amps	
	Power:	55.0	watts	
	Color Temperature:	3200	kelvin	Yellow
	Illumination:	1570	lumens	

## Low-Beam Headlight—Halogen to LED Upgrade

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Only the low-beam headlights were replaced with the following LED lamps:

**Table 2: XtremeVision 7G 72W 16,000LM - H7 LED Headlight**

Ratings ( <i>low-beam only – each lamp</i> )				
	Voltage:	9 – 32	volts	
	Current:	3.0	amps	
	Power:	36.0	watts	
	Color Temperature:	6500	kelvin	Cloudy Sky Blue
	Illumination:	8000	lumens	

The OEM lamps were retained as emergency spares.

The author decided to replace the OEM halogen lamps with LED lamps because of brightness, cost, efficiency and operating temperature.

Halogen light is formed from a combination of argon and nitrogen gases heated by a tungsten filament contained within a heat-resistant glass tube. Automotive halogen lamps produce a yellow light in the 3,000-4,000 kelvin color temperature range. Bulb usually cost between \$6.00-\$30.00 and last between about 450-1000 hours. Halogen lamps burn hot, producing headlight lens temperatures<sup>1</sup> that might range somewhere between 150-300 degrees (F) depending on the housing design and configuration. Actual lens temperatures tend to fall toward the lower-mid area of that range.

HID (high-intensity discharge) headlights produces light by means of an electric arc between tungsten electrodes housed inside a translucent or transparent arc tube. Automotive HID lamps are available in a wide range of color from yellow to blue in the color temperature range between 3,000-12,000 kelvin. Automotive upgrade kits cost between \$30-\$200 and the bulbs last from 2,000 to 3,000 hours. HID lamp require a ballast to generate high voltage for the lamp. HID lamps burn very hot, but because their lumens to wattage ratio is so much better than halogen, a halogen-equivalent brightness is produced with much less heat. HID headlight lens temperatures<sup>1</sup> might range somewhere between 90-250 degrees (F) depending on the housing design and configuration. Actual lens temperatures tend to fall toward the lower to mid area of the range. HID lamps radiate heat from both the lamp and the ballast. However, for most after-market applications the ballast is installed outside the headlights housing assembly, and therefore does not generally contribute to headlight lens temperature.

LED (Light-Emitting Diode) lamps produce light by a process called electroluminescence created by the movement of electrons between the two terminals of the diode. Photons are released when electrons jump across the diode junction. Automotive LED lamps are available in a wide range of color from yellow to light-blue in the color temperature range between 3,000-7,000 kelvin. Automotive upgrade kits cost between \$40-\$300 and the bulbs last from 10,000 to 30,000 hours. While LED lamps do not produce a great amount of heat, they are sensitive to operating temperature and therefore require a heat-sink to conduct heat away from the diode. LED lamps

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1. While headlight lens temperature is a somewhat esoteric value because of house assembly variables, high lens temperatures contribute to lens hazing over time.

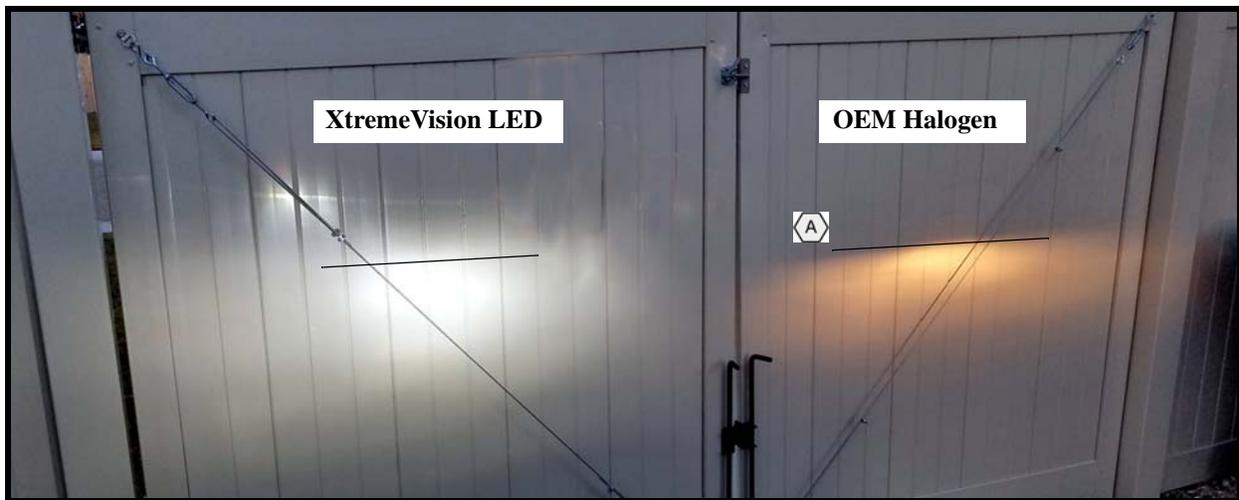
## Low-Beam Headlight—Halogen to LED Upgrade

operate with the greatest lumens to wattage ratio of all currently available automotive lighting options. LED headlight lens temperatures<sup>1</sup> might range somewhere between 70-130 degrees (F) depending on the housing design and configuration. Actual lens temperatures tend to fall toward the upper area of that range.

**Table 3: Automotive Headlight Lamp Comparison Chart**

Type	Cost (\$)	Lumens (x10 <sup>3</sup> )	Color (K)	Life (H x10 <sup>3</sup> )	L/W	Lens Temp. (Degs. F)
Halogen	6 - 30	0.7-1.6	3000- 4000	.45-1	22.5 ±13	150-300
HID	30 - 200	3.0 - 8.0	3000-12000	2-3	92.5 ±55	90-250
LED	40 - 300	3.0 - 8.0	3000- 7000	10-30	170.0 ±50	70-130

**Figure 1: XtremeVision LED compared with OEM Halogen**



To verify low-beam headlight alignment when finished, the project should be conducted at a location where the lights can shine upon a fence or wall and the top shadow can be marked. In this way the low-beam alignment can be compared with the original alignment and adjusted as needed if necessary. In the author's case, a light line was penciled onto the fence to show the location of the low-beam shadow (here marked with an added graphic line ). However, the pencil line is quite difficult to see and does not show in the photograph. A good suggestion might be to mark the shadow with painter's tape.

### Time and Skill Required

This project does not require much experience ... the old saying “if you can change a light-bulb ...” applies here with the added skill of knowing how to open the vehicle hood. While this project was relatively easy, there was a brief learning curve which added some amount of time to the project. That learning time is included in this estimate. Individual skill and experience level may shorten or lengthen these estimates. The first headlight may take forty minutes to complete. The author recommends beginning with the driver's side as it provides much more working space.

## Low-Beam Headlight—Halogen to LED Upgrade

With experience gained from the first headlight, the second may take only about fifteen minutes to complete.

### What You Need

You should run through the process pictured in Figure 3, “Project Orientation,” on page 5 to verify your vehicle parts match the details discussed in this document. If the same, then the following part need to be ordered (see Figure 3 below):

- **XtremeVision 7G 72W 16,000LM - H7 LED Headlight Conversion Kit.** Available from Amazon for about \$50.00.
- **L16<sup>1</sup> H7 Adapters** from Headlight Experts. Available for Amazon, or from Headlight Experts for about \$13.00.
- Optional - **XtremeVision LED Anti Flicker Capacitors - Error Code Cancellor Capacitor (1 Pair) - H1 / H7.** Available for Amazon for about \$13.00. (Note: I did not need this item for my installation, but included this information in the case others might need it.)

### Tools Required

The following simple tools are also needed to complete this project:

- 6” to 8” hand mirror
- 6” or 8” double-cut flat bastard file, or a Dremel grinder
- Clean cloth shop towel (small)
- Voltmeter (probably not needed, but might be useful)

Figure 2: Parts Needed for LED Conversion

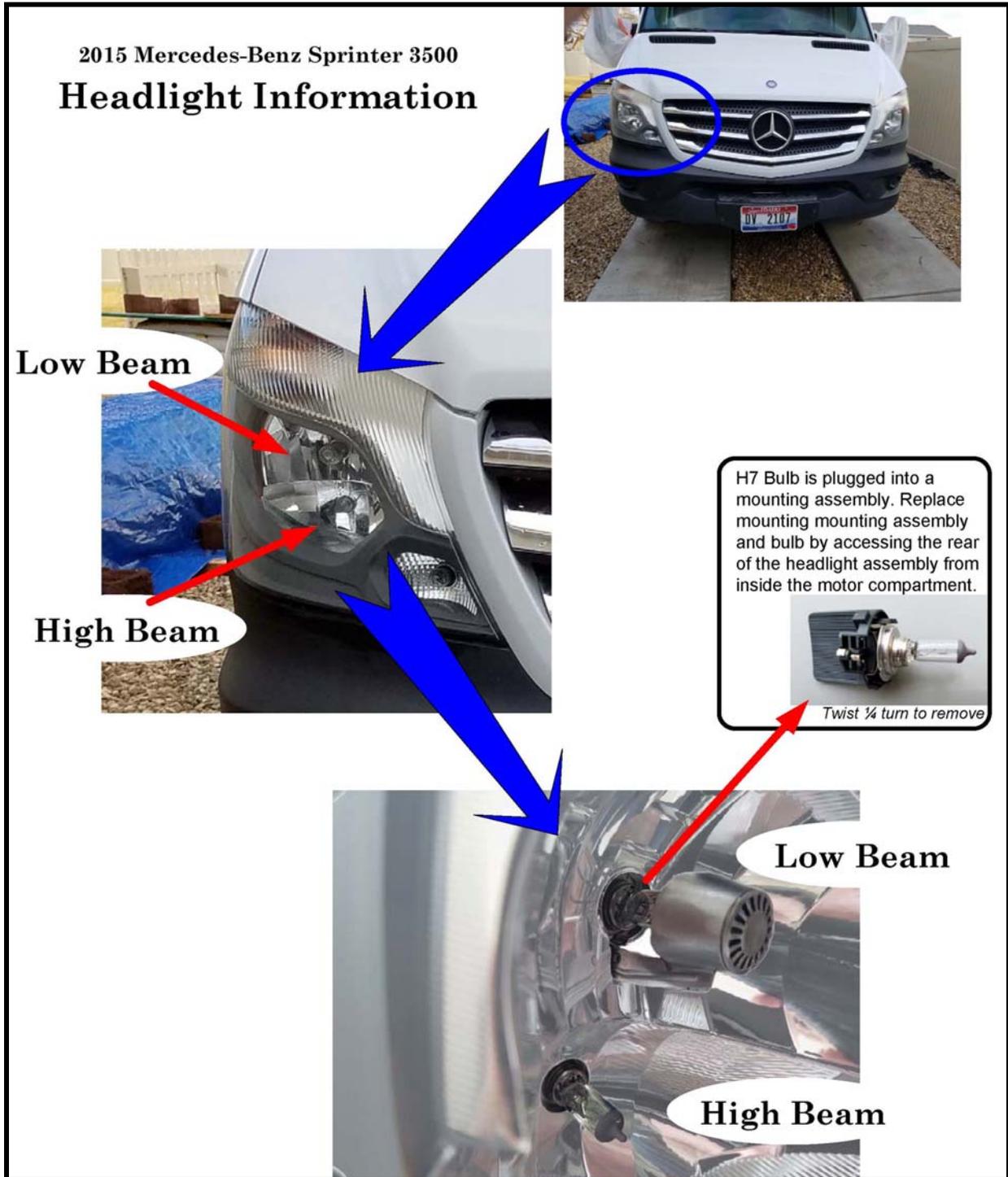


1. Note that L16 is simply a Headlight Experts’ part number.

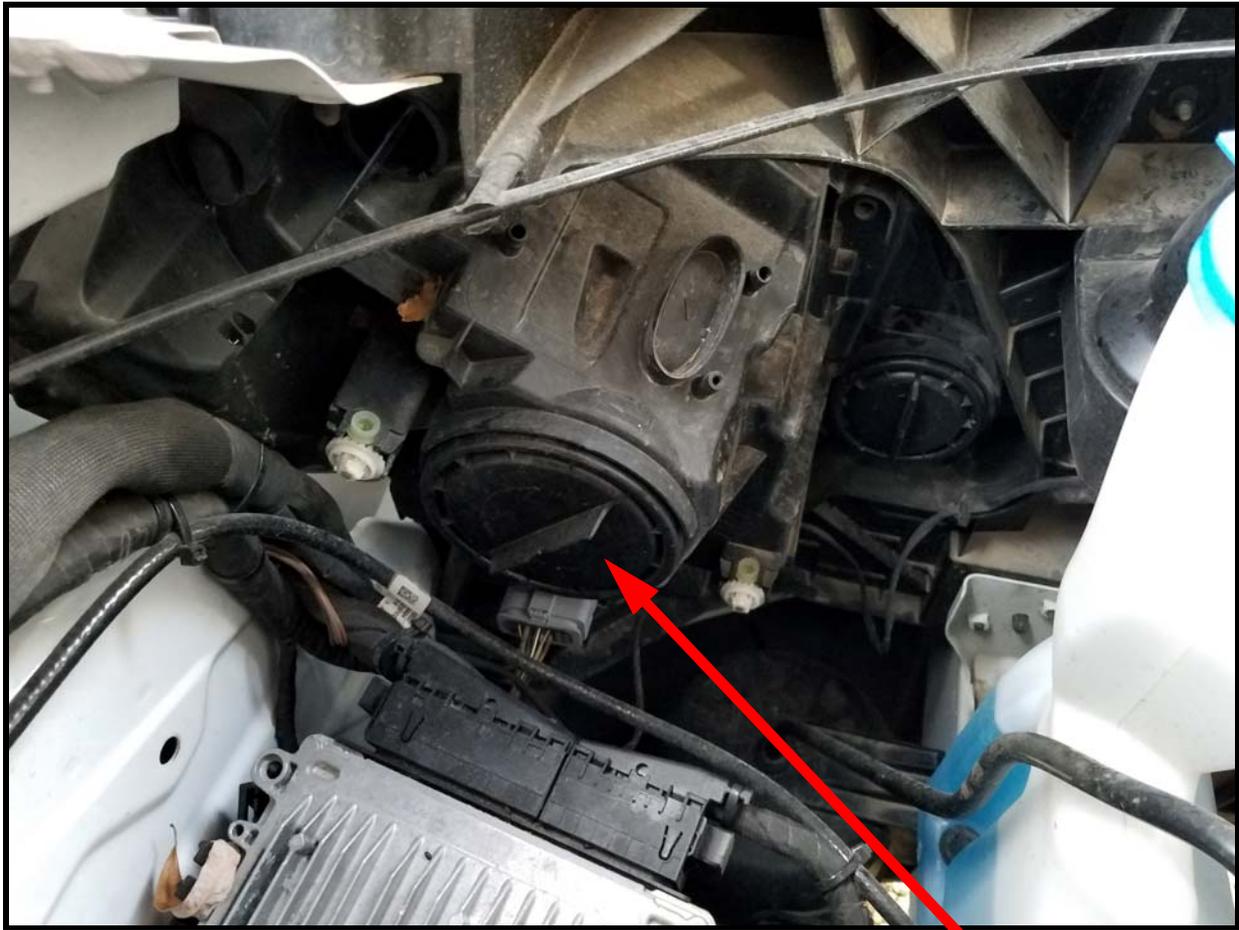
## Vehicle Orientation

The following pictorial is meant to help you orient to the project by comparing with your own vehicle. The graphic illustrates that H7 bulbs provided both high-beam and low-beam illumination and shows the H7 mounting configuration used by Mercedes-Benz on that vehicle.

Figure 3: Project Orientation



**Figure 4: Backside of Headlight Assembly Showing Access Port**

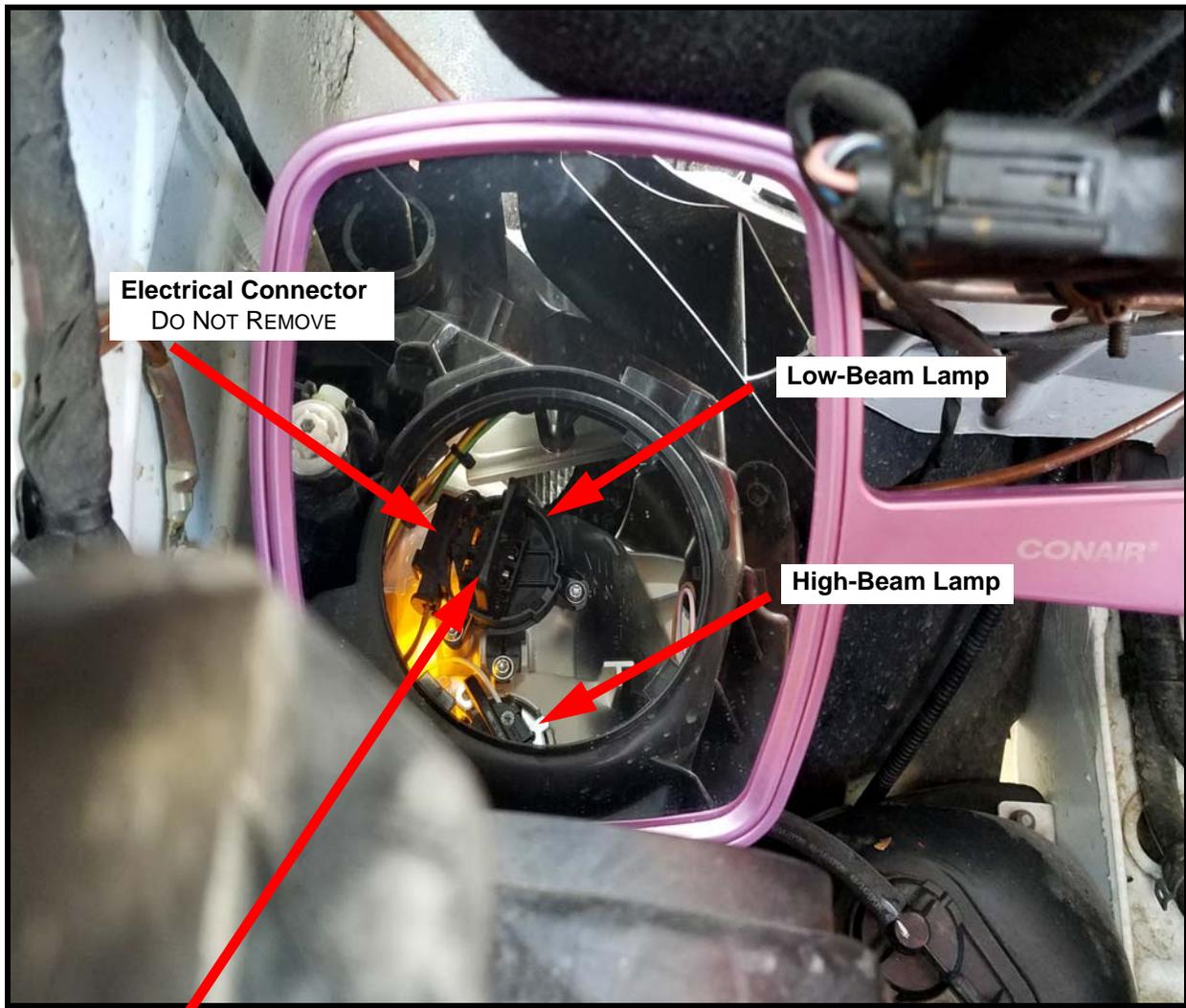


Lift vehicle hood to gain access to the areas directly behind the headlights.

Access the lamp by removing the Access Port Dust Cover. Twist ↻ the dust cover to remove it.

See your “Sprinter Operating Instructions” manual, section “Changing Bulbs” for additional instruction about how to access and remove headlight lamps.

Figure 5: Use Mirror to See Inside Headlight Assembly



To remove the OEM Lamp Module, grasp it between your thumb and finger and twist ↻ it about a ¼ turn. It should twist and come out easily.

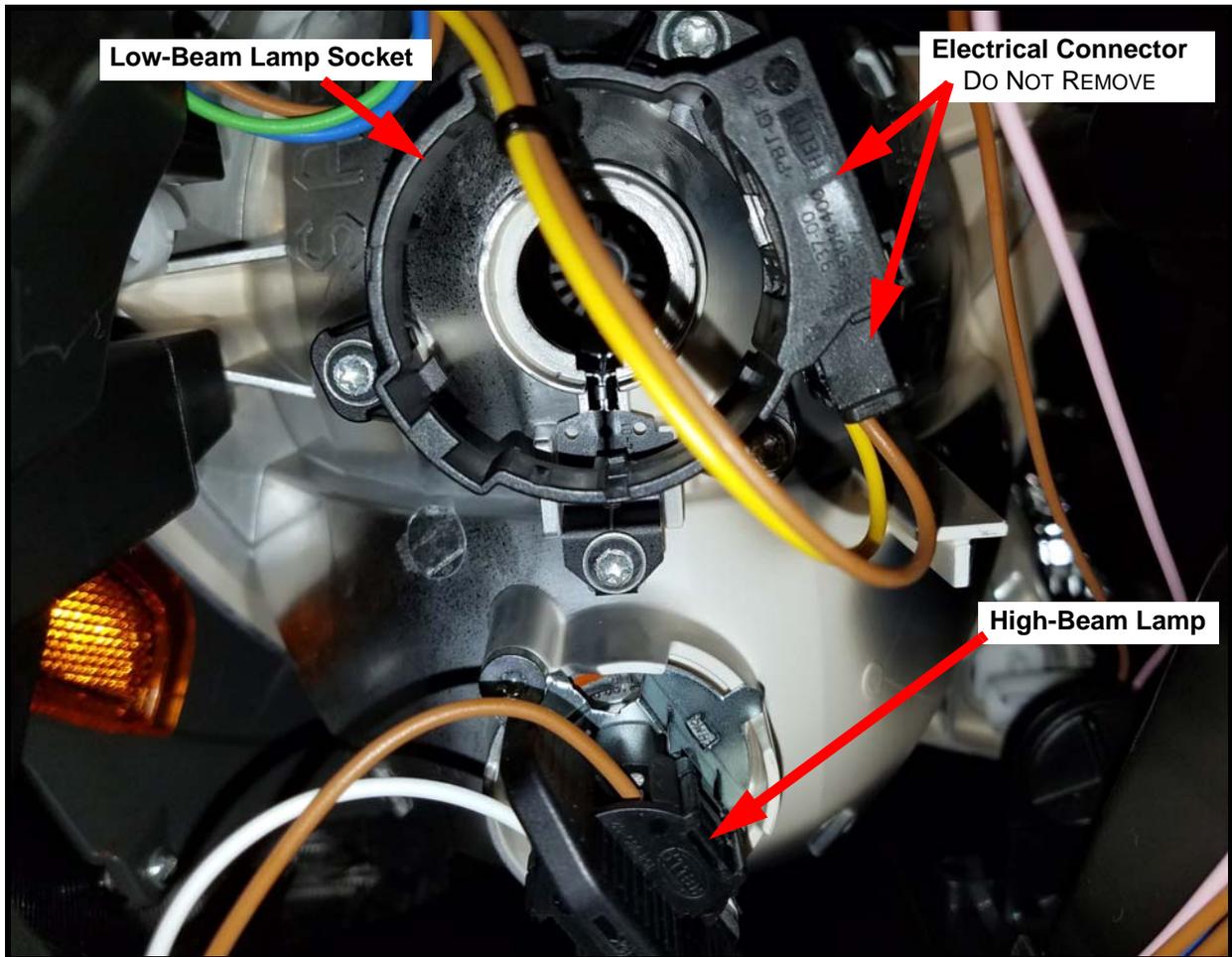
Since your work here is by feel only and you cannot actually see what you are doing, it is recommended that after you remove the lamp module that you practice removing and installing it several times. This practice will pay off when you install the LED Modules.



**DO REMOVE THE ELECTRICAL CONNECTOR!** The lamp socket, the OEM Lamp Module, and the L16 H7 Adapter already have connectors built-in. The twist-lock feature makes the necessary electrical contact.

Also pay attention to the amount of twist and contact orientation as you remove the OEM Lamp Module. This is important to know when you install the LED Modules.

Figure 6: Inside View of Headlight Assembly with Low-Beam Lamp Module Removed



If necessary, push wires to the side of the Low-Beam Socket so they don't interfere with installation of the LED Module.



Recommend you carefully put (stuff) the clean cloth shop towel inside the headlight assembly below the low-beam lamp such that it will prevent things from dropping down inside the headlight assembly. This is important because the LED Module can come apart when removing it. While it is unlikely the parts will drop, this step could prevent a lot of grief.

## Getting Everything Ready

In this section we prepare and assemble all of the new parts into a single LED Lamp Module that will twist-lock into the Low-Beam Lamp Socket. This process constructs a module that becomes a direct plug-and-play replacement for the existing OEM Lamp Module. The two can be easily swapped should any problem ever occur. Figure 7 is a photograph of the XtremeVision kit with one LED lamps shown. Figure 8 is a photograph of one of the L16 H7 Adapters.

**Figure 7: XtremeVision LED Conversion Kit**



**Figure 8: L16 H7 Adapter**

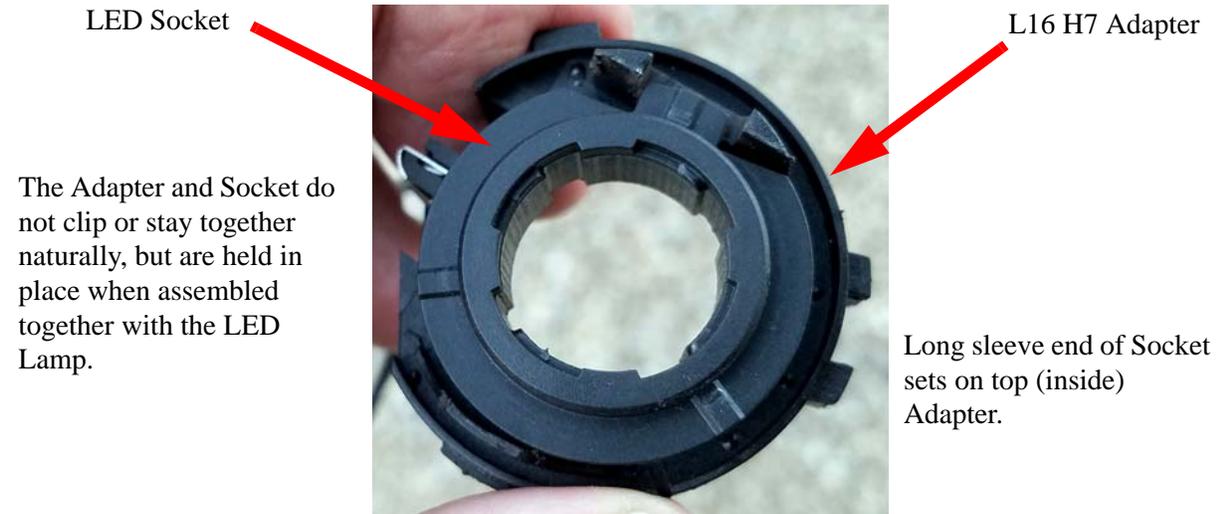
With a tool, file or grind about  $\frac{1}{16}$  inch of plastic height from these three parts of the Adapter. The goal here is to reduce the gap distance shown in Figure 10.



The only reason for reducing the height of the plastic standoff is because the thickness of the combined LED Socket and Adapter is too great for the LED Lamp to lock into place to hold the assembled unit together. Therefore, it is probably wise to attempt LED Module assembly several times during the height modification process so that you remove only enough plastic height to facilitate assembly.

See Figure 12, “Photograph of Completely Assembled LED Module,” on page 12 and Figure 13, “Photograph of LED Module Plugged into the Headlight Assembly,” on page 14 about assembly.

**Figure 9: Photograph to Illustrate Proper Orientation of LED Socket on Adapter**



The Adapter and Socket do not clip or stay together naturally, but are held in place when assembled together with the LED Lamp.

Long sleeve end of Socket sets on top (inside) Adapter.

This photograph is only for illustrating the orientation of the Socket to the Adapter.

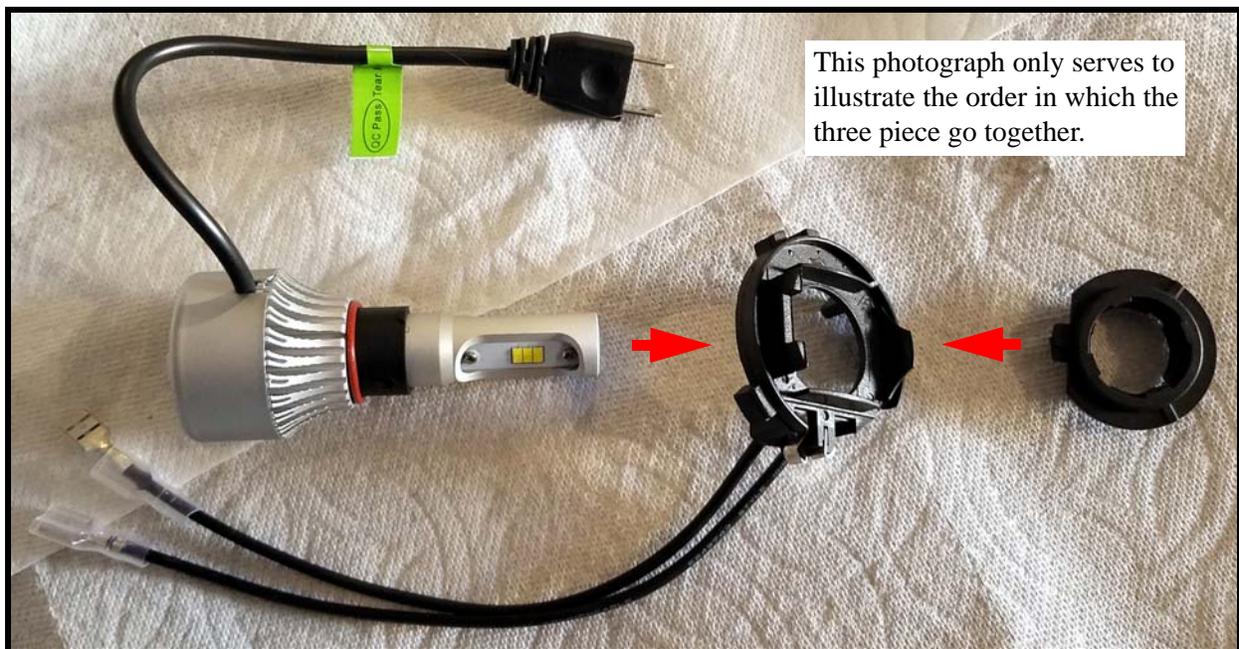
**Figure 10: Photograph to Illustrate the Gap Space Between the LED Socket on Adapter**

Without height modification, the combined thickness of the Adapter and Socket is too great to allow assembly with the LED Lamp. Watching this gap is simply a way to monitor your progress as you modify the adapter.



This photograph is only for illustrating the distance between the Socket and the Adapter.

**Figure 11: Assembly Order for LED Module**



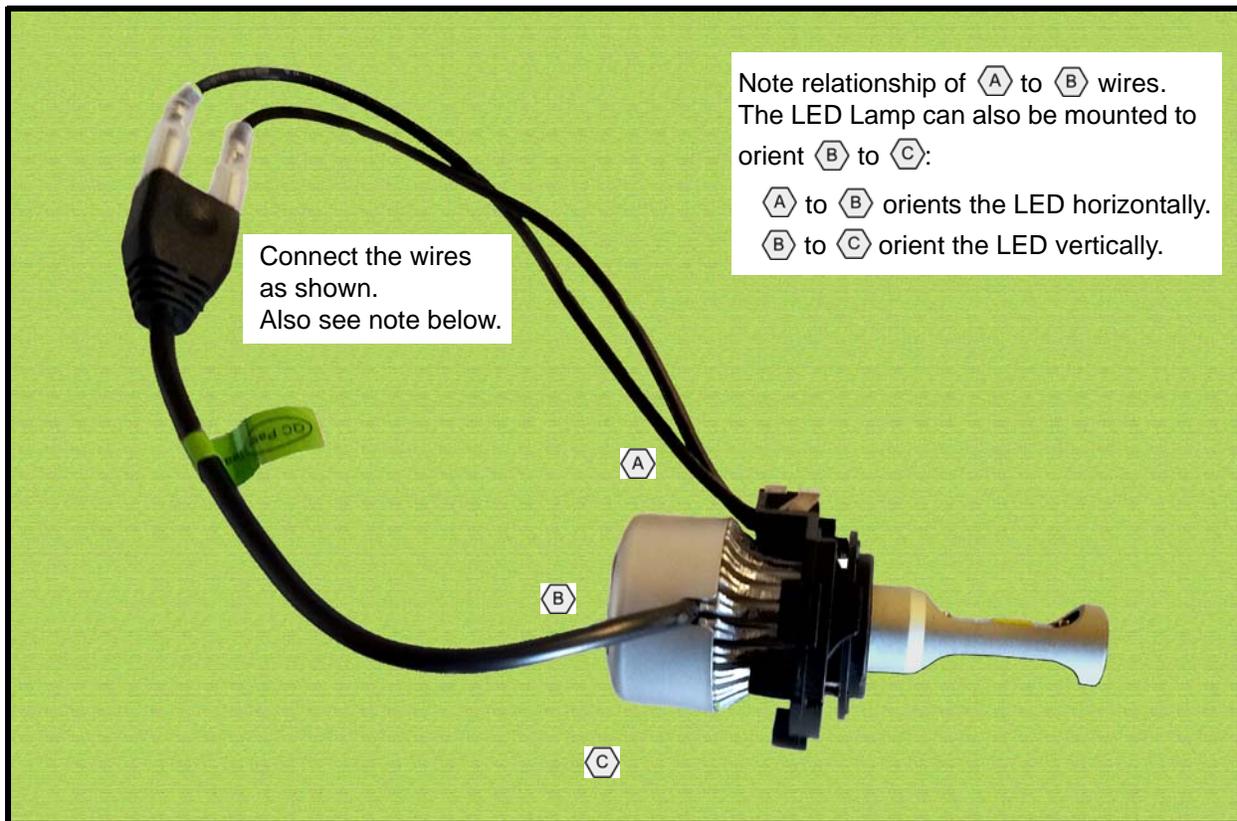
The following steps will assemble the component into a plug-and-play LED Module as shown in Figure 12:

1. Hold the LED Lamp in one hand while grasping it by the heat-sink with the narrow LED pointing upward.
2. Take the L16 H7 Adapter and place it over the narrow LED with the modified parts of the Adapter facing upward. Let the Adapter fall to rest at the rubber O-ring. It will lay

here sloppily at the moment. Rotate the Adapter such that its wires are to the right side of the LED Lamp wires as shown in Figure 12.

3. Place the LED Lamp Socket, long sleeve side down, over the narrow LED. Orient the Socket tab so that it rest in the Adapter  groove, as shown in Figure 9.
4. Rotate, either the LED Lamp, or the Adapter-Socket slightly, while attempting to mate the Socket with the Lamp. This is the reverse process of removing the Socket illustrated in Figure 7. While doing this you will observe that the Adapter's tiny circuit board plastic barrier rubs against the LED Lamp heat sink. This is not a problem so long as the plastic insulates between the circuit board and heat sink. Try to keep the Adapter perpendicular to the LED Lamp while you twist-lock the Socket in place. If the Socket will not twist-lock in place, then it may be necessary to remove more plastic from the Adapter, see Figure 8.
5. The LED Module will be firm once all of the parts are properly mated together. Finally connect the Adapter pig-tail wires to the LED Lamp plug. Alternatively, you may wish to leave the wire loose, with the ends insulated and connected to a voltmeter to monitor the for voltage while you install the LED Module into the headlight assembly with the low-beam headlights switched on. To avoid blowing fuses, be careful to ensure the lead end remain insulated.

**Figure 12: Photograph of Completely Assembled LED Module**



**Note:** There is no indication for proper polarity. Polarity didn't seem to matter in one install, but was critical in the last install. Therefore, you have a 50/50 chance of doing it right or wrong. No harm done if wrong, just won't work. Dealing with this issue is covered in the next section.

### Get It Done

The final detail of the assembly process is to install the LED Module into the headlight assembly. This is probably the most difficult step of the entire process because you cannot see what you are actually doing. This is also the point where you should put (stuff) that clean cloth shop towel into the housing assembly because, in my case the LED Module came apart once while removing it. Had the towel not been in place, the LED Socket might have fallen down into a lost space of the headlight assembly. This is also the step where your previous remove / install practice pays off. While the assembled LED Module twist-locks into place, it seemed to require some fiddling to get it to lock into electrical contact. This is also where the voltmeter might become useful.

If you believe you have the LED Module installed correctly and properly twist-locked in place and the LED Lamp fails to illuminate, then three possible corrective actions exist:

1. The LED Module is not making proper electrical contact. Mark the wires to remember how they are connected. Disconnect the wire and, with the low-beams switched on, measure the voltage between the pigtail ends coming from the Adapter.
  - If it measure 0-volts, then proper electrical connection is not made. You need to fiddle with the twist-lock placement to ensure the module has twisted all the way into place.
  - If it measures battery voltage, then proper electrical connection is complete. Do not fiddle with the Module anymore. The Module is properly installed. Proceed to Step 2.
2. The LED Lamp is wire backwards. Swap the wires and go back to Step 1. This will probably correct the problem.
  - If problem correct, then smile and be happy. Get the other low-beam done, and go camping.
  - If it failed to correct the problem, then double check everything, and reluctantly consider a Step 3 possibility.
3. The LED Lamp is defective (unlikely). If Step 1 has proper voltage and Step 2 fails to correct the problem. Then the LED Lamp might be defective. Double / triple-check everything before contacting XtremeVision about the next step.

**Figure 13: Photograph of LED Module Plugged into the Headlight Assembly**



Insert the LED Module into the low-beam socket and twist  it about a ¼ turn to lock in place. It might be helpful to look inside at the front of the headlight to help you align the lamp into the hole.

With both low-beam headlights working properly, then stuff the wires into the headlight assembly and replace the dust cover. Check low-beam headlight alignment, and correct as necessary.

You are done. Go camping!

### **Low-Beam Vertical Alignment**

An extensive search of the web failed to provide useful information regarding do-it-yourself headlight alignment information for post-2014 Sprinters. I did find several vague illusions about automatic leveling features and references to things like “leveling sensors” and “leveling motors.” Most of that discussion seemed related to OEM HID headlights, however some discussion implied that all headlight assemblies were auto-leveling. After a lengthy, fruitless search, I decided to give up and suspect that all of the systems are auto-leveling. If such is true, then any necessary adjustment would require special access to the vehicle’s computer to complete the alignment process. This then becomes a task for a properly equipped competent automotive shop.

After completing my upgrade project, I found the passenger side alignment to be very near the original OEM lamp alignment, but the driver's side was somewhat askew. While searching for a resolution, I came across a *Sprinter-Forum* discussion that addressed some of this topic, and found a comment by "autostaretx" asking "Is the bulb perhaps slightly askew in its socket? (or the socket askew in the holder)." Dumb idea, I thought, but since it only take a few seconds to try ... why not? Actually it is a brilliant idea, it worked! Now both low-beam headlight line up very close to where the original OEM H7 lamps were shinning. You might wish to read that *Sprinter-Forum* discussion, *Aiming headlights -- Sprinter shop uses a wall* at <https://sprinter-source.com/forum/showthread.php?t=51041>.

Since these are very bright low-beam headlights, and because I really don't want to be that guy with *retina-burners* on the highway, I will take my vehicle to a shop where they can verify and adjust the lamp elevation as necessary.

### A Brief Self Promotion

Ray Iddings has written several books on central California history, including the follow which are available at Amazon. Please consider adding these books to your library. Thank you.

- New Idria Quicksilver: History of the New Idria Mining District
- Historical Guide to San Benito Mountain & Joaquin Rocks Region of Central California
- Joaquin Murrieta: The True Story from News Reports of the Period

