INSTALLATION GUIDE

ALLSIDES® REVERSE GROUND LIGHTING SYSTEM

For Trailers

IMPORTANT! No two installation scenarios are the same. Accent lighting is highly subjective. Not everyone shares the same lighting or installation quality goals. Some folks are OK with twisting wires together, others want to solder and heat shrink them. Some folks are OK with running wires where they may be seen or unprotected to save money/time, others want a tidy, clean install so they wrap plastic split-loom around all exposed cables. Some folks are OK with mounting their LED strips to whatever surface they can find, others want to take the time necessary to build out appropriate mounting surfaces to provide the best lighting effect on their vehicle and maximize the longevity of their lighting system. The point is it's not possible to provide all the materials necessary for all installation scenarios on all types of vehicles to meet everyone's quality goals. Our light kits provide the essential components needed for a high-quality, functioning lighting system. Installation of our light kit to your specific vehicle will however likely require additional items to make it look, fit and work the way you want. This is particularly the case with electrical wiring, switching functionality and mounting surfaces for the LED strips. We have created a list of additional items you may need. Here's the link: https://www.boogeylights.com/other-items-you-might-need/. While we offer them for sale you can also find these items locally. We urge you to review this information before starting your install.

BENCH TEST YOUR LIGHTING COMPONENTS FIRST!

We know this takes a few extra minutes, but we STRONGLY suggest you bench test your lights AND your controller / switches (if purchased) on a table before doing anything further. Test all of them. While we test every light strip and controller before shipping, bench testing your lights will eliminate the possibility of any problems with the lights or controller before mounting. It also lets you know everything is working properly. Also, the process of bench testing gives you an opportunity to understand the wiring system without interference from other wires, connectors and cables. You can use any 12vdc battery to do this (e.g. car battery, motorcycle battery, lawn tractor battery or 12vdc power supply). Bench testing takes an extra 10 or 15 minutes. It's simple to do and can potentially save you hours of time and frustration down the road.

Did we mention the importance of bench testing every LED strip first?

THIS IS A GUIDE. NOT A HOW-TO. It's simply not possible to provide detailed instructions for all installation scenarios. Far too many variables. The information in this manual is intended to be used as a guide. It is not a detailed step-by-step how-to installation manual. We do not spell out every single step along the way. We cover the essential steps related to installing this kit. Beyond that we assume the installer has the skills, knowledge and tools necessary to do the work using the information we provide as a guide. You may need to vary your installation and/or make adjustments based on your vehicle. This is particularly the case with electrical wire routing, electrical connections, electrical load sizing and switching. If you're unsure about how to do the installation – particularly the electrical components – we urge you to seek assistance from someone who has those skills.

YOU MUST HAVE AN UNDERSTANDING OF 12V POWER. An essential skill with installation of any Boogey Lights LED products is knowing how to correctly wire the product to a 12vdc circuit. This includes understanding the importance of having a properly sized fuse at the power source, polarity, how to properly seal an electrical connection, using properly sized wire gauge for the load, measuring voltage and measuring the additional amperage draw you're adding. If you are uncertain or unfamiliar with any of these concepts, we urge you to ask someone who has the knowledge to assist you onsite. We cannot advise you on these matters remotely either.

POWERING YOUR LIGHT SYSTEM. This light kit will work on a wide variety of trailers: from cargo trailers to food trailers to car haulers to utility trailers to horse trailers; only to name a few. The lights don't care what type of trailer they're attached to. As long as you have 12vdc power available and access to the tow vehicle's reverse circuit to turn them on/off (or use the optional ON/OFF wireless remote), they'll work. These are simple 12vdc lights. Not complicated. This installation guide describes the process of how to properly install this light kit to the bottom of a trailer so they'll last. This guide however does not include wiring instructions to the power source which is typically coming from the tow vehicle. If you purchased the optional wireless ON/OFF switching mechanism with this kit, we of course include the wiring instructions for that specific device purchased but how to wire the lights mounted to the bottom of the trailer to your tow vehicle is not detailed. Why? Because there are way too many variations and configurations possible. Plus, we assume the person doing the installation knows how to locate the tow vehicle's reverse circuit OR can install the ON/OFF RF wireless remote. We do however provide the wiring diagram for a typical 7 WAY BLADE plug used on most trailers.

WORK AREA. Make sure you have ample area in which to work and that the area is protected from rain or cold temperatures. The 3M adhesive tape and 3M adhesion promoter works best if applied when the air temperature is above 40 degrees (and of course is DRY).

MOUNTING SURFACE CONSIDERATIONS. Make sure you have an adequate surface area where to affix the LED light strips to the bottom of your trailer. Most trailers do not have an enclosed bottom. There will typically be a series of support struts around the rear of the trailer. Depending on how you measured and ordered your light kit, you'll need to make sure you have sufficient surface area to attach the LED strips. In most trailer installs, you'll need to build out a mounting surface (see photos below). In addition, the area where you are attaching the LEDs needs to be reasonably clean (eg. free from oil, grease, rust, dirt, road grim), smooth, rigid, flat and one continuous flat surface.

IF YOU NEED TO BUILD OUT A MOUNTING SURFACE. For trailers that don't have a smooth, flat continuous surface to mount to – you can use aluminum or plastic L channel. We offer both the aluminum channel with plastic diffuser and the plastic l-channel as an option when ordering this kit. In addition, you can purchase aluminum L-Channel at just about any hardware store in the country. It's very common. Rivet (or screw) it to the bottom of the trailer. Then, mount the LED strip to the aluminum or plastic flat stock. It makes for a nice, clean installation. See photos below. If you are mounting the LED strips just behind tires, and you purchased our LOW PROFILE LED STRIP version of this kit, you may want to install the LED strips inside aluminum channel with plastic diffuser on top. That diffuser will protect the LED strip from being damaged by road debris flung up by the tires. Doing it this way also makes it easier to remove the lights if for some reason you want to in the future. It's

the method we use for our in-house installations. We have a video on our website showing more about how to do this. Here's the link: <u>https://www.boogeylights.com/video-creating-a-smooth-mounting-surface/</u>. This video (and many others) can also be found in our INSTALLATION RESOURCES section here: <u>https://www.boogeylights.com/installation-resources/</u>.

Before deciding how or where you're going to mount the LED strips, it's super important to understand that these LED strips cannot be mounted in such a way as they span multiple surfaces. They must be mounted on a smooth, flat, continuous rigid mounting surface. Spanning two mounting surfaces on a vehicle that moves, flexes and vibrates will absolutely not work. The LED strip will fail and they will do so sooner rather than later; we can almost guarantee it. We know the temptation is there because it's easy/fast to do BUT you're going to be disappointed if you do. Mounting the LED strip across multiple surfaces will void the warranty as well. Also, do not attempt to mount the strip to follow a radius. The LED strip has to be mounted in a straight line. We include some photos of how to do this below.

ELECTRICAL CONNECTIONS. Make sure you know where your power leads from the LED strips will terminate. For most cargo and utility trailers, that point will be at or near the axle in the rear. We then connect the included 2 conductor feeder cable (aka 'hook up wire') from those power lead cables and run it forward up to the tongue of the trailer. We usually secure the feeder cable to the one of the trailer's support beams. That 2 conductor feeder cable is what connects to the reverse circuit in the trailer's wiring harness (which plugs into the tow vehicle). For most trailer installations, that reverse circuit cable in the trailer's wiring harness will be capped off; not connected to anything. This is because most cargo/utility trailers do not have a reverse light on the back of the trailer. The 7 way blade plug wiring harness however that comes from the tow vehicle WILL HAVE that cable available (assumes of course the trailer is using a standard commercially available 7 way blade plug). Simply connect the positive wire of the 2 conductor feeder cable coming from the reverse ground lights to that reverse circuit wire (PIN 7 of a 7 way blade plug). Then, connect the negative (ground) wire of the 2 conductor feeder cable to the ground wire of the 7 way plug (PIN 1). It's important you use the ground wire coming from the tow vehicle for this. DO NOT USE THE TRAILER FRAME AS A GROUND.



If you purchased the optional wireless ON/OFF controller, you'll need to mount the controller either inside the trailer or inside a waterproof box mounted on the trailer frame somewhere. The controller on the input side needs 12vdc positive and negative which you can pull directly from the 7 way plug (PINS 4 and 1). Be sure to use the inline blade fuse included with the controller. On the output side, the positive and negative wires attach to their respective wires coming from the LED strip 2 conductor feeder cable. If you purchased the optional wireless ON/OFF controller, we include the wiring diagram with it. Note that we also include a heavy duty 30amp relay with the wireless ON/OFF controller. The wireless ON/OFF controller is rated at a max of 5amps. If the reverse ground lights you're installed are anywhere close to this 5amp limit (e.g. 4amps or greater), we strongly suggest installing the relay. Install diagram for the relay is included. If you are unfamiliar with how a relay works or how to wire it using the included diagram, we suggest asking someone to assist you with this part of the installation. Insurance regulations do not allow us to provide vehicle specific wiring instructions remotely.

KNOW YOUR AMPERAGE DRAW. These lights are not vehicle specific. They'll work with any trailer that is towed by a vehicle that has a 12vdc reverse light circuit available at the tongue of the trailer (optionally, you can use the on/off wireless controller to turn on/off the lights). To be clear, in most cases the reverse light power is provided by the TOW VEHICLE -- not the trailer. So having access to that reverse circuit from the tow vehicle is essential.

One word of caution: Adding additional LEDs to your tow vehicle's lighting circuit may exceed your vehicle's rated amperage for that lighting circuit and throw an error because the lighting control module (LCM) in the tow vehicle 'thinks' there is a problem with your electrical system due to the increase in amperage draw. It's a safety feature offered in most modern vehicles manufactured today. The good news is that with most tow vehicles, the reverse circuit has a higher amperage rating than the tail-turn-brake lights. Usually 10amps, perhaps more. These reverse ground lights will pull anywhere from 2amps to 4amps depending on the number of diodes and copper wire in the circuit. And of course, reverse lights are rarely on for more than a few minutes anyway. People don't drive in reverse for long periods of time. We have yet to encounter a situation where the LCM of the tow vehicle errored out due to the addition of these Reverse Ground Lights being added to the trailer. That said, if your tow vehicle does have a problem with the additional amperage, the easy solution is to add a relay into the circuit.



BOTTOM VIEW OF TRAILER



MOUNTING YOUR LED STRIPS

Where you mount the LED strips will depend on what you ordered and the measurements you took before placing your order. Whether you ordered LOW PROFILE LED STRIPS or HEAVY DUTY LED STRIPS the mounting will be pretty much the same (you'll just have more strips to mount if you purchase the Heavy Duty strips.) If you don't have a smooth flat mounting surface where you want to mount the LED strips, you'll need to build out that mounting surface. For most installations, we have to build out the mounting surface. This product offers both an optional Plastic L-Channel (2" x .5") and Mini T12 Aluminum Channel with Plastic Diffuser. The Plastic L-Channel will work with both the Low Profile and Heavy Duty LED strips whereas the Mini T12 Aluminum Channels will only work with the Low Profile strips. In either case, these mounting surfaces can be riveted to the bottom of the trailer and then the LED strips mounted to the smooth surface. In some situations you might need to use aluminum angle if you're spanning open areas for rigidity. We have a photo of one such example further along in this guide. As mentioned earlier in this manual, we have a video on our website showing this process. Here's the link again: https://www.boogeylights.com/video-creating-a-smooth-mounting-surface/. We include some photos below and on the following page.

The REVERSE GROUND LIGHTING SYSTEM includes enough LED strips to cover the rear, three sides of the trailer as shown in this photo. There's one REAR and two SIDEs. These strips mount to the bottom of the trailer shining straight downward. You can see the reflection of the LED strips mounted to the bottom of this trailer reflecting off the high-gloss floor in the photo. The idea is to flood the area behind the last axle with light on all three sides providing better visibility when backing. The lights only light up when the tow vehicle is in reverse.



Placement of the LED strips

For the Reverse Ground Lighting system we like to mount the LED strip in a few inches from the side of the trailer. That way, the LED strip is hidden from view.

With regard to placement, one option is to mount the LED strips 4" or so in from each side of your trailer. This placement will usually provide the best "glow" effect without seeing the LEDs when lit. Of course, this is a matter of personal preference and depends on available mounting locations. If in doubt, we recommend dry mounting an led strip in the location you're thinking and then, light that strip up using any 12vdc power source. See how the glow looks from a distance. There aren't any right or wrong answers here. All personal preference. Adjust as needed.

This photo is from an under-glow installation on a semi-trailer but the concept is the same for any trailer that has support beams as shown in this photo.





We used Aluminum L Channel which allowed us to mount the rear LED strip further in from the edge of the trailer. The L Channel is riveted to the trailer's support strut with the LED strip mounted to the channel. You can purchase aluminum L channel at just about any hardware store.



This photo is from a double axel travel trailer. We installed aluminum flat bar to the bottom struts and then mounted the LED strips to that aluminum flat bar.



HOW TO VIDEOS -> https://www.boogeylights.com/how-to-videos/

CUTTING YOUR LEDS- If you need to cut your LOW PROFILE LED strip you can do so as long as you cut in the proper location – which is every three LEDs as shown in the below photo. Cutting incorrectly could damage your lights and is not covered by the warranty. If you cut the strip, be sure to seal the cut end. You can also use silicone found at your local hardware or RV store. If you do need to cut your LED strip, we strongly suggest doing so BEFORE you mount the strip to your RV/Camper/Trailer. **NOTE: Heavy Duty LED strips CANNOT be cut. LOW PROFILE only.**

HI-INTENSITY SURFACE MOUNTED LED STRIPS



The LED strip can be cut one time on the copper solder pad where indicated; between the cluster of 3 LEDs. Important to cut in the center of the copper pads. Once cut, the end must be sealed using silicon, liquid electrical tape or even heat shrink to stop water intrusion from damaging the strip.

MOUNTING THE LED STRIPS

Once you have your LED strips cut (if necessary) and you know where you are going to attach them, follow these steps:

- The area where you are mounting the LEDs has to be clean: free of all dirt, oil or anything that might affect the LED from sticking. You only get one opportunity to mount the LEDs so it's critical the area be prepared properly.
- Use alcohol to clean the area where you are going to mount the LED strip. Be sure to let the alcohol dry completely before proceeding to the next step. (Note: Do not use acetone or similar cleaner without reading the section "A Word About 3M Tape & 3M Promoter" further on in this document).
- Next, use the 3M Adhesion Promoter supplied with your kit to "paint" on the promoter where you are going to mount the LED strip. See the note below (on page 6) about the proper way to use promoter. *This is an important step. Do not bypass.* Allow the promoter to dry for 30-60 seconds.

Do NOT bend the LED strip in a radius of less than 2 inches.



Do NOT bend the LED strip on a horizontal plane.



- Peel off the red backing tape that protects the 3M adhesive tape on your LED strip. Be careful not to let the tape touch anything. The 3M backing tape on these LED strips are one-use only. They cannot be reused.
- Carefully push the LED strip to the area you have prepared. You will want to apply only enough pressure to the strip to make sure it is firmly mounted. You only get one opportunity to do this. Once the LED strip touches a properly prepared surface that has been promoted, that LED strip will be very difficult to remove. Moreover, if you do remove the LED strip, the strip cannot be used again without adding another layer of 3M adhesive tape to the back. DO NOT press too hard as too much pressure can damage the LEDs and connecting wires in the strip. Also, do not pull, stretch or twist the LED strip. Too much tension on the strip will also damage the LEDs such that some of the LEDs in the strip will not illuminate. The strip must be mounted flat against a single continuous mounting surface, in a straight line. Really important that the ENTIRE STRIP be stuck to the mounting surface and that you NOT attempt to span across multiple mounting surfaces.
- Use ZIP TIES to affix the left-over power lead cable running to the LED strip to the bottom of your trailer. You don't want to leave this power lead cable hanging. VERY IMPORTANT TO SECURE THE POWER LEAD THAT ATTACHES TO THE LED STRIP SO IT CANNOT MOVE. Doing so will place too much stress on the LED strip itself causing it to fall off or fail where the power lead connects to the LED strip (not a failure covered under warranty either).

3M Tape & 3M Adhesion Promoter (aka Primer)

All Boogey Lights[®] LED strips have 3M Tape backing affixed to them. This 3M Tape is designed to make a more-orless permanent bond between the LED strip and the surface to which it is attached. When properly prepared, 3M Tape can be affixed to polyethylene, polypropylene, ABS, PET/PBT blends, concrete, wood, glass, metal and painted metal surfaces. To make this bond you must however prepare the surface to which the LED strip will be affixed. You do this by first cleaning the surface with isopropyl alcohol (50/50 mixture with water) and then painting on 3M Adhesion Promoter. YOU CANNOT SKIP THIS STEP. Always apply 3M Adhesion Promoter to any surface Boogey Lights[®] LED strips will be mounted. The promoter acts as a primer that ensures maximum adhesion. Porous surfaces may require 2 applications of 3M Promoter for uniform coverage and good adhesion. If you are going to add a second coat, allow the first application of promoter to dry before applying the second coat. Our lighting kits include a small bottle of 3M Adhesion Promoter. Simply use a clean, dry cloth to apply it to the mounting surface.