

LVR3I Installation Notes Revised May 19, 2003

Software version 4.2 Dec, 2000

You will notice that your LVR3I has four larger unsoldered holes in the PCB, 2 on each end. They are labeled IN+ IN- B+ and B-. Solder wires to these holes and connect as follows:

IN+	Connect to battery positive	node BAT+	BATTERY+ & BULB +
IN-	Connect to battery negative	node GND	BATTERY-
B+	Connect to one side of bulb	node BAT+	BATTERY+ & BULB +
B-	Connect to other side of bulb	node BULB	BULB-

Note that since the BULB+ is the same connection as BATTERY+ you must be careful not to have the BULB- shorted to the BATTERY- through common metal frame connection, which can happen with some lighting systems. In other words the LVR3E has a positive common, NOT negative. Also, this means that you don't have to connect to both the IN+ and B+ if you use only 3 wires to connect to the regulator. Page 2 of the schematic has 3 wiring examples.

The LVR3I has reverse polarity protection, which prevents damage to the LVR3I in most cases. However, this does not protect your bulb from too much voltage! If you use polarized plugs on your battery this should not be a problem, but be aware that trailer hitch style polarized plugs will not prevent reversal from the light to a charger. The maximum input voltage is 16 volts limited by C1, unless you bought a 12 volt output unit in which increases the maximum to 30 volts.

The LVR3I has internal programming that will warn you when the battery is getting to low, by slightly dimming the bulb about once per second. Connect a switch in place of the On/Off button to disable the warning feature. Also, the LVR3I has a optional low battery cutoff feature which will turn the LVR3I off once the battery gets below this programmed set point. It also can be disable with the same switch (as above). Also, the LVR3I will dim the bulb back to a very low level when the battery gets critically low. All of these features are set to specific voltages depending on what type of unit you ordered and can not be changed later. The LVR3I is designed to dim up the bulb when the power is connected to the LVR3I or when the bulb is connected. If you are using more than one bulb on a single LVR3I, then only the first bulb turned on will be dimmed up.

The following list the specifications for your order. The input voltage range is by design the bulb voltage to 2.5 times the bulb voltage. The maximum current is continuous peak current, which is only approximately related to average bulb current. Warning flashing normally begins when the input voltage is right above the bulb voltage, but this may be optionally different. Low battery cutoff is a programmed option for rechargeable batteries to prevent cell reverse damage should the lighting system be left turn on.

Bulb (Output) Voltage	Maximum Peak FET Current	Input Voltage Range (for full regulation)	Warning Flashing	Low Battery Cutoff
	10 Amps TO-220	Bulb to volts		

The auto sensing ON/OFF feature then the LVR3I will automatically switch on and off when the bulb is connected or disconnected from it. This allows the LVR3I to always be connected to the battery without draining the battery excessively while the bulb is disconnected. (See configuration #4) Short of that, I recommend using a power switch between the LVR3I and the battery, but not having the bulb current go through this switch. (See configuration #1) This configuration provides zero off current and no bulb current power loss through the ON/OFF switch. Another good option is to use the momentary button on the ON/OFF/DIMMING button on the PCB. This button will turn your headlamp on or off each time you hold the button down for about 1 second. If you push and release this button quickly it will cycle to the next dimming level.

If you have any problems, questions, comments, please feel free to contact me at: willie@surefire.com

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LVR3I READ THIS! May 19, 2003

IF YOU THINK YOUR UNIT MIGHT GET WET, PROTECT IT!

The LVR3 must be protected from water. It can be put in a box (battery case) or potted. If it is potted, use a material designed for electrical potting or a material that you know has been tested. Standard silicone rubber will corrode the unit. I use Starbrite Liquid Electrical Tape or 3M Scotchkote coating works well for this purpose and is available at most hardware stores. Be careful not to get this stuff in the button top.

If you chose not to coat or pot your unit you should put it into some sort of enclosure. Headlamps like a Petzl provide a nice enclosure which keeps direct water off of the unit. The box you choose need not be watertight if you know you can keep water from getting directly on the printed circuit board. One problem with a "water tight" box is that if it is not completely water tight, water will tend to build up in it, where as a non sealed box it will evaporate and dry out. Condensation in a non-sealed box can potentially be a problem, but distilled water has very high resistivity and as such I haven't noticed this to be a problem. For water immersion use like caving, potting or a sealed box is needed. For diving, a pressure vessel must be used.

RELIABILITY

I have been selling these units for 10 years now and the most failures have been either broken wires, water damage, shorted output or power hooked up reversed on older LVR's that did not have reverse protection. Very few have had component failures. The electronics are very reliable, much more so than most of the rest of the lighting system.

USE A GOOD QUALITY BATTERY HOLDER

If you are using an after market battery holder, you will be much happier down the road if you use a good quality holder. The cheap plastic holders that are sold at Radio Shack will not last long before the plastic case splits out. Also, these holders can not handle much current before the wiring gets hot and melts into the plastic. Mouser Electronics and Digikey both sell metal battery holders made by Keystone Electronics. These are the best holders I know of, and are still reasonably priced. For caving applications, I recommend soldering to the batteries. I have found it to be the only reliable battery connection.

CAUTIONS ABOUT USE

The LVR3I is not protected from short circuits. If you short the output the power FET may be damaged, which in turn can damage the microprocessor. However, normally the LVR3I will short the battery well enough that the LVR will survive.

If the power is connected backwards to the LVR3I, your bulb may blow out instantly! The power FET has an internal diode that will send the battery voltage to the bulb less the 0.7 volt drop. This small drop can damage the FET, but this is very unlikely. If you are using a 6 volt bulb on a 12 volt battery the bulb will get over 11 volts and blow out instantly. So if you have battery connectors that can be plugged in backwards, be careful or replace them with polarized plugs. Also, some battery holder allows for the cells to be installed backwards. My favorite Keystone Electronics holders allow this. **BE CAREFUL!**

If you are using lead acids, NiCad, NiMH or LiION you may want a fuse in series with the battery located near the battery. These batteries can deliver high enough current to melt your wiring if shorted. If the battery pack is under clothing, this could prove painful if the wire melted into your skin. However, fuses do have resistance and some power is lost in the fuse.

Although the warning flashing will tell you when you are at the end of the battery life, some battery and bulb combination may go out very fast once the battery has been depleted. If you need to know how much battery life you have left, I suggest measuring your batteries with a voltmeter. If your application is critical, a small digital volt meters can be connected to the battery and provide a continuous display of the battery condition.

Since the LVR3C is a switching regulator some radio frequency noise is generated. Although the emissions are well within FCC guidelines, there is still a possibility of interference with AM, FM, or two-way radios. If interference is suspected, try turning off your headlamp. **The use of this regulator can definitely interfere with avalanche transceivers used for skiing and mountaineering.** Contact me on system modifications to minimize interference.

WARRANTY

I can not and do not make any warranty claims whatsoever. You must assume any risk should the LVR3I fail during use. You must assume any risk of injury or death cause by the failure of the LVR3I during activities such as but not limited to caving, cycling, climbing, diving, or mountaineering. If you use this unit in activities where lighting is life critical, you should have completely independent backup lights available. If you are not willing to accept this risk please send the unit back and I will refund your money.

However, I will repair a broken unit, normally for free, depending on what happened to it.