Kelley's Works in Progress

Headlamp Upgrade Harness Installation

You have just purchased an upgraded wiring harness for your headlamps, which will allow you to run bulbs with higher wattage ratings safely, and will probably even make your stock headlamps brighter. This headlamp harness will allow power to flow directly from your battery or alternator into your headlamps *without* running back to your headlamps switch and back - which greatly reduces conductor losses in the circuit, and removes the "choke point" that the headlamp switch presents to the circuit.

This headlamp harness has main leads constructed of 12AWG stranded wire (for flexibility) contained in a single cable, which presents two insulating jackets to the environment, with added split loom tubing laid over segments where mechanical interference is expected to be at issue.

It also offers fully "plug and play" installation - no modifications to your original wiring are necessary. A male plug is used to connect the harness to your original wiring (which is used to trip the relays,) although this plug should be retained with a wrap of tape or a common Nylon wire tie in order to ensure a solid connection that will last for years. The plugs and sockets used are high-quality units, but why take chances?

Ends of the cables where "break-outs" occur are also sealed using cold-shrink tape and *again* with heat-shrink tubing to help prevent water intrusion into the outer jacket. Individual connections are crimped and sealed with heat-shrink tubing as well, and the fuses are contained in weathertight holders - and the relays themselves are also weathertight. Problems are not expected when fording streams, puddles, and small water holes.

The relays and fuse holders are premounted on aluminum channel "bridges" - not only for later models that have the punched hole next to the battery (where these components are to be mounted,) but also to simplify component mounting for the end-user. This will also simplify component locations - both the high beam fuse and the high beam relay will be toward the front of the vehicle, as mounted.

This harness uses standard ATO/ATC fuses (just like the rest of your rig,) which you should already have. Since we don't know what wattage of bulbs you will be using, fuses are not provided - but a chart at the end of these instructions will help you select the fuse you need. Relays are standard DIN/Bosch units, but they are only physically similar to the relays used in your rig - these will power two circuits at once (DPST type,) and are a bit harder to find. Using a standard DIN relay will result in one headlamp being illuminated with the headlamp switch OFF, and the headlamp that is ON will switch sides when the switch is turned ON. Either way, one headlamp will be ON and the other OFF - this is not a fault of the wiring. It is simply the wrong relay being used for the application. Spare relays will be available from Works in Progress, should you not be able to find them locally. Spare relays are about the only replacement component you may have trouble finding - but they should still be available if you look a bit (be sure to ask for a DPST relay - the standard relay is an SPDT [Single Pole, Double Throw; or "changeover."] They *are* out there.)

This harness was designed to support loads up to 200 Watts per lamp filament. The relays will certainly handle more, and the wiring probably will as well - but 200W per filament was the design condition, and 200W per filament is the load that will be sustained by this harness. Since H4 bulbs in the range of 200W are not generally available, this should handle any bulb you care to plug into it.

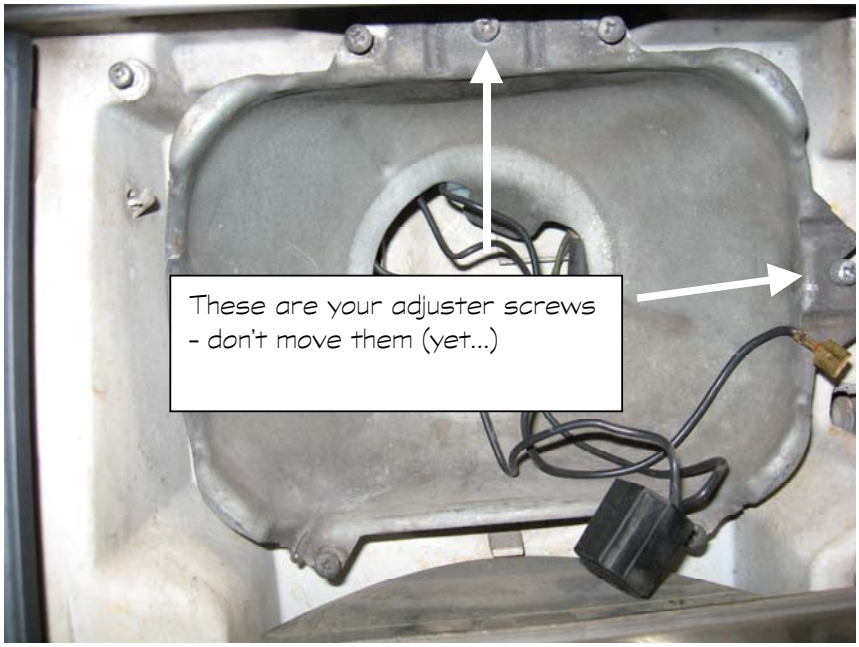
Installation Instructions

Please be sure to read through these instructions entirely before starting work. If you have any questions, please feel free to email - I try to answer all messages within 24 hours.

Like all good things, some small amount of work is involved. So, here's what you'll need to do:

Remove your battery. It's going to be in the way later anyhow. Write down your stereo presets before you pull the battery, and note anything else you'll need to reset once you've restored power.

Next, remove the upper crossmember retaining your radiator. For this, you'll need a 10m/m socket (for the end screws) and an 11m/m or 12m/m socket (for the stud nuts on the front fascia retainer.) There is no need to remove any of the Torx© screws that hold the bracket to the crossmember, or the central hood latch - you can use it for a handle. Set the crossmember aside. Also remove the headlamp bezels and headlamps, and set them aside. Your headlamp bucket should end up looking like this:



As you can see here, I was able to remove the crossmember as a single piece, without getting out the Torx© bits. It's much easier this way, and it will probably work for you as well. Ignore the other stuff in the picture - my rig is progressively less "stock" as I get around to things, and it's an 88, so it's also an awful lot less "OEM" as well. Parts doe get old and want changing...

Check your new harness - one headlamp socket is bundled with red heat shrink tubing, the other with black. The red is used to mark the plug for the right headlamp - take the black one all the way across and run it to the left headlamp. Drape the cable in front of the radiator and A/C condenser (if present) and allow it to hang - it will rub just a bit, but that's what the split loom tubing is for. Checking it once a year should serve - replace the split loom if it's worn. Unless you're re-covering the wiring, you can access it for inspection by simply removing the grille - which can be done with a regular Phillips screwdriver in about two minutes, in most cases.

While you're threading the new headlamp socket through the back of the bucket, tuck the original plug behind the bucket to get it out of the way. You're not going to use it any more, unless you remove the new harness.

Once you've finished with that wiring, turn your attention to the other headlamp bucket. Repeat the process with the other socket, except you're also going to connect the male plug on the headlamp harness to the socket on the vehicle. The new socket can go through the back of the headlamp bucket, for use with your new headlamps.

Once you've got both headlamp sockets in place, and the harness connected to the original wiring, you can turn your attention to the relay block and fuse holders. They're already mounted on bridges for you, and the holes in the bridges should be positioned over sheetmetal once you've got them in place. Be sure there is enough room to remove the fuseholders from the caps - they pull downwards, and you will need at least one full inch to remove the fuseholder to install or replace a fuse. Once you've selected the mounting location for the relay bridge, clean a patch of the sheetmetal under one end to bare metal and apply corrosion inhibitor. You will need a good ground here; it's the return path for the headlamps. The two black wires with the small ring terminals will go under a mounting screw head. Apply corrosion inhibitor there as well, and be sure the screws are secure.

Use the drilling/tapping screws provided - they don't require pilot holes, but it wouldn't hurt anything. They should clear the hole in the bridge neatly - you want them to thread into the body sheetmetal anyhow. It's easiest to use a drill motor with a screwdriver bit (Phillips – #1 will work, #2 is better) to install the mounting screws.

Once you have the bridges in place, you can re-install the radiator crossmember and the battery. The relays may go into either socket (doesn't matter - both relays are identical.) The fuseholder closest to the front of the vehicle (as mounted) is for the high beam headlamps; the one at the rear is for the low beams. If you want to check to make sure, the one with the white wires going into the bottom is for the high beams, and the one with the green wires for the low.

The two wires (one white, one green) with the 3/8" ring terminals go to the battery positive (+) terminal, and the two black wires with the smaller ring lugs go around one of the mounting screws for the relay bridge, with a bare patch cleaned underneath.

Now, refer to the chart at the back of these instructions to select your fuses. Install the two fuses (the fuseholder, as mentioned above, will pull downward from the cap once the catch is released. Push up to replace, and you should hear a "click" when the fuseholder is fully seated.) You can use pretty much any H4 bulb currently available - you just select the fuses you need to match them.

Mounting Considerations

The relays have terminals one-half inch long. Allow a minimum of ¾" inch to allow removal of the relay. Use the mounting tab on the relay to gauge height - that is slightly more than the minimum clearance required for servicing the relays and fuses (assuming the relay is removed first.)

The fuse holders will need about 1-½" of vertical clearance below the assembled fuse holder to remove/replace the fuses. Since the fuses and relays can be dismounted separately, the same clearance will serve. If only clearance for removal of the relays can be allowed, the corresponding relay can be removed before removing the fuse.

Fuse Selection Chart

I have used the listings in the Hella Vehicle Lighting, Electrical Products, and Accessories catalogue. I will also make a version available on the Works in Progress website (www.geocities.com/Jeepl6Power) that I will keep updated as more bulbs and brands come to my attention.

Should your bulb's power consumption not be listed, the fuse requirement may be determined by taking the wattage of a single bulb filament (high or low beam,) doubling it, and dividing the total by 12 nominal volts. The answer will be in amperes - you then select the next *higher* fuse rating (in amps) that is available. I will attempt to keep the online version as up-to-date as possible, but if I should miss something, please do let me know so I can add it to the chart. Also, should you require help with the math, I'll need to know the nominal wattage rating of your bulbs, and I can calculate the fuse requirement for you.

All entries in the following table assume that two filaments (one per side) will be powered.

Low Beam Wattage	Fuse Required	High Beam Wattage	Fuse Required
45W	7.5A	45W	7.5A
55W	10A	60W	10A
60W	10A	70W	15A
65W	15A	80W	15A
70W	15A	85W	15A
80W	15A	100W	20A
85W	15A	110W	20A
90W	15A	130W	25A
100W	20A	140W	25A