Adding Lights, Fixing Problems, and Connecting your RV Hauler and Trailer

David Dixon
Deep Space Lighting

What's the Goal?

- To present an overview of lighting products that can help address shortcomings on your truck, or meet the needs of your conversion to an RV hauler.
- To show methods of installing (both mounting and wiring) lights on your truck.

Specific Items

- Headlights
- Adding reflectors without looking like a mailbox post
- Wiring harnesses/methods
- Converting from separate stop/turn to combined stop/turn for trailer (Jackalopee)

Finding the Right Lights

- There are no *DOT Approved* lights. Anyone claiming this is either misinformed or lying. A light should, however, be certified by its manufacturer as DOT compliant.
  - When you see this language from a vendor or manufacturer, it's probably safe to assume either that the product isn't compliant, or that the vendor isn't qualified to help you find what you need (or both)
- If it's labeled for off-road or show use only, it shouldn't be connected to any of your truck's lighting circuits. It's also illegal to sell a light for use on a motor vehicle that doesn't meet FMVSS 108 even if it's intended for off-road use.
- LEDs themselves are fairly reliable and made by only a handful of companies, but the reliability of the boards they're mounted on and the quality of the driver circuits varies quite a bit. Generally:
  - Stick to name brands
  - Look for the SAE type code, and make sure the light is designed for the function you need
  - Look for multiple resistors on the light's circuit board. Cheaper lights will use resistors to roughly control current through strings of (usually 3) diodes—this method doesn't sufficiently protect the diodes from higher voltages, and they're much more likely to dim if the voltage drops.

Headlights

- Regardless of make/model, your truck (especially used) will most likely be equipped with sub-par headlights
  - Headlight housings are a maintenance item. Abrasion and UV exposure cause deterioration.
- Plug-and-play LED and HID bulb kits are not legal, and are not safe. Optics must match bulb.
  - Discharge (HID/Xenon) light sources (bulbs) should have a part number beginning with “D”
  - There are no LED bulbs that are legal, only complete assmblies.

Truck-Lite LED Headlight Assemblies

- Available for newer (2009+) Volvo VNL, Freightliner Cascadia, International ProStar
- Expensive for used truck ($1300-1600/pair), good value on new truck (~$1000)
- Require LCM programming change on Volvos (usually 1 hour labor)
- Only ProStar is full LED. Others still have incandescent turn signal and side marker.

JW Speaker Sealed Beam Replacements

- Currently the only sealed beam replacement that's a significant upgrade.
- Expensive – generally $600-1000/pair
- Available in multiple configurations, including 6x8, 4x6, and 7" round size (round often requires modification to fit)

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- Bi-Xenon/HID projector-type upgrades. In many applications, able to reuse existing headlight housing.
- Freightliner M2, Columbia
- Pete 388, 389, 567, 587
- Kenworth T600, T660, T680; T170, T270, T370, T440, T470
- Volvo VNM, VNL
- $250-1200/pair

Incandescent/Halogen, Xenon, LED

- Incandescent/halogen is old-guard. Simple tungsten filament is heated so that it glows.
- Xenon/HID/Discharge lighting strikes an arc between electrodes, uses regulated AC power to maintain arc
- LED uses driver circuit and PWM signal to regulate output
- Power consumption: Halogen > Xenon > LED
- Brightness: Xenon > Halogen > LED
- Cost: LED > Xenon > Halogen
- Reliability: Xenon and LED > 2500 hrs, Halogen > 100 hrs
- Performance totally depends on optics

Replacement Housings

- Stick to name brands. Unbranded or off-brand housings are typically inferior quality.
- Hella, Depo, TYC are among brands with replacements.
- For most truck models used as RV haulers, replacement is better value than polishing.

Dreaded Light Control Module

- Don't be scared—it's job is to alert you to problems and protect your truck.
- Monitors current on most lighting circuits, alerting to low current (open circuit, e.g. failed bulb) or short circuit (high current). Will shut off power to individual circuits **before** fuse blows in most cases.
  - There are 6 LCM fuses on Volvos. If you find circuit breakers, take truck to dealer for recall.
- If making modifications, be cognizant of total draw on any circuit.

Where to Connect Bed Lights

- 5-pin MetriPack 280-series connector on left frame rail previously connected to tractor light bar.
- Provides tail/marker, left and right stop/turn, and reverse.
- Pre-made and custom wire harnesses are available. Cost ~$250-325.

What Bed Lights to Buy

- Recommend Grote Hard Shell or Truck-Lite Fit-N-Forget light connections. These interface with MetriPack 150 3-pin plugs.
  - No exposed male terminals like with PL series
- Stick to name brands; look for lights with proper driver, not current-limiting resistors. A good light will not change in brightness from 9 to 14V.
- Generally, fewer LEDs in a particular light will be more reliable.
- Try to make use of marker/clearance lights with reflex reflectors built in (look for “A” and “P2” markings).
- Prices vary significantly. Shop around—the same light will often vary by a factor of 2 or more. Ryder Fleet Products, Amazon, eBay, Iowa 80, Raney’s are all good sources, just don’t get distracted by cheap unbranded offerings. Expect to spend $300-500 for the full set of lights.

How to Mount Lights

- Always square with back/sides of truck, not angled.
- Lights in pairs should be symmetrically mounted about centerline.
- Make sure to note orientation marking on individual lights (e.g. “TOP”)
- Stop/turn lights outboard of reverse lights
- Clearance/marker lights at extreme top/rear
- Exactly 3 ID lights, not a continuous row of lights.

Adding Reflectors

- For rear reflectors, Optronics makes a 4” round S/T/T light with a reflectorized flange mount
- For side reflectors or if you don’t have round rear lights, Truck-Lite makes a 2.5” round marker light that’s reflectorized.

Connecting to Trailer

- Most likely, your RV has combined stop/turn lamps (4 wires: left stop/turn, right stop/turn, tail/marker, ground)
  - DRVs are configured for combined input, but use logic box to guess at 5-wire signals
- Your truck will be configured for separate stop/turn lamps (5 wires: stop, left turn, right turn, tail/marker, ground)

DRV Option

- Perhaps easiest way to connect to DRV is to eliminate logic box and feed separate stop/turn signals from truck to RV.
- Disadvantage is that you're not set up to pull a trailer with combined stop/turn lights
- Would be more reliable, and safer with separate stop/turn configuration (5% reduction in rear-end crashes)

Everyone Else

- Use relay logic to convert 5-wire truck signals to 4-wire RV standard.
- Can be done with home-built harness.
- Jackalopee is ready-made converter that also offers a few other features.

Shopping List

- 7 Red marker/clearance lights with reflex reflectors (P2 or P3, A)
  - e.g. Signal-Stat 1052, 18050R, 21251R
- 2 Amber marker/clearance lights with reflex reflectors (P2 or P3, A)
  - e.g. Signal-Stat 1052A, 18050Y, 21251Y
- 2 Reverse lights (R)
  - e.g. 4060C, 44350C
- 1 License plate light (L)
  - e.g. 15061
- 2 (minimum) or 4 (recommended) Stop/tail/turn lights (T2, S2, I6)
  - e.g. Super44 44030R
- Wire, plug shells, pins, weather seals, mounting grommets and/or screws
  - Pre-made harness option

Recommendations

- Keep the primary functions (stop, tail, turn, and reverse) in the same general area
- Use amber turn signals where possible (5% reduction in rear crash rates)
  - Not easy on truck
  - Strongly recommended on trailer
- Add a center high mounted stop lamp (red) on vehicle centerline that activates with brake signal, 34” minimum above ground on vehicle centerline
  - Brake light feed from stock trailer connector is easiest place to access this
- Leave (or install) conspicuity tape on back of sleeper and across top of mud flaps (truck tractor requirement)
- Be particularly attentive to mounting directions with LED lights
  - All lights directly facing to rear (or side), not at angles
- Walk along side of and around truck looking for places where lights may be obscured. Think about where other drivers are likely to be (e.g. adjacent lanes).
- Don't be scared of the Volvo LCM—it may seem to do strange things, but most of the time is there to help you.

What about my trailer?

- It's not uncommon to see RVs that have left out or improperly mounted required equipment
  - Some remedies are available via manufacturer; your notification to them starts a process that requires correction of the problem independent of any warranty.
- Requirements for the rear of the trailer are similar to the truck bed; a few extra lights are required for the front and side:
  - Stop, tail, and turn lamps
  - Rear reflex reflectors
  - Rear clearance and identification lights
  - Front clearance lights
  - License plate
  - Rear side marker lamps and rear side reflex reflectors
  - Front side marker lamps and front side reflex reflectors
  - Intermediate side marker lights and reflex reflectors (30' or longer)

Questions?

If you need help figuring out what your truck needs, or want to flush out a proposed light plan, let me know.

Next seminar be Henry Szmyt’s presentation on Hitch Design, Weight and Balance