

Ram Truck Exterior Lighting modifications

Explanation of Bulb out Detection Feature

Ram trucks have the ability to perform lighting diagnostics on all exterior lighting circuits, excluding trailer tow circuits. These lights and their associated diagnostics are controlled by the central body controller (CBC). The CBC continuously monitors all lighting circuits for short and open circuit conditions by comparing the current load on the circuit to that of the anticipated factory condition load. If a condition causes the load to go outside this predefined range, the CBC will set a diagnostic trouble code (DTC) and may send a notification to the cluster about the bulb that is out of range and/or turn off the output. If the bulb is a turn signal, the cluster (and side view mirror turn signals if equipped) will “fast flash” the turn signal indicator of the appropriate turn signal (left or right) but the light itself will continue to flash at the normal rate.

An out of range condition can easily be created through modification (adding LEDs or increasing the factory supplied quantity of lights on a circuit) or disconnecting of the exterior lighting circuits. This document will outline what you need to know about avoid this condition and its effects on Ram trucks.

Caution: Exterior lighting circuits have NO FUSING between the lights and the driver on the CBC. Excessive loads placed on the lighting circuit may cause damage to the CBC and result in expensive repairs. The guidelines in this document must be followed when modifying exterior lighting.

Rear Bulb Out Detection Disabling

Note: NHTSA requires turn signal bulb out detection on some vehicle configurations. It is the upfitter's responsibility to confirm that the vehicle is complaint with FMVSS 108 when delivered to the end user.

In order to prevent cluster fault messages and DTCs related to rear lighting, bulb out detection must be disabled. For 2015 and later models, disabling bulb out detection will also eliminate any existing DTCs and cluster fault messages that may have already occurred.

Starting in 2016 model year, certain Ram truck configurations will have bulb out detection disabled from the factory on REAR FACING LIGHTING ONLY. These configurations are as follows:

- All 4500 and 5500 cab chassis
- All dual rear wheel 3500 cab chassis (dual rear wheels are standard on 3500 cab chassis)
- All box delete 2500 and 3500 pickups (sales code XBC)

This means, on the above models there are no modifications required if you are simply replacing the factory incandescent rear bulbs with LEDs.

For all other configurations, the following options are available to disable bulb out detection on REAR FACING LIGHTING ONLY.

Method A – Recommended

Also new for 2016, all 2500, 3500, 4500, and 5500 can have rear bulb out detection disabled at an authorized dealer. If your dealer is not familiar with this procedure, inform them that the sales code LB6 must be added to the vehicle using the “Vehicle Option Updates” tool. Once the sales code is associated to your VIN, a vehicle reconfiguration must be performed with a service tool to update the truck.

Method B

As in previous years, circuit L950 is a blunt cut LG/WT wire that can be grounded to disable rear bulb out detection. This circuit, along with several others, is found in location H which is underneath the power distribution center (PDC) next to the driver’s side fender. These wires are secured to a PDC wiring harness with tear tape and can be pulled out for easier access. Note: These are the same wires found inside the fender for 2013-2014 model years that were relocated under the PDC in 2015 for easier access. See “Upfitter Wire Interface Instructions/Schematics” of “Upfitter Electrical Instructions” for more details.

Method C

If your vehicle is equipped with the Vehicle System Interface Module (VSIM) module (option XXS) there is a circuit W509 WR/BR that functions like the L950 circuit described in method B. For more information on the VSIM module see the VSIM module information in the “Electrical/Wiring Information” section of the Ram Body Builder Guide.

Rear facing lighting includes: stop/turn lights, backup lights, CHMSL light (when equipped), and rear park lights.

Modifying Exterior Lighting on Ram Trucks

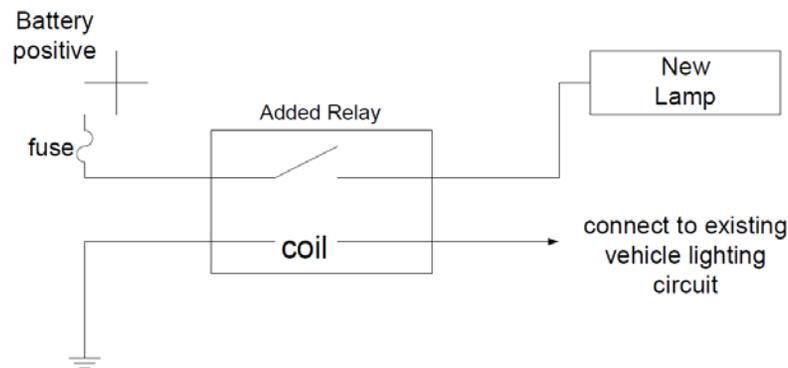
Once bulb out detection has been disabled, the OEM lighting can be replaced with aftermarket components as long as the overall load of the lighting doesn’t exceed the max current rating of the circuit. The table below shows the max current ratings for each of the lighting outputs.

Circuit	Max Continuous Current Rating (A)
Stop/Turn	9
Reverse	4.5

Park	3.5
CHMSL	3

Note that these ratings are separate for the left and right circuits, but the wires CANNOT BE PHYSICALLY COMBINED to double the max continuous current rating. Connecting left and right side circuits will cause a fault message and DTC. Instead, left side lighting should be wired to the left side circuitry and right to the right to take full advantage of the current maximums on both sides of the vehicle.

Finally, if these ratings are insufficient to support the desired lighting, a relay must be used. The diagram below shows an example of how the relay should be wired to power additional lighting.



Over Current (Short) Conditions

The body controller will consider any load that exceeds the limits above to be a short circuit. This can be caused by placing too many lights on the original circuit, installing too large of a light, or connecting the lighting circuit directly to ground. When this occurs, the CBC will turn off the overloaded lighting circuit in order to protect the wiring or module from failure. If it is determined with a volt meter, test light, or other means that a lighting output has been disabled, it can be re-enabled by eliminating the load condition causing the short and cycling the ignition off and back to run. If cycling the ignition doesn't re-enable the circuit, then it's possible that that driver on the CBC has been permanently damaged.

Note that an over current situation may not be encountered until the vehicle's engine is running. This is because the vehicle's charging system will increase the battery voltage when the engine is running. Increasing voltage will increase current draw of the load, potentially triggering short circuit detection.

Re-enabling Bulb out Detection

If it is determined that bulb out detection must be re-enabled ensure that the OEM lighting, or lighting with an equivalent load has been installed before following the steps below. Failure to do so will result in DTCs and possible faults displaying in the cluster.

Method A

If this method was followed to disable bulb out detection, or if your vehicle came from the factory with bulb out detection disabled, an authorized dealer can enable bulb out detection on your vehicle.

If your dealer is not familiar with this procedure, inform them that the sales code 5QR must be added to the vehicle using the “Vehicle Option Updates” tool. Once the sales code is associated to your VIN, a vehicle reconfiguration must be performed with a service tool to update the truck.

Method B

If method B was used to disabled bulb out detection, simply unground the wire and isolate or remove any bare wire used to make the ground connection.

Forward Facing Lighting

Modification of the forward facing lighting and its associated circuitry is generally not advised. For 2015 and beyond, snow plow upfits should make use of the dedicated snow plow wiring found under the power distribution center. See Snow Plow Installation for more details.

Connecting aftermarket tail Lamps to Ram 2500/3500 pickup truck with factory installed LED taillights.

Note: This information applies specifically to Ram pickup trucks with LED rear taillights. High line (i.e. Laramie) models come standard with LED taillights. If you cannot tell if the lights are LED, or the pickup box has been removed, examine the taillight connectors. Incandescent rear light trucks use a 4 pin connector and LED light trucks use a 6 pin connector (but only 5 wires).

Overview

Aftermarket tail lamps can be added to a Ram truck with production LED tail lights. But, special provisions must be made to eliminate the “fast flash” and the lamp out indication in the cluster. This is done by adding a relay that will ground the diagnostics circuit when the turn signal bulb/LED array is on.

OEMs are required to perform diagnostics on certain lighting circuits. In the tail lamps, this requirement applies to the turn signals. In vehicles with LED tail lamps, there is circuitry built into the LED array that determines if the LEDs are illuminating when the turn signal is on. The LED array sends a voltage out on the diagnostics circuit. The diagnostics voltage is read by the CBC. (Central Body Controller) The CBC controls all exterior lighting on the vehicle. When the turn signal array is illuminated, the voltage on the diagnostics circuit is low (i.e. ground). Conversely, when the array is off, the diagnostics voltage is high. The diagnostic voltage cycles as the turn signal flashes. The CBC compares the state of the diagnostic voltage to the desired state of the turn signal circuit. If the states are incorrect, the CBC tells the Cluster there is a turn signal fault and the cluster “fast flashes” the turn signal indicator and displays a bulb out message.

Instructions

To add aftermarket tail lamps, disconnect the production tail lamps in the vehicle. Connect the ground, stop/turn, back up and park lamp circuits of the vehicle to the appropriate circuits provided with the aftermarket tail lamp. (see attached schematic for details) Attach one side of the coil of a normally open SPST relay to the stop/turn lamp circuit. Ground the other side of the coil. Attach one side of the relay contacts to the diagnostics circuit. Ground the other side of the contacts. The attached schematic shows both relay grounds being made through tail lamp ground circuit. If this is not convenient, the relay grounds may be tied to chassis. Separate relays must be used for the left and right turn signals.

The preferred method for connecting the aftermarket lights to the vehicle wiring would be to use some sort of sealed connector system. Weather Pack has commercially available sealed connector systems. If no connector is available, the vehicle harness connector should be removed and the tail lamp circuits should be butt spliced to the vehicle harness. All splices should be soldered and sealed using self-sealing heat shrink tube (Mopar PN04778570).

If there is a need to leave the vehicle harness connector intact, a center splice may be used. All splices should be soldered and sealed. The harness connector must be capped. Bundle all splice wires together and secure with tie wraps.

Mount the relays in a location that is shielded from the environment and protected from damage.

