Standard No. 108

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

Mr. Marcus Boykin
B-G Innovative Safety Systems, LLC
79 Pasture Road
Lexington, TN 38351

Dear Mr. Boykin:

This responds to your letter asking about the application of Federal Motor Vehicle Safety Standard (FMVSS) No. 108, "Lamps, reflective devices, and associated equipment," to a lighting system your company has developed. In your letter and phone conversation with John Piazza of my staff, you describe your product as "an auxiliary vehicle lamp operating system" for use both as original equipment (OE) and as aftermarket equipment.

You state that your product, which adapts to the existing headlight wiring harness, provides a supplemental lower beam from the existing upper beam when the lower beam fails. We understand that, when the lower beam is not in a failed state, the headlight system, controls, and telltales function normally. If the lower beam is selected and has failed or does fail, your system provides a supplemental lower beam from the existing upper beam. You state that the lighting on the converted upper beam is "diffused down to the same output illumination as" the lower beam. If the upper beam is selected, the upper beam will continue to function normally.

We further understand that, with respect to the OE version of your product, you contemplate a dashboard warning to warn the driver that the normal lower beam is not functioning. In the aftermarket version of your product, once the vehicle's lower beam has failed and your device is providing a supplemental lower beam, every time the engine is started the headlights will flash three times to warn the driver that the original equipment lower beam is not operating and that your device is providing a supplemental lower beam. You state that you are seeking "interpretation and approval" of your device.

As we explain below, while NHTSA does not provide approvals of motor vehicles or motor vehicle equipment and does not make compliance determinations outside of an agency compliance proceeding, we are able to provide you with our interpretation of how NHTSA's statute and regulations would apply to your product as you have described it to us. We believe that your product would be considered supplemental lighting. As such, it may be installed as original equipment as long as it does not impair the effectiveness of any required lighting. If your product is offered as aftermarket equipment, it would not be directly subject to FMVSS No. 108 but would be subject to the Safety Act's make inoperative prohibition.

Background

The National Highway Traffic Safety Administration (NHTSA) is authorized by the National Traffic and Motor Vehicle Safety Act (Safety Act), 49 U.S.C. Chapter 301, to issue Federal motor vehicle safety standards that set performance requirements for new motor vehicles and new items of motor vehicle equipment. NHTSA does not provide approvals of motor vehicles or motor vehicle equipment and does not make determinations as to whether a product conforms to the relevant FMVSS outside of an agency compliance proceeding. Instead, the Safety Act requires manufacturers to self-certify that their products conform to all applicable FMVSSs. Manufacturers must also ensure that their products are free of safety-related defects.

This letter provides you with our interpretation of how the statute and regulations administered by NHTSA would apply to your product as you have described it to us, based on our understanding of the information provided. This is not an "approval" of your product.

Vehicle lighting sold as OE is regulated under FMVSS No. 108. (All references in this letter are to subsections of FMVSS No. 108 unless otherwise noted.). FMVSS No. 108 requires vehicles to be equipped with certain types of lamps (known as "required" lamps), which must meet very specific and detailed performance standards.[1] All other lamps are considered "supplemental" lamps.[2] Unlike OE required lamps, OE supplemental lamps are not required to meet any specific performance requirements. However, they are required to comply with certain generally-applicable provisions of FMVSS No. 108. One of these provisions is set forth in S6.2.1, which states: "No additional lamp, reflective device, or other motor vehicle equipment is permitted to be installed that impairs the effectiveness of lighting equipment required by this standard."

Both OE and aftermarket vehicle lighting are subject to the Safety Act's "make inoperative" prohibition (49 U.S.C. § 30122), which prohibits a manufacturer, distributor, dealer, rental company, or motor vehicle repair business from knowingly making inoperative any part of a device or element of design installed on or in a motor vehicle or motor vehicle equipment in compliance with an applicable FMVSS. While this "make inoperative" prohibition does not apply to individual vehicle owners, NHTSA encourages vehicle owners not to remove or otherwise tamper with vehicle safety equipment. Also, any modifications made by a vehicle owner would have to comply with applicable state law.

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[1] The standard's performance requirements also apply to lamps that are "for replacement of like equipment on vehicles to which this standard applies." On a related matter, we note that you state that "drivers with a failed light are out of compliance." This is incorrect, as FMVSS No. 108 does not regulate lighting in use. Therefore, if a headlamp fails in operation, the vehicle is not "out of compliance" with the Federal standard (state laws may apply to in-use performance).

[2] NHTSA also uses the term "auxiliary" lamps.

Discussion

FMVSS No. 108 requires vehicles to be equipped with one of several permissible headlighting systems. Headlighting systems are comprised of headlamps and associated hardware. The purpose of headlighting is primarily to provide forward illumination.[3]

The threshold issue presented by your request is whether your product is part of the required headlighting system, and thus subject to FMVSS No. 108's requirements applicable to headlighting systems or, instead, supplemental lighting that is regulated by FMVSS No. 108's impairment provision.

In determining whether lighting equipment that provides forward illumination is part of the required headlighting system or, instead, supplemental lighting, NHTSA looks at several factors. These include: (1) where the lamp directs its light; (2) whether it uses a headlamp replaceable light source to emit a beam that provides significantly more light flux than supplemental cornering lamps or fog lamps; (3) whether the lamp is intended to be used regularly, or is limited to more narrow driving conditions and situations; (4) whether the vehicle's complete lighting system, not including the lamp in question, would include all of the forward lighting equipment required by FMVSS No. 108; (5) whether there is a manual on/off switch; and (6) whether the lighting feature is one that activates only upon the failure of an element of the required headlighting system and acts as a temporary backup of that lighting element.[4]

The last of these factors is most relevant to your product. Prior agency interpretations have found that a lighting feature that activates an upper beam light source when the lower beam fails or a lower beam headlamp upon the failure of an upper beam headlamp is supplemental lighting.[5] The system you describe activates a back-up beam only upon the failure of the required lower beam. Accordingly, we believe it is supplemental lighting.

Since you contemplate selling your supplemental lighting device as original and/or aftermarket equipment, we will consider the requirements affecting each of these.

Supplemental lighting installed as original equipment

Supplemental lighting installed as OE (i.e. before sale to first purchaser other than for resale) is permitted if the lighting does not impair the effectiveness of any lighting equipment required by FMVSS No. 108 (S6.2.1). If you are the manufacturer of original lighting equipment required by FMVSS No. 108, but not the manufacturer of the vehicle on which it is

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[3] S4 ("*Headlamp* means a lighting device providing an upper and/or a lower beam used for providing illumination forward of the vehicle.") (Formatting in original.)

[4] Letter to [Redacted] (Jan. 21, 2004) ((1)-(5)), *available at* https://isearch.nhtsa.gov/files/swivelinglamp.3.html (last accessed June 20, 2018); letter to L. W. Camp, Ford Motor Company (July 15, 1998) ((6)), *available at* https://isearch.nhtsa.gov/files/18080.ztv.html (last accessed June 20, 2018).

[5] Letter to L. W. Camp, *supra* (lower beam backing up upper beam); letter to Ian Goldstein, Safe Passage Technologies (July 21, 1998) (upper beam backing up lower beam), *available at* https://isearch.nhtsa.gov/files/18164.ztv.html.

installed, the vehicle manufacturer, and not you, has the legal responsibility under the Safety Act to certify that the vehicle complies with FMVSS No. 108 and all other applicable FMVSSs. Accordingly, the vehicle manufacturer must certify that supplemental lighting installed as OE complies with S6.2.1. Effectiveness may be impaired if, among other things, the device creates confusion with the signal sent by another lamp, or functionally interferes with it, or modifies its candlepower to either below the minima or above the maxima permitted by the standard.[6]

Table XIX has specific photometry requirements (maxima and minima) for lower beams. Activation of an upper beam light source when a lower beam source fails raises considerations of glare. The lower beam maxima are meant to ensure that other roadway users are not glared. If your device produces a supplemental beam that exceeds the lower beam photometric maxima, we would consider that to impair the effectiveness of the headlighting system. Accordingly, your device needs to modify the upper beam to ensure that the lower beam photometric maxima are not exceeded.[7] Because your device is supplemental lighting, it would not be required to provide sufficient illumination to meet or exceed the photometric minima required for a lower beam headlamp. However, we note that by reducing the output illumination of the upper beam to that of the lower beam, the reduced upper beam would provide only a limited amount of illumination that may not be sufficient to usefully illuminate the road.

For your information, we also point out below several other requirements of which you should be aware in designing and manufacturing your product. (Note that it is the responsibility of manufacturers, and not NHTSA, to identity all FMVSSs applicable to their products and certify the compliance of their products with the standards.)

- Your product must not interfere with the activation and operation of the upper beam.
- It may not impair the effectiveness of the upper beam headlamp indicator required by S9.5. When your device is providing a supplemental lower beam, it should do so in a way that the upper beam indicator is not activated. Also, when the driver (or vehicle, if it has a semiautomatic headlamp beam switching device, or automatic headlights) has activated the upper beams, the upper beams must be activated and the upper beam indicator must be activated.
- S9.4 requires that "the lower and upper beams must not be energized simultaneously except momentarily for temporary signaling purposes or during switching between beams."
- The headlamps must be steady burning, except that they may be flashed for signaling purposes.[8] We would not consider your system's momentary flashing function as violating

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[6] *See, e.g.*, letter to Byung M. Soh, Target Marketing Systems, Inc. (Sept. 13, 1988), *available at* https://isearch.nhtsa.gov/gm/88/nht88-3.100.html (last accessed June 20, 2018).

[7] Letter to Ian Goldstein, *supra* ("Because headlamps are primarily operated on the lower beam, activation of an upper beam light source when a lower beam source fails raises considerations of glare . . . the upper beam in this instance ideally should be activated at a markedly reduced intensity such that it does not impair the effectiveness of required lighting devices [S6.2.1], or, more specifically, that, as a lower beam substitute[] it does not compromise turn signal visibility.")

[8] Table I-a.

this requirement because it is similar to a signaling function and would not be likely to confuse other motorists because it only flashes upon start-up.

- The device generally should not function in such a way that it would be likely to confuse other motorists (for example, it should not mask the ability of other drivers to perceive the front turn signal).
- If a telltale or control is offered as original equipment, it must comply with any relevant requirements in FMVSS No. 101, "Controls and displays."

We wish to point out that Table I-a requires that "[t]he wiring harness or connector assembly of each headlighting system must be designed so that only those light sources intended for meeting lower beam photometrics are energized when the beam selector switch is in the lower beam position[.]" Although it may appear that a device such as yours might not meet this requirement, NHTSA has interpreted the requirement otherwise.

This issue arises if the lower beam is activated (with the beam selector switch in the lower beam position) and then fails, after which a system (such as yours) activates a modified upper beam as a backup lower beam. If the backup lower beam utilizes upper beam light sources that are not normally used for meeting lower beam photometrics, the backup lower beam might be viewed as violating this requirement.[9] However, prior interpretations have concluded that this Table I-a requirement does not apply to a failure condition in which a supplemental beam supplements a failed lower or upper beam, assuming the supplemental light does not otherwise impair the effectiveness of any required lighting.[10] Applying that line of reasoning, we believe that your system would not create a noncompliance with the Table I-a requirement.

Supplemental lighting offered and installed as aftermarket equipment

Supplemental lighting offered as aftermarket equipment (accessory lighting) is not directly subject to FMVSS No. 108, which applies only to original equipment and lighting equipment manufactured to replace original lighting equipment required by FMVSS No. 108. Section 30122 of the Safety Act, however, prohibits a manufacturer, distributor, dealer, rental company, or motor vehicle repair business from knowingly making inoperative, in whole or in part original required lighting equipment. In applying the make inoperative prohibition to accessory lighting we typically ask whether the accessory lighting would impair the effectiveness of any required lighting. Generally, if an item of accessory lighting would not be permitted as original equipment, commercial entities will not be permitted to install the lighting as an aftermarket accessory for a vehicle in use. Thus, the make inoperative analysis is generally the same as the impairment analysis we applied above in the context of supplemental lighting installed as original equipment. We observe that, due to varying headlamp designs throughout the vehicle fleet, there may be potential compatibility issues with the product you describe and

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[9] Whether this would occur depends on the design of that particular headlighting system. For example, this would not be the case if the headlighting system used the same light sources for both the lower and the upper beams.

[10] Letter to L. W. Camp, *supra* (lower beam supplementing failed upper beam). *See also* letter to Ian Goldstein, *supra* (modified upper beam supplementing failed lower beam).

certain vehicles. In addition, manufacturers of aftermarket lighting accessories are subject to the Safety Act's defect notification and remedy requirements discussed above.

We also note that manufacturers of equipment to which an FMVSS applies must meet the manufacturer identification requirements set out in 49 CFR Part 566. For these and other requirements, you may consult NHTSA's New Manufacturers Handbook, available at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/manufacturer_information_march2014.pdf.

If you have any further questions, please contact John Piazza at (202) 366-2992.

Sincerely,

Jonathan Morrison
Chief Counsel

fax

Subject:	Request For Interpretation
Date	February 24, 2016

To:	The Chief Council	*From:*	Marcus Baykin
Phone number:	202-366-2992	*Phone number:*	731-487-3029
Fax number:	202-366-3820	*No. of pages*	2 pages and 1 Fax cover

Comments:

We are requesting interpretation of our Technology as it's used in the automotive industry

To the Chief Council of NHTSA: We are seeking Interpretation and approval of our new designed safety enhanced technology. Our technology references according to section 108 of the FVMSS. Our technology is an auxiliary vehicle lamp operating system. Our technology provides a supplemental low beam from the existing high beam that is normally available when the low beam fails, where applications are favorable. This technology currently adapts to the existing headlights wiring harness. The converted light will flash three times when powered off and back on as a notification to the operator that their supplemental headlight is on and the failed light needs to be replaced. The high beam continues to function as normal when switched back for high beams by the operator. This product sustains the drivers two working low and high beam headlights at all times as a supplemental when the low beam fails. This sustains driver vision as stated the importance of having required headlights according to section 108. Once the failed light has been replaced, the auxiliary system turns off and vehicle is back into compliance with regards to Section 108. Though, we realize that section 108 pertaining to lighting is only good when you have the required lamps and are out of compliance when one fails. Not having one or the other deems the vehicle out of compliance. We have supporting data from NHTSA where failed headlight outages are contributing factors to accidents, injury related accidents, property damage, and deaths. Our solution according to section 108 paraphrases that vehicles must have two working headlights, taillights, etc. in order to produce adequate illumination on the roadways during driving or while operating a motor vehicle. **S2. Purpose.** The purpose of this TSD is to reduce traffic accidents, deaths, and injuries resulting from traffic accidents by providing adequate illumination of the roadway and by enhancing the conspicuity of motor vehicles on the public roads so that their presence is perceived and their signals understood, both in daylight and in darkness or other conditions of reduced visibility. We recently won Best in West for innovation and have received State support in Tennessee recognizing our innovation for the safety enhancement of drivers. We are seeking interpretation that will allow us to work with OEM's where applicable such as the adaptive headlight technology in order to increase safety. As it stands now with section 108, drivers with a failed light are out of compliance either way. This is the time when the drivers are most prone to be involved in an accident especially during night time driving and adverse driving conditions from season to season. We would like your interpretation that would become our interpretation in working with OEM's for integration of our technology, increasing safety sustainability of headlights. This is totally a supplemental headlight system that aids in driver visibility where it's applicable. This technology is for limited use and does not impair the effectiveness of any current lighting equipment required by this standard. The lighting on the converted high beam is diffused down to the same output illumination as the current failed beam output. The current system is totally plug and play to the vehicles existing wire harness. We recently received our patent on this technology. We have received council from DOT standard engineers there at NHTSA and also with representatives of the SAE Lighting Committee. Their interpretation of the technology was approved upon collaboration and understanding of the technology but requested that we contact NHTSA's Chief Council for an official interpretation. We are also currently utilizing our technology in the Heavy Truck Industry with approval from the Federal Motor Carrier Safety Administration. This year alone, nearly 12,000 vehicles to date have been cited for inoperable headlights. Having two headlights is not only important for the drivers viewing but also pedestrians and oncoming drivers. A vehicle with one headlight makes driver

judgment improper as the vehicle often times is perceived as a motorcycle. NHTSA estimates that more than 26,000 people died in traffic crashes in the first nine months of 2015, compared to the 23,796 fatalities in the first nine months of 2014. U.S. regions nationwide showed increases ranging from 2 to 20 percent. Our objective is to drive fatalities and accidents down and increase overall driver safety by at least allowing the lights to sustain themselves to a more favorable visualization that will also contribute to a safer vehicle when failed headlights happen.

Regards,

Marcus Boykin, V.P.

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