



Rosco Comments Regarding NHTSA Advanced Notice of Proposed Rule Making (October 2019)

National Highway Traffic Safety Administration
49 CFR Part 571
[Docket No. NHTSA–2018–0021]
RIN 2127–AM02
Federal Motor Vehicle Safety Standard
No. 111, Rear Visibility

Camera Monitor Systems (CMS) as an alternative to inside and outside rearview mirrors

Comments on Subject no. 4

(4) We seek comment on whether and, if so, why minimum field of view requirements for CMS should differ from the current minimum field of view requirements for mirrors under FMVSS No. 111. Petitioners have stated that providing drivers with expanded views, larger than those required by FMVSS No. 111, would be advantageous. What data exist to support this assertion? What, if any, potential advantages and disadvantages, such as increased eye glance durations, may be observed for wide-view images? Please provide research or data that addresses how wider views will affect image quality.

Rosco Vision Systems is the leading manufacturer of mirror and camera systems for the school bus and cutaway bus industries. The specific vision requirements of these vehicles differ significantly from those of cars and trucks.

In 2006, Rosco demonstrated the concept of a mirrorless bus at the National Association for Pupil Transportation (NAPT) Conference held in Kansas City, MO. The mirrorless bus was equipped with six cameras, two mounted along the left side, two mounted along the right side, one mounted on the front, and one mounted on the rear of the vehicle. The interior of the bus was equipped with three monitors to display the views of six exterior cameras.



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Mirrors, Sun Visors, Cameras, Sensors, and Video Recording



Mirrorless Vehicle Exterior - A total of six cameras were installed (two LH + two RH + one Front + one Rear)



Mirrorless Vehicle Cabin - three monitors as seen inside the 2006 bus

The concept was well received, but elicited concerns that still exist today and are similar to what was mentioned in the ANPRM. These concerns relate to:



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- To view the students in danger zones around the bus, forward facing cameras (replacing System B mirrors) are needed. This is different than in rear view applications where rear facing cameras are used. Forward facing cameras may be damaged during typical city driving and parking. They may also be more frequently obscured by dirt and debris accumulating as the vehicle moves, especially in inclement weather. More research and testing would be needed to assess the effectiveness of current self-cleaning camera systems or other solutions to address this issue.
- A driver's ability to discern three separate images (see above vehicle cabin photo) is of concern. The three images, one from each of the sides and one from the front, if seen in three separate monitors to view the students loading and unloading, would be difficult for the driver to keep track of. Stitching the three images into a single image could be helpful, but may still be confusing and require acclimation and training.
- Taking the driver's eyes away from the field is detrimental. Adding a monitor in the "direction" the driver is typically looking would create a forward blind spot so, for cross view requirements, the monitor must be mounted outside the "field". If the driver is required to view the loading and unloading zone in a monitor that is not in the field of vision, the driver cannot see the overall field in the same way he/she can when checking the cross view mirrors.
- School bus training typically requires drivers to check their mirrors prior to departing the stop. The drivers are able to perceive distances and other factors within the use of those mirrors. Distance perception, size and color variation can be issues with cameras, as is mentioned in the ANPRM. The "human factor" issue of school bus drivers and their familiarity with mirrors would necessitate significant changes in training and daily operating procedures.
- Latency in image processing is a concern - even a short delay between image capture by camera and its display on a video monitor could result in a catastrophic situation. While this is mentioned in the ANPRM, it may be even more relevant within the school bus danger zones.
- A power outage to the CMS during bus operation would leave the driver without any vision of the danger zones around the bus. Mirror systems are not subject to this risk.

As mentioned above, Rosco Vision Systems is a leading provider to the School Bus Industry not only for mirror systems, but also for camera systems. These camera systems have been exclusively used to complement the existing System A and B mirrors. To our knowledge, no testing has been done in this area to assess the exclusive use of cameras and video displays in place of mirrors. A mirror and CMS hybrid approach could be a viable option while more studies are done to assess the impact on these pedestrian-sensitive vehicle applications. At this time, for school buses, a CMS should only be allowed as a complement to existing mirror systems A and B.

It is also our view that coordination with Transport Canada regarding similar school bus CMS implementation in CMVSS 111 is critical. There is a heavier burden on US vehicle manufacturers, up fitters and vision safety equipment manufacturers when US and Canadian automotive markets have very different requirements for similar vehicle categories.