Commercial Motor Vehicle Safety and Security Systems Technology

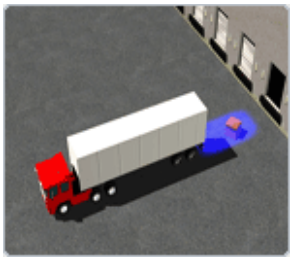
Rear Object Detection Systems

Objective

Rear object detection systems monitor a specific area behind a commercial motor vehicle, detect objects, and provide warnings to drivers when they are approaching an object behind the vehicle while in reverse. These systems assist the driver in avoiding collisions during backing or parking maneuvers.

Description

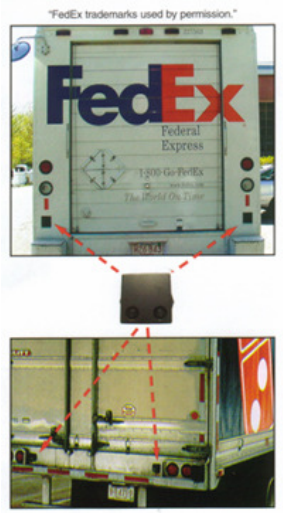
Rear object detection systems detect moving and stationary objects located within a specific area behind a commercial motor vehicle while it is backing up. Currently available systems can detect objects within a range of approximately 10 to 20 feet behind a vehicle. They can be integrated with other sensors, such as side object detection sensors to cover other blind spot areas around a vehicle. Audible and/or visual distance-based alerts that vary depending upon the closeness of the vehicle to an obstacle are the types of warnings that can be provided to a driver through a processing and/or display unit in the cab. The sensor units located on the back of the vehicle can consist of different types of detection technology, such as radar or sonar.



Delphi Forewarn® Dual-beam Radar Back-up Aid

Ultrasonic technology or sonar (Sound Navigation And Ranging) determines the range of objects by emitting a transmitter pulse of ultrasonic energy. The resultant echo is detected by a receiver as it is reflected from the detected object. The emitter is a membrane that transforms mechanical energy into a chirp (inaudible sound wave) and sends this sound out toward the target area. When the sound encounters an object, it is reflected back to the receiver circuit that is tuned to the frequency of the emitter, which then transfers the data to a driver display unit.

Radar (Radio Detection and Ranging) technology is also used for rear object detection systems. Radar typically operates in the ultra-high-frequency or microwave range of the radio-frequency spectrum. These radio frequency waves are transmitted from the vehicle at defined intervals within a specific coverage area. The sensor collects echoes from electromagnetic waves that bounce off objects behind the vehicle. These echoes are sent to a signal processing unit and communicated to a driver interface. Some processing units utilize algorithms for object detection, object tracking, and angle measurement to provide specific distance information.



Object Detection Systems

Rear object detection systems provide audible and/or visual alerts to warn drivers when objects are detected. Some systems indicate the vehicle's distance from a detected object. For example, the driver interface may consist of a graphical or digital visual display that shows the distance from the vehicle to a specific object. Other visual alerts could consist of a series of lights which change color or light up as objects are detected. These visual alerts can be used in combination with audible alerts that vary in tone and frequency as the vehicle moves closer to an object.

Rear object detection systems can be activated manually when needed or automatically for continuous operation. Some rear object detection systems are connected directly to the vehicle's backup lights, which activate automatically when the vehicle is shifted into reverse. Other systems are activated when the key is put into the ignition or the vehicle is put into operation. When the systems are activated, their operation is "hands-free," and the driver can focus on safely operating the vehicle.

One limitation of current rear object detection systems for tractor trailers is that they are dependent upon specific tractor-trailer combinations. The processing and/or display unit located in the tractor can only process or display information transmitted from its matching sensor unit which is located in the trailer. Neither the processing and/or display unit nor the sensor unit is interchangeable with other units. This principle would also apply to a rear object detection system that had dual sensor units.

Application

Rear object detection systems provide an added measure of safety during backing and parking maneuvers. Many collisions that occur while backing and parking are caused when the driver cannot see what is behind the vehicle. If objects come into the path of the vehicle after the driver has checked mirrors and begun the backing and/or parking maneuver, then the driver may not be aware of the potential hazard. These systems can provide an advance warning so that the driver has additional time to stop and avoid a collision with objects behind his vehicle. These systems are intended to augment driver awareness, but they do not replace the critical importance of visual observations or mirrors.

Operations and Benefits

Commercial motor vehicle drivers operate their tractor trailers in a wide variety of environmental conditions including rain, snow, ice, and fog. Rear object detection systems can provide an advanced warning of obstacles in their path as they are backing up or parking in low visibility situations. These advanced warnings benefit drivers by alerting them about the existence of the obstacle and giving them more time to stop or respond appropriately to them.

Rear object detection systems can specifically aid in reducing commercial motor vehicle crashes associated with blind spots behind the vehicle and situations where drivers must back into unfamiliar loading docks and limited parking spaces. Additional benefits of these systems include reducing injuries, fatalities, repair costs, and vehicle downtime by preventing crashes related to backing up.

Cost

The installed cost of rear object detection systems depends upon the type of system that is purchased and how they are purchased (i.e. through retail setups or as fleet options). Simple, single sensor units that can be installed by most any technician range from about $250 to $350 per unit. Easily installed dual sensor units cost approximately $550 for the system and $150 for each additional sensor. More advanced systems may range in cost from $500 to $2000 depending upon the customer requirements, with some systems requiring additional installation costs.

Vendors

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Eaton Corporation (VORAD®) P.O. Box 4013 Kalamazoo, MI 49003 Phone: 800-826-4357 http://www.vorad.com/jsp/features /backspotters.jsp	**Echovision-Division of Armatron International, Inc.** 15 Highland Avenue Malden, MA 02148 Phone: 800-343-3280 http://www.echovision.net/index.html
Rostra Precision Controls, Inc. 2519 Dana Drive Launinburg NC 28352 Phone: 910-276-4853 Fax: 910-276-1354 Toll Free: 800-782-3379 http://www.rostra.com/RearSentry.htm	