Collision Avoidance Technology

Timothy Cheek

*Delta [v] Forensic Engineering, Inc.*

901-D Southern Pine Blvd.
Charlotte, NC 28273
(704) 525-5700
(704) 525-5888 (fax)
tcheek@deltavinc.com

Christy Comstock

*Everett Wales & Comstock*

1944 E. Joyce Boulevard
Fayetteville, AR 72703
(479) 443-0292
(479) 443-0564 (fax)
Christy@everettfirm.com
Timothy Cheek, a principal engineer at Delta [v] Forensic Engineering, Inc. in Charlotte, North Carolina, specializes in accident reconstruction and event data recorders. He is the technical chair for the SAE Electronic Data Recorder Subcommittee and instructor for the SAE course on electronic data recorders.

Christy Comstock is a partner in the Fayetteville, Arkansas firm of Everett Wales & Comstock where her litigation practice is focused primarily on the defense of motor carriers. She is a member of ALFA International’s Transportation Practice Group, TIDA, ABA-TIPS Commercial Transportation Litigation Committee, and Transportation Lawyers Association and has been recognized by Super Lawyers in the field of transportation.
Collision Avoidance Technology

Table of Contents

I. Introduction ...............................................................................................................................................183
II. The Technology ..........................................................................................................................................183
III. Limitations .................................................................................................................................................185
IV. Preservation of Data – Best Practices.......................................................................................................185
Collision Avoidance Technology

I. Introduction

Evolving technology has significantly changed the operating relationship between drivers and their motor vehicles. For decades, drivers manually controlled vehicles through braking and steering inputs. Driving became safer for motorists with the implementation of passive safety systems such as seatbelts, safety glass and airbags. When manufacturers turned their focus to crash prevention, active safety systems began to be developed and implemented in an industry wide effort to prevent accidents altogether. One of the best examples is anti-lock braking systems – introduced in the 1970’s, anti-lock braking systems were developed to assist drivers in maintaining control of their vehicle while applying maximum brake application. Technology was later developed that could warn a driver to take action in response and to avoid hazardous traffic situations.

Even with improvements in safety and reduced numbers of fatal crashes, rear-end collisions have continued to comprise a significant number of accidents involving medium and heavy duty commercial trucks. According to the National Highway Traffic Safety Administration (NHTSA), on average, 2-3 rear-end collisions involving commercial trucks occur somewhere in the U.S. every hour with approximately 32,000 rear-end crashes reported each year between 2003-2008. Collision avoidance systems or crash avoidance systems are active safety systems that can help drivers prevent these types of accidents by detecting and warning drivers of potentially dangerous conditions and by intervening should a driver fail to sufficiently respond. Where collisions occur, these systems can help to reduce the severity of any rear-end crashes involving commercial trucks.

It should be noted that while the focus of these materials is on collision avoidance systems for commercial vehicles, this technology is now widely available in passenger vehicles and based upon research by the Highway Loss Data Institute (HLDI), which was studied in 2013 by the Insurance Institute for Highway Safety, forward collision warning and automatic braking systems are helping reduce the incident of front to rear collisions by passenger vehicles. For model year 2013, according to the HLDI, approximately 211 models of passenger vehicles were equipped with forward collision warnings and more than 100 models included some form of autonomous emergency braking. Substantially similar technology will soon be aboard commuter trains – in February 2014, Metrolink announced it was the first commuter rail system in the nation to implement state of the art collision avoidance technology known as “positive train control” – technology which has been mandated by the Rail Safety Improvement Act to be implemented on all passenger trains by 2015.

Despite improved vehicle safety technologies, motor vehicle accidents and accident litigation will continue to occur, and these materials are intended to provide a very basic general overview of some of the characteristics of collision avoidance technologies available in commercial vehicles and provide practical insights regarding preservation of the available data.

II. The Technology

Collision avoidance systems vary depending upon the manufacturer, but generally the systems are built around a forward-looking radar which is mounted in the truck’s front bumper (or just behind it on a cross member). The radar and microprocessor evaluate the speed and following distance of forward vehicles by measuring the distance, relative speed and deceleration of the forward/target vehicle in the truck’s path. The avoidance system incorporates this data to initiate one or more of a series of pre-programmed warnings.
to the driver and if necessary, and in the absence of sufficient driver input, to elicit response from the vehicle’s anti-lock braking, cruise control, electronic stability and roll stability control systems.

The systems are fully integrated into either the vehicle dashboard or an interface unit in the cab to provide system information to, and aid the driver in, recognizing and responding to potentially dangerous driving situations. Using visual, audible and haptic alerts which are distinguishable, the commercial driver can be alerted to potentially dangerous conditions – for example, that he is getting too close to a forward vehicle; that he is departing from his lane of travel; or that a stationary metallic object is blocking the roadway. Adaptive headlights or advanced front lighting that responds to vehicle steering may be incorporated into the system. The driver may be alerted that a collision with a forward vehicle is likely and that the situation should be addressed immediately. In the event that the driver does not make the needed response, the system will respond with collision mitigation efforts. The most current and next generations of collision avoidance technologies incorporate a forward looking camera to collaborate with the radar, and it is anticipated that the next generation of avoidance technologies will expand functionality as the universe of conditions to which a driver can be alerted will be increased. And along with other widely available commercial vehicle technologies, these systems provide a number of tools by which a motor carrier may choose to monitor fleet and driver performance.

The following are some examples of available collision avoidance tools:

Collision Warning System –
• Detects developing rear-end collisions;
• Provides audible and visual alerts to the driver when the vehicle's following distance may result in a collision;
• Does not control the vehicle speed unless adaptive cruise control is engaged or a collision mitigation system event is detected;
• Is designed to remain engaged and active at speeds beyond a minimum set parameter.

Adaptive Cruise Control –
• Works with cruise control to maintain speed when no vehicle is being tracked;
• Supplements vehicle’s cruise control and attempts to maintain a safe distance by maintaining a minimum following interval when a forward vehicle is being tracked;
• Supplies audible, visual and haptic (tactile) alerts to the driver;
• Automatically decelerates vehicle using throttle, engine and foundation brakes;
• Automatically accelerates when lane is clear.

Collision Mitigation System –
• Detects developing rear end collisions through its monitoring of following distance;
• Cruise control does not need to be engaged;
• Supplies audible, visual and haptic (tactile) alerts to the driver;
• If the driver does not take action to decelerate, automatically decelerates vehicle using throttle, engine and foundation brakes;
• Automatic braking application is intended only to assist the driver in possibly avoiding or reducing the severity of a collision;
• Employs full stability technology to mitigate rollovers and loss of control situations on wet and dry roadways.
III. Limitations

None of these systems are meant to replace driver control over the vehicle. To the contrary, the commercial driver must always maintain the control and safe operation of the vehicle. Collision avoidance technologies are designed as back-up safety systems to aid the driver.

Mitigation technologies that depend upon activation of cruise control will not be available where cruise control is not employed; driving conditions which contraindicate cruise control must dictate.

Current collision avoidance technologies generally react only to moving objects located directly in front of the vehicle, and generally will not be operational at low speeds. The technology is not designed to react or alert a driver to objects that the system has not seen; objects moving in front of the driver or approaching from the adjacent lane or ramp; or oncoming traffic. The systems have limitations in winding and curving roadways, and while the technology varies, it generally does not warn of objects smaller than a passenger car (mopeds, motorcycles); nonmetallic objects such as people or animals; or objects which are stationary unless they are sizeable. As noted above, some of these limitations may be overcome in next generation technologies.

IV. Preservation of Data – Best Practices

Lawyers engaged in commercial vehicle accident investigation and litigation are well-versed in the need to identify and preserve evidence and must exercise reasonable efforts to preserve electronically stored information. While the law varies from state to state, a prudent rule of thumb is to make reasonable efforts to preserve evidence even in the absence of a written request or notice from an opposing party. Best practices historically have included towing commercial vehicles post-accident to preserve electronic data; this practice has application to the preservation of data which may be available from collision avoidance technologies. Similar to other electronic on board recorders, there is a risk that collision avoidance data will be overwritten by subsequent events which are likely to occur if the vehicle is operated.

Although engineers, experts or other technical personnel may be required to analyze collision avoidance data, lawyers must be equipped to communicate with its client's operational employees in order to make timely decisions concerning the identification of available data and its recommended preservation. In general, collision avoidance technologies are programmed to capture recorded detail for a period of time prior to and following the occurrence of pre-programmed parameters for collision mitigation; sometimes these parameters are referred to as a triggering or critical event. These parameters may be programmed differently from fleet to fleet and there may be variances among the different systems which are available. In this manner, collision avoidance data is analogous in many respects to ecn data, provided however, the data is not limited to that generated by the commercial vehicle. Captured information may include engine speed, gps coordinates and gps speed, heading, forward/target vehicle speed, acceleration, truck distance from target in distance and in time, as well as the type and number of warnings and whether the event was a collision mitigation event. The systems may generate maps and graphs, and in some instances, video recordings may be captured.

It is recommended that, at a minimum, the following inquiries be added to the lawyer's investigation and preservation check-list:

Commercial Vehicle
• Is the truck equipped with collision avoidance technologies? Obtain a manufacture's manual for the system employed on the truck.
• Was the radar unit (the brains of the system) damaged in the accident?
• Did the radar unit lose power as a result of the accident? If so, did the radar have sufficient opportunity to communicate data prior to losing power?

• Is there indication in the truck maintenance records of radar replacement and/or realignment?

• Is there a reason that the radar unit on the tractor needs to be removed and maintained versus downloaded by an authorized individual with the proper software?

• Who is authorized to access and download the radar unit?

• What are industry-accepted protocols for accessing data on the radar unit?

• Identify which systems are programmed to interface with the collision mitigation technology – ecm, Qualcomm, Peoplenet, Driver Tech, other? Is the collision mitigation technology data accessible through these systems or other systems employed on the truck?

• Did circumstances occur (a critical or triggering event) which prompted collision avoidance technology, i.e., warnings and/or collision mitigation?

• If so, what time period and categories of data were captured by the collision avoidance technology? Were any reports, graphs and/or videos generated?

• What amount of data can be accessed by the motor carrier and what data is proprietary to the manufacturer?

• Should a data preservation notice be sent to third parties?

Passenger Vehicle:

• Is the passenger vehicle model equipped with collision avoidance technology as a standard feature? If not, was the vehicle equipped with add-on collision avoidance technology?

• Send a preservation request for retention of the data event recorders in the passenger vehicle.

• Identify who is authorized to download collision avoidance data on passenger vehicles, keeping in mind the necessary permissions required by state law.