



## COMMERCIAL VEHICLE ONBOARD ELECTRONICS: VEHICLE/DRIVER MONITORING, ENGINE CONTROL MODULES AND SAFETY SYSTEMS AND DEVICES

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*As a certified accident reconstructionist, Dwayne Owen is experienced in reconstructing crashes involving vehicles ranging from tractor-trailers and agricultural equipment to passenger vehicles, motorcycles and bicycles. Mr. Owen has trained in the operation and maintenance of heavy duty vehicle air brake systems and components through Bendix; he has also been certified as a Crash Data Retrieval System Operator through Vextronix since January, 2004. A retired Deputy Chief of the Freeport Police Department, Mr. Owen's training and twenty years of police experience involved all phases of police work; he has investigated in excess of 6000 motor vehicle crashes. He is co-author of the book, *Vehicle Accident Investigation: A Guide for Risk Managers and Claims Personnel* and a contributing author to *Truck Accident Litigation, Second Edition* published by the American Bar Association. Mr. Owen has a commercial driver's license and is a graduate of the SOS Big Rig Driving School. Mr. Owen is also a board certified forensic examiner, a professional evidence photographer and is a former nationally certified Motorcycle RiderCourse Instructor.*



Recent advances in technology in the trucking industry through communication systems, changes in brake systems, transponder usage, and warning systems have increased the complexity of the field immensely while producing plentiful data. While much of this data is fleeting, as the trucking industry uses it for the moment then discards it, some of it is retained. The impact these changes will have on the trucking industry can only serve to emphasize the importance of staying abreast of current technology in order to remain competitive in a rugged and increasingly technological field.

### Vehicle/Driver Monitoring

With today's technology, being on the road no longer necessarily means being unsupervised. Today's systems can allow trucking companies, law enforcement, and others to determine a vehicle's whereabouts, speed, performance and a driver's activities at the touch of a button or a glance at a screen.

### Communication Systems

Today communication systems are playing a more prevalent role in the commercial vehicle trucking industry. Whether simple cell phones and pagers or advanced GPS tracking systems, they allow insight into driver and vehicle locations. In a post 9/11 world these systems are taking on new dimensions as they are used to track hazardous materials on the nation's highways and locate vehicles to aid law enforcement.

Common communications systems used today include:

- Cell Phones and Pagers
- In-Cab Ground-Based Communication Devices such as:
  - OmniExpressFleetVisor
  - Terion FleetView
- Satellite Communication Systems such as:
  - OmniTRACS: Satellite Mobile Communication System
- Untethered Systems

### Transponders

Another key tracking system in place to monitor today's trucking industry is transponders. Today transponders are used to govern everything from weigh station bypass systems to yard and truck stop access. Transponders are used for charging tolls on highway and services at truck stops. From controlling authorization to automated billing, transponder systems can provide additional information about a vehicle's whereabouts and activities.

### Engine Control Modules (ECMs)

Engine Control Modules (ECMs) were originally put into service to control emissions but the technology also brought new monitoring opportunities. Today trucking companies use ECMs to monitor vehicle maintenance, speed, resource management and driver actions. Accident reconstructionists are now using ECM data to support or refute driver testimony as it can provide an objective source as to how the vehicle was performing at the time of the collision.

The following ECMs and their proprietary software are in regular use today:

- Caterpillar Electronic Technician
- Cummins Insite and Power Spec
- Mack VMAC
- Detroit Diesel Corporation DDEC

### Safety Systems and Devices

Safety systems and devices are continually being improved and changed as new technology becomes available at a reasonable cost and reliability. Below is a brief overview of some examples of how these systems are used in the commercial vehicle industry today.

### Back Up Systems

Back up alarms and mirrors have been in use for some time. Additional research into ergonomic response has changed how some alarms are used today. In addition,



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sensors and rear vision cameras continue to improve the safety of vehicle backing. These systems come in a variety of cost ranges and have varied effectiveness depending on vehicle usage.

#### Tire Pressure Monitoring

Today there are two main types of tire pressure monitoring in place:

- Deflation detection systems (DDS)
- Tire pressure monitoring systems (TPMS)

These tire monitoring systems help prevent accidents and make the highways safer by providing drivers, and in some cases through connection of ECM and communication systems, even fleet managers, with data about tire performance while their vehicles are on the road.

#### Brake Systems

Technological changes in brake systems can increase the complexity of braking analysis. Was the Anti-Lock Brake System (ABS) functioning properly? Was the driver braking hard enough to activate the ABS system? The differences in performance between ABS and non-ABS systems can make crucial differences in accident analysis. Electronic Brake Systems (EBS) are currently in use in Europe on commercial vehicles though not allowed in the U.S. aside from use as an additional system to the current dual airbrake system. An EBS system offers better brake force distribution and shorter stopping distances, substantially reduced brake lag, self-diagnosis and continuous monitoring.

#### Specialty Systems

New systems are continually being made available as manufacturers, trucking companies, and government work to make our

nation's highways safer. Specialty systems are available today that govern vehicle speed, monitor drivers' fatigue levels, provide rollover prevention, warn of impending collisions by monitoring and controlling following distances and warning drivers if their vehicle deviates from its lane of travel. Some systems are even allowing more thorough driver monitoring as ECM speed and hard brake event data is tracked and sent back to fleet managers via communication systems that monitor driver performance while on the road.

A sampling of some specialty systems currently in use follows:

- Eaton Vorad SmartCruise®
- Eaton Vorad Collision Warning System
- Freightliner Corporation's Rollover Advisor & Control
- Lane Guidance

#### **Conclusion**

Knowing the current technology available to the trucking industry provides crucial insights in case analysis. From ECM data analysis to the current safety systems available and regularly used, this technology is changing not only the way the trucking industry does business, but also the field of accident reconstruction.

We welcome your calls to discuss file issues and the relevance of electronic monitoring. An understanding of this data may prove to be a fundamental component of the case.

If we can be of assistance please contact us at [ruhl@ruhl.com](mailto:ruhl@ruhl.com) or by calling the Champaign, IL office at (800)355-7800 or Scottsdale, AZ at (800)235-2808.

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