

# THE RECONSTRUCTIONIST

## AN ACCIDENT RECONSTRUCTION NEWSLETTER

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### Accident Reconstruction - Tractor Trailers and Heavy Trucks

Woodrow M. Poplin, P.E.

Commercial vehicles are just like automobiles except for a few "small" details. They can be 5 times as long, 1.5 times wider, 30 times heavier, take 50 % longer time and distance to stop, take 3 times longer to turn or cross an intersection. They have only side mirrors for a rear view. In addition, they may articulate in the middle, have a high center of gravity and are relatively noisy.

Post accident examination of a commercial motor vehicle is similar to any other vehicle. Probably the largest difference is the brake system. Air braked vehicles typically require more maintenance than hydraulic brakes. Older vehicles require routine adjustment of the brakes, typically every few weeks or several thousand miles. Newer vehicles have self adjusting brakes, but it is not unusual to find brakes out of adjustment even with these mechanisms.

As everyone knows, aircraft crash analysis usually involves locating and analyzing data from "black boxes" which record cockpit conversations, flight controls and a



Relative Energy Available for Collision Damage - Loaded Truck & Auto



Relative Braking Distance to Stop a Heavy Truck and Automobile

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variety of parameters associated with the aircraft's operation. Not as well known is that most modern vehicles store diagnostic and troubleshooting information associated with the powertrain and safety systems. This data can be retrieved with a variety of proprietary and commercial equipment usually in the form of a "scan tool" or a computer interface. For automobile or small trucks, the most useful information is usually obtained with the air bag or "Supplemental Restraint Systems". Large truck systems



Relative Time to Cross an Intersection - Loaded Truck and Automobile



were developed around maintenance requirements for the engines and therefore concentrate predominately on engine operating conditions. For commercial motor vehicles, the primary data of interest is in the Engine Control Module (ECM). The major engine manufacturers, Cummins, Detroit Diesel, Caterpillar, Mack and Volvo all capture and record data that can sometimes be extensive. Knowing a vehicles speed, engine rpm, brake effort, throttle position and other parameters in detail for the time frame before, during and after a collision can be extremely helpful in any accident analysis.

FULL ARTICLE LOCATED AT [WPOPLIN.COM](http://WPOPLIN.COM)



# SERVICES

## Vehicle Accident Analysis and Reconstruction

- |                              |                        |                          |
|------------------------------|------------------------|--------------------------|
| t Vehicle/Scene Photographs  | t Headlamp Analysis    | t Vehicle Dynamics       |
| t Vehicle/Scene Measurements | t Skidmark Analysis    | t Timing Issues          |
| t Vehicle/Scene Analysis     | t Occupant Dynamics    | t Braking Distances      |
| t Mechanical Examination     | t Pedestrian Dynamics  | t Rigging Procedures     |
| t Structural Examination     | t Overturn Analysis    | t Welding Practices      |
| t Technical Analysis         | t Visibility Issues    | t Cargo Securement       |
| t Speed Evaluation           | t Event Data Retrieval | t FMVSS & SAE Compliance |

## Event Data Supported Vehicles

*(List of supported automobiles by year and make is available online at [wpoplin.com](http://wpoplin.com))*

### AUTOMOBILES

- |            |              |          |            |
|------------|--------------|----------|------------|
| t GM       | t FORD       | t ISUZU  | t STERLING |
| t CHRYSLER | t MITSUBISHI | t SUZUKI |            |

### COMMERCIAL VEHICLES

- |              |                  |         |
|--------------|------------------|---------|
| t CUMMINGS   | t MACK           | t VOVLO |
| t CATEPILLAR | t DETROIT DIESEL |         |

## Methods of Documentation

- t CAD Drawings
- t Animation Coordination
- t Total Station Site Documentation
- t Photogrammetry
- t Microscopic Examination
- t Black Box Data Retrieval



## Vehicle Accident Analysis Examples

- t Use of Skid Marks, Road Gouges and Vehicle Damage
- t Microscopic Examination of Headlamp Filaments
- t Lighting/Conspicuity Issues—Line of Sight/Visibility
- t Timing Issues
- t Occupant Ejection
- t Pedestrian Accidents



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### W POPLIN ENGINEERING

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