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LATE-BREAKING UPDATE OF 2-PAGE ICEHS WRITTEN SUMMARY - with images added
(2009 Annual Meeting)

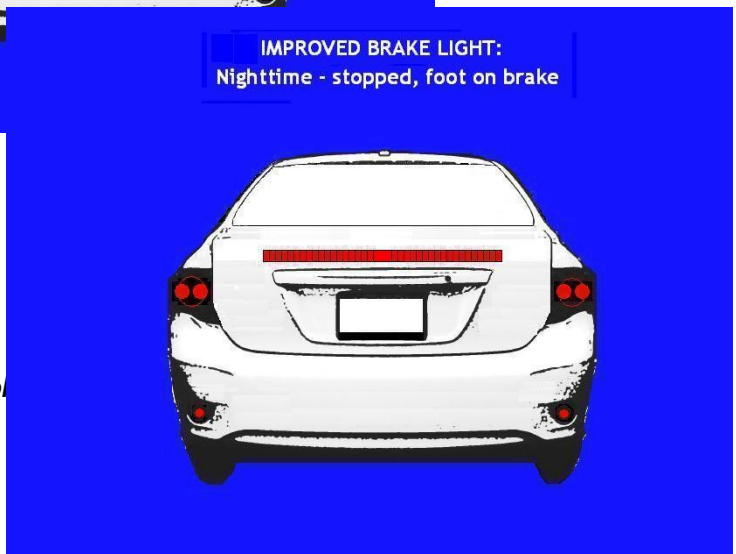
BACKGROUND: By any measure, crashes of one vehicle into the rear of another are more common than other types of vehicular crashes. They may take place at any speed, and can range in effects from a mild fender-bender to wholesale destruction of the rear of one and front of another vehicle, along with serious injury to or even death of the driver and passengers of either or both vehicles. For most of the years since the brake light was brought into common use for motor vehicles in the 1920's and 30's, the light has only indicated that the brakes are being applied. In fact, when the brakes are defective, depressing the brake pedal may illuminate the brake lights even though little or no slowing is actually taking place. Furthermore, even with properly operating brakes, conventional brake lights convey no information whatsoever about the rate at which the vehicle is slowing. Finally, as long as the driver's foot remains depressing the brake pedal, conventional brake lights do not distinguish between a slowing and a fully stopped vehicle. Clearly, with the exponential increase in traffic and congestion, there is a need to provide drivers in traffic behind other vehicles with more nuanced information. This includes whether a car is decelerating due to braking, some indication of the rate of such deceleration, and both whether the car will soon and has already come to a full stop. Once a standardized method has been approved, adopted, and used on a widespread basis, rear-end collisions should diminish in number.

PREVIOUS WORK DONE BY OTHERS TO IMPROVE BRAKE LIGHTS: The idea of improving brake lights is not a new one. Most of us are familiar with the increasing size of brake lights over the years, along with changes in their shape, and the addition of a third light positioned above the car trunk. The chief other improvements suggested (but not generally adopted) have addressed rate of deceleration and distinguishing slowing from stopping. There are well over 100 examples of such other improvements in the US Patent Office (in addition to international patents and foreign patents) dating from the 1970's. See, for example, US Patent # 3,593,278 for a brake light which uses a variable frequency of flashing to indicate a vehicle's rate of deceleration. Such proposals have also been the subject of vigorous discussion on special "idea exchange" web sites such as "Why Not? [web link is *www.whynot.net* under the subject "better brake light", dating from 2003]. One auto manufacturer, Mercedes Benz, has been using a flashing brake light over the past year in its A-Class cars (not sold in the USA). In order to facilitate the development and field evaluation of this new brake light, Mercedes Benz in 2005 petitioned the National Highway Traffic Safety Administration (NHTSA) for an exemption to Standard No. 108 on vehicle lamps (requiring brake lights to be steady and not flash). In 2006, it was granted that exemption. It is also possible to purchase flashing brake lights as add-ons to existing brake light systems. However, there is not widespread use of such improved lights, and there is no more standardization in their appearances than there is in the appearance of conventional brake lights. There is also a small but active after-market in brake lights with modified appearance. (Interestingly, modified brake lights have been in use recently on some larger motorcycles.) Mechanical engineers at the University of Toronto have been

exploring brake light re-design. In 2008, students at Virginia Tech designed a modified "smart" brake light to indicate the severity of braking. However, relative braking severity is not to be equated with absolute rate of deceleration. Rate of deceleration is the broader and more informative concept, and provides essential additional information from which, among other things, braking severity can be inferred.

THE POWERPOINT DEMONSTRATION AT THE APHA SCIENTIFIC SESSION: An initial sequence of about eight PowerPoint slides of a passenger vehicle viewed from behind will be used to demonstrate current conventional brake light technology during daytime and nighttime both for slowing and stopping. This will be shown for purposes of subsequent comparison with the improved brake light. As can be seen from conventional brake lights, there is no difference in the lights between braking and having come to a full stop with the foot on the brake.

These slides will be followed by a comparable demonstration, using a rapid sequence of about forty-seven additional PowerPoint slides, of one prototype of an improved brake light system which provides nuanced information about deceleration and coming to a full stop. By way of example, as is apparent in the following three slides of the improved brake light, there is a marked difference between the beginning of braking, continued breaking, and having come to a full stop with the foot on the brake. Although it cannot be seen below in the static images, the PowerPoint presentation adds the dimension of time, which shows the sequence below in repeating cycles at ever-increasing rates to further indicate the rate of deceleration to the driver behind, until a full stop has been reached.



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The single system of lights scanning (moving) repeatedly and ever more rapidly toward a central point on the back of the vehicle can be easily understood to convey several different types of information about the rate of deceleration. These include speed of slowing, closeness to stopping, and whether a full stop (zero endpoint for deceleration) has been reached. Computer technology currently available readily enables such a re-design of the brake light system.

ADOPTION OF THE IMPROVED BRAKE LIGHT: Once consensus has been achieved among traffic and safety engineers in the Society of Automotive Engineers (SAE) about the nature and appearance of an improved brake light and the components of its system, a patient and skillful campaign will be required to get such lights adopted for standard use in motor vehicles. The experience of Mercedes Benz in the field evaluation referred to above should be helpful for informing future efforts made toward general adoption and standardization for all motor vehicles in the US. Voluntary field use would be an effective stepping stone to eventual adoption of a new type of legally-mandated brake light. Such mandating would most probably be achieved through an amendment to the current Code of Federal Regulations applicable to vehicular brake lights (49 CFR s.571.108, S5.5.10).

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