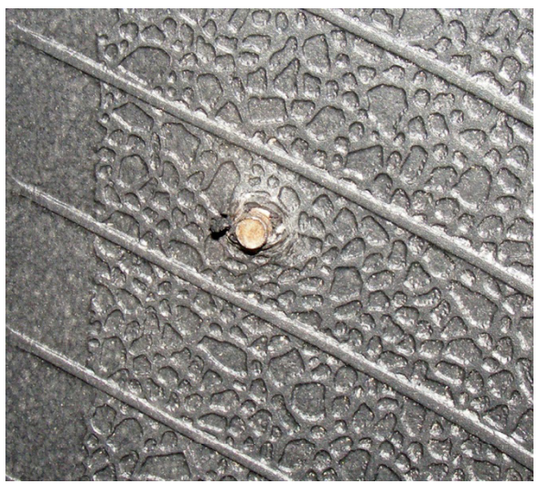
Even steel-belted radials get punctures. Some puncturing objects are small, some are quite large. This is a tire from my Aurora which acquired a nail. Two photos on the opposite panel show a close-up of the nail head and the interior view of the nail. It wasn't even a whole nail—just a stub of nail. How embarrassing! ☺

Seriously, I saw this nail in my tire and remembered the clicking sound that I thought was a small stone wedged in a tread groove, so I knew when I picked it up. Since I was ready to buy new tires anyway, I decided to wait a while and see what effect this penetration would have on that tire's inflation pressure. In two weeks of driving, there was no discernible loss of pressure in this tire.

When the puncturing object is small and uniform, like a nail or a small screw, a tubeless tire will typically capture that object and hold it in place, forming a good seal around the edges of it. Generally, air pressure will be lost by the punctured tire, but the loss is usually slight or gradual. A tire with a nail may lose one or two psi a week, or maybe five psi a month, or some amount of pressure.

In a previous newsletter, I showed what can happen when a puncturing object remains in a tire for a significant period of time before repair: air/dirt/moisture can get into the plies of the tire, causing internal separations which can lead to a catastrophic failure. If a puncture is quickly and properly repaired, the tire will most likely provide a normal service life. Am I proposing that you drive around with a punctured tire to see how it lasts or performs? No, definitely not. The purpose of these photos and this part of the newsletter is to demonstrate that punctures do not necessarily result in significant air loss. When quickly and properly repaired, a punctured tire will generally not lose its safe-operating characteristics. If I had not already been intending to buy new tires, I would have had this one fixed promptly. Under the circumstances, it gave me an opportunity to see what effect a couple of weeks of normal driving would have on the pressure contained in this tire as it was driven while retaining this piece of a nail.



Version 3.7 of the Bosch CDR (Crash Data Retrieval) software has been issued, and there is an associated 3.7 hardware cable for certain late-model Ford vehicles. Progress means never saying "enough is enough." What if they couldn't keep charging us more for new stuff? But technology keeps advancing, and improvements require changes. With all current safety and performance enhancements, cars are better now than ever.

With more new cars having accessible crash data starting with the 2013 model year, finding a new car without event data recorder capabilities is going to become more and more difficult. As with virtually everything else, there are two sides to that coin: if you weren't doing anything wrong, there will be an electronic record which proves it; if you were doing something wrong, the electronic record will show what operating characteristics were not within normal or legal parameters. Please keep in mind that the data stored in EDRs in crashed vehicles are not a substitute for a reconstruction; they are an augmentation to a reconstruction. There are many reasons for making that statement; an example of validation would be for

those cars and light trucks which record a delta-v along the longitudinal axis only. That value has no meaning without knowledge of the principal direction of force (PDOF), which the recorded data does not provide. Another example is those EDRs which record delta-v in both the longitudinal and transverse axes; some of those even summarize with a statement of peak resultant delta-v and PDOF. But, in most cases, those self-generated numbers are not valid: the associated algorithm considers the peak value of each, the algebraic sum, and the direction of the vector represented by their respective peak values. But delta-v rarely reaches a maximum value in both axes at the same instant; one must look at the entire tabulation of both values and determine at what period in time the vector sum was maximum, not the value of the algebraic sum of the maximums. Once that moment in time has been determined, a PDOF can be calculated for that period. The PDOF generated by the EDR's on-board algorithm will almost always be wrong, sometimes by a very large amount, and trying to apply that erroneous value to the crash under investigation will lead to serious errors in the conclusions. But, more and more, the data contained in the EDRs may provide some information about pre-crash operation of the vehicle which would not have been demonstrated by any physical evidence. Good for the innocent, bad for the guilty. Truth or truthful conclusions are the ultimate goal of every reconstructionist who has integrity.

For many years, I have been dealing with collisions between personal and commercial vehicles by considering or assuming that an equal amount of work was expended in doing damage to the commercial vehicle as was expended in doing damage to the personal vehicle. There are crush coefficients available for almost every late-model car and light truck, but essentially none for commercial vehicles. An article published in *Accident Reconstruction Journal,* Volume 21, No. 1, provided data and results concerning staged collisions between personal and commercial vehicles. Lo and behold, calculated values of impact speed did not match the recorded impact speed until application of the assumption that the commercial vehicle absorbed as much energy as the passenger vehicle. Validation, at last, for something I've been doing for over 20 years.

Thank you for reading my latest newsletter. Call anytime you have a question.

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