I have had the same fax machine, an Epson Acu-Laser CX11NF, for about ten years. It has been an excellent machine, but it was wearing out. I much prefer laser faxes, because I often have to take my faxes into the field with me, where they may get rained on. And sometimes I might spill coffee on a fax. ☺ So I finally bought a new fax machine, a Brother MFC-9970CDW. It incorporates wireless networking, color laser printing at 30 pages per minute, duplex printing and copying, and color fax sending and receiving capabilities. It also has a 250-sheet paper tray, which is a step up from the Epson machine. It has a legal-size scanner, which is also a step up from the Epson machine, which has a letter size scanner, but the Epson can print to legal-size sheets.

One thing about color laser printers is the quiet. The old one and the new one are so quiet when receiving a fax that I had to connect a conventional telephone to the fax machine so I'd know when I was receiving something. Both the old machine and the new machine have color fax capabilities, but I've never had anyone send me a color fax or ask me to send them a color fax. If you have color fax capability and want me to fax you copies of color photographs or send some to me, that should work well. Black-and-white faxes of color photographs are often only good to use as scratch paper on the side which didn't get covered with indecipherable patterns of black toner.

Several other features of the new machine are useful. The 256 KB of RAM can be upgraded to 512 KB total by the addition of a 256 KB memory module, available from Kingston for a ridiculously low price; I bought it and installed it. The Epson machine used proprietary RAM, available only from Epson for $600 a stick; I never upgraded the RAM in that machine, since one stick of RAM was two-thirds as much as I paid for the whole machine. Also, the new machine has an optional lower paper tray which adds 500 more sheets to the total paper supply; I bought it and installed it, too. I have seven plain-paper printers total in this house; sometimes it seems that I spend an inordinate amount of time keeping paper in the printers. When I can load 750 sheets at a time, I won't have to spend as much time adding paper.

For those of you with modern computers (i.e., at least Windows 7), I have learned that the single most effective upgrade for increasing speed is the installation of a solid state drive (SSD). A typical Windows 7 boot time when the operating system is on an SSD is ten seconds or less, as people who have one have told me. I saw this myself on the Ultrabooks I bought for my wife and daughter. It is also my understanding that the SSDs with five-year warranties perform better than those with three-year warranties. Based on that information, I ordered a five-year-warranty SSD; a SATA III PCIe card (my motherboard is SATA II, and all six ports are already in use); and adaptors for power supply, SATA data cables, and one which will allow me to mount the SSD in a bay for a 3.5-inch hard drive. Although the prices of SSDs are expected to come down significantly this year—they are already well below what they were when SSDs were first released—I decided to bite that bullet now. After installing those goodies, I can write "worth every penny."

I have prepared a PowerPoint presentation based on cases of Bosch Crash Data Retrieval Reports applied to investigations in which I have been involved. There is a wide variety, from cases where the only good data I had for evaluation of the crash was the image from the airbag control module (ACM) or Powertrain Control Module (PCM) to cases where I had a wealth of physical evidence which was supported by the data images, and one where the physical evidence and the data recorded in the ACM were substantially different. There are also several cases where the imaged data proved an attempt at fraud by the owner. This slide show has been prepared for presentation at the 2014 SCARS/SeARS/IAARS crash seminar, where I have been invited to speak once again. The nominal presentation time is two hours; the presentation time could be compressed if necessary or expanded slightly. I believe this slide show would be interesting to anyone involved in investigating automobile crashes, either for forensic or insurance purposes. If you would be interested in having me present this slide show to an appropriate group of people, please contact me by telephone (770.918.0973) or email (ralph.cunningham@att.net).

Readers of my newsletters may remember that Hyundai and Kia have developed their own systems for interrogating the ACMs in their 2014-model-year and later vehicles. There are major shortcomings with the methods of reporting, primarily that no image is stored, that there is no documentation that the extracted data set is from a specific vehicle, and that the output/report is only available as a pdf file. Since my last comments about those interrogations and reports, some more extensive evaluations of the accuracy of the recorded data have been conducted. In an article in the latest edition of ***Collision*** magazine (www.collisionpublishing.com), comparison of the data sets reported in pdf form with data from independent, calibrated instruments reveals that the reported values for acceleration (and, consequently, delta-v) are reasonably accurate for most directions of force (longitudinal or transverse) in most of the vehicles equipped with EDR capability. The previously described shortcomings are still present, but the testing so far has shown the data sets to be generally accurate, and the systems and reported data seem to meet the current Federal requirements. At the time the article in ***Collision*** magazine was written, only about 50 of the Hyundai/Kia systems had been sold in the United States, meaning that entities with the capability to interrogate the ACMs in those vehicles were few and (presumably) far between. The current situation is analogous to the situation which existed with Toyota vehicles before Toyota reached agreement with Bosch to provide CDR access to their vehicles, except that the pre-Bosch systems were owned by Toyota and, as far as I know, the accessing and reporting were conducted by Toyota employees at no charge to the vehicle owner or crash investigator, when you could get to the end of the long queue awaiting interrogation.

Bosch uses Polk data to determine the percentage of cars and light trucks currently in use that have data recording capability accessible with the Crash Data Retrieval Toolkit, perhaps to justify their current price of $9600 for the hardware, which only includes annual software licensing fee

for one year, and (currently) $899 a year subsequently. Their calculation is that 44 percent of all vehicles on the road have Bosch CDR accessible data. Broken down by manufacturer, 79 percent of GM vehicles in use, 66 percent of Toyota vehicles in use, 45 percent of Ford vehicles in use, and 32 percent of Chrysler vehicles in use have some form of crash data accessible with the Bosch system. As older vehicles get replaced with newer vehicles, the percentages of cars and light trucks with Bosch CDR-accessible data will increase.

Those of you who are familiar with my original newsletters may recall that I predicted, in 2002, that we would be seeing 42-volt DC systems in cars in the near future. Quite recently, I admitted that it now seemed unlikely. But in an article titled "Powering a Drive to Higher Voltages" in the February 4, 2014, edition of Automotive Engineering magazine (www.sae.org), the author indicated a high likelihood that we would soon see 48-volt applications in cars and light trucks. There are several inter-related and valid justifications for the higher voltage.

Vehicles with a stop-start feature can provide significant fuel savings in urban driving situations, and start-stop technology is much less expensive than producing a hybrid vehicle. But the life of a lead-acid battery is related, at least in part, to the number of discharge-recharge cycles, and starting the engine is by far the largest drain (and stress) on a battery in a modern motor vehicle. Battery technology is producing absorbed glass mat (AGM) batteries, which can provide higher voltages in a given volume of battery while maintaining competitive costs, and the AGM batteries accept charging much more readily than lead-acid batteries, meaning that the discharge-charge cycles are not as stressful on an AGM battery as on a lead-acid battery. Control components for 48-volt systems with a multitude of 12-volt accessories, which are here to stay for quite some time, are much less expensive than hybrid systems, and they weigh a lot less. The 48-volt systems can be used to maintain air conditioning and other functions while the engine has been shut down for a traffic signal or other stop; the blower for the HVAC systems in most cars is often the heaviest user of electrical power after the starter, and they won't run long on a 12-volt battery. Plus, to keep an air conditioning system operating in start-stop mode, the compressor will have to be driven by an electric motor, not as an accessory to the engine; an electric motor to drive the compressor would be a huge current drain on a 12-volt battery, but a 48-volt battery could provide the same power with one-fourth of the current flow in amperes. Chrysler, Ford, and General Motors are jointly investigating the development of 48-volt systems for "mild hybrid" vehicles. Only time will tell if we will someday have cars available with 48-volt systems, but that presently seems likely.

As this is being written, Audi is in talks with Bosch to allow CDR access to crash data in its airbag control modules. Does this mean that Volkswagen and Porsche will follow? I don't know—it will be interesting to see how that corporation deals with Federal requirements.

Thank you for reading my newsletter. Please contact me anytime you have a question regarding crash data retrieval, crash reconstruction, or the other vehicle-related services I offer.

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