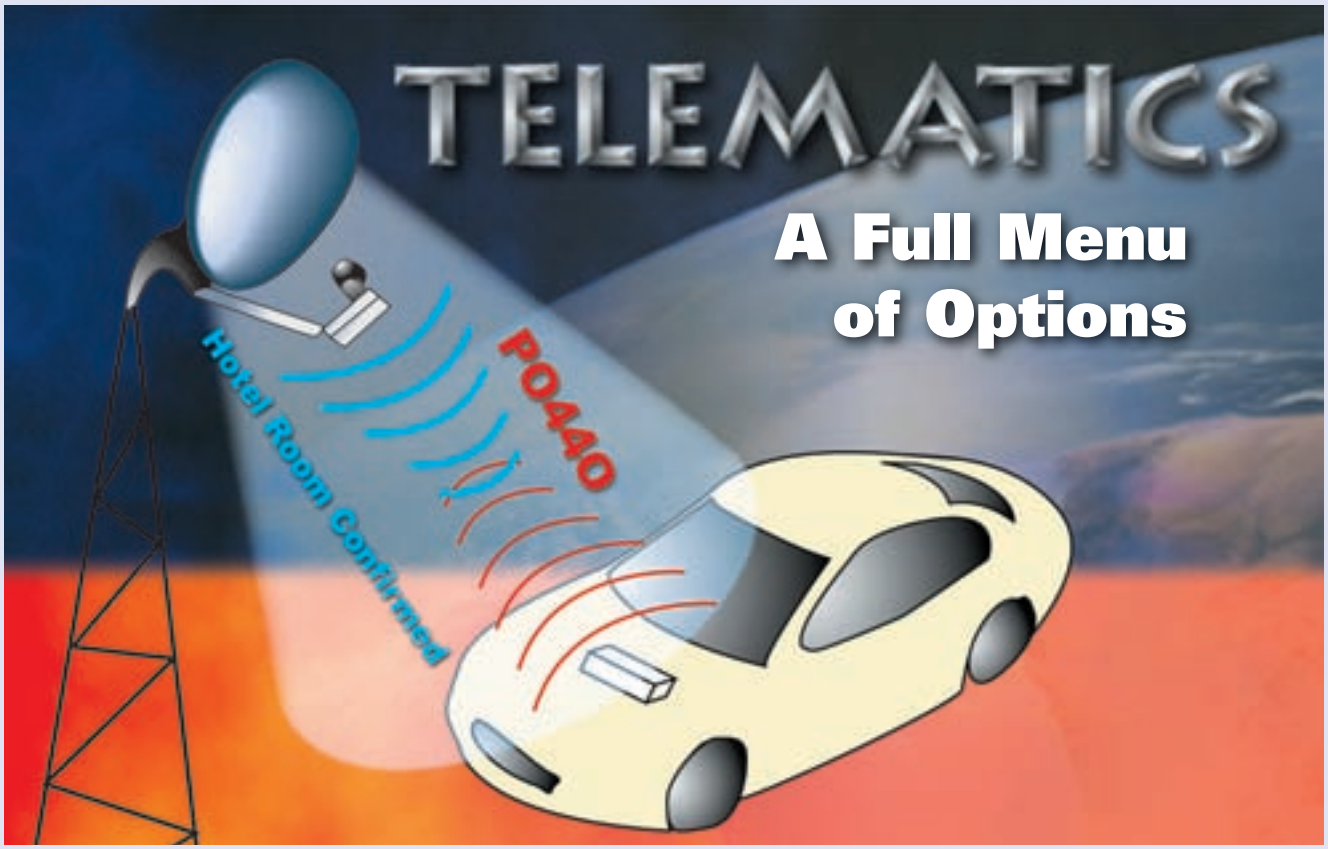

The recent SAE Future Transportation Technology Conference in Costa Mesa, California, provided information on hybrid electric vehicles, 42-volt electrical systems, alternate fuel and fuel cell technology, Intelligent Data Bus (IDB) and OBD-II+ systems. All of these technologies will (perhaps) find their way into new vehicles in the not-too distant future. However, I believe the Intelligent Data Bus (IDB) and OBD-II+ systems will have the most profound effect on the automotive repair industry.

The conference panel sessions included discussions and reports on the current OBD-II system, a possible future OBD-II+ (or OBD-III if you prefer), and the new IDB systems. IDB is a proposed gateway to allow on-board vehicle navigation, e-mail and possible on-board multimedia systems (also known as telematics), communication with a traffic network and information from other on-board sensors. The IDB would also access the PCM and provide remote diagnostics or, as I will discuss later, provide OBD emissions status reports. The panelists who took part in these discussions included representatives from ETI, SEMA, CARB, EASE Diagnostics and GM Service Operations.

Current Telematics Systems

Current telematics systems do not include an IDB. An example of an in-production telematics system is the GM On-Star system, which can provide on-line services such as hotel and restaurant reservations. Additionally, if the MIL illuminates while the vehicle is driven, On-Star provides an explanation of the MIL by polling the PCM and retrieving the DTC. This information can then be used to ease the driver's concern by suggesting a course of action. For example, if the MIL was triggered by an EVAP fault, the driver could continue with his business and elect to have the vehicle inspected at a more convenient time. The On-Star system is not meant to be used to repair the vehicle, rather it provides information to the motorist and, if the customer chooses, suggest repair facilities in the area for further diagnosis.

The Japanese telematics market is several years ahead of the rest of the world. As early as 1997, additional information services were available on Japanese vehicles equipped with on-board navigation systems. These services include access to the Internet, e-mail and real-time traffic information, (as well as warnings of sobriety checkpoints), but so far they have not generated many subscribers.

Since mid-2000, Mazda has offered an information service integrated into its navigational system on Mazda and Ford vehicles sold in Japan. Two unique features of the system are: no subscription fees and the ability to connect the vehicle to Mazda to collect diagnostic information. This will allow Mazda to advise the motorist of a course of action in case of a malfunction.

Vehicle Networking

The IDB could very easily be adapted to provide a bridge between the vehicle management system and the telematics systems. An article in the August 2000 issue of *Automotive Industries* suggests the debate is on among automotive manufacturers as to which networking protocol should be adopted for in-vehicle use. One possibility is the IEEE1394 consumer electronics bus, also known as *Firewire.* Alternately, MOST (Media Oriented System Transport) is a protocol championed by the Becker Group (a German autoparts supplier), as well as Daimler-Chrysler and BMW. This system uses fiber-optic cable versus twisted pair copper wires to achieve IEEE1394. What does this all mean? According to *The Hansen Report on Automotive Electronics,*" It will make some of the onboard automotive electronics very competitive. Multimedia and telematics will become more open to the aftermarket."

Remote Diagnostics

The IDB also shows promise as an avenue for remote vehicle diagnostics. When connected to the OBD-II system, this high-speed data could facilitate remote diagnostics by providing DTC's, freeze-frame data, glitch capture and live data to a remote location, all via an Internet connection. For example, a technician in a repair shop could view data on a monitor while the customer is actively experiencing a problem. Each vehicle equipped at the factory with a navigation system such as GM's On-Star program already has an assigned web address, facilitating implementation of remote diagnostics. GM is not the only carmaker with such a program. Ford, Jaguar, SAAB and others have also made advances in this area.

Positive and Negative Effects

During the conference, a potential drawback to the implementation of IDB systems was pointed out by Mike McCarthy of the California Air Resources Board. If an IDB malfunction occurred, it could bring down the data bus and stop the sensors from communicating. At present, CARB and the EPA have only the authority to mandate aftermarket access to *emissions* DTC's and data — not to airbag, ABS, traction control, HVAC or other data. This proposed system would require all parties to voluntarily agree to abide by rules and standards not yet established. Will the OEM's agree to provide aftermarket access to all the systems that transmit data on the bus? In addition, the failure of an OEM-installed IDB device could fall under a vehicle emissions warranty, especially if the failure of that device prevented diagnostic communication with the vehicle's emissions system. This could become a hardware/reliability issue at 100K miles.

OBD-II Monitoring Effectiveness

On the emissions-compliance front, conference reports were presented on the effectiveness of smog-check testing versus OBD-II emissions monitoring by members of CE-CERT. CE-CERT is a University of California at Riverside research group focusing on many areas of transportation research, including transportation/emissions modeling and intelligent transportation systems. Their studies compared the effectiveness of OBD-II vehicles to detect emissions-related problems greater than 1.5 times the FTP standard versus ASM (Acceleration Simulation Mode) smog testing performed by smog check shops in California. The results of this study, along with CARB's already developed wireless communication with a vehicle's PCM for emissions-related status reports (P-codes, on-board system readiness report), will have a profound impact on the entire repair industry.

CARB has also been evaluating the effectiveness of OBD-II systems on 1996 and later cars as an alternative to a smog check program. There are over 150,000 vehicles in pilot programs in states such as Wisconsin, Colorado, Utah and California comparing OBD-II monitoring to I/M 240 testing. Starting with 1996 and later vehicles, the conclusion thus far is that an OBD-II system provides a more accurate measure of actual vehicle emissions than an I/M test alone. CARB has also tested a system using transponder technology to 'ping' an OBD-II system and poll the PCM for any emissions-related faults.

Jack Hayler, the panel session moderator, proposed a couple of options. One would give the vehicle owner the option of full-time vehicle emissions monitoring in exchange for a tax credit against the yearly state motor vehicle registration fee. The alternative for those who did not wish to have their vehicles monitored would be conventional smog check testing. The smog test programs would continue to receive their funding, regardless of which alternative the motoring public ultimately favored.

Full-time vehicle monitoring could be a good thing, but the question remains "How do you ensure that once a MIL illuminates, the vehicle will be taken to a service facility for diagnosis and repair?"

As mentioned earlier, a vehicle assigned a web address and equipped with IDB during manufacture could dial up a repair facility and transmit data at the time of the fault. The question remains, how can this technology be implemented to ensure voluntary consumer compliance without government interference?

Future Uses for IDB Technology?

Suppose the OEM's responsibility on emissions-related systems were limited to five years or 70,000 miles. At the time of vehicle purchase, consumers could choose between *yearly smog testing* with a registration fee or a *continuous monitoring system*. The 'club' of economics would no doubt drive many people into continuous monitoring. Any other real or perceived 'benefits' of continuous monitoring would probably be a hard sell with consumers.

Vehicles with continuous monitoring systems would be equipped with a transponder that receives an electronic ping including a date/time stamp. If any emissions-related DTC's were detected during a ping, the vehicle data (including VIN and owner's name) would be transmitted to a database that would be accessible to local repair shops and dealers. This would allow open competition for vehicle emissions service. If, after 90 days, the vehicle had not been brought in for diagnosis and/or repair, the data would be transmitted to a state-run agency. A letter would then be sent to the vehicle owner, requesting him to bring his vehicle in for inspection or show proof of compliance. Of course, what would happen if the motorist chose to ignore the reminder is anyone's guess.

This program could lead to a reduction in the length of the OEM's emissions liability, while allowing vehicle owners access to a wider range of choices for vehicle service. Yes, one might interpret this as a method of continuously monitoring the whereabouts and activities of law-abiding citizens. One could also argue this amounts to an ankle-bracelet program for the car-using population.

Parallels to this technology already exist in other areas of our lives. Cell phones, GPS systems, Lojack vehicle theft-deterrent systems and 'cookie' files over the Internet already have the capability to track our movements, interests and spending habits. The main difference is that each of these technologies is voluntary — we can chose to opt in or out, depending upon our perception of the potential gain. Therefore, any proposed vehicle monitoring system *must* allow the consumer the freedom to chose between conventional testing methods or continuous emissions monitoring via the IDB. That way, if you don't want your vehicle to be continuously pinged, you could still take your vehicle in for a yearly smog check, just as you can turn off the cookie file option on your browser while surfing the Internet.

Last year's CARB data indicated that 11 million vehicles were smog tested in California using conventional methods, with 9 out of 10 passing the test. At an average cost of $50 per smog check, approximately $495 million taxpayer dollars were spent — just to prove they were in compliance. If a continuous monitoring system were introduced and accepted by consumers, a pragmatic independent repair shop owner might look at this as money that could be better spent performing vehicle repair/maintenance work. ■

— By Lester Bravek