



# COMING SOON

By Halsey King

As in many fields, the march of technology and innovation in the public and community transportation bus industry is nothing short of breathtaking. New ideas that make vehicles more efficient, safer and economical spring up seemingly daily, and are often swiftly adopted into the field. The small and mid-size buses that populate community transportation are part of this ongoing technological revolution.

While larger buses get much of their technological advances from the trucking industry, small and mid-size buses take advantage of breaking automotive technologies out of Detroit and the automobile industry. This is a definite advantage because it keeps research and development costs low, brings new systems and components on-line faster and offers the end-user a wide variety of system and component choices in buses.

It is easy to see the spillover of technologies from Detroit into what I'll call the community transportation (small and mid-size buses) bus industry in recent years. In this article, I'll cover the best of these technologies, and the ones most likely to have the greatest impact on public and community transportation. With each example, I hope you'll see the trend toward more economic, safer and efficient service. Technology simply for the sake of technology makes little sense in the community transportation field. When technology impacts how you serve your community — as is the case with the examples I'll cover here — its benefits are tangible.

## Right Now

There are three key advancements that most community transportation operators have seen since 1995 on the buses they purchase. In the maintenance classes I teach, we focus on these first because they have had a clear and immediate impact on the maintenance shop floor.

**Fuel Injection Systems.** The carburetor, at its very best, feeds fuel and air into the engine under a wide set of operation conditions. Often, these carburetor systems were unreliable and gave mechanics real fits. Problems in the carburetion system often went misdiagnosed leaving vehicles out of service for long periods of time — always a real problem for any transit operation.

Today's fuel injection systems are practically maintenance free and it's quite rare for me to hear complaints about them as I travel. All you

# TO A BUS NEAR YOU...

have to do is periodically test injectors and change a filter. Probably the best thing about the fuel injection systems is that, like many other innovations, maintenance costs are decreased while vehicle efficiency increases.

**High-Energy Ignition Systems.** The removal of tetra ethel lead from fuel has led to cleaner-burning engines in transit (at least for those using gas-powered cutaways and vans). These systems resulted in longer sparkplug life and considerably less maintenance costs because the lead build-up in the engine is significantly reduced.

What this means to a mechanic is that the old “engine tuneup” has faded from the shop lexicon, as have points and condensers. In the not-so-distant-past we had to change all of these components every 5,000 miles.

**Polycarbonate Window Glazing.** The change from glass to polycarbonate window glazing reduces bus weight and allows for increased passenger loads — which is always important for transit. These new windshields are available in various tints and shades just like glass, but last longer.

Most importantly, the polycarbonate versions are much safer. A brick hurled at one of these windows might break, but it will not shatter and throw glass into the vehicle.

## The Future Holds a Big Charge

But what about tomorrow? There are a number of new technologies just over the horizon that will find useful application in the fleets of public and community transportation tomorrow. As with those we’ve already highlighted, these will offer lower overall cost per maintenance mile, longer bus life, enhanced passenger comfort and convenience, as well as better overall safety.

If you have attended one of our Association’s Vehicle Maintenance Management and Inspection (VMMI) sessions over the years, you already know that I think the 42-volt electrical systems planned by most bus manufacturers in the U.S., and already on the streets in some foreign countries, will completely change (and charge) our field.

Consider that, with few exceptions, our buses have employed 12-volt systems since the mid-1950s. These high-power, 42-volt systems will be the heartbeat of eye-popping innovations like electric steering, brakes, power and valuable passenger amenities. While there is some controversy among manufacturers about the 42-volt system, I believe it will become standard for small and mid-size buses.

Some of these electrical systems are already here now. The new Mercedes SL, for example, has electric brakes require neither a master cylinder nor brake fluid. These brakes which have far fewer moving parts and are much simpler to maintain — according to industry professionals

Chevrolet has just announced that its 2004 Malibu will have electric steering — ridding us of power steering systems requiring pumps, fluid and belts. These advanced systems will, in time, change the need for maintenance and the parts we buy, as well as reduce pollution because they don’t use fluids and lubricants like the current systems do.

Another advantage to the 42-volt electrical system is that fewer belts will be attached to the engine. This may seem an innocuous change, but these belts are a drag on overall engine power. Reducing the parasitic loads often incorporated into power steering belts, alternator belts and the like can yield more horsepower, better operations and even better fuel efficiency.

These electrical system changes are in the works. But there’s much more on the horizon. What follows is a list of some of these new technologies and how likely they’ll revolutionize the small bus industry.

- **Kevlar seat belts with built-in air bags** – Kevlar is the bullet-proof fabric that has found great utility in safety vests for policeman and soldiers. Already, it has found its way into seat belts, virtually ending the fraying and rips/tears that can sometimes occur. Having air bags built into these belts is a serious safety improvement as bags embedded in steering wheels often inadvertently

injure drivers and passengers by the force by which they deploy.

- **Kevlar fibers in our bus tires** – Rather than the current nylon and steel threads used in tires, Kevlar replacements are on the way. As we're just beginning to test this technology, it's too early to guess their impact. But I'm sure it will be significant in helping to avoid tire damage and lead to longer wear. Also, dual tires may soon be replaced by a single big rear tire.
- **Heads-up displays on the windshield** – Using the same technology as you might have seen when the President of the United States talks and his speech is projected onto a clear pane before him, heads-up displays can project vehicle information — like speedometer and other gauges — right onto the windshield. Drivers won't have to look away from the road to check anything!
- **A new generation of air conditioning units** – In the past decade, we've seen more environmentally-friendly coolants and Freon introduced into the public and community transportation industry. We're now seeing fuel-cell technology coming online to power new air conditioners and spool-type compressors that require fewer parts.
- **Life-long engine oils and coolants** – This technology comes to us from the trucking industry, which is already using these highly advanced lubricants. Many of these newer oils could be either silicone, vegetable- or soy-based, and need be changed every 30,000 miles or so.
- **A refreshing look at driver ergonomics** – A variety of advances are making the job of driving a bus both easier and safer. Such concepts as arm and head rests, heated seats, four-point safety harnesses and movable foot pedals are all being installed in buses today.
- **Others** – Automatic sensors for passenger doors, rear-vision cameras, drop-down LCD “infotainment” systems for small and mid-size buses, LED reading lights and a new generation of ADA accessibility systems are other technologies that in the near future will become commonplace on smaller buses.

## Looking Ahead

My crystal ball tells me that over the next two decades the small and mid-size bus will see dramatic changes. One of the most revolutionary is sure to be joy-stick steering and a moving away from today's steering wheel. Currently, many aircraft and even “Bobcat” loaders and tractors are operating by joy stick, so it's not as futuristic as one might think — just the transfer of existing technology into our field.

Any technologies that have fewer parts and are easier to service, well, you can expect those to find their way into your buses. That's why such innovations as electric brakes and steering are already moving into the industry.

I'd expect safety to be an even greater driving force. Much of the technology today focuses on crash-damage mitigation and impact control. In the next decade, engineers will focus their time and resources on crash avoidance.

If you're looking to guess what the next technological advancement in the small bus field might be, I'd say look to what's happening with automobiles and the newest ideas out of Detroit. The driving force behind these changes has been — and will continue to be — efficiency and safety. 🚌

*Who better than Halsey King to highlight the latest and greatest in public and community transportation bus technology? Halsey began his career in the early 1970s as a mechanic working on imported cars in Paramount, Calif. He began working with buses at the Taylor Bus Service in Anaheim in 1975 and parlayed that experience into a three-year stint in Saudi Arabia with that nation's public transport company. He's worked with several transportation consulting firms in the past 20 years, and managed the Transportation Technology Program at Eastern Michigan University. Since 1993, he's been on his own working with hundreds of transit providers as Halsey King and Associates. In 1999 he was appointed to the Board of Directors of the Society of Automotive Engineers, a premier standards development organization, where he helped organize the Service Technicians Society, of which he remains a member.*

*For the Association, Halsey teaches our Vehicle Maintenance, Management and Inspection (VMMI) class. Thus far, nearly 300 people have attended these three-day classes, which include a certification process.*