Advanced safety systems

ANY questions on exactly what safety systems are on any given vehicle usually ends up focusing on the features of the restraint system. The answers usually run the gamut from the number of airbags in the vehicle, the type of occupant classification system and whether or not there are occupant sensors, to name a few. However, there is more to occupant safety than just the restraint system.

Advancements in technology on today's vehicles usually have safety as the main design incentive. Consider such innovations as adaptive cruise control, braking assist systems that go beyond anti-lock brakes, and advanced lighting systems that give the driver a better view of the road. Some of these systems have been featured in previous articles while some will be a focus of future articles. This article will offer a brief overview of some advanced safety systems (other than restraints) included on some 2006 and 2007 model vehicles.

Adaptive Cruise Control

Normal cruise control maintains a set speed. Adaptive cruise control automatically adjusts the speed to maintain a set distance from the vehicle ahead.

One of the more advanced systems is the Mercedes-Benz **Distronic Plus** system. This system employs two separate radar frequencies. One frequency is used to monitor activity at distances of up to 150 metres away. The other frequency monitors activity at close proximity up to 30 metres. This enables Distronic Plus to bring the vehicle to a complete stop and resume acceleration when set by the driver to do so.

Brake Assist

Brake assist systems are designed to alert the driver of a potential hard braking situation, or even apply the brakes automatically. The 2006 Acura RL **Collision Mitigation Brake System® (CMBS)** operates in multiple stages. The first stage is an audible, visual, and tactile (physical) alert. The second stage applies light braking to reduce the speed of the vehicle. If an inevitable collision is determined, the CMBS takes over, forcefully retracting seat belts and activating the brakes to at least reduce the collision severity.

The 2006 Infiniti FX has a system called **Pre-Pressurized Brakes.**

Pre-pressurized brakes work with the adaptive cruise control laser. If the situation meets a specific parametre, the system applies additional hydraulic brake assist pressure to reduce stopping distance and the chance of, or severity of a collision.

The Mercedes-Benz system, **Brake Assist Plus (BAP)**, also works in conjunction with the adaptive cruise control system to calculate how much brake assist is required to stop the vehicle relative in relation to the following distance and closing speed. Again, the system only takes control during an aggressive stopping situation.

FIGURE 1

The 2006 Infiniti Q45 complex headlamp system can be adjusted to several pre-sets.

FIGURE 2

The 2006 VW co-centric tail lamps light up in multiple colors.

Advanced Lighting

Lighting systems used to be uncomplicated but, in the interest of safety, several innovations have been introduced. One of the long-term safety problems is a driver failing to dim the high beam headlamps for another vehicle. Several vehicle makers have developed automatic systems to handle this situation. The 2007 Dodge Caliber **Smart Headlamps System**, for example, uses a light sensor contained in the front of the rearview mirror assembly to look forward for oncoming vehicle headlamps or tail lamps and automatically switch the headlamps to low beam.

Forward lighting systems that turn as the vehicle turns is certainly not a new idea (consider the 1948 Tucker) but it is an idea that is catching on today in the interest of safety. A unique feature of the 2006 Cadillac XLR system, called **Adaptive Forward Lighting**, is that there are two moveable headlamps on each side of the vehicle. The inner headlamps move in the direction the vehicle is steered up to 5°, and the outer lamps move up to 15° in the direction the vehicle is steered.

The 2006 Infiniti Q45, FX, QX, G35 and M45 are equipped with headlamps with multiple possible adjustments (see Figure 1). From inside the vehicle, the driver can adjust the headlamps to one of four different vertical pre-set positions.

Lighting innovations are not just confined to the headlamps. The BMW **Adaptive Brake Light** display (2006 7 Series and X5) increases in size the faster the vehicle slows down. This is designed to alert following drivers of a vehicle making a more aggressive stop.

The 2007 Volkswagen EOS, Passat, and Golf are equipped with multi-colored circular LED tail lamps which, when braking, light up yellow on the outside of the circle and red on the inside (see Figure 2). This provides better visibility during braking.

Night Vision Enhancement

Night vision enhancement systems help the driver see objects in

FIGURE 3

The view in the dark ahead beyond the headlamps is shown on an instrument panel screen on the Mercedes-Benz S-Class.

FIGURE 4

A camera looks out for the blind spot on the Volvo Concept Safety Car, an idea now to be put into production.

the path of the vehicle that could not normally be seen at night. Night vision enhancement systems are capable of detecting objects beyond the reach of normal headlamps. The system sometimes works in conjunction with a head-up display, projecting the image in front of the driver.

General Motors was the first to offer a **Night Vision** system (on the 2000 Cadillac DeVille) but discontinued its use after the 2005 model year. Lexus began offering a night vision enhancement system on the 2003 LX470 called **Night View**. The system works with the head-up display. 2007 Mercedes-Benz S-Class vehicles also offer this type of system called **Night View Assist**, using a high-resolution monitor located in the instrument cluster (see Figure 3).

Lane Departure Warning

Lane departure warning systems warn (or try to wake up) the driver if the vehicle is drifting into another lane. The 2006 Infiniti M45 and FX systems use a camera mounted by the rear-view mirror to monitor lane markings. An audible alarm inside the vehicle activates to alert the driver that the vehicle is moving off course.

Run-Flat Tyres

With conventional tyres, when all the air has escaped, the vehicle cannot safely continue down the road. Run-flat technology helps solve this problem by supporting the vehicle long enough to get to a service location or the original destination safely without damaging the tyre or the wheel.

Some run-flat designs simply add enough sidewall stiffness to low-profile tyres to operate at conservative speeds without air. Newer designs incorporate a composite liner around the wheel inside the tyre to add support if air pressure is lost.

Other Advanced Safety Systems

There are also several vehicle-specific innovative safety systems that don't fit easily into the other categories.

For example, the Mercedes-Benz **Pre-Safe** system has been around for several model years. If a potential impact is detected due to critical handling behavior, seat belts are automatically tightened, the passenger seat back angle is automatically adjusted, and the

FIGURE 5

Paddles on the back of the 2006 Jaguar XJ steering wheel allow shifting the transmission without taking your hands off the wheel.

side windows and sliding roof are automatically closed. The 2006 Lexus GS430 **Pre-Collision** works in a similar manner.

The Volvo **Blind Spot Information System** is an option on their 2007 models. Small cameras mounted on the outside mirrors monitor the "blind spot," the area alongside and to the offset rear of the vehicle (see Figure 4). When another vehicle enters this zone, a yellow warning light comes on beside the appropriate door mirror in the driver's peripheral view.

The 2006 Jaguar XK has an optional convenience feature; transmission shift paddles on the backside of the steering wheel (see Figure 5). This allows the driver the option of keeping both hands on the steering wheel while driving. The XK is also equipped with a speed limit switch to prevent the vehicle from exceeding a specific speed.

The 2006 Dodge Caliber has adjustable foot pedals that can be used to provide a safer driver position and enable better vehicle control.

The 2006 Land Rover Range Rover and Lincoln Navigator have heated outside mirrors that don't fog up or gather ice. The Range Rover also features a heated windshield.

Conclusion

Innovations are not always for vehicle performance or driver convenience and entertainment but are often designed for improved safety, and safety is not always about restraint systems. This article touched on some, certainly not all, of the advanced safety systems found in vehicles today. Many of the systems that we have described appear primarily on luxury-class vehicles, but that will probably change soon. Unlike some other types of innovations, workable safety systems tend to get included on other makes and models, especially when lives are saved. Watch for more of these systems in the years ahead.

I-CAR

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