SKIDMARKS

THE OFFICIAL PUBLICATION OF THE CALIFORNIA ASSOCIATION OF ACCIDENT RECONSTRUCTION SPECIALISTS

AUTOMATING TRAFFIC SOLUTIONS

CAN COMPUTERS SEE SOLUTIONS WE CAN'T?

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the BOARD BEAT

At the end of every year, I write the Board Beat for the 4th Quarter CA2RS Newsletter. Inasmuch as I like to share new and exciting news, many of the things at CA2RS remained the same in 2017: Membership numbers continued to be solid; we had three great well-attended Quarterly Training Sessions; the financial situation remained strong; we had a great Annual Conference; and Jahna Rinaldi, Roman Beck, Dave Cameron, and John Crews were reelected to their positions on the CA2RS BOD.

One thing that we brought back in 2017 was Live Crash Testing. Earlier this year, the CA2RS Organization was able to add to our already-impressive number of Motorcycle Crash Tests that were originally conducted back in 2004 with additional testing in 2009 and 2013. The testing has evolved quite a bit over the past 13 years with new instrumentation, delivery systems, and video capabilities (drones). What impressed me the most about this round of testing was the well-rounded participation by CA2RS members from both Nor Cal and So Cal and law enforcement and private sector. Plans are in the works for the next round of crash testing.

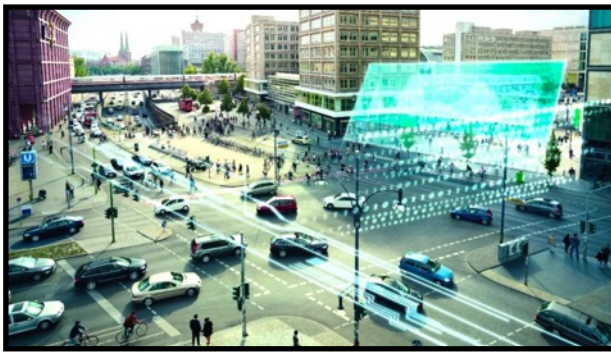
We are excited about the 1st Quarter Training that will be coming in January of 2018. Adam Hyde, a longtime friend of CA2RS and respected instructor will be coming to both Nor Cal and So Cal to give a presentation on "The Approach and Implementation of a UAS (Drone) Program for Accident Investigations" (both police and consultant).

As always, I want to give a special thanks to my fellow members of the CA2RS BOD: Jahna Rinaldi, Bill Focha, Sean Shimada, Dave Cameron, John Crews, and Roman Beck, in addition to admin staff of Treasurer Nichole Hanley and Newsletter Editor Tim Neumann. The CA2RS Organization and I are very lucky to have these dedicated people helping us run the Organization.

Speaking of Newsletter Editor, Tim Neumann – he has decided to turn over the reigns of the CA2RS Newsletter. Tim has been an invaluable asset to the CA2RS Organization for many years. Tim is finishing up his second stint as the Editor of the newsletter. I believe the quality of the CA2RS Newsletter is second to no other Reconstruction Organization. Tim's hard work and dedication over the years is in a large part responsible for the quality of the CA2RS Newsletter. We wish Tim success in his future endeavors. We also welcome Mr. Paul Jacobs as the new Editor starting in 2018.

Have a Wonderful Holiday Season,

Chris Kauderer
Chairman



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How Police Are Preparing for the Arrival of Autonomous Cars

by linda poon | city lab

On a sunny June afternoon in Chandler, Arizona, more than a dozen police and emergency vehicles paced up and down a mostly empty street, with their sirens blaring and emergency lights flashing. All eyes, though, were on the handful of self-driving cars that shared the road. Some drove in front of a fire truck; others cruised alongside police motorcycles and unmarked cars. Spectators, including Police Lieutenant David Ramer, watched in anticipation as the cars decided when to pull over and when to yield.

For the hours-long demonstration, Ramer spent three months coordinating with Alphabet's Waymo to find the right time, place, and fleet of vehicles to help the company train its cars to recognize and respond properly to emergency vehicles. This is a task most human drivers have yet to get right, and still, it's an essential one for machines to master before they can take over on the road.

"Emergency vehicles [in Arizona] are supposed to stay in the fast lane on the left, and everyone is supposed to slowly pull to the right," Ramer says. "Very, very rarely does that happen; most people panic and park right there."

So he welcomes the department's partnership with Waymo, which according to a 43-page safety report published this month, is creating a "library of sights and sounds" to feed into its software.

As more autonomous and semi-autonomous cars find their way onto public roads, law enforcement officers and first responders are figuring out how to handle them in collisions or during traffic stops. It was only two years ago that a police officer in Mountain View, California, pulled over a car only to find that there was no driver inside (there was a passenger, however). The incident invited jokes and snickers on the internet, but also raised serious questions.

"How do those first responders know if this thing is an automated vehicle rather than a driver vehicle, and how do you know that it is fully off?" asks James Hedlund, a consultant for the Governor's Highway Safety Association who previously worked at the National Highway Traffic Safety Administration. "How do you know what it's doing, what it's thinking?"

Since then, there have been several, more serious incidents that have called police, firefighters, and paramedics to the scene, from a high-speed collision in Arizona that flipped an autonomous Uber vehicle on its side to a fatal crash in Florida between a truck and a semi-autonomous Tesla.

In fact, Hedlund says, the hardest questions come even before the arrival of fully autonomous, so-called Level 5 vehicles. (Most have only reached Level 2, meaning the car can automatically steer, accelerate, and decelerate, but a driver has a to be alert and ready to take control of the wheel. Recently Audi introduced the world's first Level 3 AV.) *Editor's Note: See the related article on Page 17, which covers this vehicle development from Audi.*

"It's Level 3 that is the real tricky one," he says. Much like in a Level 2 vehicle, the system in a Level 3 AV will steer and accelerate on its own. But in this case, the driver won't need to monitor the road under certain conditions, allowing him or her to be truly hands-free. "Was the driver informed that he or she had to take over?" he continues. "If so, did the driver really take over?

At least one company is actively working with first responders on those questions. In the same report that highlighted Waymo's partnership with Chandler, the company also offers a glimpse at its collaboration efforts with fire and police departments in cities where they test their cars. Those cities, according to the report, can get on-site training for their officers and first responders on how to identify and assess self-driving cars after a collision, as well as "a line of communication for further engagement." (Waymo has not responded to CityLab's request to elaborate.)

Getting AVs out on the road has never been just about the technology; policymakers, researchers, and safety advocates have been going back and forth about how they should be regulated, and what traffic laws should look like in the future. And at least in early conversations, it seemed like law enforcement agencies were largely left out of the discussion. Last September, policy guidance from the Department of Transportation urged local officials to involve police and other first responders when considering whether to let companies test AVs in their state, and to train them on potential hazards. At the same time, as *Car and Driver* magazine noted, when the DOT formed a federal advisory committee in January focused on automation, law enforcement experts weren't included.

Yet, experts are already speculating that the age of AVs will change policing, and what the social implications of those changes may be. For one thing, a report by the Marshall Project predicts that it would be the end of traffic stops, which would also mean the end of so-called pretext stops, in which "officers stop a motorist for a minor violation in order to investigate a potentially more serious crime."

Other big questions remain unanswered, too, such as this one posed by the International Association of the Chiefs of Police in their publication, the *Police Chief*:

> ***One area of particular concern is the issue of law enforcement's access to the autonomous vehicle control systems. During a recent presentation on autonomous vehicle technology … one of the first questions asked by a member of the audience was whether or not regulations would mandate a "kill switch" to enable law enforcement agencies to shut down the vehicles if needed.***

In the meantime, the more common tasks like filing crash reports and issuing DUIs will be tweaked in some ways. And first responders should be a part of the conversation as much as the companies and local policy makers. "The initial challenges for AV development were technological—just trying to get the doggone thing to work," says Hedlund "Now the challenges are how to integrate it into the road, driver, and pedestrian systems, which includes a lot of crazy things [the companies] need to be responsible for, and law enforcement is key there."

The good news, he adds, is that the dynamic is changing. Some cities like Chandler have reached out to their police and fire departments before approving any tests on public roads. And there are all sorts of incentives—like avoiding liability—for companies to follow Waymo's lead in working with first responders.

Ramer acknowledges a lot of the changes will be a result of trial and error. For now, his biggest challenge is fully understanding how autonomous vehicles work. He says his department hasn't been offered Waymo's on-site training, but that his door will always be open—to any company looking for a partner.

Originally posted here on CityLab.com on October 25, 2017

Before self-driving cars take over the road, first responders need to know what they'll do in an emergency.

FLASH BACK

(where we are ONE YEAR LATER)

Autonomous Vehicles Will Mean the End of Traffic Stops

Robin Washington | 9.30.2016 (published in partnership with The Marshall Project)

If African-American motorists—or drivers of any color—deplore being pulled over for a broken taillight only to be socked with more serious charges, they can take heart that the practice should disappear within the next 20 years. Not that racial harmony will be achieved or that a new polymer will make taillights indestructible. Rather, it's that human beings won't be doing the driving. "I think you would see the end of traffic stops," Joseph A. Schafer, the criminal justice department head at Southern Illinois University, says of the coming of driverless cars. "It radically changes police-public encounters."

Schafer is a co-author of The Future of Policing and a member of Police Futurists International, a group describing itself as law enforcement and allied professionals focused on "improving criminal and social justice" through "long-range planning and forecasting." Schafer predicts it would be futile to ticket the occupants of self-driving cars. The drivers may not own the vehicles, which could be part of a Google or General Motors fleet that picks up and drops off riders all day long. In that case, he passengers may not have any responsibility for operating or maintaining these vehicles.

While driverless vehicles may seem like a distant fantasy, they're not far off. Uber has begun offering its service using semi-autonomous Ford Fusions in Pittsburgh. Automakers and tech companies are spending billions of dollars battling to be the first to bring fully autonomous vehicles to the market, with Ford promising to do so by 2021. There are driverless taxis in Singapore and minibuses in Switzerland and, if you or your neighbor has a recent-model car with adaptive cruise control, lane assist and collision avoidance, it already possesses the technology to drive itself. All that's needed to remove human drivers from the equation is for the cars to better learn to read and respond to the roads.

Various predictions envision a driverless society within 10 to 30 years. That means police departments must begin to develop tactics and equipment that aren't dependent on cruising and pulling people over. They haven't done so. "For the last decade, I've been talking to police executive training programs about the future of policing," says Schafer. "I would talk about autonomous cars. People looked at me like I was nuts"—until media attention focused on Google's testing of autonomous cars. Since then, officials have become more aware but still haven't begun serious planning, Schafer says. "I'm dealing with people in the second half of their career," he says. "Most assume they won't be in law enforcement by the time it becomes an issue. Some are banking on it: 'Man, this is going to be a headache. I'm glad I won't be around to take care of it.'"

Losing the pretext stop—where officers stop a motorist for a minor violation in order to investigate a potentially more serious crime—is no small thing. Schafer estimates such stops, along with traffic accidents, account for roughly half of all encounters with the public. Bernard Levin, a retired professor of psychology at Blue Ridge Community College in Weyers Cave, Virginia., and a co-author of The Future of Policing, calls it the "major means of catching people when we don't know who we're going for."

Other innovations also are poised to make cruising obsolete, including cameras at stoplights and speed monitors that offer 24/7 traffic enforcement at a fraction of the cost of humans officers and that already capture video of more serious crimes as they occur. Schafer says patrol drones might be the next stage.

"You could have multiple drones with one person back at the station applying human judgment when something pops up," says Schafer. "Unlike today driving around, they might observe a fight in process." Levin is skeptical that surveillance will supplant live policing.

"Most of policing isn't about technology, it's about people, and the technology is an add-on," he says. "There still will be tremendous need for a street cop, a patrol cop, to go to where the problem is and help people solve the problem. Sometimes you help people by arresting them. Most of the time, you just talk people out and help them wind up better than they were. The drone doesn't help you do that."

The experts do agree, however, that innovations will make it far easier for police to quickly get to a scene, regardless of how they're notified. Google already has received a patent on light detection and spacial recognition technology directing its driverless vehicles to clear the way for emergency vehicles. Expect future squad cars to add to a layer of redundancy by electronically announcing their presence to the traffic stream.

As for old-fashioned cops-and-robbers, high-speed chases are becoming obsolete too, says Levin. After John Dillinger and friends souped-up their getaway cars to leave Keystone Kops-style wagons in the dust, the high-performance squad car made its debut. But with the information explosion and cameras everywhere, the police chase today is not worth the risk, especially with accidents involving civilians, Levin says.

"I can go rob a bank in Sheboygan and 20 minutes later, they will have figured out who it is," he says. "Once they know who it is, it's not hard [to find them.] It's very hard to go anywhere without leaving footprints." Yet like Dillinger, expect criminals also to embrace driverless technology. "A cop will tell you very quickly, 'Gee, what you have now done is create a wonderful system for the transport of contraband,'" Levin says. He offers a solution: With fully autonomous cars and highways all interconnected, roads and vehicles could simply be powered off.

Driverless Cars Are Coming. What Does That Mean for Policing? | The Marshall Project

"Think of it as a bumper car ride in an amusement park," he says. "You can certainly have central control." If authorities know which vehicle carries the suspect , it could be disabled remotely (or for that matter, the car could be instructed to lock its doors from the inside and drive itself to the police station.) But it's more difficult if it's a manhunt involving a random car among several miles of vehicles on Interstate 95. "How far back (do you go)?" asks Levin. "Are you going to stop the whole country every time you have one bad guy in Springfield, Virginia?" Another futurist paints a more chilling picture, where the driverless world intersects with terrorism.

"The FBI actually put out a warning bulletin two or three years ago on what are called VBIEDs" – vehicle borne improvised explosive devices, says Marc Goodman, a global security consultant and author of Future Crimes. "Take the suicide bomber out of the mix and now you can have that very same threat delivered to your doorstep autonomously." You don't have to wait for the future: Some cars already can park themselves with no one inside, and options like Tesla's Summon feature allow the car to pull out of a space and drive itself to you a few dozen feet away. That's just enough time and distance for a terrorist to set an explosive device and walk away into a crowd – leaving little time for police to react.

Image and article:
https://www.wired.com/2016/09/autonomous-vehicles-will-mean-end-traffic-stops/

Pedestrian Hybrid Beacons

U.S. Department of Transportation,Federal Highway Administration, FHWA-SA-17-065

The pedestrian hybrid beacon (PHB) is a traffic control device designed to help pedestrians safely cross busy or higher-speed roadways at midblock crossings and uncontrolled intersections. The beacon head consists of two red lenses above a single yellow lens. The lenses remain "dark" until a pedestrian desiring to cross the street pushes the call button to activate the beacon. The signal then initiates a yellow to red lighting sequence consisting of steady and flashing lights that directs motorists to slow and come to a stop. The pedestrian signal then flashes a WALK display to the pedestrian. Once the pedestrian has safely crossed, the hybrid beacon again goes dark.pedestrian desiring to cross the street pushes the call button to activate the beacon. The signal then initiates a yellow to red lighting sequence consisting of steady and flashing lights that directs motorists to slow and come to a stop. The pedestrian signal then flashes a WALK display to the pedestrian. Once the pedestrian has safely crossed, the hybrid beacon again goes dark.

More than 75 percent of pedestrian fatalities occur at non-intersection locations, and vehicle speeds are often a major contributing factor.[1] As a safety strategy to address this pedestrian crash risk, the PHB is an intermediate option between a flashing beacon and a full pedestrian signal because it assigns right of way and provides positive stop control. It also allows motorists to proceed once the pedestrian has cleared their side of the travel lane, reducing vehicle delay. *(Data from the AAA Foundation for Traffic Safety, Impact Speed and a Pedestrian's Risk of Severe Injury or Death, September 2011.)*

Pedestrian Hybrid Beacons

Safety Benefits:

69%
Reduction in pedestrian crashes

29%
Reduction in total crashes

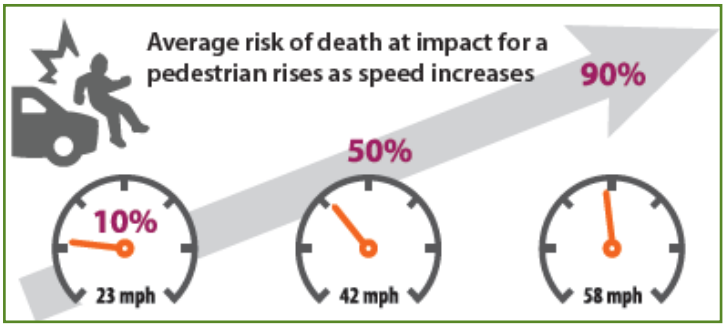
15%
Reduction in serious injury and fatal crashes

Pedestrians cross the roadway at a PHB location.

Source: City of Tuscon, Arizona

Source: CMF Clearinghouse, CMF IDs: 2911, 2917, 2922.

Transportation agencies should refer to the *Manual on Uniform Traffic Control Devices* for information on the application of PHBs. In general, PHBs are typically used when gaps in traffic are not large enough or vehicle speeds are too high for pedestrians to cross safely. PHBs are not widely implemented, so agencies should consider an education and outreach effort when implementing a PHB within a community.



[1] National Highway Traffic Safety Administration, *Traffic Safety Facts – 2015 Data – Pedestrians*. Report DOT HS 812 375, (Washington, DC: 2017).

For more information on this and other FHWA Proven Safety Countermeasures, please visit https://safety.fhwa.dot.gov/provencountermeasures.

Over the years, I have encountered a wide array of unique vehicle inspection assignments. Sometimes the circumstances of the loss are quite clear, other times not so clear.

Figure 1. 2005 Hyundai Santa Fe

What Vibration?

Not too long ago, I was asked to inspect a 2005 Hyundai that reportedly had excessive vibration while being driven. I arrived at the inspection and completed an initial examination of the Hyundai *(Figure 1)*. Aside from badly worn front tires, everything else appeared normal. But once on the highway, a terrible vibration emanated through the floor pan and shook the steering wheel. I returned to the facility and asked to have the front wheels rotated to the rear. Once again I ventured out on the highway only to find the same intense vibration. I again retuned to the facility and requested the Hyundai be put on a twin post hoist. As soon as the Hyundai was elevated on the hoist, the origin of the vibration was quickly discovered. What was once an all wheel drive vehicle was now only a front wheel drive. The rear driveshaft and a portion of the gear box had been torn out when the Hyundai struck a roadway object *(Figures 2 and 3)*.

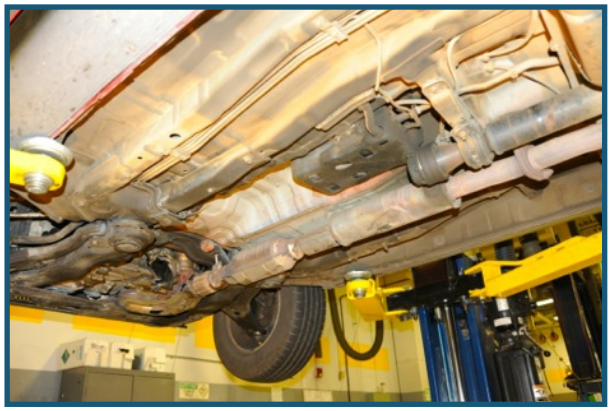


Figure2. Undercarriage of the Hyundai Santa Fe

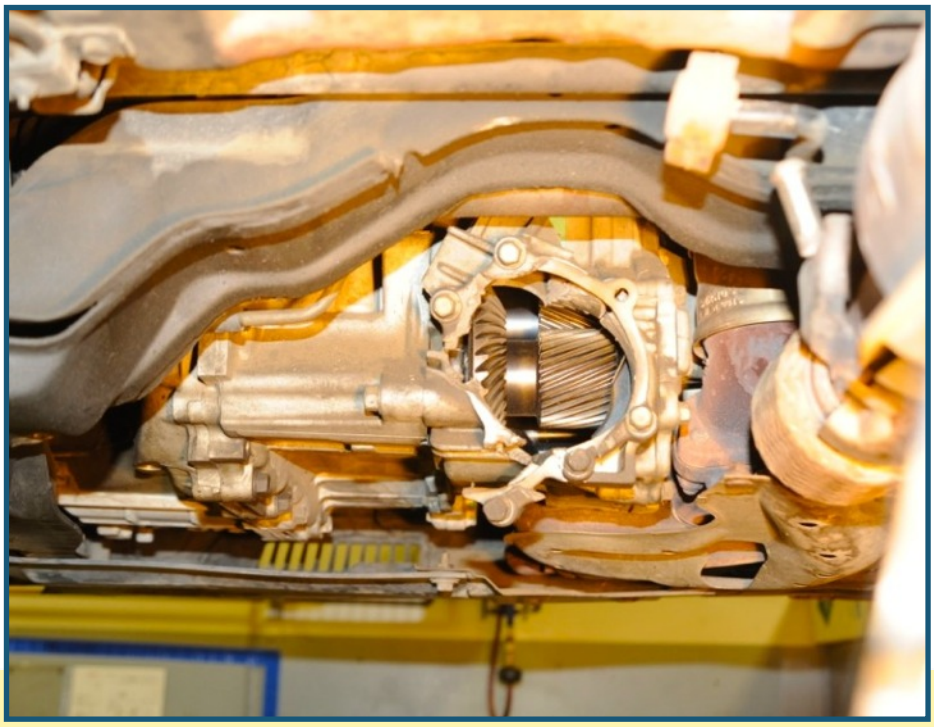


Figure 3. Gear box damage to the Hyundai

Quality Repairs

On another assignment, I was asked to inspect a 2006 Mercedes Benz ML500. According to the owner, he was exiting a parking lot at LAX when he lost all steering. He subsequently struck a parked car before coming to rest. The Mercedes Benz was taken to a holding facility where I inspected it *(Figure 4)*. Utilizing a floor jack, I raised the damaged right front section. Once raised, the cause of the accident became readily apparent. The owner had new front struts installed and the technician failed to reinstall the upper control arm retaining nut.

Figure 4. Mercedes ML500 upon initial inspection

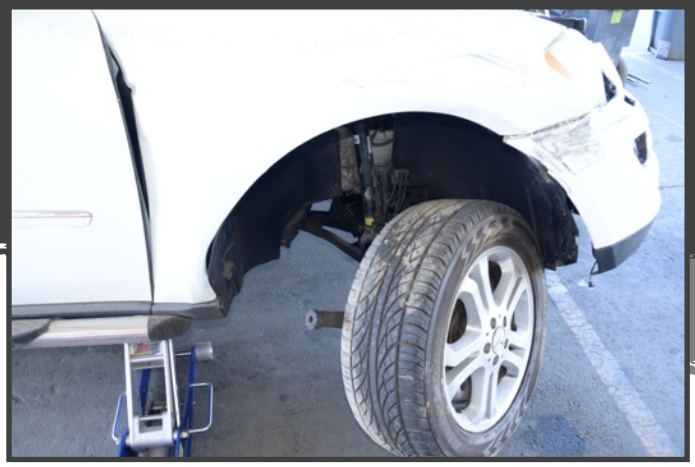


Figure 5. Mercedes ML500 with right-front wheel lifted

Figure 6. Right front upper control arm close-up

Someone Doesn't Like Him

Reportedly, the driver was traveling down the roadway in his Ford when he said he lost all steering. Fortunately, he did not strike any other vehicles. The Ford was taken to a body shop (Figure 7). The technician removed the wheel.

Figure 7. Ford C-Max at body shop, right front wheel removed

The inner wheelhouse panel had contact damage from clockwise wheel rotation *(Figure 8)*.

Figure 8. Damage to Ford C-Max at right front wheel

The steering tie rod had separated *(Figure 9)*. Upon close examination, I determined someone had backed off the nut and cut through approximately 60% of the rod with a rotary saw *(Figures 10 and 11)*.

Figure 9. Ford C-Max right-front tie rod

Figure 10. Close-up of the nut, which had been backed off (above-left).

Figure 11. Close-up of the tie rod with partial cut (left).

Figure11. *Maserati as parked at body shop*

Staged Accident

Reportedly, the Insured was driving her 2016 Maserati on a street, in Pomona. At an intersection, she changed into the left turn lane. As she proceeded with her left turn, an unknown large white truck ran the red light and struck the right side of the Maserati. No police report was filed. She had a private tow service tow the Maserati to a body shop *(Figure 11)*. The passenger side contained a large puncture, copious amounts of thick white paint transfer and no evidence of lateral movement *(Figure 12)*. The thick white paint appeared to have been applied by multiple impacts *(Figure 13)*. Seat belt pretensioners did not deploy *(Figures 14-15)*.

Figure 12. *Damage to passenger side of Maserati*

Figure 13. *Close-up of damage depicted in Figure 12*

The Maserati is equipped with an event data recorder (EDR) that has the ability to record five seconds of pre-crash data. The EDR was accessed and 34 pages of crash data related to two different lateral events was found. The two events shared the same key cycles (1616) and odometer reading of 9,408 miles.

Figure 14. *Right-front passenger restraint (overview, top left).*

Figure 15. *Right front passenger restraint, extended by author (bottom left).*

The EDR also recorded the outside temperature at the time of each event. The first recording was at a temperature of 104°, the second event was 94°. In all likelihood, the time between the events was several minutes to account for the 10° drop in temperature. During both events, the transmission was in park, the brakes were not applied and the engine was at idle *(Figure 16)*.

A sample of the white paint was collected and sent to the lab for analysis. The analysis showed the paint was not automotive paint. The lab FT-IR analysis is seen below *(Figure 17)*.

Pre-Crash Data (1st Prior Event - table 3 of 4)
(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Braking System, Brake State	PRNDL Status	Reverse Gear (Manual Only)	Tire Pressure Monitor Indicator Lamp	Tire Pressure Status, LF	Tire Pressure Status, RF	Tire Pressure Status, LR	Tire Pressure Status, RR
-5.0	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.9	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.8	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.7	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.6	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.5	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.4	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.3	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.2	No Braking	Park	No	Off	Normal	Normal	Normal	Normal
-4.1	No Braking	Park	No	Off	Normal	Normal	Normal	Normal

Figure 16. *Maserati EDR data table showing vehicle was in Park*

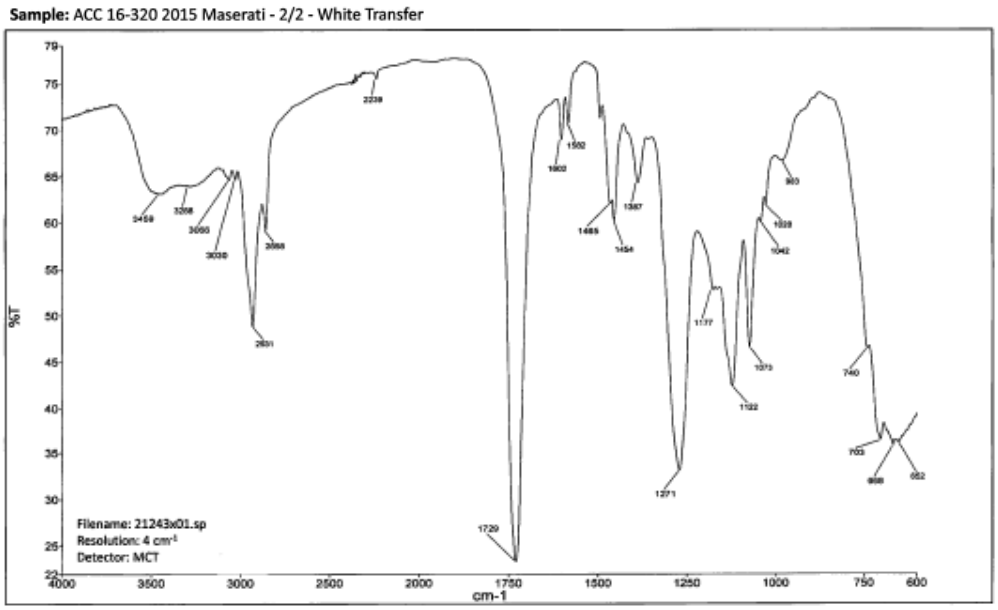


Figure 17. *Maserati paint sample graph*

Clearly, the evidence does not support the Insured's version of the facts of the loss. The 2016 Maserati was stationary, unoccupied, with the transmission in park, and the engine idling when the passenger side damages were created. In all likelihood, the Maserati was struck with an industrial forklift, or similar piece of equipment. The first impact did not create enough damage, so it was struck a second time.

About the Expert *– Dr. Kenneth R. Zion, CA2RS Member and owner of Automotive Collision Consultants, is an automotive collision and mechanical expert with over 40 years of automotive repair experience. He specializes in inspecting and analyzing vehicles for suspected repair fraud, failure analysis, staged accidents, and accident reconstruction. He maintains numerous automotive ASE / ICAR certifications and a Master certification in Automotive Collision/Painting.*

Here Are All The Cars Reported To Have Exploding Sunroof Problems

Jalopnik - David Tracy | October 25, 2017 | MSN Autos

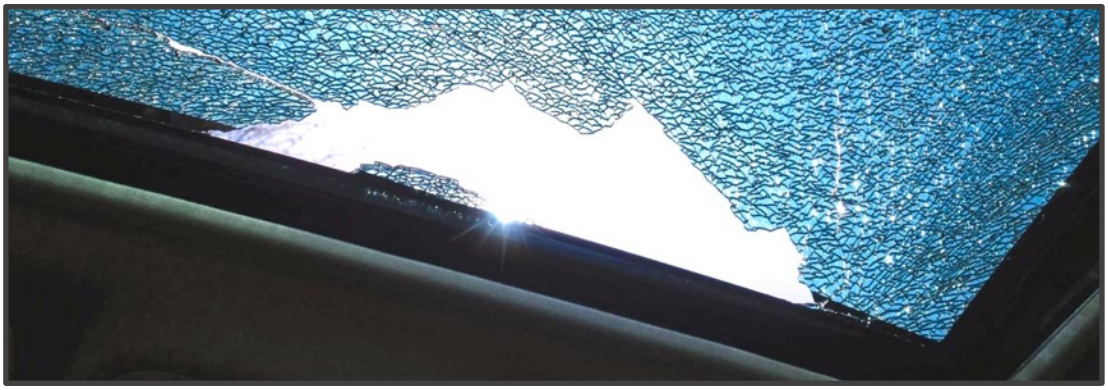
Sunroofs on dozens of newer car models from around the world are shattering spontaneously, leaving owners perplexed and seeking answers. But while even experts don't know entirely why this is happening, we do know which cars are yielding the most complaints to regulatory agencies.

Canadian news site *Global News* writes about a couple driving to a doctor's appointment with their three-month old child, when the sunroof in their 2016 Volkswagen Jetta shattered, showering bits of glass onto their baby, and causing the driver to swerve the car.

This wasn't the only complaint of a sunroof shattering seemingly instantaneously. The news site says that, according to data from Transport Canada, complaints about exploding sunroofs have gone from zero in 2007 to "over 110" in 2016, and those complaints already total 103 so far in 2017.

Global News writes that, since 2000, the regulatory agency has 351 recorded complaints about breaking sunroofs, with the list below detailing ten of the models that received the most:

- *Hyundai Santa Fe (37)*
- *Nissan Murano (19)*
- *BMW 3 Series (13)*
- *Kia Sorento (10)*
- *Mazda3 (9)*
- *Toyota RAV4 (9)*
- *Nissan Rogue (9)*
- *Ford Focus (8)*
- *Ford Edge (6)*
- *Hyundai Elantra (6)*



Earlier this month, *Consumer Reports* wrote a lengthy article describing this "exploding sunroof" issue in the United States, citing a mother named Heather Savage, whose 2016 Nissan Pathfinder had its sunroof explode with two of her children in the car. Luckily, her shade was rolled forward, and the glass didn't enter the vehicle.

The nonprofit group says in its story that of the 859 complaints filed by owners with the National Highway Traffic Safety Administration since 1995, 71 percent were logged in 2011 or later, and almost all were explosive:

> ***"...while some details vary, they're identical to Heather Savage's experience in this way: A sunroof suddenly shatters with no direct or known cause."***

Consumer Reports, which writes that these sunroof explosions "have happened in every month of the year in every part of the country, in vehicles from all over the world" and on every type of road, found that the most common vehicles included in the 859 complaints to NHTSA were the Scion tC, Hyundai Veloster, Kia Sorento, Nissan Murano and Kia Optima.

And those 859 complaints, *Consumer Reports* writes, aren't truly representative of the total number of sunroof failures, with the site writing:

> ***"While owners of Kia Sorentos have filed at least 43 reports of shattered sunroofs with US regulators, Kia has told NHTSA it has at least 156 Sorento sunroof cases in its own records. Kia Optima owners have filed at least 25 reports with regulators, but the company told NHTSA it is aware of 173 shattered Optima sunroofs."***

"Ford reported 88 sunroof explosions for its Edge crossover vehicle – 11 times the number of complaints that have been reported to NHTSA." So clearly it's a lot more prevalent of an issue than your average person might think, even if *Consumer Reports* admits that "the odds of this happening to you are low."

Why Is It Happening? And Why Now?

One theory for why sunroofs are shattering has to do with manufacturing defects. *Global News* cites the head of research for a large glass repair company, saying contaminants in glass (which is often tempered for strength, but shatters instead of just cracking) can cause high internal stresses, especially in high temperature conditions, which can increase the chance of breakage.

***Consumer Reports* spoke with someone who worked at major automotive glass company PPG, who said even a small chip on the "beveled edge" on the outside of the glass can make the sunroof prone to failure. That source also said thermal shock and loads associated with the twisting of the body as the car hits bumps could contribute to the sunroof "weakening over time."**

But the real issue, which *Consumer Reports'* sources and *Global News'* sources seem to agree on, is impact damage on sunroofs that have gotten much larger over time, with *Consumer Reports* reporting:

> *"One problem is that modern designs are more three-dimensional and often involve bending glass to the curvature of the roof, notes Rob Vandal, senior director of research and development with Guardian Glass, a major American automotive glass supplier. That makes them more susceptible to impacts, even from very small objects, Vandal says, because they present a more vertical surface for an offending object to strike."*

***Global News* has something similar from its sources, writing: "What generally causes the glass to shatter is accidental damage," said Davies. "A rock or even something as small as a pebble hitting the glass can cause it to shatter, especially if the glass has already been subjected to significant stress."**

Indeed, "the majority of complaints received by Transport Canada involved breakage due to impact," the agency told Global News via email. Sunroofs are getting big and geometrically complex, meaning accidental damage is more likely than ever.

What's Next?

So basically, modern car sunroofs, which have become quite prevalent and also rather large and ornate, are prone to damage from a variety of sources, especially external impacts. This is not a particularly surprising revelation. Still, that doesn't mean something shouldn't be done about the failures. In March of 2016, the 2011 to 2013 Kia Sorento was recalled in Canada after it became clear that the sunroof was susceptible to shattering, especially on gravel roads.

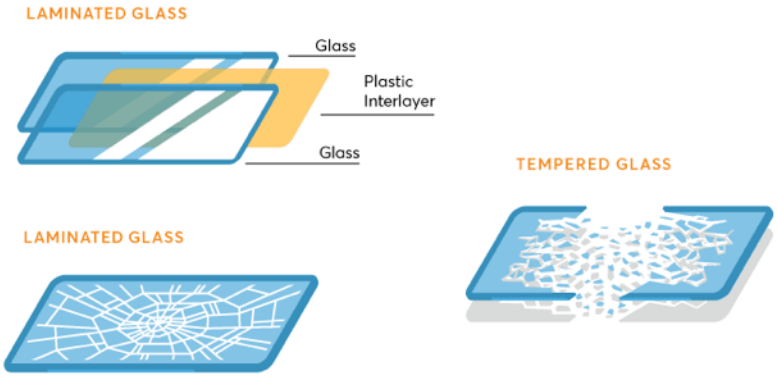
ON THAT THOUGHT...

The NHTSA Office of Defect Investigation is looking into eleven complaints received from owners of 2012 Hyundai Veloster vehicles, who allege that their panoramic sunroofs shattered or exploded.

Of the eleven complaints, seven of the owners say that the sunroof shattered while driving at typical highway speeds. "I was driving, making a left hand turn from a stop light and then heard a very loud bang! The sunroof above me shattered and fell all over me, the car, and outside," one Veloster owner wrote in a submitted complaint to NHTSA. Other owners complaints indicate that there were no abnormal conditions on the day when the sunroof shattered, such as high or low temperature, with one owner even reporting that it happened while he was washing his car, saying that glass flew up to six feet in all directions. The defect is being investigated, and may result in a recall if the sunroofs are found to be defective.

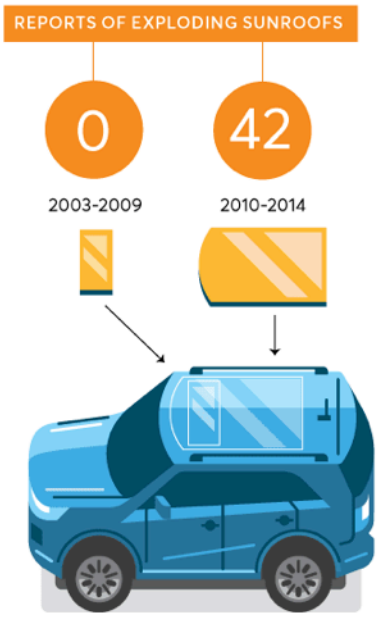
One Way to Make Sunroofs Safer: Stronger Glass

Using laminated glass—two panes fused by a sheet of plastic—instead of tempered glass could make sunroofs safer, in part because they are more likely to stay in one piece and hold their form when broken.



An Investigation of the Kia Sorento

The Sorento is the only car being investigated by the federal government for sunroof problems. There were no reports of exploding sunroofs by consumers to the government with the Sorento's original design, from 2003 to 2009. But 2010 to 2014 models, with panoramic sunroofs, had 42 complaints. Reports dropped with the 2015 model. Kia told CR that changes to the Sorento design were not in response to the breakage incidents.



Source: Data come from the National Highway Traffic Safety Administration Office of Defects Investigation's vehicle owner complaint database, for 1995 to September 2017. The complaints are self-reported.

Those same vehicles, says *Consumer Reports,* are under investigation in the U.S., with the nonprofit writing: "NHTSA has been investigating the Sorento for model years 2011 to 2013 since 2013, yet visible progress appears to have slowed since spring of 2016."

There have been quite a few sunroof recalls in the U.S. over the years dealing with shattering sunroofs, with the consumer advocate noting:

"Aside from its current investigation into the Sorento, the agency has conducted four previous sunroof-defect investigations since 2004. Two resulted in automaker recalls while the models were under NHTSA investigation—for the 2012 Hyundai Veloster and the 2004 Nissan Maxima. Two others closed with no defect identified—the 2004-2006 Cadillac SRX and the 2005-2006 Scion tC. Those two models are among the top 10 in consumer complaints."

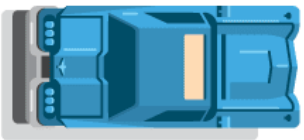
"Audi and Volkswagen have issued sunroof recalls without NHTSA first opening an investigation, Audi for its 2012 Q5 and the 2013-2014 A8 and S8, and Volkswagen for its 2013-2015 Beetle. A spokesman for both brands told CR, "We take the safety of our products seriously."

For its part, *Consumer Reports* suggested three next-steps on this issue. It wants all automakers with patterns of sunroof shattering to order recalls. It also wants regulators to "expand their investigation of the Sorento to include other automakers and models."

And finally, *Consumer Reports* thinks "the auto industry as a whole needs to establish stronger safety standards for so-called panoramic sunroofs without waiting for regulators."

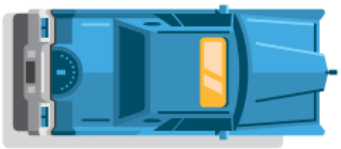
Innovations in Sunroof Design Over Time

Cars have had sunroofs—panels that allow in air, light, or both—since at least the 1930s, though their popularity really took off in the 1960s. Here are some milestones in the evolution of their size and design.



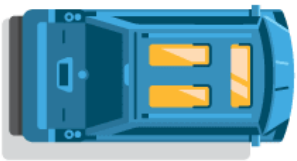
1960 | FORD THUNDERBIRD

Ford featured a retractable sunroof on one of its most iconic models, promoting it heavily in ads.



1973 | LINCOLN CONTINENTAL MARK IV

Lincoln's luxury sedan came with an option for a retractable glass sunroof.



2004 | NISSAN QUEST

In one of the first "panoramic" sunroof systems, Nissan went for a more open-feeling cabin by using several individual glass panels.

2012 | HYUNDAI VELOSTER

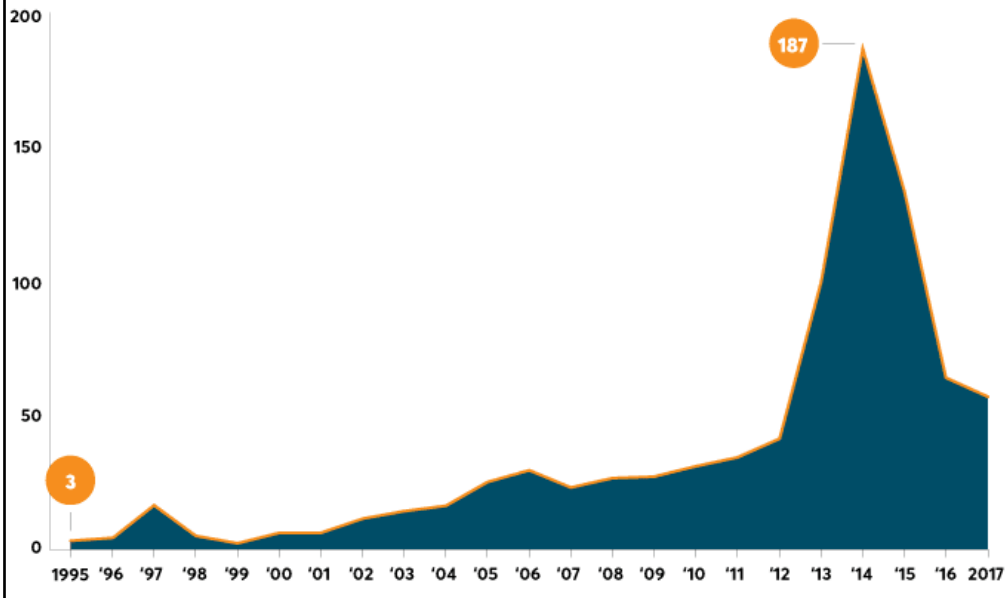
This Hyundai car shows the trend toward larger panoramic sunroofs that extend over nearly the entire roof.

> *"Shattered sunroofs have been reported in vehicles representing 35 brands over the last 20-plus years in the U.S."*

> *"An exploding sunroof might sound like a freak occurrence, but a Consumer Reports investigation has found that it's not."*

Exploding Sunroof Incidents, 1995-2017

The number of complaints to the government increased steadily from 1995 until 2013, and then spiked through 2015, particularly for Kia and Hyundai. Complaints have since declined for cars from those automakers. When asked why, Kia offered no explanation, and Hyundai said its recall of the Veloster fixed a flaw in the assembly process that may have damaged the glass.



Source: Data come from the National Highway Traffic Safety Administration Office of Defects Investigation's vehicle owner complaint database, for 1995 to September 2017. The complaints are self-reported.

Report from Anaheim—CAARS Annual Conference

by Roman Beck

The 2017 Annual CAARS Conference was held from October 26-28 in Orange, California. Seventy five members attended the conference and four vendors hosted tables. Orange was familiar turf for the CAARS Conference and it appeared as if the hotel and the surrounding night-life and restaurants were enjoyed by all. Ms. Jahna Rinaldi took care of the registration, hotel arrangements, and all other amenities. As always, she did a wonderful job making sure everyone was comfortable and happy. The conference topics were Motorcycles, Roadway Drag Factor Evaluation, Toyota Techstream, Rollovers and were presented by Jeff Bell, Lou Peck, Bill Focha, and MEA Forensic. The speakers were familiar to the group from previous conferences and training sessions, and were kind enough to once again travel to Orange to share their knowledge with us.

The conference opened up on Thursday morning with Motorcycle Collision Reconstruction and Dynamics by Steve Anderson of MEA Forensic. He first discussed motorcycle dynamics including wobble and weave, with excellent videos as illustration. Then he discussed weight transfer during braking, leaning and counter-steering. He also covered a variety of reconstruction techniques, including video analysis, PC Crash multibody analysis, skidmark analysis, and Kawasaki EDR systems. He concluded the presentation with cases studies, including momentum analysis using EDR data from motor vehicles. He also demonstrated techniques for coordinating laser scanner data with surveillance video.

After a wonderful buffet lunch arranged by Jahna, Jeff Bell of the California Highway Patrol presented on roadway drag factor evaluation. He started with an introduction of MAIT (Multidisciplinary Accident Investigation Team) and its structure/functions. He then discussed various types of friction, and methods for determining these values. Drag sleds, accelerometers, radar, and published data are some of the methods for determining an appropriate braking drag factor. He concluded the presentation with two case studies that involved multiple techniques for determining a range of braking drag factors.

Towards the end of the day, Jonathan Lawrence of MEA Forensic presented on Automatic Emergency Braking (AEB) and the Toyota Techstream tool. The presentation covered many automated and semi-automated vehicle functions, and concluded with a parking lot demonstration of AEB involving a Toyota approaching a mock vehicle. Mr. Lawrence then used the Techstream tool to query the vehicle for data related to these and other driving tests.

On Friday morning, Cole Young and Dave King started a marathon day covering rollovers and critical speed yaw. The presentation covered statistics and previous research, followed by test methodology. Using videos and testing, they discussed the stages of a rollover crash, from initial loss of control, to trip, and followed by roll/pitch to final rest. The presentation of the loss of control phase provided the attendees a wealth of calculations and evidence, especially for determining whether the driver was braking during the pre-trip yaw. The presentation continued with an excellent set of photographs and diagrams depicting scratch patterns and how to determine a rollover sequence from them.

After a second fine lunch at the hotel, Cole and Dave continued their detailed presentation, including testing of vehicle rollovers. They discussed what evidence to look for at the scene and on the vehicle. The spectacular graphics helped make the presentations enjoyable and informative. Tim Nelson of MEA Forensic concluded the day with a great presentation on biomechanics of rollovers, with special emphasis on injury types and patterns.

On Saturday morning, the Annual CAARS General Membership meeting was conducted. Included in the meeting were elections to the CAARS Board of Directors: Jahna Beard was re-elected to Vice-Chair, Roman Beck, Dave Cameron and John Crews were re-elected to their positions of Directors-at-Large. The conference concluded with a presentation by Lou Peck on motorcycle reconstruction techniques and a review of the June motorcycle crash tests conducted in Vallejo. These motorcycle presentations covered a wide range of useful topics, especially wheelbase reduction formulas and momentum applications.

The conference ended at approximately noon with a raffle of prizes. We look forward to what the 2018 CAARS Conference will bring! See you in South Lake Tahoe, California.

— *Roman*

Approach and Implementation of an sUAS (Drone) Program for Accident Investigation

Presented by Adam Hyde

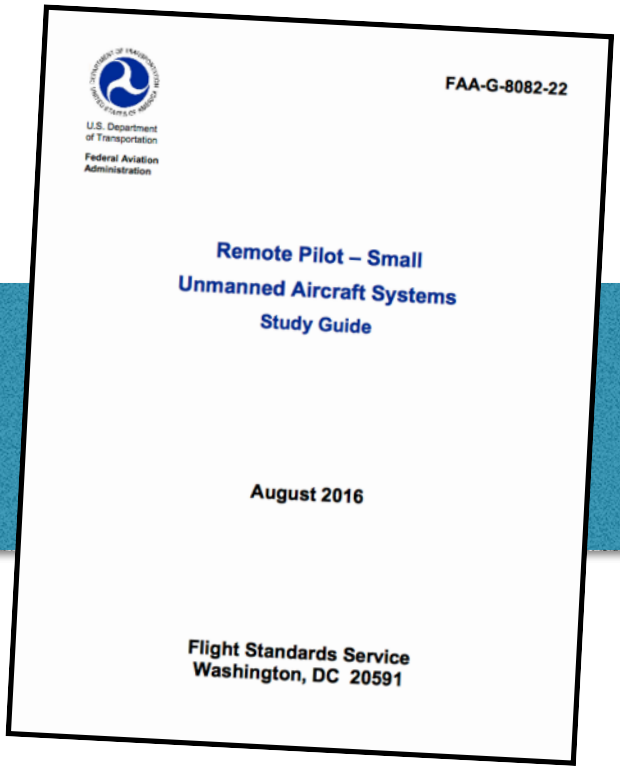
Southern California

January 24, 2018: 0800-1700 hours

Hosted by the Glendora Police Department

150 South Glendora Avenue
Glendora, CA 91741

Please park on the streets around the Civic Center, and NOT in the combo Police/Library parking lot.


U.S. Department of Transportation
Federal Aviation Administration

FAA-G-8082-22

Remote Pilot – Small
Unmanned Aircraft Systems
Study Guide

August 2016

Flight Standards Service
Washington, DC 20591

Northern California

January 25, 2018: 0800-1700 hours

Hosted by the Vallejo Police Department

Dan Foley Cultural Center
1499 North Camino Alto
Vallejo, CA 94589

Audi takes its self-driving car where others dare not go

The automaker is betting big on Level 3 autonomy.

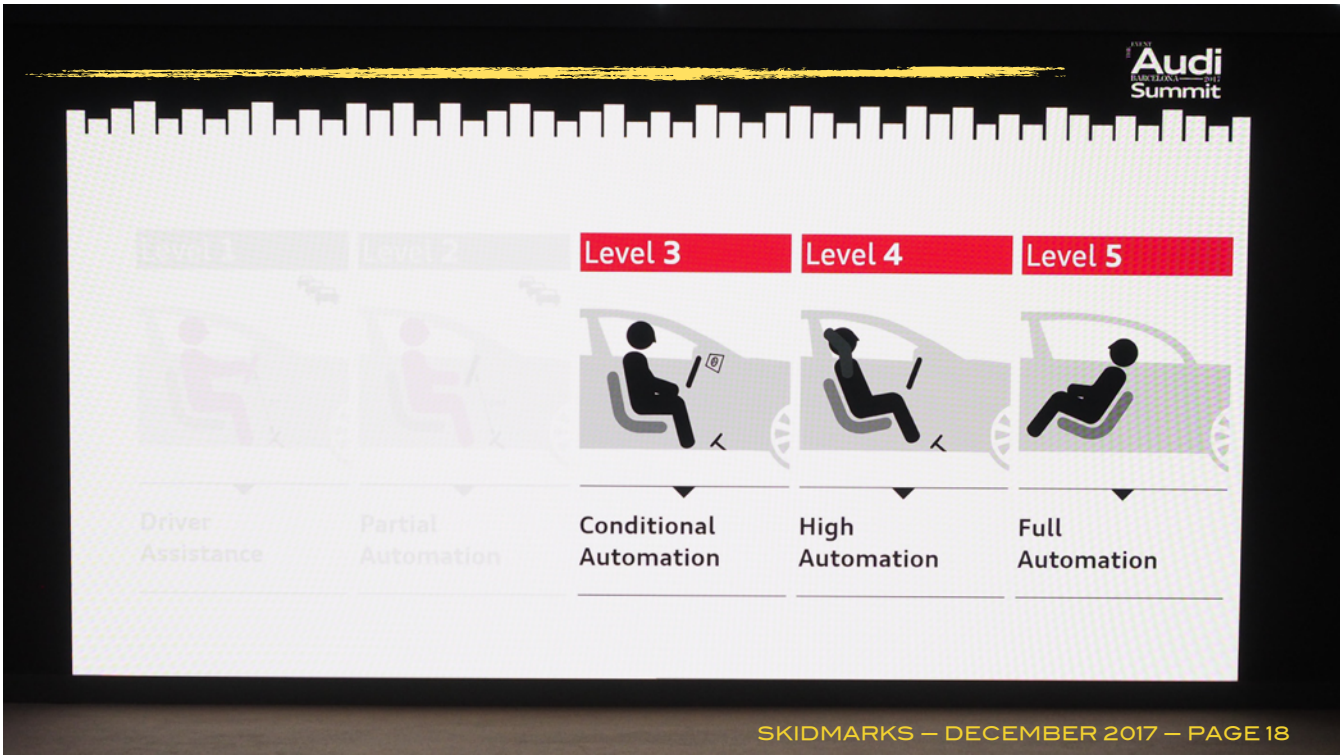
July 11, 2017 || engadget.com || Roberto Baldwin

The self-driving future has a ratings scale. The classifications begin at zero, where you're constantly in charge of all the car's acceleration, steering and braking. Basically a car without cruise control. It ends with Level 5, where the car that doesn't even need a steering wheel or a driver. Currently, if drivers want semi-autonomous features they're getting a Level 2 experience. Like Tesla's Autopilot or Cadillac's Super Cruise, the car can drive itself in specific situations (usually on the highway) but require the human behind the wheel to pay attention and take over at a moment's notice.

At its first tech summit, Audi introduced the new A8 with Level 3 autonomy. It's the first production vehicle that'll let the driver actually stop paying attention while the car drives itself. It's also a big deal for the automaker and drivers that really need to update their Facebook status while commuting. Here, the company is making a bet that other companies have decided to pass on.

Most automakers see Level 4 as the next logical step for their vehicles. At that stage, the car is is almost totally in control all of the time without any human interaction and will only stop itself if there's a system failure or the conditions dictate that the human behind the wheel needs to take control.

A Level 3 vehicle can also drive itself without the driver paying attention. But not all the time and usually only in certain circumstances. Still, that's a huge leap from what's currently on the road and requires constant supervision by the driver. But before you start planning on napping while driving to work, this level of autonomy still requires the driver to take over if the system gets confused or fails.

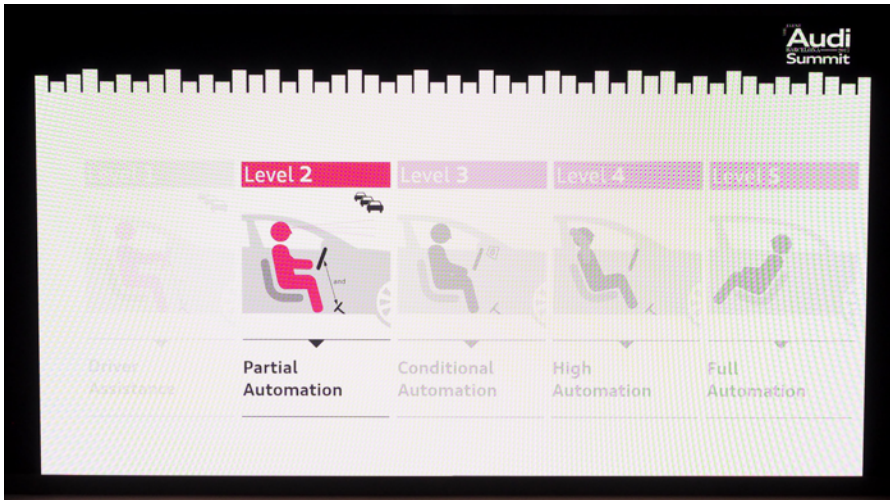


It's that last bit that's had automakers like Volvo and Ford publicly state that they will go directly to Level 4. The argument against a Level 3 vehicle being sold to the general public is about safety. If a driver becomes too dependent upon the car's autonomy, they're less likely to intervene when the system fails. While Elon Musk has called out these automakers for withholding what he perceives are additional safety features that would ship with a Level 3 car, it's likely that Tesla will jump to Level 4. Musk has even noted that Level 5 autonomy will be available in approximately two years.

Audi's system seems to address some issues around Level 3 driving with Driver Ability Detection. This brings the car to a stop if it determines that the driver is not attentive and able to take control of the vehicle after 10 seconds of audible and visual warnings. At that point, the vehicle turns on the hazard lights and alerts Audi. Also it's not Level 3 everywhere, just in heavy traffic going slower than 37 miles per hour.

Even then, Audi's Traffic Jam Pilot feature requires that the vehicle is on a divided highway with a barrier or at least a median between the vehicle and opposing traffic. Basically it's the road most people drive everyday to work. It's a very specific circumstance that many people deal with everyday and during that time, the A8 will drive for you and, I can't believe I'm saying this, you can text your friends while behind the wheel or even watch TV as noted by Audi.

The biggest obstacle to the vehicle being able to deliver on all its technical promises is regional regulations.



While an A8 can drive itself without the driver paying attention, where it's being driven will determine whether it's allowed to. That's going to be true for many vehicles in the future. Just because a car delivers Level 4 or even Level 5 automation, it doesn't mean lawmakers are going to let it actually happen on the roads under their watch.

So if you live in a state or country that allows Audi's flagship luxury sedan to take care of the heavy lifting while you're commuting, count yourself lucky. The automaker may be going all in on Level 3, but it hinted at the ability to update the new A8 to Level 4 capabilities via a software update -- if the hardware can handle it.

Regardless of how lawmakers initially react to the new car's technology, Audi is moving forward. The company will further fine-tune its AI and algorithms in anticipation of an autonomous world. The A8 isn't so much a bet as an investment for Audi, as it levels up in the world of self-driving vehicles.

One-Off $2 Million Pagani Zonda Crashes in England

MSN, The Drive || Chris Constantine || October 24, 2017

An incredibly rare Pagani Zonda crashed on the A27 in Tangmere, England near West Sussex this weekend, according to the BBC. Sussex police reported that the car was cruising with a group of other performance cars on Saturday morning when it lost control and collided with a guardrail, causing significant damage to the front and rear of the Zonda. The entire front bumper was completely ripped off and the area around the back left wheel has been dented, causing damage to the Pagani's rear wing. Thankfully, the driver was not injured.

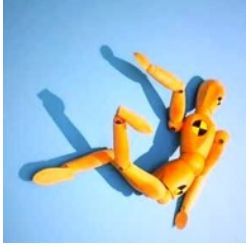
CarBuzz collected more information about this particular Zonda, revealing that it's Peter Saywell's one-off Zonda PS. It's unknown if Saywell was driving the vehicle at the time of the crash, but the car was on its way to a track day hosted by the collector when it hit a guardrail.

Unlike other Zonda 760s, the PS started with its quad exhaust tips in a row instead of Pagani's signature "exhaust square" featured on the regular Zonda and the Huayra. Many will argue that this is the car that started the 760 series of bespoke Zondas, which brought the 7.3-liter AMG engine's power output up to 760 PS (750 horsepower). Saywell's car was originally commissioned in white with yellow accents but went back to Pagani in 2013 for a major overhaul. It was repainted in bright blue and had its exhaust system swapped for the traditional square layout. It also borrowed aero bits like the roof scoop and spoiler from newer 760 cars like the 760LH and 760RS, but received carbon-fiber fenders to make it unique. This is going to be one expensive repair bill for Mr. Saywell, but the mighty Zonda PS will live to see another track day.

Pagani Zonda PS

10 Cars Pass IIHS' New Passenger-Side Crash Test

Crash tests show automakers made strides in passenger safety



One year after a crash test raised questions about the safety provided to passengers in the front seat of small SUVs, a new set of tests paints a more encouraging picture.

The Insurance Institute for Highway Safety (IIHS) conducted new crash tests where the brunt of the collision was absorbed by the front passenger side of mid-size cars.

The results? Ten of the 13 cars tested were graded as doing a "good" job protecting passengers, the highest mark given by the Insurance Institute. One car, the Volkswagen Jetta, was rated as "acceptable" and two models, the Volkswagen Passat and Chevrolet Malibu, were rated as providing "marginal" protection, the second lowest grade awarded by the IIHS.

"We're excited by the results," said Becky Mueller, senior research engineer for IIHS. "All of the structures we tested were greatly improved compared to the structures of small SUVs tested last year." Mueller said she believes automakers have learned to put a greater emphasis on protecting passengers in the front seat, especially when it comes to collisions where the front passenger corner of a car hits another vehicle or object while traveling at 40 miles per hour.

Still, there are areas where the IIHS said automakers can make improvements. For example, the airbags for five cars allowed the crash test dummy to slide too far forward so it either hit or came close to hitting the dashboard. Meanwhile, the seat belt designs for some models also allowed too much forward motion during crash tests.

Mueller said both problems can be corrected by engineers working on the design of the passenger seat airbags and seat belts. "Overall, passengers should feel confident riding in the front seat," said Mueller. "But we don't want anyone to slip through the cracks, so there are still some improvements that can be built into these cars."

https://www.cnbc.com/2017/10/18/crash-tests-show-automakers-improved-passenger-safety.html

VEHICLES EARNING A GOOD RATING ON THE PASSENGER SIDE CRASH TEST THEIR FIRST TIME OUT:

'17s

- 2017 Ford Fusion
- 2017 Honda Accord
- 2017 Hyundai Sonata
- 2017 Lincoln MKZ
- 2017 Mazda6
- 2017 Nissan Altima
- 2017 Nissan Maxima

'18s

- 2018 Subaru Legacy
- 2018 Subaru Outback
- 2018 Toyota Camry

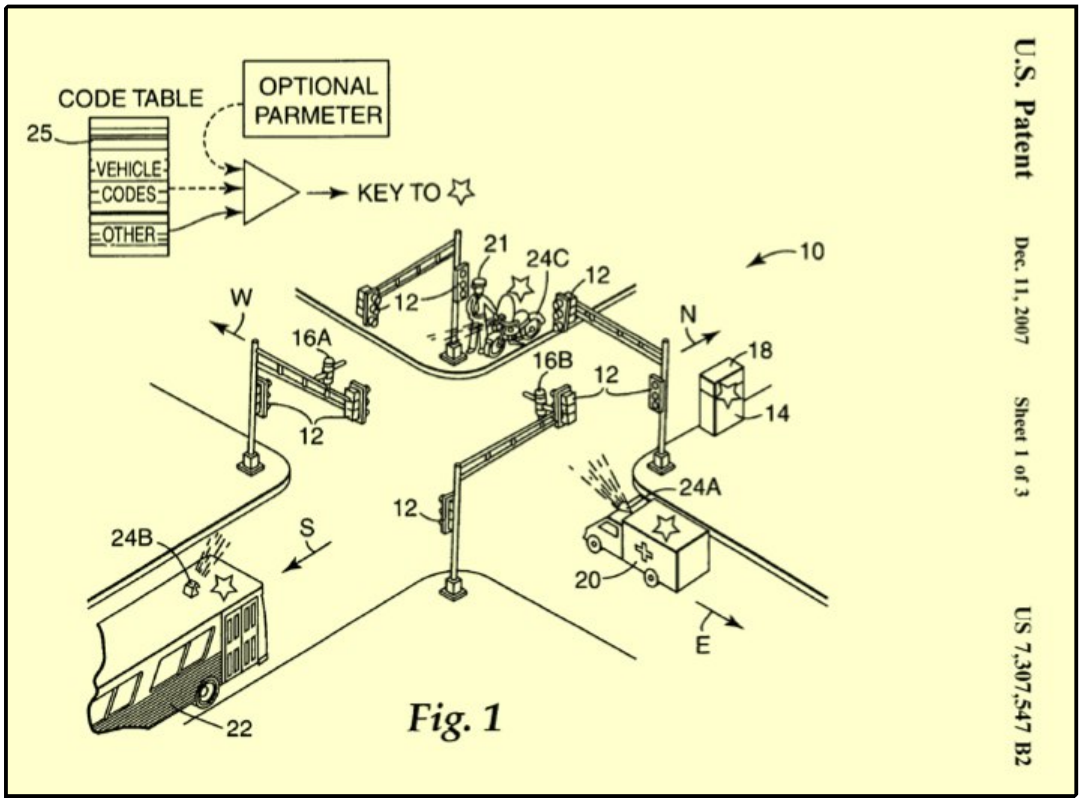
how the OPTICOM and automated signal pre-emption influences traffic

Traffic signal preemption (also called **traffic signal prioritization**) is a type of system that allows the normal operation of traffic lights to be preempted. The most common use of these systems is to manipulate traffic signals in the path of an emergency vehicle, halting conflicting traffic and allowing the emergency vehicle right-of-way, to help reduce response times and enhance traffic safety.[1] Signal preemption can also be used by light-rail and bus rapid transit systems to allow public transportation priority access through intersections, or by railroad systems at crossings to prevent collisions.

Implementation

Traffic preemption devices are implemented in a variety of ways. They can be installed on road vehicles, integrated with train transportation network management systems, or operated by remote control from a fixed location, such as a fire station, or by a 9-1-1 dispatcher at an emergency call center. Traffic lights must be equipped to receive an activation signal to be controlled by any system intended for use in that area. A traffic signal not equipped to receive a traffic preemption signal will not recognize an activation, and will continue to operate in its normal cycle.

Vehicular devices can be switched on or off as needed, though in the case of emergency vehicles, they are frequently integrated with the vehicle's emergency warning lights. When activated, the traffic preemption device will cause properly equipped traffic lights in the path of the vehicle to cycle immediately, to grant right-of-way in the desired direction, after allowing for normal programmed time delays for signal changes and pedestrian crosswalks to clear. Traffic signal preemption systems integrated with train transportation networks typically extend their control of traffic from the typical crossarms and warning lights to one or more nearby traffic intersections, to prevent excessive road traffic from approaching the crossing, while also obtaining the right-of-way for road traffic that may be in the way to quickly clear the crossing. This also allows buses and hazmat vehicles in the USA to proceed through the intersection without stopping at the railroad tracks.



Fixed-location systems can vary widely, but a typical implementation is for a single traffic signal in front of or near a fire station to stop traffic and allow emergency vehicles to exit the station unimpeded.

Alternatively, an entire corridor of traffic signals along a street may be operated from a fixed location, such as to allow fire apparatus to quickly respond through a crowded downtown area, or to allow an ambulance faster access when transporting a critical patient to a hospital in an area with dense traffic.

Traffic signal preemption systems sometimes include a method for communicating to the operator of the vehicle that requested the preemption (as well as other drivers) that a traffic signal is under control of a preemption device, by means of a notifier. This device is almost always an additional light located near the traffic signals. It may be a single light bulb visible to all, which flashes or stays on, or there may be a light aimed towards each direction from which traffic approaches the intersection.

US007307547B2

(12) **United States Patent**
Schwartz

(10) **Patent No.: US 7,307,547 B2**
(45) **Date of Patent: Dec. 11, 2007**

(54) **TRAFFIC PREEMPTION SYSTEM SIGNAL VALIDATION METHOD**

(75) Inventor: **Mark A. Schwartz**, River Falls, WI (US)

(73) Assignee: **Global Traffic Technologies, LLC**, Oakdale, MN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 103 days.

4,734,881	A	3/1988	Klein et al.
4,914,434	A	4/1990	Morgan et al.
4,970,439	A	11/1990	Stopa
4,972,185	A	11/1990	Stopa et al.
4,992,790	A	2/1991	Montgomery
5,014,052	A	5/1991	Obeck
5,159,480	A	10/1992	Gordon et al.
5,172,113	A	12/1992	Hamer
5,187,373	A	2/1993	Gregori
5,187,476	A	2/1993	Hamer
5,202,683	A	4/1993	Hamer et al.

(Continued)

In the case of multiple notifier lights at a controllable intersection, they will either flash or stay on depending on the local configuration, to communicate to all drivers from which direction a preempting signal is being received. This informs regular drivers which direction may need to be cleared, and informs activating vehicle drivers if they have control of the light (especially important when more than one activating vehicle approaches the same intersection). A typical installation would provide a solid notifier to indicate that an activating vehicle is approaching from behind, while a flashing notifier would indicate the emergency vehicle is approaching laterally or oncoming. There are variations of notification methods in use, which may include one or more colored lights in varying configurations.

(57) **ABSTRACT**

A secure optical-communication traffic-preemption system and method is provided that securely communicates an identification code from an optical emitter to a traffic location. The optical emitter transmits light pulses that represent an encrypted code that is an encryption using a time-varying encryption key of at least an identification code. An optical detector situated at a traffic location receives the transmitted light pulses. Validation, including decryption using a time-varying decryption key, is attempted for the encrypted identification code represented within the received light pulses. In response to validating the included identification code, a traffic-preemption command is generated for a traffic light at the traffic location.

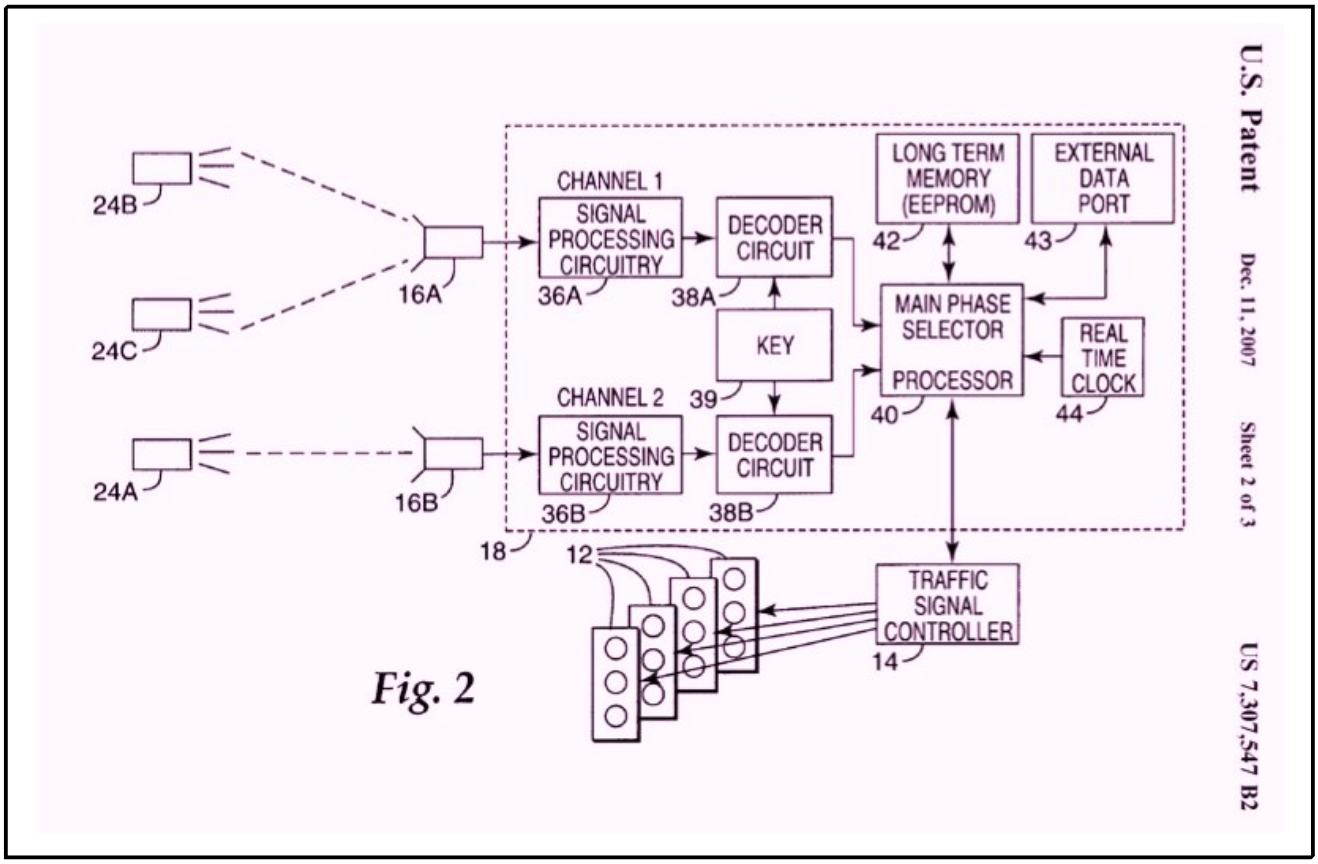
Events leading up to an activation and notification are not experienced by drivers on a daily basis, and driver education and awareness of these systems can play a role in how effective the systems are in speeding response times. Unusual circumstances can also occur which can confuse operators of vehicles with traffic preemption equipment who lack proper training. For example, on January 2, 2005, a fire engine successfully preempted a traffic light at an intersection which included a light rail train (LRT) crossing in Hillsboro, Oregon, yet the fire engine was hit by an LRT at the crossing.

A subsequent inquiry determined that the LRT operator was at fault. The accident occurred in the middle of a network of closely spaced signalized intersections where the signs and signals granted right-of-way to the LRT simultaneously, at ALL intersections. The LRT operator was viewing right-of-way indications from downstream signals and failed to realize that preemption had occurred at the nearest intersection. The fire engine, granted the green light before it arrived at the intersection, proceeded through while the LRT operator, failing to notice the unexpected signal to stop, ran into the fire engine and destroyed it.[2]

Vehicular device types

Acoustic

Some systems use an acoustic sensor linked to the preemption system. This can be used alone or in conjunction with other systems. Systems of this type override the traffic signal when a specific pattern of tweets or wails from the siren of an emergency vehicle is detected. Advantages of a system like this are that they are fairly inexpensive to integrate into existing traffic signals and the ability to use siren equipment already installed in emergency vehicles – thus dispensing with the need for special equipment. A major disadvantage is that sound waves can easily be reflected by buildings or other large vehicles present at or near an intersection, causing the "reflected" wave to trigger a preemption event in the wrong direction. Reflected waves can also create unnecessary collateral preemption events alongside streets near the emergency vehicle's route. Yet another disadvantage is that the acoustic sensors can sometimes be sensitive enough to activate the preemption in response to a siren from too far away, or from an unauthorized vehicle with a horn exceeding 120 dB (many truck and bus horns exceed this threshold at close range).[3]



Line-of-sight

A vehicle that uses a line-of-sight traffic signal preemption system is equipped with an emitter which typically sends a narrowly directed signal forward, towards traffic lights in front of the vehicle, to attempt to obtain right-of-way through controllable intersections before arriving at the intersection. These line-of-sight systems generally use an invisible infrared signal, or a visible strobe light which serves a dual purpose as an additional warning light. The emitter transmits visible flashes of light or invisible infrared pulses at a specified frequency. Traffic lights must be equipped with a compatible traffic signal preemption **receiver** to respond. Once the vehicle with the active emitter has passed the intersection, the receiving device no longer senses the emitter's signal, and normal operation resumes. Some systems can be implemented with varying frequencies assigned to specific types of uses, which would then allow an intersection's preemption equipment to differentiate between a fire engine and a bus sending a signal simultaneously, and then grant priority access first to the fire engine.

Drawbacks of line-of-sight systems include obstructions, lighting and atmospheric conditions, and undesired activations.

Obstructions may be buildings on a curving road that block visual contact with a traffic signal until very close, or perhaps a large freight truck in front of a police car blocking the traffic signal from receiving the emitter's signal from the police car.

Modifying the position of the receiver or even locating it separate from the traffic signal equipment can sometimes correct this problem.

Direct sunlight into a receiver may prevent it from detecting an emitter, and severe atmospheric conditions, such as heavy rain or snow, may reduce the distance at which a line-of-sight system will function.

Undesired activations may occur if an emitter's signal is picked up by many traffic lights along a stretch of road, all directed to change to red in that direction, prior to the activating vehicle turning off the road, or being parked without its emitter being deactivated.

Line of sight emitters can use IR diodes. They are pulsed with a low-priority signal (10 Hz) or a high-priority signal (14 Hz).[4]

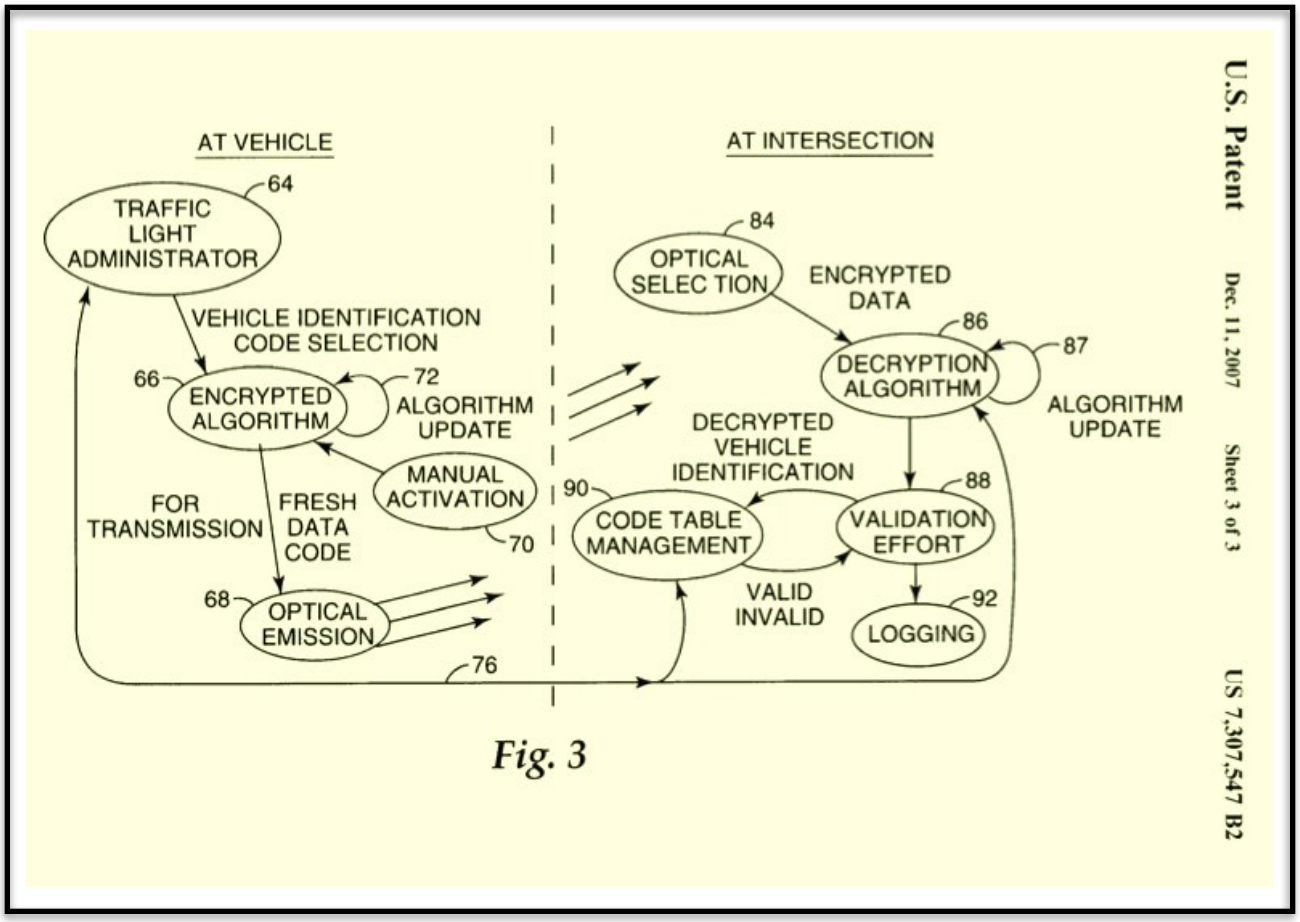


Fig. 3

Localized radio signal

Radio-based traffic-preemption systems using a local, short-range radio signal in the 900MHz band, can usually avoid the weaknesses of line-of-sight systems (2.4 GHz and optical). A radio-based system still uses a directional signal transmitted from an emitter, but being radio-based, its signal is not blocked by visual obstructions, lighting or weather conditions. Until recently, the major drawback of radio-based traffic signal preemption systems was the possibility of interference from other devices that may be using the same frequency at a given time and location.

The advent of FHSS (Frequency Hopping Spread Spectrum) broadcasting has allowed radio-based systems to not only overcome this limitation, but also the aforementioned limitations associated with acoustic and line of sight (optical) systems. It was not until recently that cost effective GPS preemption systems were introduced, supplanting FHSS radio-based preemption as the preemption method of choice, particularly for cities that had experienced the myriad of issues associated with other (acoustic and optical) preemption systems.

Radio-based systems also began to offer some additional benefits – adjustable range and collision avoidance. The operating range was adjusted by varying the radio signal strength so that traffic lights could be activated only nearby (if desired), or at greater distances. The downside to these preemption systems (which also performed collision avoidance) was that they would display the direction of impending collisions, but not be able to effectively (or accurately) calculate the distance to collision by any method other than RF signal strength, which was only a rough estimate at best.

Global Positioning System

With the advent of widespread Global Positioning System (GPS) applications came the introduction of a GPS-based traffic preemption system, that could also do collision avoidance. Recently some GPS preemption systems (see first two external links below) have found a way to overcome the nagging problem that "blinds" many GPS systems: how to prevent the system from being "blinded" by the loss of a GPS signal. In dense cities with tall buildings, GPS receivers may have difficulty obtaining the four required GPS satellite signals, required for trilateration to determine location. If the vehicle systems are not designed with a backup "IMU" (Inertial Measurement Unit), lack of GPS availability may adversely affect the system's performance (see first external link below). Extremely heavy cloud cover or severe weather can also adversely impact the ability of the GPS receiver from obtaining the four required satellites.

By Niagara - Own work, GFDL, https://commons.wikimedia.org/w/index.php?curid=3422715

Notes:

1. *"Gadget Buzz". cnet.com. Retrieved 2007-06-05.*
2. *Accidents Point Up Dangers of Rail Transit Archived October 3, 2006, at the Wayback Machine.*
3. *https://ntl.bts.gov/lib/jpodocs/repts_te/14097_files/14097.pdf*
4. *http://www.tech-faq.com/how-do-traffic-lights-work.html*

From https://en.wikipedia.org/wiki/Traffic_signal_preemption. Accessed December 9, 2017

From time to time, I am asked a question about commercial vehicles. The answer to the questions could benefit more than just the person who asked the question. This column answers commercial vehicle-related questions. If you have a question feel free to contact me at wfocha@comcast.net

QUESTION: *I have a few questions about a crash I was assigned to follow-up. Recently patrol officers at my department investigated a collision involving a Ford F250 pickup truck pulling a two axle utility trailer. The trailer contained five tons of construction material. We know the weight from shipping papers the driver furnished to the investigating officer. The driver of the truck ran a red light and collided with several cars in the intersection. The truck left locked-wheel skid marks, but the trailer left none. Is the trailer required to have brakes? – DC*

ANSWER: DC, thank you for your question. It sounds like you have a lot going on in this case that would make for several columns. I will address the brake issues in this column.

The short answer is yes, the trailer should have had working brakes. California Vehicle Code (CVC) Section 26302 (a) states in part, every trailer or semitrailer, manufactured and first registered after January 1, 1940, and having a gross weight of 6,000 pounds or more and which is operated at a speed of 20 miles per hour or over shall be equipped with brakes. Subsection (b) says, "Every trailer or semitrailer manufactured and first registered after January 1, 1966 and having a gross weight of 3,000 pounds or more shall be equipped with brakes on at least two of its wheels." Subsection (c) states, "Every trailer or semitrailer manufactured after January 1, 1982 and equipped with air brakes shall be equipped with brakes on all wheels." Lastly, subsection (d) states, "Brakes required on trailers or semitrailers shall be adequate, supplemental to the brakes on the towing vehicle, to enable the combination of vehicles to comply with the stopping distance requirements of section 26545 CVC."

Additionally CVC section 26453 CVC states, "All brakes and component parts thereof shall be maintained in good working order. The brakes shall be so adjusted as to operate as equally as practicable with respect to the wheels on the opposite side of the vehicle. Most of the trailers that are not equipped with air brakes will have electric or hydraulic brakes."

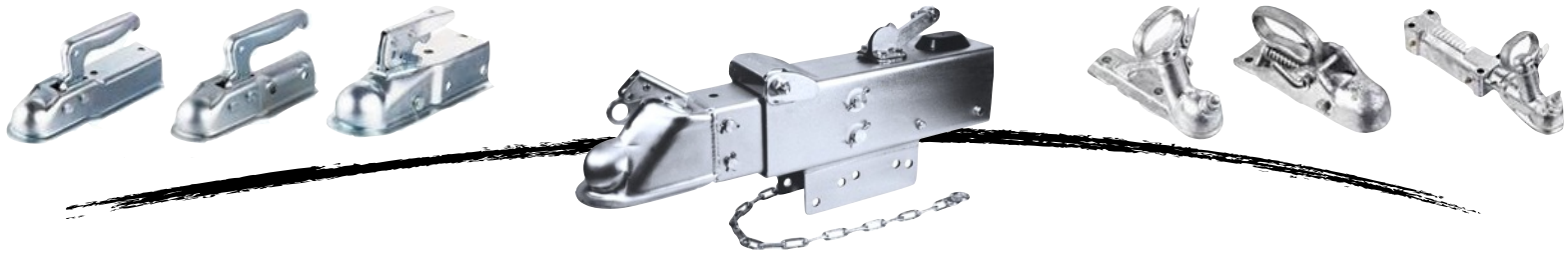
Figure 1: *Photo of a surge brake*

Hydraulic brakes are also called surge brakes. They can be recognized by a robust actuator at the trailer hitch and a large lever at the top of the actuator (*see Figure 1*). The brakes are actuated when the towing vehicle slows to come to a stop the inertia of the trailer pushes against the hitch.

As the force pushes against the hitch it pushes a piston into a master cylinder. The piston forces hydraulic fluid into hoses and tubes that direct the fluid to slave cylinders at each wheel end. The slave cylinder pushes the brake shoes against the brake drum thus slowing and stopping the wheel.

Figure 2: *Photo of a trailer hitch equipped with an electrical brake*

The large lever on top of the actuator is the breakaway brake. The lever should be attached to the tow vehicle by a chain or cable. If the trailer becomes disconnected from the tow vehicle the chain will become tight and move the lever and apply the brakes. Electric brakes are by far the most popular type of trailer brakes. Trailers with an electrical brakes are recognized by a smaller hitch, such as the one depicted in Figure 2 (above).



Electric brakes are actuated when the driver applies the service brakes in the towing vehicle. An electrical signal is sent from the brake light switch to the brake controller in the cab of the truck (see Figure 3, below left). The brake controller modulates and electric current to the trailer through the pigtail connection between the tow vehicle and the trailer. The electrical current energizes an electromagnet at the wheel end. The magnet is attached to an actuator arm. When the magnet is energized the magnet attempts to adhere to the brake drum thus forcing the brake shoes against the drum, slowing the wheel.

The breakaway brake on an electric braked trailer is recognizable by a small black plastic box (see Figure 4, below right). The box is on the tongue of the trailer and has a cable attached to it. The cable attaches to the tow vehicle. If the trailer becomes unattached from the towed vehicle the cable will pull out of the black box. This will cause electrical power from a storage battery on the trailer to energize the magnets and stop the trailer.

DC, thanks again for the great question. Stay tuned for some comments next time on some of the additional aspects of your collision.

Keep the questions coming.

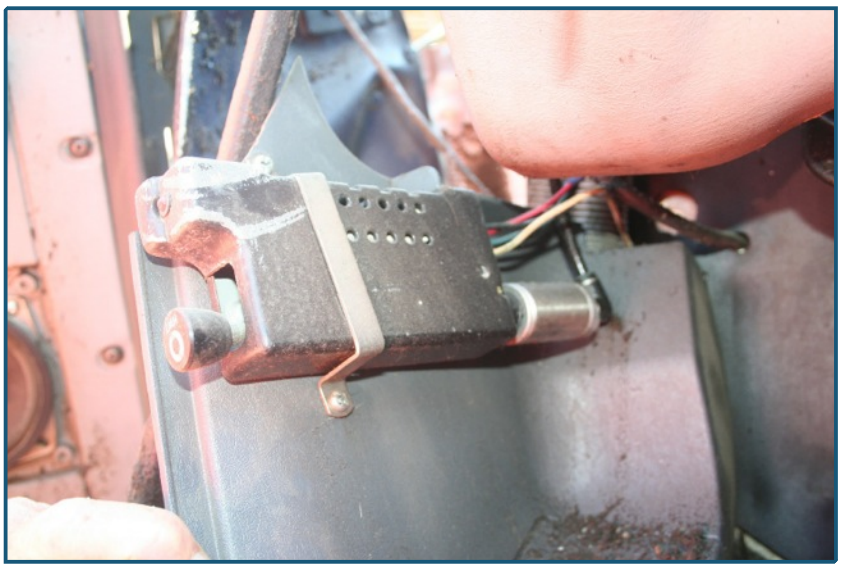


Figure 3: *Photo of a brake controller in the cab of the truck*

Figure 4: *Breakaway brake for electric trailer*

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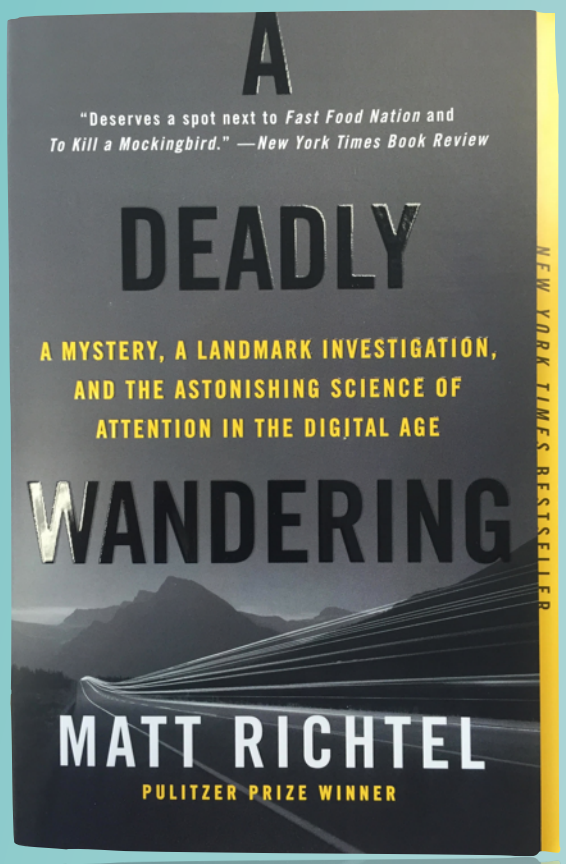
A Deadly Wandering: A Tale of Tragedy and Redemption in the Age of Attention

by Matt Richtel

A novelist and Pulitzer Prize-winning New York Times reporter explores with nearly Javertian persistence one of the early cases of traffic fatalities caused by texting while driving.On Sept. 22, 2006, college student Reggie Shaw, texting in his truck, veered into the oncoming lane on a narrow highway near Logan, Utah,and struck a car, knocking it into an approaching truck. Both men inside that car were rocket scientists with families, and both died. Richtel (Devil's Plaything, 2011, etc.) begins his account with an MRI of Shaw's brain (he returns to this scene near the end), then reports the crash in detail, following the story to its most recent legal and emotional conclusions (insofar as there can be conclusions). He alternates his focus throughout: from Shaw and his family, to the victims' families, to the police and legal system, to the legislators considering texting laws, to the latest scientific research on how much we can possibly attend to in our incredibly distracting world (not nearly as much as we think).

Readers will be alarmed to discover what science has learned about the dangers drivers create when they text or talk on the phone. The vast majority of us arejust not capable of doing so safely. Richtel excels at bringing to life his cast of sundry characters. (Virtually everyone agreed to interviews.) Readers get to know Shaw's parents, the widows, the daughters of the victims, the attorneys on both sides, a judge who keeps Les Misérables near at hand (and required Shaw to read it), a victims rights advocate,scientists and, of course, Shaw himself, who emerges as a modest young man (a devout Mormon), a young man who'd never before been in trouble, a young man who, we eventually realize, could be any one of us. Comprehensive research underlies this compelling, highly emotional and profoundly important story.

Kirkus Reviews



"A portrait of our digital age that will deeply frighten you and cause you to reevaluate many common aspects of your 'connected' life. ... An extraordinarily important book that everyone—and I mean everyone—should read."

Douglas Preston

Koenigsegg's Agera RS is the fastest car in the world – *FOR NOW*

Ronan Glon / November 6, 2017 / DigitalTrends

As Hennessey was introducing the 300-mph Venom F5 in Las Vegas, Swedish boutique carmaker Koenigsegg prepared to make headlines with its own record-breaking car. The company asked the Nevada Department of Transportation (NDOT) to close an 11-mile stretch of Route 160 between Sin City and Pahrump to allow the company to put its ultra-exclusive, ultra-expensive supercar through its paces on a public highway.

The excitement was palpable as the winged, dark red Agera RS (below right and left) lined up right in the middle of Route 160 with factory test driver Niklas Lilja behind the wheel. To beat the record, he needed to make two runs down the same stretch of road at an average speed of over 268 mph, the record set by the Bugatti Veyron Super Sport in 2010. Company officials chose Nevada due to the state's abundance of long, straight stretches of relatively flat roads, and its low population density. The Las Vegas Review Journal nonetheless wrote motorists traveling through the area faced 20-minute delays.

Koenigsegg published a video showing Lilja briefly hitting 284.55 mph during his first run. He maxed out at 271.19 mph during the second run, which averages out to 277.9 mph. And as a result, ladies and gentlemen, the Agera RS is officially the world's fastest production car. The record was verified by officials from the Guinness Book of World Records.

Setting a speed record is no small feat, but the Agera RS packs a serious amount of firepower. The company's official website explains power comes from a twin-turbocharged, all-aluminum 5.0-liter V8 engine tuned to make a monstrous 1,160 horsepower at 7,800 rpm and 944 pound-feet of torque at 4,100 rpm. Those figures aren't jaw-dropping, not when the Bugatti Chiron offers 1,500 hp, but the Agera RS benefits from the widespread use of lightweight materials like carbon fiber (which is even found in the suspension system) and aluminum. It tips the scale at a little over 3,000 pounds, while the 16-cylinder Chiron checks in at about 4,400 pounds.

The Agera RS recently broke another speed record. It might not keep its title for very long, though. Hennessey promised the Venom F5 (below left) can reach over 300 mph, a figure that has left many skeptical due in part to the limited availability of street-legal tires capable of hitting such high speeds without shredding into pieces like mozzarella on a Domino's pizza. Promising to break the 300-mph threshold is easy, but Hennessey will need to prove it in order to be taken seriously. The Agera will lose its crown when and if that happens – unless Koenigsegg has another trick up its sleeve.

ACTAR EXAMINATION DATES

FEBRUARY 2018

3 BRISBANE, QUEENSLAND (AUSTRALIA): SPONSORED BY MDATAI. APPLICATION SUBMITTED BY DECEMBER 5, REGISTER BY JANUARY 4, 2018. LOCATION TBD, EXAM STARTS AT 0800 HOURS.

16 EDMONTON, ALBERTA: SPONSORED BY CATAIR. APPLICATION SUBMITTED BY DECEMBER 18, REGISTER BY JANUARY 17, 2018. HELD AT RENNEBERG-WALKER ENGINEERING, 9320-49 STREET. EXAM STARTS AT 0800 HOURS.

APRIL 2018

13 GOLDEN, CO: SPONSORED BY CSP. APPLICATION SUBMITTED BY FEBRUARY 12, REGISTER BY MARCH 14. HELD AT THE CSP ACADEMY, 15055 SOUTH GOLDEN ROAD. EXAM STARTS AT 0800 HOURS.

13 DETROIT, MI: SPONSORED BY MICHIGAN STATE PATROL. APPLICATION SUBMITTED BY FEBRUARY 12, REGISTER BY MARCH 14. HELD AT MICHIGAN STATE PATROL DISTRICT 2 HQ, 1301 THIRD STREET. EXAM STARTS AT 0800 HOURS.

MAY 2018

18 EDMONTON, AB: SPONSORED BY CATAIR. APPLICATION SUBMITTED BY MARCH 19, REGISTER BY APRIL 18. HELD AT RENNEBERG-WALKER ENGINEERING, 9320-49 ST. EXAM STARTS AT 0800 HOURS.

JUNE 2018

8 MARIETTA, GA: SPONSORING AGENCY TBD. APPLICATION SUBMITTED BY APRIL 9, REGISTER BY MAY 9. HELD AT 662 SOUTH COBB DRIVE, MARIETTA.

NO EXAMS SCHEDULED FOR MARCH, JULY, AUGUST, OR SEPTEMBER AT THIS TIME.

GO TO ACTAR.ORG FOR ADDITIONAL DETAILS/INFORMATION

If, like us, you still think those vending machines that pluck your drink from its spot and whoosh it down to you like a space capsule are cool, this bad boy is about to blow your mind. Singapore's Autobahn Motors have built what is arguably the most extravagant vending machine in the world. It opened in December 2016, and bills itself as 'the world's largest luxury car vending machine' stocking 60 of the world's most expensive and desired rides. Bentleys, Ferraris, Lamborghinis, Mustangs. It's a petrol head's dream!

4 glass columns with 15 storeys punctuate the Singapore skyline. When illuminated at night it looks totally surreal. Stood on the ground floor, customers choose the car they want to see and, thanks to an advanced car retrieval system, it arrives in front of them in just two minutes.

As you might imagine these motors are pretty pricey, with the Lamborghini Aventador topping out at $339,951. This is more than just a publicity stunt though. Whilst it's visually stunning, it was created to make use of the very limited land space in Singapore. In one of the world's most densely populated cities, looking up is the way to go!

https://www.icoolkid.com/video/supercar-skyscraper

parting shot
parting thought

It has been my pleasure to bring you the topics, images, book reviews, and current events related to the field of collision investigation and reconstruction in the newsletters over the past few years. I have made many friends and have enjoyed this small contribution to an excellent organization. To borrow the words of AA Milne, "How lucky I am to have something that makes saying goodbye so hard."

Thank you –

Tim

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