SKID MARKS

THE OFFICIAL PUBLICATION OF THE CALIFORNIA ASSOCIATION OF ACCIDENT RECONSTRUCTION SPECIALISTS

CHANGES BEST NOT TAKEN FOR GRANTED

A RETROSPECTIVE OF AUTOMOTIVE AND TRAFFIC HEROES

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As I reflect on 2016, I realize the CA2RS organization had another very successful year in many ways!

First, in the area of training–arguably the organization's most important mission–we had a very productive year. Our three quarterly training sessions saw new topics introduced and discussed. The attendance at the quarterly trainings this year, both in Northern and Southern California, was higher than ever. This tells me two things: we are offering interesting training to the membership and the membership is more involved than in past years. This increased involvement by the membership is encouraging to me and the other members of the BOD. The Annual Conference, held this year in South Lake Tahoe, also had greater attendance that we have seen in recent years.

Probably the most exciting and memorable event of 2016 was CA2RS participation and involvement in WREX 2016 in May. The WREX Conference was the largest conference ever held in the field of accident investigation and reconstruction with over 800 people in attendance from all over the world. Many people in attendance at the WREX Conference, including folks who have attended several conferences in our field over the years, stated it was the best Conference they had ever attended. I am proud to report the CA2RS Organization and its members played a key role in the success of the WREX Conference. Despite being 3,000 miles away from the location of the conference, CA2RS had the most attendees of any organization other than NAPARS (a national organization). Members of CA2RS were active volunteers in the Crash Testing events, which was lead by our own Bill Focha (who was the Chairman of the CrashTesting Committee). CA2RS was an initial participating organization of the WREX Conference putting in "seed" money to help finance the efforts. I am happy to report we have been reimbursed all of our seed money. In addition, we were also reimbursed all of the money we spent for Bill Focha to attend all of the planning meetings over the past three years.

Membership in the CA2RS organization continues to be strong, our financial position is solid and we are achieving our mission of providing valuable training and opportunities for networking. Members have recently commented that the current state of the CA2RS Organization is better than it ever has been. That is great to hear!

I was honored recently to be elected to serve for another term as the Chairman of the CA2RS Organization. I am privileged to work with a great group of people on the BOD and supporting staff who make my job much easier. I believe the fact that we work so well collectively as a team makes the CA2RS Organization stronger.

I am looking forward to another Great Year in 2017!

Happy Holidays,

Chris Kauderer

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Note from the Editor: Although this issue is a retrospective of individuals who changed automotive safety and, in turn, automotive history, it is also important to stay up with the now and soon-to-be automotive history. This article (below) and a few others, including the Opinion pieces (which are not the Editor's opinions nor CAARS opinions), are intended to cause the reader to think about how the current climate with these topics will affect how we perform our respective duties in collision investigation and/or reconstruction as well as a forecast of potential issues that may change how we do business and how our work is critically analyzed.

Is Driving While High Illegal? California Marijuana Law Would Test Drivers For Drugs

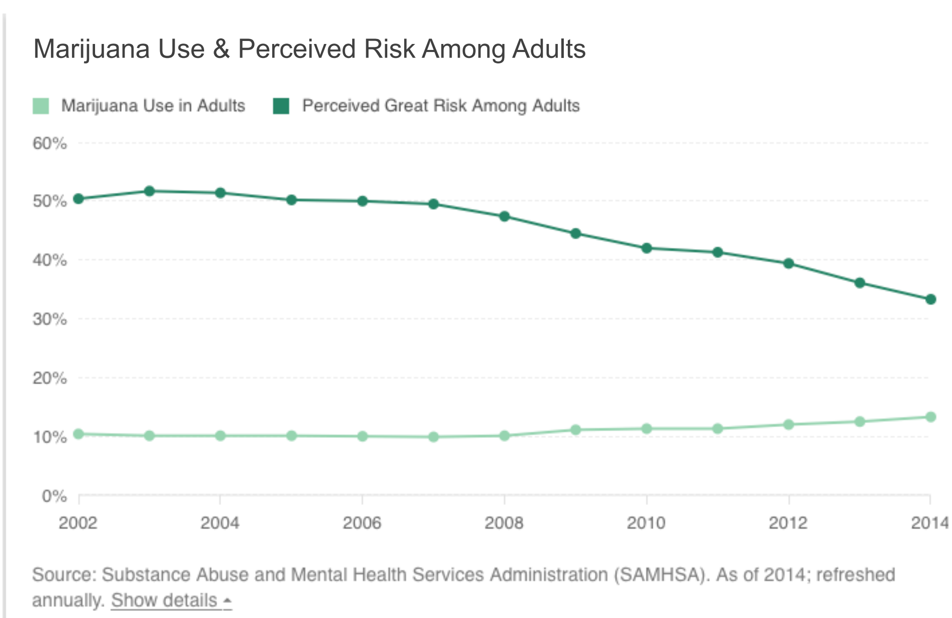
Janice Williams / December 8, 2016 / International Business Times

One of the biggest concerns for marijuana opponents has been that fully legalizing cannabis will result in unsafe roads and more traffic accidents. In California, where recreational marijuana use recently became legal for adults following the 2016 election, Assemblyman Tom Lackey introduced a new bill that could allow police officers to conduct roadside tests on any driver they suspect is under the influence of marijuana with the use of a testing device.

A similar amendment was presented in 2016 but was rejected after the assembly raised concerns about the dependability of field testing marijuana-induced drivers. However, the California Highway Patrol has been trying to narrow down on the best ways to identify drivers under the influence of marijuana, which could be an essential process to Lackey's bill that was officially proposed on Monday.

Named **Assembly Bill 6**, Lackey's law **would allow police to test saliva of drivers suspected of being under the influence of marijuana**, similar to officers' approach to drivers under the influence of alcohol who are given a breathalyzer test. The samples would quickly determine whether a driver tested positive for various illegal drugs including **marijuana, which is still considered a Schedule I substance under federal law**. "California cannot wait any longer to take meaningful action against drugged driving now that voters have passed Proposition 64," Lackey said in a statement to High Times. "Using new technology to identify and get stoned drivers off the road is something we need to embrace."

The legal drinking limit for drivers is .08% blood alcohol content. However, the bill didn't identify what would be the legal marijuana consumption limit for drivers, which could be problematic for some drivers since traces of marijuana remain in the human body long after the intoxicating effects associated with pot use wear off. Although the National Highway Traffic Safety Administration's 2013 and 2014 report showed that the number of people operating vehicles grew by almost 50 percent since 2007, a separate study in the report found that **driving under the influence of marijuana** only **elevated risks of car crashes between one to three times that of a sober person**. (Conversely, drivers under the influence of alcohol were five to 30 times more likely to experience car crashes compared to sober drivers.)



Toward a Marijuana 'Breathalyzer' Test

Michelle Taylor / Forensic Magazine / December 21, 2016

It's pretty easy to single out a driver that is driving under the influence of alcohol. Swerving between lanes, running red lights and inconsistent speed are signs easily identifiable to passersby and police alike. Additionally, police can conduct a test using a breathalyzer to estimate the amount of blood alcohol content in said driver—providing unequivocal confirmation of the presence of alcohol. But how do you spot a driver who is driving "high," or under the influence of marijuana? He or she could be showing signs similar to a drunk driver, but not necessarily since the effects of marijuana in large doses are much different than the effects of alcohol.

Each state has its own laws regarding the blood alcohol level of drivers in terms of what is considered legal and what is considered legally drunk, or under the influence. And now, with more states legalizing both medical and recreational marijuana, legal limits are being set in this arena as well. However, they are not as clear as drunk driving laws—which is more a function of the vice than the law itself.

Unlike alcohol, THC—the active compound in marijuana that leads to a high—can stay in a user's blood for minutes, days, hours or even months depending on what strain of marijuana is used, how often, and the specific method of ingestion. For example, a standard blood test can detect 1 to 2 ng/mL THC in the blood of a chronic user for two days, and an occasional user for eight hours. This is upped significantly if the user ingests marijuana through an edible, like a gummy bear or chocolate.

In Colorado, the legal limit is 5 ng/mL, so the chronic marijuana user who last ingested the plant two days ago would be fine. However, in a "zero tolerance" state like Rhode Island, the user would find himself arrested and behind bars—even if s/he isn't high because their last marijuana ingestion was two days ago.

"There are just so many questions we need to address, and so much we don't know," said Tara Lovestead, a chemical engineer at NIST." The biggest issue for law enforcement is Δ9-THC in the blood does not correspond to intoxication." At the Forensics@NIST conference in November, Lovestead gave a presentation describing her work to identify other chemical markers indicative of marijuana intoxication. She is focusing on creating noninvasive, portable breath tests for Δ9-THC that can indicate recent marijuana usage from 30 minutes to 2 hours prior.

Lovestead said her team's approach incorporates three key areas: fundamental data; materials development; and "breathalomics." Chemistry-wise, there is still a lot researchers do not know about cannabis, THC and other cannabinoids. So, part of Lovestead's research is to research. Her and her team are measuring vapor pressure, molecular interactions and partition co-efficients to successfully apply it to overall cannabis research. They are also researching and/or developing new materials to outfit a potential marijuana breathalyzer device, especially in terms of what is best suited to crucial absorption and desorption techniques.

Last, but certainly not least, Lovestead is paving a way toward determining the chemical signature of marijuana intoxication. To do so, Lovestead has thus far relied on a dynamic headspace sampling technique called porous layer open tubular (PLOT)-cryoadsorption that has provided extremely sensitive quantitative recovery of Δ9-THC. The method highly decreases the amount of time expended to identify vapor pressure information.

Another method Lovestead uses for breath collection is capillary microextraction of volatiles. Unlike PLOT-cryo, this method is already ready for in-the-field sampling, and is most suited for the breath collection of cannabis-related metabolites, which indicate if a user actually smoked marijuana or just ingested it secondhand. "[Fundamental data, materials development and breathalomics] build upon one other and help the other out," Lovestead said about her lab's approach to a marijuana breath test. "In the future, we are going to look at more artificial breath work with the different materials available."

Inventor of the flight recorder, seat belts, the first collapsible bumper and other auto safety equipment:
James J. Ryan II (1903–1973)

Safety belts save lives, and no one knew that better than the legendary James “Crash” Ryan, a professor of mechanical engineering at the University of Minnesota from 1931 to 1963. Professor James J. Ryan II was a 1920 graduate of LeClaire High School, later attending Iowa State University and teaching at the University of Minnesota.

A national advocate for automotive safety, Ryan was responsible for improvements in shock-absorbing hydraulic bumpers, recessed dashboards, collapsible steering columns and seat belts. In 1963 he obtained a patent for the first automatic retractable safety seat belt. **Ryan earned his nickname “Crash” by using himself and his graduate students as subjects in numerous crash tests conducted on campus.**

However, truly serviceable recorders that had any chance of surviving plane crashes were not produced until several years after the war. Black box technology did not advance further until 1951, when Professor James J. Ryan joined the mechanical division of General Mills. Ryan was an expert in instrumentation, vibration analysis, and machine design.

Attacking the problem of FDRs, Ryan came up with his own VGA Flight Recorder. The "V" stands for Velocity (airspeed); "G" for G forces (vertical acceleration); and "A" is for altitude. The Ryan Recorder was a 10 lb device about the size of a bread box with two separate compartments. One section contained the measuring devices (the altimeter, the accelerometer, and the airspeed indicator) and the other contained the recording device, which connected to the three instruments. As released in 1953 and sold by General Mills to the Lockheed Aircraft Company, the entire apparatus was enclosed in a yellow-painted spherical shell.

Years earlier, Ryan also developed the first aircraft “black box” flight recorder, a purely mechanical unit that recorded flight data as impressions on metal film.

Black boxes have been used since the earliest days of aviation. The Wright brothers carried the first flight recorder aloft on one of their initial flights. This crude device registered limited flight data such as duration, speed, and number of engine revolutions.

Another early aviation pioneer, Charles Lindbergh, used a somewhat more sophisticated version consisting of a barograph, which marked ink on paper wrapped around a rotating drum. The entire device was contained in a small wooden box the size of an index card holder. Unfortunately, these early prototypes were not sturdily constructed and could not survive a crash.

As civil aviation developed in the years before World War II, “crash-survivable” flight recorders came to be seen as a valuable tool in analyzing aviation disasters and contributing to the design of safer aircraft.

Beginning in 1958, larger civilian passenger aircraft in the United States were required to carry survivable FDRs, and numerous other devices were produced employing various recording media, from metal strips to, eventually, magnetic tape (left).

Ryan's basic compartmentalized design is still used in flight recorders today, although it has undergone numerous improvements.

Today the descendants of his device are required equipment on all commercial and military aircraft. The Ryan Flight Recorder, known as the “Black Box” is one of the many items on display in the Buffalo Bill Museum in LeClaire, Iowa.

Ryan’s entire office contents, tools, files and awards are also on display at the museum.

Originally posted at www.transportationheroes.org/heroDetail.php?id=62

James Jay Ryan Papers, 1933-1973
Finding aid written by: University Archives staff; updated by Amy Flessert

Collection Summary
This collection contains the papers of James J. Ryan, professor of mechanical engineering at the University of Minnesota (dating from 1933-1973).

Creator:
Ryan, James J. (James Jay), 1903-1973.

Title:
James Jay Ryan papers

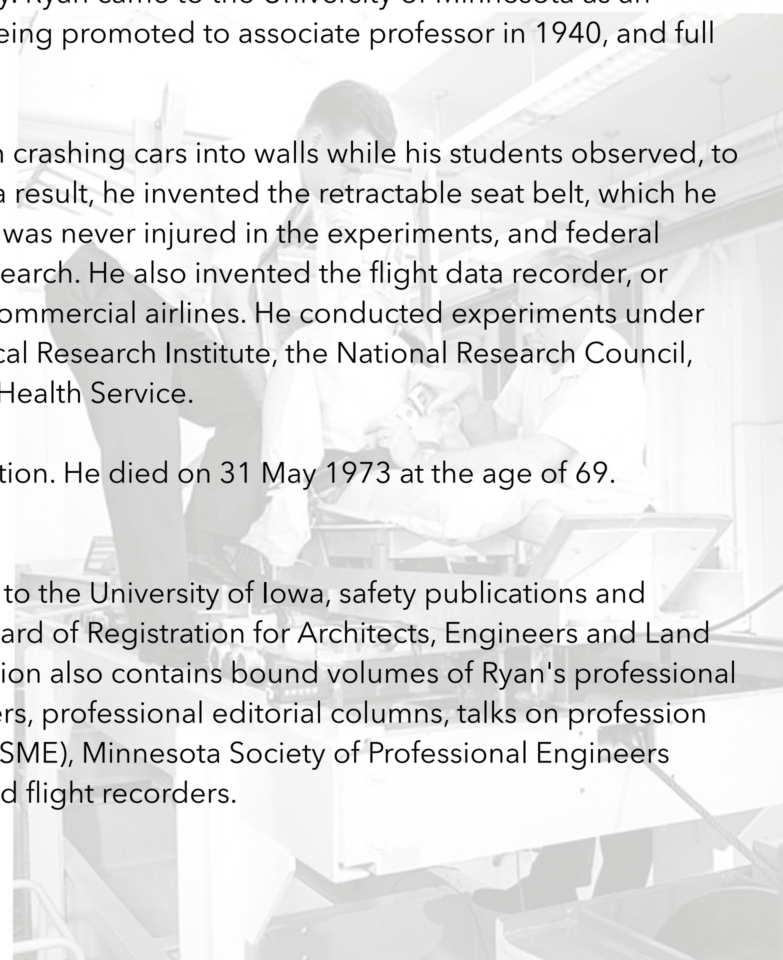
Repository:
University of Minnesota Libraries. University of Minnesota Archives [uarc]

Quantity:
7 boxes (7.0 cubic feet)

Collection Number:
uarc 975

Biographical Sketch of James Jay Ryan (1903-1973)
James Jay Ryan, B.S. (1925) University of Iowa, M.S. (1929) University of Pittsburgh. Professor mechanical engineering at the University of Minnesota (1931-1963). Best known for his inventions of the flight data recorder and the retractable seat belt.

James Ryan was born on 27 November 1903 in LeClaire, Iowa. In 1925 he received his B.S. in mechanical engineering from the University of Iowa, and in 1929, his M.S. in mechanical engineering from the University of Pittsburgh, doing his graduate work at Stanford University. Ryan came to the University of Minnesota as an assistant professor in mechanical engineering in 1931, being promoted to associate professor in 1940, and full professor in 1950.



Concerned about automobile safety, in 1949 Ryan began crashing cars into walls while his students observed, to complete his own testing in auto safety experiments. As a result, he invented the retractable seat belt, which he patented in 1963. Although nicknamed "Crash" Ryan, he was never injured in the experiments, and federal government researchers frequently consulted him on research. He also invented the flight data recorder, or "black box," patented in 1960, and now required on all commercial airlines. He conducted experiments under grants from the Office of Naval research, the Naval Medical Research Institute, the National Research Council, the United States Air Force, and the United States Public Health Service.

In 1963, Ryan retired because of a rheumatic heart condition. He died on 31 May 1973 at the age of 69.

Scope and Content
This collection contains personal papers, papers relating to the University of Iowa, safety publications and reprints, plans, papers relating to the Minnesota State Board of Registration for Architects, Engineers and Land Surveyors, and to the Citizens Transit Council. The collection also contains bound volumes of Ryan's professional papers including legal consulting, publications and papers, professional editorial columns, talks on profession and safety, American Society of Mechanical Engineers (ASME), Minnesota Society of Professional Engineers (MSPE), research and grants, automobile safety letters and flight recorders.

James Jay Ryan Papers — Detailed Contents

- **Volume 4:** Legal Consulting, 1958-1965 (Box 1)
- **Volumes 5-6:** Secretary's Copies of Letters, 1957-1962 (Box 1)
- **Volumes 7-9:** Publications and Papers, 1931-1961 (Box 1)
- **Volume 10:** Professional Editorial Columns, 1954-1972 (Box 1)
- **Volume 12:** Personal Papers, 1950-1960 (Box 1)

- **Volume 16:** Baldes, James Edward, 1940-1968, includes correspondence and articles (Box 2)
- **Volume 17:** Special People: Platt, Mosely, Campbell, Tracy-Wolff, Koji, Tsai, 1949-1966. (Box 2)
- **Volume 18:** Special People: Nader, Severy, Mortenson, Ganoelot, 1937-1967. (Box 2)
- **Volume 19:** Recommendations and References for Students, 1937-1964 (Box 2)
- **Volume 20:** M.E. 121 Engineering Design, 1961, includes course notes, student's papers, tests, grades, and course evaluations (Box 2)
- **Volume 21:** Talks on Profession and Safety, 1950-1964 (Box 2)
- **Volume 22:** Engineering of the Quarter Century (Award), 1965 (Box 2)
- **Volume 25:** 30th Anniversary, 1961 - Ryan's professional anniversary (Box 2)

- **Volume 27:** American Society of Mechanical Engineers (ASME) Activities, 1951-1961 (Box 3)
- **Volume 28:** ASME Section Officer, 1962-1964 (Box 3)
- **Volume 29:** ASME General Activities Honors Committee, 1963-1969 (Box 3)
- **Volume 30:** Capital Chapter and State Society Activities and Offices, Minnesota Society of Professional Engineers (MSPE), 1949-1953 (Box 3)
- **Volume 31:** State Precedence MSPE, 1954-1955 (Box 3)

- **Volume 33:** Graduate School Research, 1931-1956 (Box 4)
- **Volume 34:** US Air Force Research, 1955-1959 (Box 4)
- **Volume 35:** US Public Health Service, 1938-1962, research grants (Box 4)
- **Volumes 36-38:** Letters on Safety Requests, 1955-1968 (Box 4)

- **Volume 39:** Automobile Safety Letters, 1968-1971 (Box 5)
- **Volume 41-44:** Flight Recorders, 1948-1968 (Box 5)

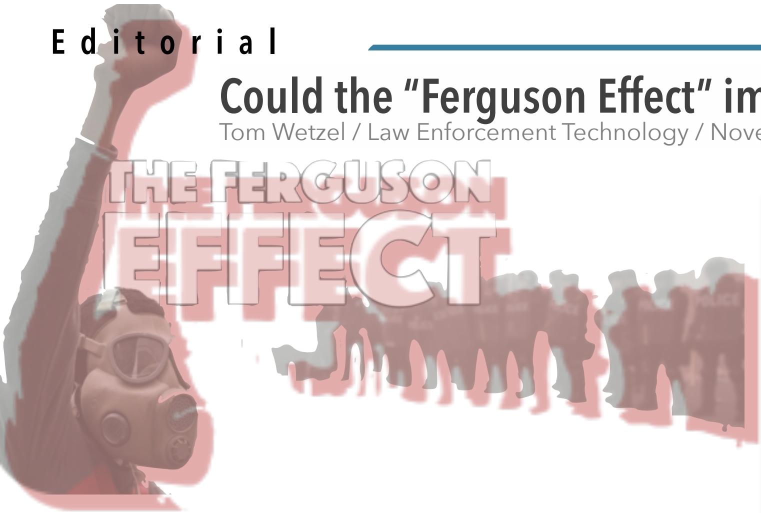
- Personal Papers, 1933-1973 — 5 folders; University of Iowa, 1935-1973 — 2 folders; State Board of Registration for Architects, Engineers, and Land Surveyors, 1971 — Legal size (Box 6)

- Safety Publications, 1939-1973;State Board of Registration for Architects, Engineers, and Land Surveyors, 1964-1972 — 4 folders; Reprints, 1959-1973 — 2 folders; Citizens Transit Council, 1970-1973 (Box 7)


James "Crash" Ryan

Could the "Ferguson Effect" impact policing in Ohio (and elsewhere)?

Tom Wetzel / Law Enforcement Technology / November 16, 2016



If you haven't heard of the term "Ferguson Effect," you may start hearing more of it.

And when you do, it should chill you.

What that basically means is that officers will answer their calls and take their reports but will be less likely to try and ferret out bad guys to the degree they had before.

FBI Director James Comey suggested that a spike in violent crime might be linked to police reluctance to be caught on video that goes viral.

Although touched on by some frank enough to address this possibility, others have argued that there is no evidence of such an effect despite crime spikes in major metropolitan areas.

That opinion may begin to change, though, in light of a recent national survey of police officers conducted by David Blake, who heads an independent law-enforcement consulting and training firm. In his survey, a significant percentage of the 500 front-line police personnel from around the country surveyed using online Survey Monkey acknowledged that they have reduced their proactive efforts.

Many also perceived an increase in criminal activity.

Even though the query involved a small sampling of cops and certainly requires further analysis and peer review, this exploratory effort may give us a glimpse into how officers are feeling. It is important because this preliminary research allows us to view this concern through the eyes of the officers, and what they may be seeing should concern us.

This should not only trouble the upper echelons of police leadership but also our entire citizenry, because we need our officers to "shake the bushes" and search out trouble. If they don't, we will quickly find out how corrosive and far-reaching that criminal element is capable of being.

There is a scene in the 1986 cop movie "Running Scared" where an officer compares police officers to garbage men. Even though they must continually pick up trash every week, imagine what would happen if they just stopped picking up all the garbage.Our country's police officers are exceptional. They value the rule of law and are accountable to those they serve. Each and every day, they take personal risks to their health and safety to keep us safe. But we cannot expect them to continue to take extra chances if the risk-to-reward ratio is grossly disproportional to the point where they fear embarrassment to their agency, termination from employment or possible incarceration for mistakes made during tense, life-threatening and rapidly evolving situations. It's hardly surprising that some may be demonstrating some caution if they think no one is going to support them anymore, or that citizens mistrust them to the point where they are perceived as guilty until proven innocent. Adding a loss of confidence in their leadership, who they may suspect will throw them under the bus for political reasons or to satisfy the demands of angry mobs, will only exacerbate the problem further.

Then, adding more paperwork to a job that is already inundated with it may only cement the deal for some, as the Chicago Police Department may have sensed when they required officers complete two-page forms for any stop they made. To little surprise, there was a reported decrease in stops. Spending more time to complete paperwork is less time spent trying to ferret out bad guys.

Jack Dunphy is a pseudonym for a southern California police officer's blog in which he recently wrote in part about a moment when he and his partner spotted some gang members, one of whom may have been responsible for a murder, near an alleyway. They weighed the possibilities about what could happen if they get out of their cruiser—possibilities that included having the gang members run away from them. If they do that, the officers would have had to chase them and might end up using force, to include deadly force, when they catch up to them. These actions, which wouldn't have been pretty, may end up getting videotaped and going viral. That and the fact they will have their decisions second-guessed, led them to a discomforting conclusion where Dunphy writes, "So, as we are not fools, we drive on."

We depend on our men and women in blue to both serve and protect, and part of that protection includes using their skills, intelligence, courage and inquisitiveness to find trouble and stop it in its tracks before it hurts us. I'm optimistic and confident that Northeast Ohio police officers are committed to that mission, but let's hope a "Ferguson effect" doesn't infect this area or get a long-term stronghold on us, or we're all in trouble.

LET Editor's Note: Watch for Part II of this column next month, where Lt. Wetzel will address solutions to overcome the Ferguson Effect. (CAARS Editor Note: This second article is included in this issue of *Skidmarks*).

Lieutenant Tom Wetzel is a suburban police lieutenant in Greater Cleveland and an adjunct professor on community policing at Lakeland Community College.

More links for further reading – in other words, don't take Wetzel's word for it…decide for yourself.

Studies Give Some Credence to The "Ferguson Effect"
By **Crime and Justice News** | October 1, 2016

Has the 'Ferguson Effect' Finally Been Debunked?
By **The Atlantic** | September 29, 2016

President Obama Hits Another Commutation Milestone
By **The Atlantic** | November 22, 2016

Court Filings Down in California
By **newsroom.Courts.CA.gov** | October 27, 2016

A Clear View: History of Automotive Safety Glass

By Llewellyn Hedgbeth

Early cars were little more than motorized buckboards but it didn't take long for drivers to determine they'd like a little protection from road hazards like sharp flying rocks. In 1904 when the first windshields were introduced, most were a horizontally-divided piece of plate glass just like the glass used for house windows. When the top half got too dirty to see through, a driver could fold it down and keep going. Ford, in 1908, advertised its Model T for $850 – unless a driver also wanted fancy extras like a windshield, speedometer, and headlights, equipment that boosted the price another $100. Likewise, in 1913 Reo offered a windshield as optional equipment. In 1915, though, Oldsmobile was first to sell the top and windshield as standard equipment.

As more and more cars took to the roads, a rise in accidents was inevitable. When one of these early cars was involved in an accident, it was not uncommon for the driver at a minimum to be injured by flying shards of glass or, far worse, lose his life after going headfirst through the windshield. The latter event was known as wearing a glass necklace. In the teens motorists filed a number of lawsuits against car manufacturers, asserting the car makers were the cause of their windshield-related injuries.

There are also stories that Henry Ford and some of his closest friends were themselves injured by flying glass in accidents. Whatever the circumstances – whether personal experience with accidents, discussions with attorneys about liability issues, etc., Ford was finally convinced it was time to make car windshields safer. Another impetus for his decision may have been one reported on by author Ford R. Bryan in his 1993 book "Henry's Lieutenants": In 1918 Henry Ford saw distortion in the rear window of a Model T and decided he needed to produce improved glass. He also, however, needed less expensive glass. With more and more customers opting for enclosed vehicles, glass was harder to come by and the price of glass had risen nearly three-fold. Clarence Avery, a Ford employee, began working with Pilkington Co., a British glass manufacturer, on a new glass-making process.

By the end of 1919 they had perfected a process for pouring molten glass through rollers and onto a mobile table. The table then carried the glass under several grinders and polisher until the product was finished.

At Ford's extensive River Rouge Plant there was a steel mill, glass factory, and car assembly line. At least initially Ford manufactured the glass it needed. In late 1919 Ford began using laminated glass, over the next decade directing its use in all Ford cars.

Two European inventors developed glass laminating, Frenchman Edouard Benedictus and Briton John C. Wood. Benedictus, an accomplished artist, writer, composer, book binder, fabric designer, and scientist, made an accidental discovery in his lab. As the story goes, one day in 1903 he dropped a beaker and his lab assistant, thinking it clean, put it back on the shelf. Later as Benedictus climbed a ladder, he bumped that shelf, once again sending the flask to the floor. It broke – but its pieces held together. Cellulose nitrate, a clear liquid plastic left in the beaker, had dried and kept the glass from breaking into shards. After experimenting further Benedictus developed safety glass, two layers of plate glass with a layer of cellulose between them, and he hoped to promote its use in automobiles.

Unfortunately, it was costly and both manufacturers and drivers had a strong interest in keeping cars affordable. Though Benedictus was granted a patent in 1909, the product was not put into use until World War I when laminated glass was used in the goggles of gas masks. Meanwhile Wood had also been working with cellulose and devised another method for adding a protective layer (originally tree resin, later cellulose) between two pieces of glass and creating shatter-resistant glass. His method was patented in 1905. Benedictus, in 1910, added a gelatin layer which stuck to both panes of glass and patented Triplex. The Triplex Glass Company was founded in 1923 and Triplex glass was brought to the US in the twenties.

Also about this time a new urethane glue was also used to bond the glass to the frame. The laminated window was more secure and if it broke it broke in a spider's web pattern rather than splintering into small shards.

Because it was difficult to penetrate, it also kept passengers from being ejected. Its strength actually meant more structural integrity for the car if it rolled over. There were two significant problems with the laminated glass, however: its inner celluloid layer would discolor, darken, and become brittle over time and it could be punctured easily. In 1938 Carleton Ellis patented a glass-clear synthetic resin that did not discolor over time. Beginning in the late thirties then, manufacturers began using instead Polyvinyl Butyral (PVB) which made laminated glass clearer and stronger and helped block high frequency sound and harmful UV rays.

Throughout the twenties there were a number of changes in windshield production. In 1924 some local police departments were the beneficiaries of one windshield development. Lincoln touring sedans called Police Flyers came specially equipped with bullet-proof (glass and polycarbonate) windshields nearly an inch thick. The Bonnie and Clyde era was still some years off, but these windshields were early preparation for the good guys. In 1926 Rickenbacker offered safety glass as a standard feature all the way around its car. As Ford continued utilizing safety glass, a 1928 full-page ad for the Triplex Safety Glass Company touted, "The new Ford is equipped with a windshield of Triplex – the glass that will not shatter." Other manufacturers followed suit. Pittsburgh Plate Glass (the first financially successful U.S. plate glass manufacturer) in 1928 introduced Duplate, its economical version of laminated glass.

Changes to the windshield continued in the thirties, as well. In 1930 Cadillacs came with a vertically split-"V" type swing-out windshield. The sides of the front windshield joined in a point at the center of the hood. Now in the Smithsonian's collection is an early windshield defroster manufactured about 1930 by an Illinois company. Attached to the windshield with suction cups, the plug-in Sinko Windshield Heater would defog windows. Also in 1930 Chevrolet's AD Universal had a slightly sloped windshield and 1932 Chevrolets came with a tiltable windshield. A 1933 Libbey-Owens-Ford (sole suppliers of glass to GM) ad alerted customers that for only $1.50 more on their monthly car payment they could have safety glass that provided the greatest available protection against flying glass. Then in 1934 the Chrysler Imperial Airflow CW appeared, the first production car to come with a single-piece curved windshield. In 1936 the vertically split windshield was introduced on GM cars. Trouble came to automotive glass when in December 1936 the Federation of Flat Glass Workers demanded more pay and a closed union shop. When their demands were not met, roughly 13,000 strikers brought plate glass manufacturing to its knees. At that time Pittsburgh Plate Glass and Libbey-Owens-Ford together made 85% of car safety glass. Ford prepared to make the glass it needed to continue production and GM reported they had a month's supply. Nonetheless, before the strike was settled (in part due to Walter Chrysler's intervention) there had been thousands of lay offs in Ford and Pierce-Arrow plants.

With the strike settled and production resumed, in 1937 the use of safety glass was finally mandated for all car models. In 1939 Libbey-Owens-Ford was advertising a new safety plate glass that was stronger, safer, and more flexible. Then standard equipment on many models, it was said to have no distortion and to be "safer because it's laminated – clearer because it's plate". That ad also relied on what now might appear as shaky science. It claimed that Dr. A. H. Ryan, a nationally known physiologist, tested safety plate glass over safety sheet glass with the following results: Passengers in moving vehicles with safety sheet glass (rather than window-like safety plate glass) had 62% greater eye fatigue, 140% more headaches, 17% greater frequency of tiredness and sleepiness, 40% greater increase in blinking, 82.2% decrease in judgment of distances, and 17% loss in ability to read road signs. (Hey, who would argue with those figures?)

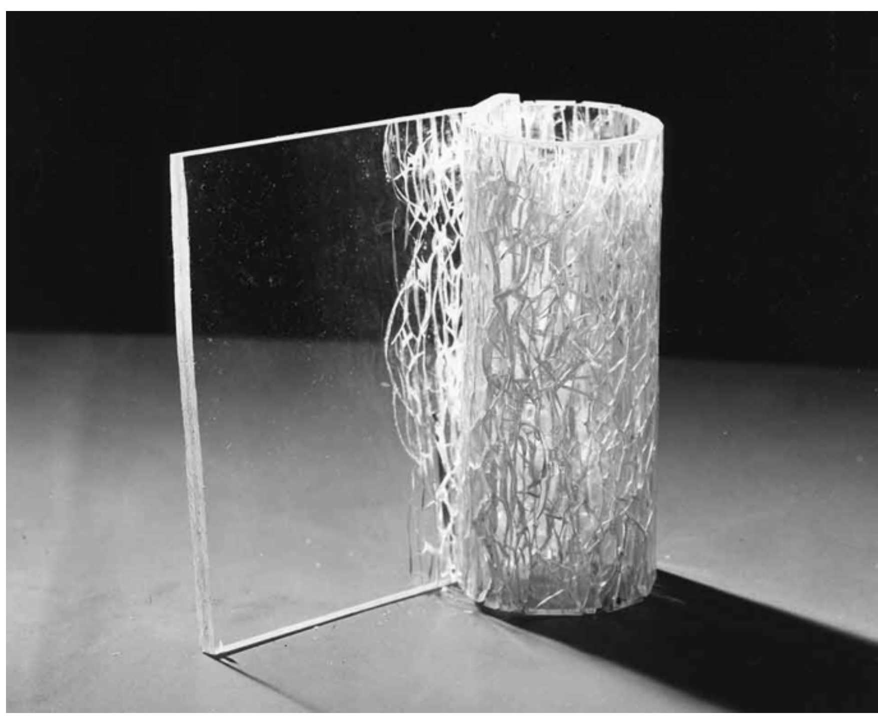
In 1938 Pittsburgh Plate Glass came out with Herculite, tempered glass that was considerably more shatter resistant than plate glass. Tempered glass is made by placing glass into an atmospheric oven which heats and hardens it. Rapidly cooled after its formation, it develops an even tougher outer skin. Its strength exceeds that of regular glass by five to ten times. Nonetheless it retains its flexibility and can be cut and formed into many shapes. It can withstand great force and if it is broken it breaks into relatively small smooth cubical pebbles.

Besides all those positive attributes, it is thinner than laminated glass and considerably cheaper to fabricate. The forties brought even further progress for automotive windshields. In 1947 Studebaker introduced its Starlight coupe with a curved windshield. Far more striking, the avant garde 1948 Tucker automobile came with "Pop-Out" windshields. Libbey-Owens-Ford manufactured them. A Tucker sales brochure explained that the "laminated safety glass [was] mounted in sponge rubber fastening so that a hard blow from within will eject it in one piece." It was also that year that Buick, Oldsmobile, and Cadillac added compound-curved windshields to their cars.

From 1936 to 1959 safety glass was used in all save the rear window of cars. In the late 1950s, though, car manufacturers were looking for a cheaper option and began using tempered glass for side and rear windows. Besides saving on cost, tempered glass made it easier for rescuers to cut into a vehicle to free trapped passengers. Some argue, however, that tempered glass should not be used on side windows since tempered glass windows will not prevent partial ejection in side collisions or rollovers. Another disadvantage with tempered glass is that it cannot be repaired as laminated glass can.

There were also styling innovations in the fifties. GM's LeSabre boasted the first wraparound, panoramic windshield designed to reduce the driver's blind spot. Its 1953 limited edition Cadillac Eldorado also offered the wraparound windshield. By 1957 most cars had curved windshields – at the top and bottom and also at the sides. With curved side windows automotive stylists could add more interior room and they could produce a smoother body line. Engineers developed techniques to drill holes in side windows for anchoring mechanisms resulting in further safety improvements. As the amount of glass increased, drivers were aware of less privacy and greater solar buildup, so tinted windshields were made available. Glass manufacturers added iron oxide to glass giving it a blue or blue-green color. They could also add a darker band of color at the top of the windshield by applying a dye to the PVB inner layer. Each state regulates how much tint can be applied to windows.

Glass production suddenly became cheaper in 1959 with the Pilkington development of the float process which significantly improved both quality and clarity of glass. In the float method raw materials are combined and melted in a tank where they are further mixed to ensure homogeneity and to remove CO 2 bubbles. The refined molten glass is then forced through a small opening onto a layer of molten tin. Because the glass is lighter than the tin, the glass floats – like oil on water. When the glass is cooled, lift-out rollers remove it from the tin bed so it can slowly be cooled further. With this method there is no need for later polishing and grinding. Roughly a quarter of all float glass produced goes into car manufacturing.



A Clear View: History of Automotive Safety Glass

The public became more interested in automotive safety features in the 60s, fueled in part by consumer protectionist Ralph Nader who campaigned for government safety standards. Beginning in 1966 cars came equipped with improved laminated windshields that could withstand nearly three times the impact of earlier versions. In the 60s and 70s Federal Motor Vehicle Safety standards were set for the strength and clarity of laminated windshields (FMVSS 205); windshield retention strength during accidents (FMVSS 212); roof rigidity in rollover accidents (FMVSS 216); and limits on windshield penetration (FMVSS 219). In addition, the National Highway Traffic Safety Administration (NHTSA) was formed.

Nowadays windshields continue to grow in complexity and sophistication. Windshields are larger and often more raked. Some provide increased visibility with a windshield that extends up into the roof above the driver or one that wraps into the side of the car. Modern windshields can filter 95-99% of UV rays. Since the 90s a hybrid film with dye to absorb heat and metal to ban sun rays has provided significant reduction in infrared (IR) rays and consequent internal heat gain.

Nano-technologies are clearly the wave of the future, though. Window film with ceramic or crystalline particles can block the IR portion of the solar spectrum. We already have "smart glass" with particles held in liquid suspension that can control the amount of heat and light transmitted through the windshield. GM is working with Carnegie-Mellon and USC on a Heads-Up Display utilizing a sensor-laden windshield to provide data to the driver. In dense fog, for instance, lasers would provide information as to the road's edge. We may soon see cars with sensors that project data onto the windshield, perhaps eliminating the need for a speedometer. While cost is still prohibitive for such applications, prices will no doubt drop as further technical improvements are made. There are even predictions that the Geyser windshields that clean themselves with nano-dust particles (now being tested in Italy on the Hidra) may be more widely available within the next five years. That could mean eliminating windshield wipers altogether. Look out, Jetsons; here we come!

Originally posted at http://www.secondchancegarage.com/public/windshield-history.cfm

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. I have decided to write a column for the CA2RS newsletter answering commercial vehicle related questions. If you have a question feel free to contact me at wfocha@comcast.net

Question: Bill, I have a collision report that has the sentence "V-1 collided with the left side of the bogie of V-2". V-2 is listed as a Peterbilt concrete mixer. *What is a "bogie"?* – Thanks, CG

Answer: *CG – The term "bogie" is an old school trucker word refers to an axle added to a truck to support additional weight. The word has its origins in England where the wheels of a train car are called a bogie.*

Trucks are normally manufactured with two types of axles, Steering and Drive. Steering axles steer the truck and drive axles transfer the power of the engine to the ground. A truck can have more than one drive axle. There are three types of "auxiliary" axles that can be added to a truck, "Pushers, Tags and Boosters". There are distinct advantages to each type of axle and it's placement on the truck.

A pusher axle gets its name because it is mounted in front of the drive axles. The Drive axles "push" the pusher axle down the road. In the photo below (Figure 1) the second axle from the front of the truck is the pusher axle. – BF

Figure 1: *Bogie axle on truck*

Pusher and Tag axles are usually air actuated by a switch on the dashboard of the truck. Airbags are used to lift and lower the axle.

A tag axle is mounted behind the drive axles. It is called a tag axle because it tags along behind the drive axles. In the photograph below (Figure 2) the fourth axle from the front of the truck is the tag axle.

Figure 2: *Truck with tag axle*

The third type of axle is a "Booster". A booster axle trails along behind the truck. It has two arms that are hydraulically actuated to force a downward pressure onto the axle and take weight off of the drive axles (Figure 3). This is the most common type of auxiliary axle in seen on trucks in California. It is usually on concrete mixers or large dump trucks called Super Dumps.

In Figure 3, the booster axle is in the up position.

Figure 3: *Raised booster*

In Figure 4, the booster axle is in the lowered position. A set of booster axles can also be found on a heavy haul lowbed trailer. I will address that topic in a future column.

Figure4: *Lowered booster*

CG: I hope this answers your question. To the rest of the readers, keep your commercial vehicle related questions coming. Have a happy and safe new year.

Bill Focha

An Exhaustive History of the Seat Belt

A seat belt, also known as a safety belt, is a vehicle safety device designed to secure the occupant of a vehicle against harmful movement that may result during a collision or a sudden stop. A seat belt functions to reduce the likelihood of death or serious injury in a traffic collision by reducing the force of secondary impacts with interior strike hazards, by keeping occupants positioned correctly for maximum effectiveness of the airbag (if equipped) and by preventing occupants being ejected from the vehicle in a crash or if the vehicle rolls over. When in motion, the driver and passengers are traveling at the same speed as the car. If the car suddenly stops or crashes, the driver and passengers continue at the same speed the car was going before it stopped. A seatbelt applies an opposing force to the driver and passengers to prevent them from falling out or making contact with the interior of the car. Seat belts are considered as Primary Restraint Systems (PRS), because of their vital role in occupant safety.

Efficiency

An analysis conducted in the United States in 1984 compared a variety of seat belt types alone and in combination with air bags. The range of fatality reduction for front seat passengers was broad, from 20% to 55%, as was the range of major injury, from 25% to 60%. More recently, the CDC has summarized this data by stating "seat belts reduce serious crash-related injuries and deaths by about half." Most seat belt malfunctions are as a result of there being too much slack in the seatbelt at the time of the accident.

History

Seat belts were invented by English engineer **George Cayley** in the mid-19th century, though **Edward J. Claghorn** of New York, was granted the first patent (U.S. Patent 312,085, on February 10, 1885 for a safety belt). Claghorn was granted United States Patent #312,085 for a Safety-Belt for tourists, painters, firemen, etc. who are being raised or lowered, described in the patent as "designed to be applied to the person, and provided with hooks and other attachments for securing the person to a fixed object." In 1911, **Benjamin Foulois** had the cavalry saddle shop fashion a belt for the seat of Wright Flyer Signal Corps 1. He wanted it to hold him firmly in his seat so he could better control his aircraft as he bounded along the rough field used for takeoff and landing. It was not until World War II that seat belts were fully adopted in military aircraft, and even then, it was mainly for safety reasons, not improved aircraft control.

In 1946, **Dr. C. Hunter Shelden** had opened a neurological practice at Huntington Memorial Hospital in Pasadena, California. In the early 1950s, Dr. Shelden had made a major contribution to the automotive industry with his idea of retractable seat belts. This came about greatly in part from the high number of head injuries coming through the emergency rooms. He investigated the early seat belts whose primitive designs were implicated in these injuries and deaths. His findings were published in the November 5, 1955 Journal of the American Medical Association (JAMA) in which he proposed not only the retractable seat belt, but also recessed steering wheels, reinforced roofs, roll bars, door locks and passive restraints such as the air bag. Subsequently, in 1959, Congress passed legislation requiring all automobiles to comply with certain safety standards.

American car manufacturers Nash (in 1949) and Ford (in 1955) offered seat belts as options, while Swedish Saab first introduced seat belts as standard in 1958. After the Saab GT 750 was introduced at the New York Motor Show in 1958 with safety belts fitted as standard, the practice became commonplace. **Glenn Sheren** of Mason, Michigan submitted a patent application on March 31, 1955 for an automotive seat belt and was awarded US Patent 2,855,215 in 1958. This was a continuation of an earlier patent application that Mr. Sheren had filed on September 22, 1952.

However, the first modern three point seat belt (the so-called CIR-Griswold restraint) used in most consumer vehicles today was patented in 1955 U.S. Patent 2,710,649 by the Americans **Roger W. Griswold and Hugh DeHaven**. Fatal car accidents were rapidly increasing in Sweden during the 1950s. When a study at Vattenfall of accidents among employees revealed that the majority of casualties came from car accidents, two Vattenfall engineers (**Bengt Odelgard and Per-Olof Weman**) started to develop the safety belt. Their work set the standard for safety belts in Swedish cars and was presented to Swedish manufacturer Volvo in the late 1950s. The 3-point seatbelt was developed to its modern form by Swedish inventor **Nils Bohlin** for Volvo—who introduced it in 1959 as standard equipment. In addition to designing an effective three-point belt, Bohlin demonstrated its effectiveness in a study of 28,000 accidents in Sweden. Unbelted occupants sustained fatal injuries throughout the whole speed scale, whereas none of the belted occupants were fatally injured at accident speeds below 60 mph. No belted occupant was fatally injured if the passenger compartment remained intact. Bohlin was granted U.S. Patent 3,043,625 for the device. The world's first seat belt law was put in place in 1970, in the state of Victoria, Australia, making the wearing of a seat belt compulsory for drivers and front-seat passengers. This legislation was enacted after trialing Hemco seat belts, designed by **Desmond Hemphill** (1926–2001), in the front seats of police vehicles, lowering the incidence of officer injury and death.

Two-point

A 2-point belt attaches at its two endpoints, and was invented in the early 1900s by **Jack Swearingen** of Louisville, Kentucky.

Lap

A lap belt is a strap that goes over the waist. This was the most commonly installed type of belt prior to legislation requiring 3-point belts, and is primarily found in older cars. Coaches are equipped with lap belts (although many newer coaches have three-point belts), as are passenger aircraft seats. University of Minnesota **Professor James J. (Crash) Ryan** was the inventor of and held the patent on the automatic retractable lap safety belt. Ralph Nader cited Ryan's work in Unsafe at Any Speed and in 1966 President Lyndon Johnson signed two bills requiring safety belts in all passenger vehicles starting in 1968. Until the 1980s, three-point belts were commonly available only in the front outboard seats of cars; the back seats were only often fitted with lap belts.

Evidence of the potential of lap belts to cause separation of the lumbar vertebrae and the sometimes associated paralysis, or "seat belt syndrome", led to progressive revision of passenger safety regulations in nearly all developed countries to require 3-point belts first in all outboard seating positions and eventually in all seating positions in passenger vehicles. Since September 1, 2007, all new cars sold in the US require a lap and shoulder belt in the center rear seat. Besides regulatory changes, "seat belt syndrome" has led to tremendous liability for vehicle manufacturers. One Los Angeles case resulted in a $45 million jury verdict against the Ford Motor Company; the resulting $30 million judgment (after deductions for another defendant who settled prior to trial) was affirmed on appeal in 2006.

An Exhaustive History of the Seat Belt

Sash
A "sash" or shoulder harness is a strap that goes diagonally over the vehicle occupant's outboard shoulder and is buckled inboard of his or her lap. The shoulder harness may attach to the lap belt tongue, or it may have a tongue and buckle completely separate from those of the lap belt. Shoulder harnesses of this separate or semi-separate type were installed in conjunction with lap belts in the outboard front seating positions of many vehicles in the North American market starting at the inception of the shoulder belt requirement of the US National Highway Traffic Safety Administration's Federal Motor Vehicle Safety Standard 208 on 1 January 1968. However, if the shoulder strap is used without the lap belt, the vehicle occupant is likely to "submarine", or slide forward in the seat and out from under the belt, in a frontal collision. In the mid-1970s, 3-point belt systems such as Chrysler's "Uni-Belt" began to supplant the separate lap and shoulder belts in American-made cars, though such 3-point belts had already been supplied in European vehicles such as Volvos, Mercedes, and Saabs for some years.

Three-point
A 3-point belt is a Y-shaped arrangement, similar to the separate lap and sash belts, but unitized. Like the separate lap-and-sash belt, in a collision the 3-point belt spreads out the energy of the moving body over the chest, pelvis, and shoulders. Volvo introduced the first production three-point belt in 1959. The first car with a three-point belt was a Volvo PV 544 that was delivered to a dealer in Kristianstad on August 13, 1959. However, the first car model to feature the three-point seat belt as a standard item was the 1959 Volvo 122, first outfitted with a two-point belt at initial delivery in 1958, replaced with the three-point seat belt the following year. The three-point belt was developed by Nils Bohlin who had earlier also worked on ejection seats at Saab. Volvo then made the new seat belt design patent open in the interest of safety and made it available to other car manufacturers for free.

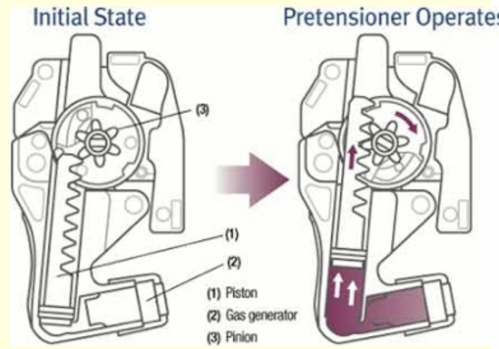
Belt-in-Seat (BIS)
The BIS is a three-point harness with the shoulder belt attached to the seat itself, rather than to the vehicle structure. The first car using this system was the Range Rover Classic. Fitment was standard on the front seats from 1970. Some cars like the Renault Vel Satis use this system for the front seats. A General Motors assessment concluded seat-mounted 3-point belts offer better protection especially to smaller vehicle occupants, though GM did not find a safety performance improvement in vehicles with seat-mounted belts versus body-mounted belts. BIS type belts have been used by automakers in convertibles and pillarless hardtops, where there is no "B" pillar to affix the upper mount of the belt. Chrysler and Cadillac are well known for using this design. Antique auto enthusiasts sometimes replace original seats in their cars with BIS-equipped front seats, providing a measure of safety not available when these cars were new. However, modern BIS systems typically use electronics that must be installed and connected with the seats and the vehicle's electrical system in order to function properly.

4-, 5-, and 6-point
Five-point harnesses are typically found in child safety seats and in racing cars. The lap portion is connected to a belt between the legs and there are two shoulder belts, making a total of five points of attachment to the seat. A 4-point harness is similar, but without the strap between the legs, while a 6-point harness has two belts between the legs. In NASCAR, the 6-point harness became popular after the death of Dale Earnhardt, who was wearing a five-point harness when he suffered his fatal crash; as it was first thought that his belt had broken, and broke his neck at impact, some teams ordered a six-point harness in response.

Seven-point
Aerobatic aircraft frequently use a combination harness consisting of a five-point harness with a redundant lap-belt attached to a different part of the aircraft. While providing redundancy for negative-g manoeuvres (which lift the pilot out of the seat); they also require the pilot to unlatch two harnesses if it is necessary to parachute from a failed aircraft.

Technology – Locking retractors
The purpose of locking retractors is to provide the seated occupant the convenience of some free movement of the upper torso within the compartment, while providing a method of limiting this movement in the event of a crash. Most modern seat belts are stowed on spring-loaded reels called "retractors" equipped with inertial locking mechanisms that stop the belt from extending off the reel during severe deceleration. There are two main types of inertial seat belt lock. A webbing-sensitive lock is based on a centrifugal clutch activated by rapid acceleration of the strap (webbing) from the reel. The belt can be pulled from the reel only slowly and gradually, as when the occupant extends the belt to fasten it. A sudden rapid pull of the belt—as in a sudden braking or collision event—causes the reel to lock, restraining the occupant in position. A vehicle-sensitive lock is based on a pendulum swung away from its plumb position by rapid deceleration or rollover of the vehicle. In the absence of rapid deceleration or rollover, the reel is unlocked and the belt strap may be pulled from the reel against the spring tension of the reel. The vehicle occupant can move around with relative freedom while the spring tension of the reel keeps the belt taut against the occupant.

When the pendulum swings away from its normal plumb position due to sudden deceleration or rollover, a pawl is engaged, the reel locks and the strap restrains the belted occupant in position. Dual-sensing locking retractors use both vehicle G-loading and webbing payout rate to initiate the locking mechanism.



Pretensioners and Web Clamps

Seat belts in many newer vehicles are also equipped with "pretensioners" or "web clamps", or both. Pretensioners preemptively tighten the belt to prevent the occupant from jerking forward in a crash. Mercedes-Benz first introduced pretensioners on the 1981 S-Class. In the event of a crash, a pretensioner will tighten the belt almost instantaneously. This reduces the motion of the occupant in a violent crash. Like airbags, pretensioners are triggered by sensors in the car's body, and many pretensioners have used explosively expanding gas to drive a piston that retracts the belt. Pretensioners also lower the risk of submarining, which occurs when a passenger slides forward under a loosely fitted seat belt.

Some systems also pre-emptively tighten the belt during fast accelerations and strong decelerations, even if no crash has happened. This has the advantage that it may help prevent the driver from sliding out of position during violent evasive maneuvers, which could cause loss of control of the vehicle. These pre-emptive safety systems may prevent some collisions from happening, as well as reducing injury in the event an actual collision occurs. Pre-emptive systems generally use electric pretensioners which can operate repeatedly and for a sustained period, rather than pyrotechnic pretensioners, which can only operate a single time.

Web clamps clamp the webbing in the event of an accident, and limit the distance the webbing can spool out (caused by the unused webbing tightening on the central drum of the mechanism). These belts also often incorporate an energy management loop ("rip stitching") in which a section of the webbing is looped and stitched with a special stitching. The function of this is to "rip" at a predetermined load, which reduces the maximum force transmitted through the belt to the occupant during a violent collision, reducing injuries to the occupant. A study demonstrated that standard automotive 3-point restraints fitted with pyrotechnic or electric pretensioners were not able to eliminate all interior passenger compartment head strikes in rollover test conditions. Electric pretensioners are often incorporated on vehicles equipped with pre-crash systems; they are designed to reduce seat belt slack in a potential collision and assist in placing the occupants in a more optimal seating position. The electric pretensioners also can operate on a repeated or sustained basis, providing better protection in the event of an extended rollover or a multiple collision accident.

Inflatable

The inflatable seatbelt was invented by **Donald Lewis** and tested at the Automotive Products Division of Allied Chemical Corporation. Inflatable seat belts have tubular inflatable bladders contained within an outer cover. When a crash occurs the bladder inflates with a gas to increase the area of the restraint contacting the occupant and also shortening the length of the restraint to tighten the belt around the occupant, improving the protection. The inflatable sections may be shoulder-only or lap and shoulder. The system supports the head during the crash better than a web only belt. It also provides side impact protection. In 2013, Ford began offering rear seat inflatable seat belts on a limited set of models, such as the Explorer and Flex.

Automatic

Seat belts that automatically move into position around a vehicle occupant once the adjacent door is closed and/or the engine is started were developed as a countermeasure against low usage rates of manual seat belts, particularly in the United States. The first car to feature automatic shoulder belts as standard equipment was the 1981 Toyota Cressida, but the history of such belts goes back further. The 1972 Volkswagen ESVW1 Experimental Safety Vehicle presented passive seat belts. Volvo tried to develop a passive three point seatbelt. In 1973 Volkswagen announced they had a functional passive seat belt. The first commercial car to use automatic seat belts was the 1975 Volkswagen Golf.

Automatic seat belts received a boost in the United States in 1977 when Brock Adams, United States Secretary of Transportation in the Carter Administration, mandated that by 1983 every new car should have either airbags or automatic seat belts despite strong lobbying from the auto industry. Adams was attacked by Ralph Nader, who said that the 1983 deadline was too late. Soon after, General Motors began offering automatic seat belts, first on the Chevrolet Chevette, but by early 1979 the VW Rabbit and the Chevette were the only cars to offer the safety feature, and GM was reporting disappointing sales. By early 1978, Volkswagen had reported 90,000 Rabbits sold with automatic seat belts. A study released in 1978 by the United States Department of Transportation claimed that cars with automatic seat belts had a fatality rate of .78 per 100 million miles, compared with 2.34 for cars with regular, manual belts.

In 1981, Drew Lewis, the first Transportation Secretary of the Reagan Administration, influenced by studies done by the auto industry, "killed"the previous administration's mandate; the decision was overruled in a federal appeals court the following year, and then by the Supreme Court. In 1984, the Reagan Administration reversed its course,[48] though in the meantime the original deadline had been extended; Elizabeth Dole, then Transportation Secretary, proposed that the two passive safety restraints be phased into vehicles gradually, from vehicle model year 1987 to vehicle model year 1990, when all vehicles would be required to have either automatic seat belts or driver side air bags. Though more awkward for vehicle occupants, most manufacturers opted to use less expensive automatic belts rather than airbags during this time period.

When driver side airbags became mandatory on all passenger vehicles in model year 1995, most manufacturers stopped equipping cars with automatic seat belts. Exceptions include the 1995-1996 Ford Escort/Mercury Tracer and the Eagle Summit Wagon which had automatic safety belts along with dual airbags.

Systems

Manual lap belt with automatic motorized shoulder belt – When the door is opened, the shoulder belt moves from a fixed point near the seat back on a track mounted in the door frame of the car to a point at the other end of the track near the windshield. Once the door is closed and the car is started, the belt moves rearward along the track to its original position, thus securing the passenger. T he lap belt must be fastened manually.

Manual lap belt with automatic non-motorized shoulder belt – This system was used in American-market vehicles such as the Hyundai Excel and Volkswagen Jetta. The shoulder belt is fixed to the aft upper corner of the vehicle door, and is not motorized. The lap belt must be fastened manually.

Automatic shoulder and lap belts – This system was mainly used in General Motors vehicles, though it was also used on some Honda Civic hatchbacks and Nissan Sentra coupés. When the door is opened, the belts go from a fixed point in the middle of the car by the floor to retractors on the door. Passengers must slide into the car under the belts. When the door closes, the seat belt retracts into the door. The belts have normal release buttons that are supposed to be used only in an emergency, but in practice are routinely used in the same manner as manual seat belt clasps.

Disadvantages

Automatic belt systems generally offer inferior occupant crash protection. In systems with belts attached to the door rather than a sturdier fixed portion of the vehicle body, a crash that causes the vehicle door to open leaves the occupant without belt protection. In such a scenario, the occupant may be thrown from the vehicle and suffer greater injury or death. Because many automatic belt system designs compliant with the US passive-restraint mandate did not meet the safety performance requirements of Canada–which were not weakened to accommodate automatic belts–vehicle models which had been eligible for easy importation in either direction across the US-Canada border when equipped with manual belts became ineligible for importation in either direction once the US variants obtained automatic belts and the Canadian versions retained manual belts. Two particular models included the Dodge Spirit and Plymouth Acclaim.

Automatic belt systems also present several operational disadvantages. Motorists who would normally wear seat belts must still fasten the manual lap belt, thus rendering redundant the automation of the shoulder belt. Those who do not fasten the lap belt wind up inadequately protected only by the shoulder belt; in a crash without a lap belt such a vehicle occupant is likely to "submarine" (be thrown forward under the shoulder belt) and be seriously injured. Motorized or door-affixed shoulder belts hinder access to the vehicle, making it difficult to enter and exit–particularly if the occupant is carrying items such as a box or a purse. Vehicle owners tend to disconnect the motorized or door-affixed shoulder belt to relieve the nuisance of entering and exiting the vehicle, leaving only a lap belt for crash protection. Also, many automatic seat belt systems are incompatible with child safety seats, or only compatible with special modifications.

Homologation and testing

Starting in 1971 and ending in 1972, the United States conducted a research project on seat belt effectiveness on a total of 40,000 vehicle occupants using car accident reports collected during that time. Of these 40,000 occupants, 18% were reported wearing lap belts, or two-point safety belts, 2% were reported wearing a three-point safety belt, and the remaining 80% was reported as wearing no safety belt. The results concluded that users of the two-point lap belt had a 73% lower fatality rate, a 53% lower serious injury rate, and a 38% lower injury rate, when compared with the occupants that were reported unrestrained. Similarly, users of the three-point safety belt had a 60% lower serious injury rate and a 41% lower rate of all other injuries. Out of the 2% described as wearing a three-point safety belt, no fatalities were reported.

This study and others led to the Restraint Systems Evaluation Program (RSEP), started by the National Highway Transport Safety Authority in 1975 to increase the reliability and authenticity of past studies. A study as part of this program used data taken from 15,000 tow-away accidents that involved only car models made between 1973 and 1975. The study found that for injuries considered "moderate" or worse, individuals wearing a three-point safety belt had a 56.5% lower injury rate than those wearing no safety belt. The study also concluded that the effectiveness of the safety belt did not differ with size of car. It was determined that the variation among results of the many studies conducted in the 1960s and 70s was due to the use of different methodologies, and could not be attributed to any significant variation in the effectiveness of safety belts.

Helping to improve safety apparatuses in vehicles, injury testing, and seat belt effectiveness are being tested today by Wayne State University's Automotive Safety Research Group, as well as other researchers. Wayne State's Bioengineering Center uses human cadavers in their crash test research. Albert King, the Center's director, wrote in his 1995 article titled "Humanitarian Benefits of Cadaver Research on Injury Prevention" that that use of cadavers in this type of research since 1987 has saved and will continue to save nearly 8,500 lives each year, due to the vehicle safety improvements made possible by human cadaver testing. He also indicates that due to the improvements made to three-point safety belts an average of 61 lives are saved per year.

The New Car Assessment Program (NCAP) was put in place by the United States National Highway Traffic Safety Administration in 1979. The NCAP is a government program that evaluates vehicle safety designs and sets standards for foreign and domestic automobile companies. The agency has put in place a rating system and requires access to safety test results. As of September 2007, manufacturers are required to place a NCAP star rating on the automobile price sticker.

Experimental

Research and development efforts are ongoing to improve the safety performance of vehicle seat belts. Some experimental designs have included:

- Criss-cross Experimental safety belt presented in the Volvo SSC. It forms a cross-brace across the chest
- 3+2 Point Seat Belt: Experimental safety belt from Autoliv similar to the criss-cross. The 3+2 improves protection against rollovers and side impacts.
- Four Point "belt and suspenders": An experimental design from Ford where the "suspenders" are attached to the backrest, not to the frame of the car.
- 3 points Adjustable Seat Belt: Experimental safety belt from GWR Safety Systems that allowed the car Hiriko, designed by the MIT, to fold without compromising the safety and comfort of the occupants.

In rear seats

In 1955 (as a 1956 package), Ford offered lap only seat belts in the rear seats as an option within the Lifeguard safety package. In 1967, Volvo started to install lap belts in the rear seats. In 1972, Volvo upgraded the rear seat belts to a three-point belt. In crashes, unbelted rear passengers increase the risk of belted front seat occupants' death by nearly five times.

Child occupants

As with adult drivers and passengers, the advent of seat belts was accompanied by calls for their use by child occupants, including legislation requiring such use. Generally children using adult seat belts suffer significantly lower injury risk when compared to non-buckled children.

The UK extended compulsory seatbelt wearing to child passengers under the age of 14 in 1989. It was observed that this measure was accompanied by a 10% increase in fatalities and a 12% increase in injuries among the target population. In crashes, small children who wear adult seat belts can suffer "seat-belt syndrome" injuries including severed intestines, ruptured diaphragms and spinal damage. There is also research suggesting that children in inappropriate restraints are at significantly increased risk of head injury, one of the authors of this research has been quoted as claiming that: "The early graduation of kids into adult lap and shoulder belts is a leading cause of child-occupant injuries and deaths."

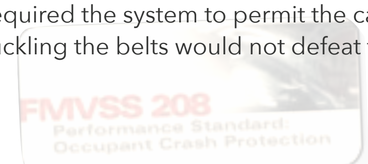
As a result of such findings, many jurisdictions now advocate or require child passengers to use specially designed child restraints. Such systems include separate child-sized seats with their own restraints and booster cushions for children using adult restraints. In some jurisdictions children below a certain size are forbidden to travel in front car seats."

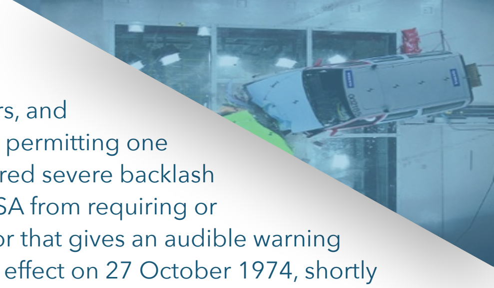
Reminder chime and light

In Europe and some other parts of the world, most modern cars include a seat-belt reminder light for the driver and some also include a reminder for the passenger, when present, activated by a pressure sensor under the passenger seat. Some cars will intermittently flash the reminder light and sound the chime until the driver (and sometimes the front passenger, if present) fasten their seat belts.

In North America, cars sold since the early 1970s have included an audiovisual reminder system consisting of a tell-tale light on the dashboard and a buzzer or chime reminding the driver and passengers to fasten their belts. Originally, these lights were accompanied by a warning buzzer whenever the transmission was in any position except park if either the driver was not buckled up or, as determined by a pressure sensor in the passenger's seat, if there was a passenger there not buckled up. However, this was considered by many to be a major annoyance, as the light would be on and the buzzer would sound continuously if front-seat passengers were not buckled up. Therefore, people who did not wish to buckle up would defeat this system by fastening the seat belts with the seat empty and leaving them that way.

To combat this dangerous habit, in 1971 NHTSA amended Federal Motor Vehicle Safety Standard Nº 208 (FMVSS 208) to require a seat belt/starter interlock system to prevent passenger cars from being started with an unbelted front-seat occupant. This mandate applied to passenger cars built after August 1973, i.e., starting with the 1974 model year. The specifications required the system to permit the car to be started only if the belt of an occupied seat were fastened after the occupant sat down, so pre-buckling the belts would not defeat the system.





The interlock systems used logic modules complex enough to require special diagnostic computers, and were not entirely dependable—an override button was provided under the hood of equipped cars, permitting one (but only one) "free" starting attempt each time it was pressed. However, the interlock system spurred severe backlash from an American public who largely rejected seat belts. In 1974, Congress acted to prohibit NHTSA from requiring or permitting a system that prevents a vehicle from starting or operating with an unbelted occupant, or that gives an audible warning of an unfastened belt for more than 8 seconds after the ignition is turned on. This prohibition took effect on 27 October 1974, shortly after the 1975 model year began.

In response to the Congressional action, NHTSA once again amended FMVSS 208, requiring vehicles to come with a seat belt reminder system that gives an audible signal for 4 to 8 seconds and a warning light for at least 60 seconds after the ignition is turned on if the driver's seat belt is not fastened. This is called a seat belt reminder (SBR) system. In the mid-1990s, an insurance company from Sweden called Folksam worked with Saab and Ford to determine the requirements for the most efficient seat belt reminder. One characteristic of the optimal SBR, according to the research, is that the audible warning becomes increasingly penetrating the longer the seat belt remains unfastened.

In 2003, the Transportation Research Board Committee, chaired by two psychologists, reported that ESBRs could save an additional 1,000 lives a year. Research by the Insurance Institute for Highway Safety found that Ford's ESBR, which provides an intermittent chime for up to five minutes if the driver is unbelted, sounding for 6 seconds then pausing for 30, increased seat belt use by 5 percent. Farmer and Wells found that driver fatality rates were 6% lower for vehicles with ESBR compared with otherwise-identical vehicles without.

Efficacy

In 2001, Congress directed NHSTA to study the benefits of technology meant to increase the use of seat belts. NHSTA found that seat belt usage had increased to 73% since the initial introduction of the SBR system. In 2002, Ford demonstrated that seat belts were used more in Fords with seat belt reminders than in those without: 76% and 71% respectively. In 2007, Honda conducted a similar study and found that 90% of people who drove Hondas with seat belt reminders used a seat belt, while 84% of people who drove Hondas without seat belt reminders used a seat belt.

Legislation

Observational studies of car crash morbidity and mortality, experiments using both crash test dummies and human cadavers indicate that wearing seat belts greatly reduces the risk of death and injury in the majority of car crashes. This has led many countries to adopt mandatory seat belt wearing laws. It is generally accepted that, in comparing like-for-like accidents, a vehicle occupant not wearing a properly fitted seat belt has a significantly and substantially higher chance of death and serious injury. One large observation studying using US data showed that the odds ratio of crash death is 0.46 with a three-point belt, when compared with no belt. In another study that examined injuries presenting to the ER pre- and post-seat belt law introduction, it was found that 40% more escaped injury and 35% more escaped mild and moderate injuries.

The effects of seat belt laws are disputed by those who observe that their passage did not reduce road fatalities. There was also concern that instead of legislating for a general protection standard for vehicle occupants, laws that required a particular technical approach would rapidly become dated as motor manufacturers would tool up for a particular standard which could not easily be changed. For example, in 1969 there were competing designs for lap and 3-point seat belts, rapidly tilting seats, and air bags being developed. But as countries started to mandate seat belt restraints the global auto industry invested in the tooling and standardized exclusively on seat belts, and ignored other restraint designs such as air bags for several decades.

As of 2016, seat belt laws can be divided into two categories: primary and secondary. A primary seat belt law allows an officer to issue a citation for lack of seatbelt use without any other citation, whereas a secondary seat belt law allows an officer to issue a seat belt citation only in the presence of a different violation. In the United States, fifteen states enforce secondary laws, while 34 states, as well as the District of Columbia, American Samoa, Guam, the Northern Mariana Islands, Puerto Rico and the Virgin Islands, enforce primary seat belt laws. New Hampshire lacks both a primary and secondary seat belt law.

Risk compensation

Some have proposed that the number of deaths was influenced by the development of risk compensation, which says that drivers adjust their behavior in response to the increased sense of personal safety wearing a seat belt provides. In one trial subjects were asked to drive go-karts around a track under various conditions. It was found that subjects who started driving unbelted drove consistently faster when subsequently belted. Similarly, a study of habitual non-seatbelt wearers driving in freeway conditions found evidence that they had adapted to seatbelt use by adopting higher driving speeds and closer following distances. A 2001 analysis of US crash data aimed to establish the effects of seatbelt legislation on driving fatalities and found that previous estimates of seat belts effectiveness had been significantly overstated. According to the analysis used, seat belts were claimed to have decreased fatalities by 1.35% for each 10% increase in seatbelt use. The study controlled for endogenous motivations of seat belt use, which it is claimed creates an artificial correlation between seat belt use and fatalities, leading to the conclusion that seat belts cause fatalities. For example, drivers in high risk areas are more likely to use seat belts, and are more likely to be in accidents, creating a non-causal correlation between seatbelt use and mortality. After accounting for the endogeneity of seatbelt usage, Cohen and Einav found no evidence that the risk compensation effect makes seat belt wearing drivers more dangerous, a finding at variance with other research.

Increased traffic

Other statistical analyses have included adjustments for factors such as increased traffic, and other factors such as age, and based on these adjustments, a reduction of morbidity and mortality due to seat belt use has been claimed. However, Smeed's law predicts a fall in accident rate with increasing car ownership and has been demonstrated independently of seat belt legislation.

Mass transit considerations – School Buses

Six states—California, Florida, Louisiana, New Jersey, New York, and Texas—require seat belts on school buses. Pros and cons had been alleged about the use of seat belts in school buses. School buses which are much bigger in size than the average vehicle allow for the mass transportation of students from place to place. The American School Bus Council states in a brief article saying that, "The children are protected like eggs in an egg carton – compartmentalized, and surrounded with padding and structural integrity to secure the entire container." Although school buses are considered safe for mass transit of students this will not guarantee that the students will be injury free if an impact were to occur. Seat belts in buses are sometimes believed to make recovering from a roll or tip harder for students and staff as they could be easily trapped in their own safety belt. In 2015, for the first time, NHTSA endorsed seat belts on school buses.

Motor coaches

In the European Union, all new long distance buses and coaches must be fitted with seat belts. Australia has required lap/sash seat belts in new coaches since 1994. These must comply with Australian Design Rule 68, which requires the seat belt, seat and seat anchorage to withstand 20g deceleration and an impact by an unrestrained occupant to the rear. In the United States, NHTSA has now required lap-shoulder seat belts in new "over-the-road" buses (includes most coaches) starting in 2016.

Originally posted at revolvy.com

If the Ferguson Effect is indeed a problem, what is the solution?

Editor's Note: This is Part II of a two-part series. Part ! is included in the earlier portion of this issue of Skidmarks and can be read in the November issue at LET.epubxp.com/i/745845-nov-2016.

A lot of recent attention is being given to the term "Ferguson Effect," which essentially means officers restricting themselves to reactive policing and avoiding being proactive during their tours of duty. Originating from the police shooting on August 9, 2014 of Michael Brown in Ferguson, Missouri, combined with other controversial police actions, our profession has found itself highly criticized to the point where many may simply not want to take any risks that could result in embarrassment to their agency, loss of their employment, or incarceration for making a mistake. Hence we have the term "Ferguson Effect" which may be taking a hold of the attitudes of more officers each day. Measuring police productivity has always been somewhat difficult because so much of what an officer does, i.e. preventing a crime, can't always be charted like monthly ticket counts. Measuring attitude can be even more difficult. How much traction the "Ferguson Effect" gets over time though should be a serious concern to not only police leadership but all officers. Effective strategies should combine individual officer efforts and personal ethics with strong agency and union leadership. This provides a consistent supportive platform and can make a difference in a fast-paced, information-based society of which some members seem to have developed an unreasonable suspicion of police officers. The following general blueprint can address the "Ferguson Effect" so that it doesn't compromise our noble mission any further.

Individual officers

Officers need to routinely remind themselves that they are still the good guys and their mission is to protect and serve. As this line of work inherently involves a certain level of bravery, we need to draw on our courage and conviction to recognize that we are all, including our own loved ones, in more danger if we let the criminal element go unchecked. We must go after evil and try to ferret it out because too many good people depend on us. We must remind ourselves of why we got into this job from the beginning. We also need to make our voices heard more because too many within the media have demonstrated a bias towards this profession. Write letters to the editors of your local papers and provide the other side of the story. Use your social media access and forward positive stories about cops. Call in to radio shows and get the facts out about why cops do what we do.

OPINION

Union participation

Police fraternities and unions have an important role in battling the "Ferguson Effect." They need to find innovative ways to show support for their members and encourage them to continue to make a difference. They also need to realize that they play a teaching role with the public. I recently read of a union taking out a TV ad to show all the good that their officers do. This is definitely thinking outside of the box, reaching broad audiences with positive content. Although expensive, this type of messaging is critical right now and a good use of union dues money.

Leadership support

Police leadership can play a vital role in whether an officer feels his department will have his back if he takes risks to protect people. Police management need to be clear that they will support them and demonstrate it with action, not just words. They must resist the urge to throw an officer under the bus for political expediency or to answer to a mob. They must be especially judicious and fair when examining police use of force, and not forget how they would want to be evaluated if forced to make "split-second judgments in circumstances that are tense, uncertain, and rapidly evolving."

A dependable voice(s)

Our profession could use a dependable national spokesperson or two who can provide fact-based scientifically supported evidence and reasoning on why cops do what they do under stress, as well as providing insight from a police officer's perspective on various matters. Not sure if they want the job but I would nominate either Dr. Bill Lewinski of the Force Science Institute or Lt. Colonel Dave Grossman, as both can provide sober analysis of police use of force. Anyone else interested?

Ours is a special profession that cannot be poisoned from a "Ferguson Effect" or any other euphemism that corrodes our noble mission to protect and serve. We cannot depend on anyone else to do it for us. If it is a must, it is up to us.

Lieutenant Tom Wetzel is a suburban police lieutenant in Greater Cleveland and an adjunct professor on community policing at Lakeland Community College.

Annual Conference Review

by Frank Owen, PhD, PE, polyXengineering, Inc.

The CA2RS annual convention was held from October 27-29 at South Lake Tahoe. A little over 70 members attended, which was more than 20% of the CA2RS membership. The main presenters at the conference were a team of three reconstructionists from Principia Engineering in San Francisco (http://www.principia-eng.com).

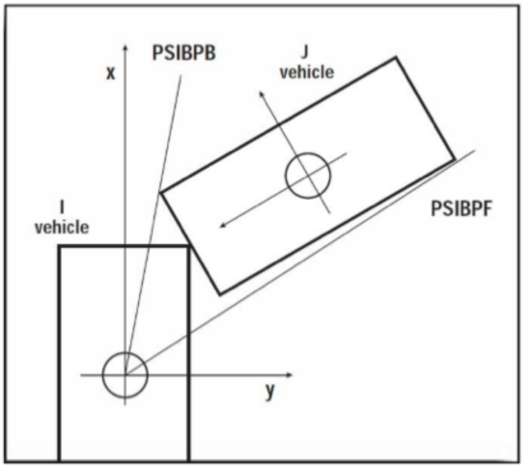
The topics covered were a good mix between general and specific. The conference was ostensibly about Delta-V and how it is used in accident reconstruction. This certainly is a fundamental cornerstone of reconstruction. But many more fundamentals came up and were discussed by the presenters during their lead-in to their principal specific topic, the used of accident-reconstruction software to simulate vehicle crashes.

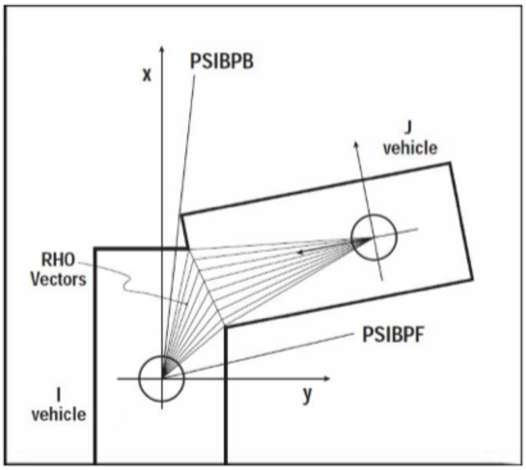
The three Principia presenters were all very experienced reconstructionists: Eric Rossetter (PhD, PE, and a principal at Principia), Dan Desautels, and Jeff Cleary. Eric handled most of the discussion about the use of software for AR. Principia's primary software tool is Engineering Dynamics Corporation's (EDC's) SIMON algorithm. Dan presented a good deal of information on crush calculations and how they are used in AR. Jeff actually was at one time an auto mechanic before going into AR as his profession. His insight into the very practical side of damage was unusual and very useful. (The scheme for email addresses at Principia seems to be jdoe@principia-eng.com.)

Like many AR presentations and seminars, this one was built around case studies. A number were presented from mostly around the Bay Area. The first was a 2013 crash of a BMW into a Toyota in Daly City, which killed three of the four occupants of the Toyota. The Toyota was T-boned as it was executing a U-turn departure from a parking space on the side of a street. Many fundamentals were covered in the presentation of this crash, including the use of Google maps, Google earth terrain, Google Pro, the use of video footage for speed determination, etc. Crush measurements were made on the vehicles. The use of crush was discussed in some detail, since the primary collision of the bullet vehicle was frontal, while the target vehicle was hit at its mid-section broadside. The history of crush and the theory behind it were discussed in some detail. For me, who has been out of this business in an active way for the past two years, the peppering of the main topic with the review of fundamentals was perfect.

This case study progressed into a discussion of the software used in AR. The evolution of Engineering Dynamics Corporation's HVE (human/vehicle/environment) software from EDCRASH and EDSMAC was discussed in some detail. SIMON is the current result of that evolution. (SIMON stands for "Simulation Model, Non-linear.) It is fully 3D, so it can take into account a vertically changing stiffness of a vehicle, for example. It can also simulate 3D events like roll-overs. It has full suspension models of vehicles built into it, so it can handle vehicle handling dynamics during drastic maneuvers. And SIMON is very expensive too. It's part of the HVE suite of EDC's software. The complete package costs $27,000 + about a 20% annual charge. (To be fair, EDC also has a number of options that are less expensive to fit the needs of accident reconstructionists. It's low-end product is HVE-CSI, $950 + 20%/year.)

Discussion of EDSMAC4 and how it determines vehicle interaction from CA2RS conference





A number of details of using the EDC software were discussed—bringing crash-site data (maps and elevation data) into the crash-simulation program, for example. The creation of a custom vehicle in HVE was discussed. It was mentioned that HVE offers a very nice collection of white papers on various aspects of its software and the application of it. These can be found at http://www.edccorp.com/library/whitepaper.html.

A very dramatic, high-speed crash in Pacifica was presented as a case study. Here a 2008 BMW exited from a tunnel, did not make a curve, and had a small-overlap collision with a guardrail on a drop-off above the ocean. Again, fundamentals and details were discussed, such as how to model the 3D crash scene, bringing AutoCAD terrain models into EDC's software, the limitations of the vehicle models of CRASH and SMAC, etc. The mix of fundamentals and details was very nice.

As part of the presentations, Dan Desautels discussed NHTSA's database on case studies that is part of the National Automotive Sampling System (NASS). A great number of cases are available to reconstructionists, collected as part of this program. (See http://www-nass.nhtsa.dot.gov/BIN/NASSCaseList.EXE/FETCHLIST for a list of cases since 1997.) Some discussion previously in the conference had skirted the topic of crash data recorders (CDRs), and Dan showed that this database also had this data for some reported crashes. Data available from CDRs have increased with the improved sophistication of these devices, and this was evident in what data were available, depending on the vintage of the vehicle.

Dan recommended comparing data in this database with the results of an ongoing investigation to see if there is corroboration. In my notes I also have many random facts that were just part of the running discussion as the presentation progressed—using Google Sheets in lieu of Excel; older vehicles CDRs give only longitudinal delta-V, nothing lateral; recommended books for AR; the nominal speed of deployment of airbags. Though the conference had a structure, many random, useful facts came up.

Several other case studies were presented, used as a structure for presenting ever more details and information that arise in AR cases. Each case's structure was different, and as a whole the cases represented a good survey of the craft, basic things but then also the application of sophisticated software to arrive at specific conclusions. Worth mentioning is a truck-jackknifing case, in which unequal braking on tires, some of which were worn, was modeled in SIMON. Pricipia showed that had the brakes been adjusted properly and had the tractor part of the truck had tires with good tread-life, the jackknife probably could have been prevented. In this Eric made the point that he made repeatedly: one chief value of simulation is that you can run a number of what-if scenarios to show what would have likely happened under slightly changed circumstances than those that prevailed in the crash.

Of course during the conference there were coffee breaks. During these, a number of vendors came in and presented their wares, including animation services, drone-based scene documentation, vehicle and crush databases, to name a few. Also as part of the conference the membership meeting took place. Minutes for this will also be published in this newsletter, so no further detail is given here.

CA2RS
Profit & Loss
January 1 through December 23, 2016

	Jan 1 - Dec 23, ...
Income	
Annual Conference	22,135.00
Magazines	5,303.38
Membership	18,890.73
Total Income	46,329.11
Expense	
Accident Reconstruction Jour...	5,187.00
ACTAR CEU	150.00
Administrative Expenses	131.31
Administrative Staff	3,600.00
Advertising	-2,880.00
ARC Network	99.00
Auto	
Gas	0.00
Total Auto	0.00
Bank Charge	1.00
Board Meeting	
Meals	199.95
Travel	1,265.89
Total Board Meeting	1,465.84
BOD Training	2,449.32
Conference	
A/V Equip	1,836.67
Actar	320.06
Conference Flyer Mailings	403.93
Down Payment	-33.98
Food	6,597.35
Giveaways	1,756.42
MEETING ROOM RENTAL	800.00
SERVICE FEES/TIPS	2,177.78
Travel Stipend	310.20
Total Conference	14,168.43
Insurance	1,706.00
MEMBERSHIP REFUND	0.49
Need More Info	38.49
Postage	9.40
PROFESSIONAL SERVICES C...	260.00
Quarterly Training	
Meals	545.62
Printing Fees	405.00
Snacks	1,075.65
Travel	1,494.93
Total Quarterly Training	3,521.20
Website	1,127.10
Total Expense	31,034.58
Net Income	**15,294.53**

CA2RS Board Meeting

September 12, 2016 at 09:49 hours

Attendees: Roman Beck, Sean Shimada, Chris Kauderer, John Crews, Bill Focha, Jahna Rinaldi

Call to Order at 1000 hours by Chris Kauderer. All present listed above, Dave Cameron absent.

OLD BUSINESS

Approve Minutes of March 1, 2016
Jahna completed minutes at last board meeting - Minutes were published in newsletter since last board meeting. Bill Focha made motion to approve. Roman Beck seconded motion and the motion passed unanimously.

2016 Conference – Jahna secured the Lake Tahoe Resort Hotel and confirmed there will be no resort fees this year. As of 9/9/2016, 139 room nights contract for $184, but we need 156 rooms for our 85% guaranteed. Regarding registration, 56 have already paid and prices will go up on September 25. She will send out email regarding registration and hotel rates expiring.

On the technical side, Sean Shimada contacted Principia Engineering to verify the speakers. We currently have six vendors and may be adding one more. Roman made a motion to approve $1,553.00 for give-aways, USB drives, and bottles for 2016 Conference. The motion was seconded by Bill Focha and it was approved unanimously. Dave will contact current vendors for giveaways.

The mentor sessions will be on Thursday and Friday afternoons for two hours after the Principia presentation concludes (1500 hours). There will be a 15 minute commercial and a 15 minute break, leaving the sessions to conclude at 1730 hours. It was suggested that the members take a survey for topics of interest, including: biomechanical, reconstruction (general), chiropractic/medical, bicycles, scanning/mapping, failure analysis, pedestrians, CDR, crush, traffic signals, commercial vehicles, fill in.

As a rough outline, the mentoring sessions will start off in small groups with opportunity for one-on-one on Thursday (small groups, general discussion/questions) and Friday to max the session when others waiting (20 minutes). Survey Monkey: Please answer 3 question survey to best meet your needs (Interested in Mentoring session? “Y/N”; Interested in 1-1? If yes - what subject (possible subjects)? Email/Survey Monkey by Jahna. As a reimbursement or compensation for the mentors (Chris & Jahna) choice of one year membership or dinner.

WREX 2016 (Bill Focha) CA2RS Put up $3,000 seed money and WREX was a success, so we got our seed money back. WREX has agreed to reimburse CA2RS for all expenses in regards to Bill Focha planning meeting attendances. For the DropBox Download (Chris) everything is ready for DropBox 70 G and members of participating organization will have access to the data. So, how can we best put out the data? Bill Focha made a motion to make all data from WREX available to all current CA2RS members for two years via Google Drive, to be purchased by CA2RS. Roman seconded the motion and it was approved unanimously.

Jahna will check on the status of the motorcycle testing. John made a motion to purchase two MUSYSIC 1600 Watt professional portable speakers (one for Nor Cal and one for So Cal), both to be used at conferences in lieu of renting equipment. Sean seconded the motion and it was approved unanimously. Jahna will order them and ship them to Davis.

OFFICER REPORTS

Chris –Jahna will run elections at the conference.

Jahna–Current Nominations: Chris Kauderer for Chair (running unopposed); Sean Shimada and Bill Focha for Director-at-Large (running unopposed). If no other nominees, a motion will need to be made at Conference Membership Meeting for no election to be held.

ACTAR **–** (Chris on behalf of Lou Peck) Lou will not be at conference, so Scott Buske will proctor the test. The test and room are already arranged and Sean and Chris will get schedule from conference so CEU's can be applied for prior to conference.

Treasurer Notes (Nichole): Updated info for RegOnline and we need to renew Directors and Officers Insurance Policy for Board. We received the seed money back from WREX ($3,000). The taxes for 2015 are complete ($260) and the domain renewals are up for ca2rs.com, ca2rs.org, and e-mail renewal for godaddy.com. Nichole needs access to PayPal (John). The treasurer report was reviewed and Bill Focha made motion to approve the report. Roman seconded the motion and it was approved unanimously.

Membership (John Crews): Total Membership is at 327 current members with 93 overdue and 45 lapsed (over one year). John will print out list and give to us to see if we can reach out to overdue / lapsed members. We believe we have fixed all of the PayPal registration issues and John has notified of everyone who has had problems with PayPal, giving alternate methods of payment (we take credit cards on site and over phone via PayPal and Square). An e-mail will be sent by John to all membership with all payment methods - PayPal, check or credit card on site and over phone. If a credit card payment is desired please send email to Ca2rs@ca2rs.com or membership@ca2rs.com and someone on the Board will contact and take payment.

Training (Sean Shimada): Third Quarter 2016 - Sarb Dhesi had a great response from training with over 40 attendees at each location. We don't have plans for first or second quarter 2017 yet, but all training locations in Nor Cal and So Cal have had good response. John Crews: Should we use Survey Monkey for new training topics instead of the conference?

Newsletter (Chris on behalf of Tim Neumann): Bill Focha will be writing a new column called "Now for a Commercial Break" where people can ask and answer questions regarding commercial vehicles.

NEW BUSINESS

2016 BOD Elections (Jahna): the current nominations are Chris Kauderer for Chair (unopposed), Sean Shimada and Bill Focha for Director-at-Large (unopposed). If there are no other nominees, a motion will need to be made at Conference Membership Meeting for no election to be held.

Open Forum:
Dues – Roman made a motion to raise member dues by $10 to $50 per year starting July 1, 2017. The motion was seconded by Sean as this will allow us to provide better quality training and keep up with training costs and digital costs. The motion was approved unanimously.

Next Board meeting will be on October 29, 2016, at the 2016 CA2RS Conference.

Adjournment: Bill made motion for adjournment, Jahna seconded motion, and it was approved unanimously. Adjourned at 14:35 hours.

CA2RS Annual General Membership/Board Meeting

October 29, 2016

South Lake Tahoe, CA

Minutes

Call to Order: by Chairman Chris Kauderer at 8:05 AM

Attendance:

Present: David Cameron, Bill Focha, Roman Beck, Jahna Rinaldi, Chris Kauderer, John Crews

Absent: Sean Shimada

Old Business:

- Approval of Minutes from September 12t,2016 meeting
- Minutes and treasurer's report to be published in Newsletter
- WREX Summary – Bill Focha discussed CA2RS role in WREX 2016, crash tests, crash test safety, CA2RS had largest representation, $3,000 seed money returned, data available to all CA2RS member on Dropbox, Rudy Degger recommended a summary report for all the crash tests

New Business:

- 2016 Conference Update – Jahna Rinaldi, 77 attendees and vendors, 2nd best attendance in past 7 years, return to Anaheim in 2017, probably return to Tahoe in 2018, concerns about resort fees and other "non-room" hotel fees
- Election – Jahna Rinaldi, motion to waive election forwarded by Chad Bluette. Seconded by Kevin Edison. Motion approved; Election waved. Newly elected BOD Directors for years 2017-2018 are :

Chair: Chris Kauderer

Director at Large: Bill Focha

Director at Large: Sean Shimada

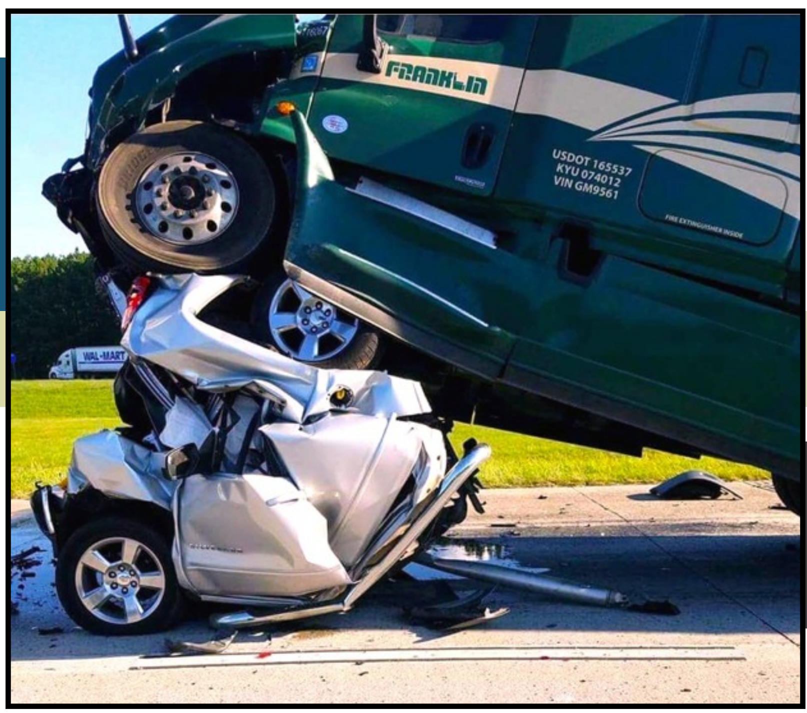
Officer Reports:

- **Chair:** Chris Kauderer, organization running well, membership second to NAPARS, thanks to Board of Directors
- **Vice Chair:** Jahna Rinaldi, organization running well
- **ACTAR:** Chris Kauderer on behalf of Lou Peck, Scott Buske proctored the test, CA2RS required to offer test annually, CA2RS has good records on which members have been to our training
- **Treasurer:** Jahna Rinaldi on behalf of Nichole Hanley
    - Square for credit card payment, as well as Paypal
    - Current/daily Balance $29,000, majority of conference not paid, which will reduce our balance to approximately $14,000, goal of conference to break even, dues go to miscellaneous operating costs and training costs
    - Profit and Loss available on request
- **Membership:** John Crews, Paypal issues, 349 members, some members have unintentionally joined twice, dues will be raised to $50 effective July 1st, 2017
- **Training:** Jahna Rinaldi on behalf of Sean Shimada, next quarterly training will be presented by David Eisenbeisz on work zones
- **Newsletter:** Chris Kauderer on behalf of Tim Neumann, Frank Owen will provide review of this conference

Open Forum:

- Member's concerns/comment:, Many members gave kudos to organization and Board of Directors
- Hope to add crash testing in 2017

Adjournment: Motion by Rudy Degger to adjourn; seconded by Benn Karne Motion unanimously at 9:01 AM



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Issue	Ad and Payment Due Date
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☐ June	May 1
☐ September	August 1
☐ December	November 1

First issue for ad appearance: __________

Special Notes:

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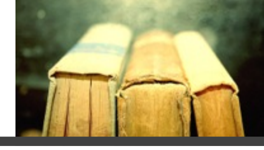
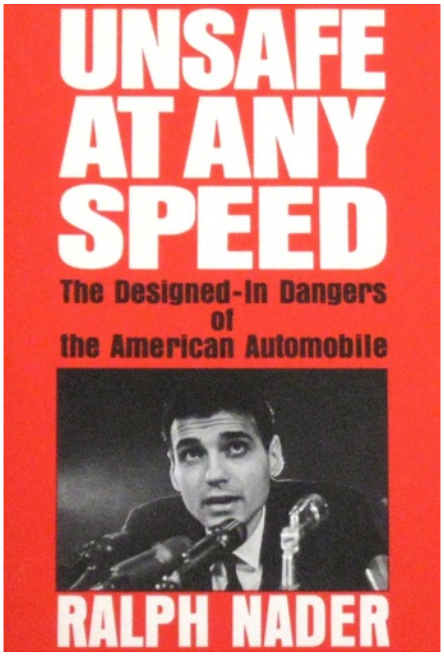


Turn the Pages of Something Old & Something New

Nonfiction from two genres to make you appreciate safety advances (in and out of the automobile)



Unsafe at Any Speed: The Designed-In Dangers of the American Automobile

Ralph Nader (Published 1965)

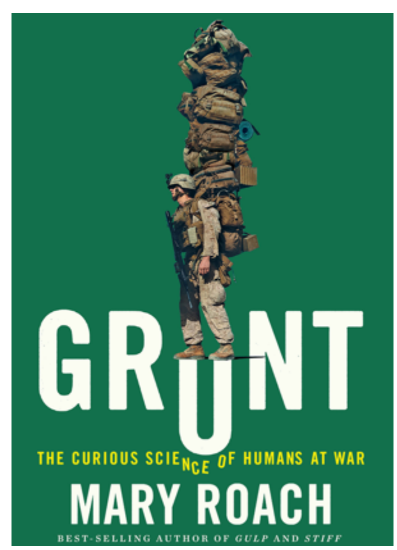
As a Traffic Safety Specialist, this book is a MUST, this old book needs to be mandatory reading for any person interested in Road Safety. Ralph documented the resistance of car companies to the introduction of safety features, like safety belts, that looks timely today, for example with the lobby that produce a delay in the mandatory fitting of air bags. Also you will learn how the primitive road safety components, still used in USA, called the three E's (Engineering, Enforcement, Education) was borne as a device to direct the efforts to the community away from the real problems of safety of the vehicles, some of the that was sell with tires that don't resist the weight of the fully loaded vehicle! Finally you can understand the lacking level of road safety in US versus European countries that have in service safety policies that will reduce the absolute number of killed by thirty percent over five years. This book is the necessary building stone to the effort to make car manufacturers accountable for the safety level of his products. — *Milton Bertin Jones, Amazon.com review*

Grunt: The Curious Science of Humans at War

Mary Roach (Published 2016)

Bestselling author Mary Roach explores the science of keeping human beings intact, awake, sane, uninfected, and uninfested in the bizarre and extreme circumstances of war.

Grunt tackles the science behind some of a soldier's most challenging adversaries — panic, exhaustion, heat, noise — and introduces us to the scientists who seek to conquer them. Mary Roach dodges hostile fire with the US Marine Corps Paintball Team as part of a study on hearing loss and survivability in combat. She visits the fashion design studio of US Army Natick Labs and learns why a zipper is a problem for a sniper. She visits a repurposed movie studio where amputee actors help prepare Marine Corps medics for the shock and gore of combat wounds. At Camp Lemmonier, Djibouti, in east Africa, we learn how diarrhea can be a threat to national security. Roach samples caffeinated meat, sniffs an archival sample of a World War II stink bomb, and stays up all night with the crew tending the missiles on the nuclear submarine USS *Tennessee*. She answers questions not found in any other book on the military: Why is DARPA interested in ducks? How is a wedding gown like a bomb suit? Why are shrimp more dangerous to sailors than sharks? Take a tour of duty with Roach, and you'll never see our nation's defenders in the same way again. —amazon.com



Editor's Note: Not technically *specific to reconstruction, but scientific and interesting with tidbits that are directly relatable to the work we do (plus, a fun, quick read).*

ACTAR Examination Calendar

MARCH 2017

9 **Houston, TX:** Sponsor pending. Application submission due by January 8. Exam registration by February 7. Held after EDR Summit at the Hilton Houston North, 12400 Greenspoint Drive. Exam starts at 0800 hours.

13 **Boise, ID:** Sponsored by IAARS. Application submission by January12. Exam registration by February 11. Held at the Boise Police Department, 333 North Mark Stall Place. Exam starts at 0800 hours.

APRIL 2017

6 **Shwenksville, PA:** Sponsored by PSP. Application submission by February 5. Exam registration by March 7. Held at the PSP SE Training Center, 2047B Bridge Road, Route 113. Exam starts at 0700 hours.

14 **Golden, CO:** Sponsored by CSP. Application submission by February 13. Exam registration by March 15. Held at the CSP State Patrol Academy, 15055 South Golden Road. Exam starts at 0800 hours.

17 **Edmonton, AB:** Sponsored by CATAIR. Application submission by February 16. Exam registration by March 18. Held at Renneberg-Walker Engineering Associates Ltd. 9320-49 St. Exam starts at 0800 hours.

MAY 2017

19 **Orlando, FL:** Sponsored by SOAR. Application submission by March 20. Exam registration by April 19. Held at the Doubletree Hilton, 5780 Major Boulevard (IPTMs Special Problems). Exam starts at 0800 hours.

JUNE 2017

4 **Wisconsin Dells, WI:** Sponsored by NATARI. Application submission by April 5. Exam registration by May 5. Held before annual conference at Kalahari Resort, 1305 Kalahari Drive. Exam starts at 0800 hours.

AUGUST 2017

8 **Glassboro, NJ:** Sponsored by MwATAI. Application submission by June 9. Exam registration by July 9. Held at Rowan University before the 2017 Joint Conference. Exam starts at 0800 hours.

SEPTEMBER 2017

18 **Edmonton, AB:** Sponsored by CATAIR. Application submission by July 20. Exam registration by August 19. Held at Renneberg-Walker Engineering Associates Ltd. 9320-49 St. Exam starts at 0800 hours.

OCTOBER 2017

3 **Springfield, IL:** Sponsored by IATAI. Application submission by August 4. Exam registration by September 3. Held at the Crowne Plaza Springfield, 3000 South Dirksen Parkway. Exam starts at 0800 hours.

13 **Golden, CO:** Sponsored by CSP. Application submission by August 14. Exam registration by September 13. Held at the CO State Patrol Academy, 15055 South Golden Road. Exam starts at 0800 hours.

GO TO ACTAR.ORG FOR ADDITIONAL DETAILS AND INFORMATION

parting shot
parting thought

JOHN LUDWICK JR'S 1965 CHEVY CORVAIR MONZA

"I knew the Corvair was the perfect air-cooled car because everyone forgets about them," Ludwick says. "People always ask what kind of car this is, and it's cool educating people in the European scene [about how] Chevrolet made a rear-engine, air-cooled car."

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