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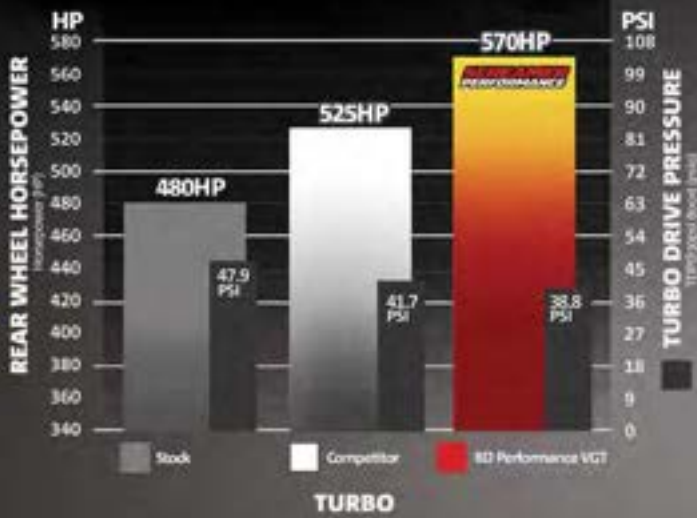

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TAILGATING

A Letter from the Editor

PRINT MAGAZINES – THE FUTURE

Dateline 8/3/18: The good 'ole inbox from Jalopnik has the headline: "Car and Driver Just Laid Off a Whole Bunch of People." Writer Ryan Felton cuts to the chase (an idiom from the 1920s film industry: edit the film and get to the exciting chase or drama scene): "The magazine industry is constantly in turmoil as print readership declines and tech conglomerates gobble up any potential revenue sources that could be had online. Now that unfortunate reality has fallen upon a heavyweight in the car magazine world, Jalopnik has learned that approximately 13 editorial staffers were laid off as a part of restructuring at the magazine."

Hearst Magazines has owned Car and Driver, as well as Road & Track, since their purchase back in January of 2011. According to the article, "At the time, Car and Driver claimed circulation of 1.2 million people."

Dateline 10/15/19: Again, the good 'ole inbox from Jalopnik has the headline: "AutoWeek to be 'Operated' by Hearst, Ends Print Magazine." Sure enough, AutoWeek (actually the magazine was sent out every second week) was sold by Crain Communications to Hearst Magazines. AutoWeek immediately became a "digital and experimental" brand for the Hearst group.

As an AutoWeek reader, I wondered what would happen to the balance of my paid subscription? For Hearst not to fulfill the remaining copies would constitute the literal definition of "mail fraud." The remaining balance was conveniently rolled over to an additional several copies of my existing Car and Driver subscription or Road and Track. If I wanted to receive a refund I could write a letter requesting one.

And, to chase down a refund would give new meaning to the 1980's game from Hasbro "Trivial Pursuits."

To be upset at the situation would be an unnecessary rise in blood pressure. And, to chase down a refund would give new meaning to the 1980's game from Hasbro "Trivial Pursuits." However, when reading my final print copy of AutoWeek, it was a bit bothersome to read the "Thanks Everybody" and "Raise a Glass to You" goodbye letters from some of the long-time staff. Example: "Boxes of AutoWeek in my garage, I have spent 30 years of my life—exactly half of it—working at AutoWeek," writes the west coast editor Mark Vaughn. Further Vaughn tells the audience, "After 61 years, this will be the last print issue of Autoweek. Hang onto it. Cling to it. Cherish it. I know I will. Go out to your garage, or up into your attic, pull out those old boxes and read about racing and cars and industry gossip and all the things you loved reading about. Read it all as it was on the printed page.

"But before you do, raise a torque wrench to the old AutoWeek, will ya? And remember how much fun we've all had together. "I'll see you on the internet."

Maybe Mark Twain had the right viewpoint, "I'm in favor of progress; it's change I don't like."

By the way, one of my all-time favorites, Cycle World, is now a glossy, upscale publication. However, it is no longer published monthly; it is now 4 issues per year. But, new publisher Bonnier has an active website with more Kevin Cameron than ever. Who said publishing a magazine was easy?

Cycle World: A garage of vintage motorcycles and Kevin Cameron's writing have kept me as a subscriber since 1973!

Can't Tell the Players Without a Scorecard

Dateline 12/06/19: Next up on the good 'ole news feed that comes to my email address: another Jalopnik announcement that The Enthusiast Network (TEN) Publications will discontinue publishing 19 of its 22 publications. The MotorTrend Group (MTG) provides all of the editorial and sales support for the 22 titles. Here is the corporate-speak from MTG "At MotorTrend Group, we remain committed to providing our fans and advertisers quality automotive storytelling and journalism across all of our content platforms and we are doubling-down on our best-in-class digital product experiences, while maintaining our support of the three most popular, profitable and strategic brands across digital and print—MotorTrend, Hot Rod, and Four Wheeler."

Corporate buzz words: doubling-down, best-in-class, content platforms, strategic brands, product experiences. These words remind me of the millennial-speak that I discussed in Issue 107's editorial. How about you just tell it like it is: We're overstaffed, advertisers chase the youthful spending folks (rightly so?), and young folks don't read nor do they care to pay for meaningful content. So, bottom line, we can't pay for content, edit, publish and pay the postal rates to deliver 6-12 issues a year to you at the low-low price of $9.99. Yep, the advertising sales used to more than cover those expenses. It ain't happenin' no more. We're throwin' in the towel.

So, what's new? Since the good 'ole interwebs in the late 1990s, the demise of print has been forecast by the pundits. The TDR has lived through the explosion of the good 'ole interwebs and the website "forums" where true enthusiasts would (and still do) gather. But, truthfully speaking, the good 'ole Face-boogers and Goob-tubers are a difficult challenge for *any* magazine or internet enthusiast forum. And, TEN Publications are killing 19 of 22 send-it-in-the-Postal Service magazines.

What's the answer?

I don't know. So, I gave the assignment to long-time automotive journalist Greg Whale. Turn to page 70 and you can read Greg's take on the state of the automotive/truck magazine business. Does Whale's observation match mine? Also, James Langan (pages 106 adds his input to the discussion.

Finally, "When in doubt, send the assignment out!" Back in Issue 103 I introduced you to automotive journalist Jack Baruth. He is never at a loss for an opinion, so I asked him to comment on the turmoil in the magazine business. His comments start on the right column. Enjoy his insight and I'll try to draw a conclusion at the end.

He is never at a loss for an opinion, so I asked him to comment on the turmoil in the magazine business.

WHERE DID ALL THE CAR MAGAZINES GO?

by Jack Baruth

Did you ever think you'd be nostalgic for the mega-bookstores, the sanitized two-story corporate-crap dispensers with their listless coffee-shop employees and their gross tonnages of heavily-discounted coffee-table volumes? In central Ohio, we lost the sensibly-sized "READMOR" strip-mall joints to flashy "Little Professor" stores; they, in turn, yielded to Barnes & Noble or Borders. At one point in history, about eighteen years ago, Borders was so powerful that they magnanimously decided not to engage in an easy-peasy buyout of Ingram Micro, the company that supplied all the books behind-the-scenes to an online retailer called… Amazon, I think it was, just because they didn't like the optics of crushing weaker competitors. In 2009, Barnes & Noble *did* try to buy Ingram, but they were pressured out of the deal by fears that they would be prosecuted under anti-trust laws.

The idea of any brick-and-mortar bookstore holding a monopoly is kind of funny nowadays, unless you're talking about a monopoly on unsold copies of last year's self-help hardcovers. Still, those megastores had their era, and during that era it was very easy to find as many as fifty or even seventy-five different automotive-related magazines on their shelves. Everything from Super Chevy to 911 & Porsche World UK. And those represented just a small slice of the periodicals available for sale. My local B&N had one long triple-decker display area that was longer than two Cadillac Fleetwoods parked bumper-to-bumper.

Not anymore. Print magazines are dying with fruit-fly predictability now. Automobile and AutoWeek are on the scrapheap of history with dozens of other titles: Diesel Power. TruckTrend. Muscle Mustangs & Fast Fords. Stuff that everyone thought would last forever, or close to it. This bloodletting isn't limited to "buff books". After eighty-seven years of publication, Family Circle just closed up shop. There will be more closures to come. A few will be of the "soft close" variety, where a magazine goes online-only (AutoWeek) or combines staff with the online side to save money and extend the print run for a few more years (Road & Track). Others will be simply shuttered.

If you remember the Golden Age of Buff Books, where people like David E. Davis earned million-dollar bonuses and relatively obscure publications supported two dozen or more people in full-time employment, this sudden allergy to newsprint is bewildering. What's changed? Don't people still like cars? Don't people still know how to read? Isn't it still nice to have a couple of magazines in your bag for a long flight or a quiet meal alone?

Late in 2018, I was told that Road & Track, my authorial home for almost six years, would be closing its Ann Arbor offices and "going mostly online." At the same time, I was recruited for a new position at Hagerty Media, the writing-about-cars side of the increasingly-famous classic-and-collector-car insurance provider. I didn't need a Magic 8-Ball to tell me that all signs pointed towards one business that was losing money and another business that was making money, so I jumped ship while the jumping was good. In the course of making that quick decision, however, I learned a bit about the business of magazines and why they are quickly becoming yesterday's news.

You can probably already guess most of the factors behind the print-rag disappearing act. None of them would be powerful enough, in and of themselves, to bring the party to a halt. Put them together, though, and it's lights out:

1. **Bookstores are closing… even at the airport.** Several years ago, R&T realized that their biggest newsstand volume was coming from airport bookstores. Why? They were the only ones that weren't closing. Everyone else "pivoted" to another business or just gave up. Unfortunately for the car magazines, however, the airlines are now pushing digital entertainment in-flight, usually without charge. Five years ago, I would be surrounded by readers on most weekday flights, leafing through everything from The Economist to Super Chevy. Now it's a bunch of morons staring slack-jawed at a Marvel movie or NFL game. The few people who *are* reading seem to be obsessed with what's called "midwitlit"—business books with ridiculously grandiose titles designed to let everybody who sees you skimming these turgid volumes know that you're better suited for promotion than layoff.
2. **It's harder to get exclusive content now.** For years, the magazines were kept on life support by the automakers who enforced print-friendly "embargoes". You'd fly out to drive the new Corvette and they'd tell you that you couldn't write about it for two months. This was designed to keep the websites from scooping the mags. The problem is that the automakers have "pivoted" to "mommybloggers" and "influencers" who post pictures on Instagram or Facebook on the same day as the event. So if you're reading a traditional auto magazine, you're usually reading old news.
3. **The advertising model has collapsed.** In 1975 there were very few ways for an automaker or automotive-product firm to get their wares in front of the buyers, and many of those ways could be found on a newsstand. The advertisers knew that only a small percentage of MotorTrend readers could afford a new BMW 325e, but they had to buy ads in every copy regardless. Nowadays, the tech giants can target ads to you with terrifying specificity. Why pay to reach a million mostly indifferent magazine readers when the same money, or less, gets you night-and-day exposure to 10,000 people who are in the process of shopping for the precise product you offer?
4. **We've become partisan about more than politics.** Today's online discussions have a ruthless specialization to them—because that's what people want. You can't put out a "Mustang magazine" nowadays; not when the online forums cater specifically to Fox-body owners or vintage-Shelby buyers or the small group of remarkable human beings who are really interested in a 302-engined "bubbleback" Mercury Capri. Today's readers won't bother with stuff that isn't directly targeted at their particular interests.

Put these four factors together, and it spells doom for any conventional auto magazine. There are only two kinds of buff books left: the ones which have closed, and the ones which *will* close. Ten years from now, you won't find any recognizable names on the newsstand. It's sad but true.

Are there exceptions to the rule? I'd like to think that you're holding one of them. The TDR will continue for quite some time because it dispenses useful, authentic information to a committed group of people who are already experts in their chosen field. Robert goes out, digs up this information, and collates it in this handy magazine just for you and for people like you. Expect to see the same thing happen for other specialized interests, from high-end firearms to exotic watches. There's also the additionally useful fact that you can lay the magazine on your garage floor while you're working on your truck. That's not so easy, or safe, with a $1000 smartphone.

The TDR: From #1 to #107, we've been doing this a while. Thanks, members!

I also think that Hagerty Magazine will continue because we ***(Hagerty is Baruth's current employer)*** don't need the advertisers' money. We're providing stories and photography to people who already do business with us. It's kind of like the thirteenth donut in a baker's dozen; you're not paying much to get it and it's nice to have for those long afternoons at home.

I like the model. It leads to honest, thoughtful writing done without much regard to advertiser pressure or always-changing popular opinion.

There's a precedent for this. During the seventeenth and eighteenth centuries, many printed works were "subscribed". We would say nowadays that they were "crowdfunded". You paid your money and you waited for your copy to arrive. If there wasn't enough interest, the run was canceled. That's how it used to work and with specialized membership magazines like the TDR and Hagerty, it still works today. I like the model. It leads to honest, thoughtful writing done without much regard to advertiser pressure or always-changing popular opinion. The best part of all: You can't get these magazines in a mega-bookstore, so you'll never have to visit one again, right?

Jack Baruth
TDR Writer

A TRIP TO B&N

Yes, as Baruth noted, B&N has changed. No surprise here, the Rolling Stones correctly composed it (songwriters Jagger and Richards) in 1974, "Time Waits for No One." And the B&N stores of today have taken over where the Toys-R-Us stores left off: toys and books for the kids, add in some coffee for the high-school hipsters and a place for the moms to congregate during school hours and they have adapted.

Lately, have you ventured into a B&N? With the implosion of TEN, the smaller magazine counter is populated with many an enthusiast publication from the United Kingdom. And these magazines are quality print, quality editorial, thicker than thick and full of advertisements

These enthusiast magazines (Hagerty from the US, others from the UK) have content worthy of the subscription price.

I don't get it.

Or, maybe I do.

While what you have in-hand has certainly evolved since our humble start in 1993, your contributions are what make the TDR and its website a publication that has endured. However, we're not without the same challenges as Car and Driver, AutoWeek, Cycle World and those 19 of 22 TEN publications.

By the way, effective February 2020 Sports Illustrated is "entering a new chapter in our 66-year history: This is our first issue as a *monthly* magazine. Things have changed..."

Geez, like Mark Twain said, "It's change I don't like."

We're not changing the TDR. But to continue, the membership needs your support and referrals. Turn to page 120 and try to help us grow.

Robert Patton
TDR Staff

2020 AMELIA ISLAND CONCOURS

Yes, I took the suggestion from TDR writer Joe Gearin (Issue 105, pages 54-57) and attended the 2020 Amelia Island Concours event. Our Issue 107 magazine (pages 62-63) told you it was the 25th Anniversary and the Guest of Honor was Mr. Roger Penske. Throughout the magazine you'll see some pictures of vehicles and people that I was fortunate to photograph. It was a great show.

See you there next year?

Mr. Roger Penske and many of the famous race cars from his past.

Member 2 Member

Member solutions to member problems.

HANDS-ON AT THE TDR

by Robert Patton

Over the past several TDR magazines there have been articles featuring member, writer, group [the Cummins Historic Resource Center (HRC) guys] or editor vehicle "builds." With great interest, I read Stan Gozzi's report on some of the custom-built cars for SEMA (Issue 107 pages 96-99). I've seen the cars and trucks of the TDR and I've seen the cars and trucks at SEMA. If I told you that the workmanship on an R. Schwarzli or HRC was up to comparison; the attention to detail on a Gozzi, Langan, Ludel, Dalgleish, B. Pine, or D. Magnoli was equal to; the show vehicle of Holmes or Donnelly was on par, well, would you believe me?

Certainly we all want to know more about the tricks-of-the-trade and how we stack up to all of those done-in-an-hour television personalities. There is only one of the staff that's had the opportunity to play in that league: John Martin. Let me give you an example that John sent in when he was talking about his 1953 Studebaker show car: the perfect gap.

John's 1953 Studebaker show car.

The Perfect Gap

John writes: "Ever notice how pro-built cars always have perfect gaps around doors, hood, and truck lids? If the gaps on a pro-built car aren't perfect, the pros cut the skin about 1/8"-3/8" from the edge of the panel (see photo) and pry the side of the panel to get the gap where it needs to be. Then they re-weld the cut back together. Use a very thin (1/32") 3" cut-off blade to make the cut."

Trial, error; weld, fill; cut, trim; the perfect gap.

Now, here is what's cool about John: He's a down-to-earth kinda guy that, save for the final bit of preparation for paint or the sewing machine to do a stitch, he is a do-it-yourselfer that is responsible for 98% of the work on his vehicles. Can his cars can be compared to one of those six-figure builds that Stan Gozzi discussed in Issue 107? Yes, and John did the build.

Here is a story about his latest creation. And, in the next part of the story (Issue 109) we'll get John to tell you what it is like to compete at SEMA/Ridler Award/Good Guys Nationals level.

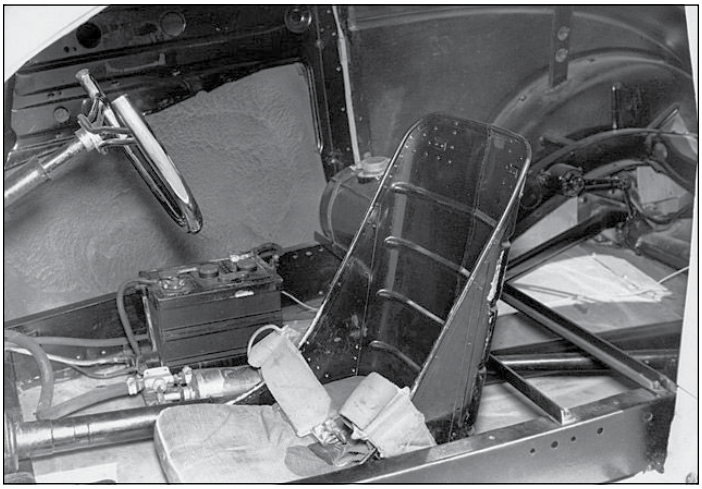
MY '34 FORD COUPE

by John Martin

Robert asked me to tell you about my latest street rod project: a 1934 five-window Ford Coupe. The project began taking shape in the late '50s when I had to pass on buying my brother's 1934 Ford Coupe. I had to use all my money just to finish college.

But the vision of an all-out, race-ready Ford Coupe never left my mind. In 2009, I was watching the bidding on a '34 Coupe on eBay. Since I thought the price was right, I entered a bid. I won, which meant I had to find some money. My wife steadfastly asked, hands on her hips while making the statement, "Just what the heck did you do now?" I took that as a sign of approval since she didn't throw anything at me.

Likely you've seen many Ford Coupes at car shows with full fenders, beautiful interiors, sound systems, and air conditioning. But the vision in my mind of what a Ford Coupe should be like was heavily influenced by three old race cars: the Peirson Brothers' 2D Bonneville racer featured on the cover of the April 1950 issue of Hot Rod magazine; the Mooneyham and Sharp 554 drag race coupe from the late '50s that was powered by a nitro-burning early Hemi; and Dawson's Demon, a fiberglass '34 Ford Coupe body on a tube frame with a fuel-burning Hemi. I've seen this car go 200mph at a quarter-mile drag strip.



The Peirson brother's 2D coupe from the 1950s.

These three cars had been etched in my mind for many years. First of all, I wanted a trick roadster nose like the Peirson coupe, but the cost of having one built was prohibitive. Instead I opted for a cut-down aluminum grille surround and made a sheet metal insert for it. A three-gallon Moon fuel tank was inserted into the grille much like the early funny cars of the '60s.

You won't drive too far with a three-gallon Moon fuel tank. Notice the nice, clean firewall.

A 4-inch taper chop was utilized with the windshield laid back to better line up with the front door edge. I always thought one of the reasons a '41 Willys Coupe looked mean was the slope of the rear of the top. By removing the top skin from the side window surrounds, I was able to lean the rear of the top forward a few degrees.

Ford Coupes have a very busy firewall. I was able to construct a much nicer looking firewall out of 16-gauge sheet shaped to mimic the grille shell. This also enabled me to move the engine back about 7-inches. The cowl vent actually works, but the dash had to be moved back 4-inches.

To lower the body over the frame, the rear fender well openings were raised up 4-inches along the belt line. Since this car is going to be very fast, the body needed to sit as low as the chassis as possible. The body was channeled 2.5-inches over the frame.

The frame is a set of fully boxed 0.125" thick aftermarket rails which were scooted forward 4-inches and cut off immediately in front of the rear kickup. I reshaped the bottom edge of the frame to match the curvature of the bottom of the body. Chassis crossmembers, the roll cage (NHRA certified to 8.50 seconds), and rear section are all TIG-welded, chrome moly tubing (0.89" wall). The front crossmember is mounted 1-inch ahead of its stock location so the wheelbase is now 5-inches longer than stock.

The engine is really the focal point of the car. In homage to the early FX drag cars, a Mercury Marine, mechanical stack fuel injection system (Kinsler), was converted to electronic fuel injection. Under the eight stacks resides a 693 all-aluminum, big block Chevy using a New Century Performance aluminum block, Brodix heads, Comp Cam valvetrain, Diamond pistons, Ohio Crankshaft and Hemi rods. Trend-tapered push rods and a T & D shaft rocker arm system are also used. I built Zoomie headers to make it appear more racy, but underneath each pipe is a pipe leading through a manifold to a huge Flowmaster muffler exiting down the center of the car.

A close-up of the New Century 693 engine. Amazing.

The specifications on the camshaft were toned down to improve drivability, but the engine still produces 850hp at 5800rpm on 93 octane fuel. Engine torque is 818pounds at 3800rpm, so this thing can pull houses off their foundations.

Initially, the throttle response was so instant that it was impossible to take off without chirping the tires. Lucky Bodenbach (New Century Performance) and his engineer son Jordan designed and CNC machined the plenum chamber between the stacks and the heads. Lucky also devised a progressive throttle linkage so the engine runs on only four of the injector stacks at lower throttle openings. The beast is now very drivable, but it hits super hard if you stand on it.

Did you day "Stand on it"?

Lucky and John fabricated an aluminum interior to simulate a race car using Speedway bucket seats as a starting point. The dash utilizes some old Stewart Warner Stage III gauges for that nostalgic look. Since many of my early Funny Car buddies didn't survive the era, safety is paramount. In addition to the roll cage, the entire driveshaft is surrounded with 1/8" chrome moly sheet. I also devised a collapsible steering column and a backup camera. All controls and a fire extinguisher are within easy reach of the driver.

Come inside, come inside.

A nice assortment of Stewart-Warner gauges.

And, all it took to build this car was eight years and all of my lunch money. Please note the superb photos taken by John Jackson during the 2019 Goodguys “Hot Rod of the Year” competition. We were lucky enough to win the Fuel Curve pick at this event held in Nashville, Tennessee. Check it out on FuelCurve.com. Dave Doucette wrote a nice article on the car.

In an early shut-off pass down the 1/8 mile at the Goodguys “Hot Rod of the Year” competition the car went 7.23 seconds. Next spring we’ll take the car to the local 1/8-mile strip to see what it will do. We expect 6.50-6.70 in the 1/8 mile and low 9s to high 8s in the 1/4 mile at 160-170mph. Needless to say, this old man ain’t gonna drive it!

John Martin
TDR Writer

10 BACK

As the Editor, I have often lamented that as a society we don't properly honor the inventiveness and achievement of our elders. So let us give that bygone achievement some proper and regular observance in our pages in the "10 Back" column.

In each installment of this column I review the accomplishments of TDR trailblazers as I summarize the old articles to reinforce that "the more things change, the more they stay the same." Here is my look back at what was happening in Issue 68, May 2010.

ISSUE 68 REVIEW

Back in the day I would assign a theme for the writers to discuss. In Issue 68 we asked them to make mention of their best TDR stories.

Turning to page 9 of Issue 68, there was a direct tie-in to today's story on premium diesel fuel (or lack their-of, see page 61). The article was written by Doug Leno. As best as I can tell, nothing has happened in the quest to establish a standard for "premium" diesel. Therefore, Doug's findings in 2010 are still relevant today. I think you'll find his text from Issue 68 interesting:

"In Issues 54 and 55 I presented a comprehensive overview of ultra low sulfur diesel (ULSD) at the time it began to emerge into the US fuel supply. I had the privilege of interviewing several notable ULSD standards contributors from Bosch and Cummins, as well as state regulatory agencies, independent consultants, and pipeline distributors as these groups struggled with the standards, test methods, and distribution logistics during the conversion.

"On a personal note, I emerged from that research with enough confidence in the nation's fuel supply that I decided not to use a fuel additive to enhance fuel lubricity in my own Turbo Diesel.

"Issue 55 was particularly memorable to me because I was able to write about so-called 'premium' diesel as it relates to the various standards and regulations in place at the time. Essentially, I discovered that premium diesel was, and is still, 'an excuse to charge more for something that is better, but not necessarily better in ways that are important.'"

More from Doug Leno: He was thoughtful in his review of his "TDR Best" and gave the audience the chapter and verse references in his quest to push his 2004.5 5.9 HPCR engine with its stock 305 horsepower to 600hp and then back to a more manageable (read less maintenance) 500hp. For those with the 2003-2007 5.9 HPCR engines that want the how-to on horsepower, Doug's series of articles were captured and can be found in the "Turbo Diesel Buyer's Guide: Volume 2003-2009," pages 86-128. Wow, 42 pages of trial and error, parts and more parts. As a footnote/update to his testing, turn to page 63 and the "Diesel Brothers" news update. My guess is that some of the parts (and/or programmers) used in Doug's quest for performance may no longer be available.

Continuing with the "best of" theme for Issue 68, on page 10 we had a member tell the story of how the TDR membership saved him money. The specific example: A price of $1875 to repair/replace a vacuum pump on his 2000 Turbo Diesel. Members recommended the Gould Gear rebuild kit (video and PCV assembly tools included) and he was back on the road for less than $50. Thanks, members!

Skip the advertisement and we've made it to page 12—more good stuff. The late Troy Simonsen gives the audience a common-sense tip for the removal of the center crossmember on a '94-'02 truck. For transfer case or transmission removal, the tapered crossmember must come out. The shadetree solution is to use a bottle jack and pipe extension, placed between the frame rails, to push the rails outward, allowing the crossmember to drop. Thanks, Troy, your legacy lives on.

Troy Simonsen's bottle jack/pipe extension trick to spread the frame rails from Issue 68, page 13.

Great, we're now at page 14. Are you making notes? Once again an article by Gary Croyle on clutches (Issue 63, pages 40-44, and in the TDR's "Perfect Collection," pages 133-139) was referenced and we had another happy member install a Perfection Clutch assembly in his truck. Thanks Gary and thanks Barry Millet for your correspondence.

Page 16…I need to move this review into high gear, The short story: if your rear power windows on a Third Generation truck refuse to operate, the problem will be at the last place you look (funny, eh?). In this example it was a broken wire at the big white wiring harness connector located at the rear door.

Okay, I've made it to "10 Back." Now we're going back to the year 2000. However, as a pat-on-the-back to all of the TDR membership, I'm going to repeat several noteworthy comments that show just how well you guys were (and still are) the forefront of maintenance and solutions to problems with our trucks. Then, I promise, I'll move quickly through the balance of Issue 68. Here is a look back to 20 years ago:

- In Issue 26 TDR writer Kevin Cameron gave us his take on lube oil additives. Further proof was presented in Issue 28 using correspondence from the trade journal Aftermarket Business. Cameron then closes the discussion with his comments in Issue 28 about owners "trying to do the right thing" and with vitamins for our vehicles. Kevin's "Best of" is found at the TDR's web site, the "Cameron Collection" pages 28-30.

- In May of 2000, "The average price of diesel rose 2.9 cents last week to $1.49 per gallon, the highest mark since the Department of Energy started collecting the data seven years ago." ***Editor's note: I predict this virus thing will drop the price to about $2 this spring.***

- Yet to develop… the importance of fuel pressure to the '98.5/24-valve engine's VP-44 fuel injection pump. As we are now all aware, '98.5-'07 owners of the 24-valve engine are well advised (Dare I say required?) to have a fuel pressure gauge permanently installed to ensure that the VP-44 fuel injection pump has adequate diesel fuel to lubricate and cool the pump's internals.

- In the "Chapter News" section there was coverage of all types of social gatherings. The members in the Southeast gathered in Reynolds, Georgia for a drag race event. I was there and the VP-44 fuel pump failed as I was leaving the drag strip. Oops… the real cause was the weak transfer pump. Maybe, just maybe, this problem was starting to surface.

- As of March 2000 the production numbers from Cummins were right at 250,000. By the end of the '98.5 to '02 product cycle, the trucks would number almost 500,000. If you are a '98.5 to '02 owner, please, please install a fuel pressure gauge on your engine and monitor the supply of fuel to the Bosch VP-44 fuel injection pump. You can read all about this topic by downloading the TDBG, Volume 1, and reading "Fuel Transfer Pumps Revisited," pages 337-365.

SERVICE TOPICS

My review of Issue 68 has reached the "generations" section of the magazine. Here I'll present a brief summary of the topics covered and, should you need detailed information, the page number is listed so that you can go back to Issue 68 for the details.

First Generation (pages 20-23)

- A one-page write up by "ro23j" that tells his story about replacing all of the brake lines and all of the fuel lines on his '91 Turbo Diesel. Moral of the story: it is not difficult, but a few special parts are needed. Things to watch for: almost clogged-up fuel tank vent and dirty fuel pick-up screen.

- Low-vacuum warning light: Check for cracks in the plastic hose fittings and, in this owner's example, it was stretched, not tight hoses at the vacuum pump and brake booster.

- New starter contacts and plunger were installed on the owner's starter. However, starter still just ticks when energized: A replacement battery solved the problem.

- A scraping/tapping noise is noticed when the vehicle is shifted into any gear other than Park. A replacement flex plate and the vendor, CAT Power Engine Parts, was suggested. Unfortunately, CAT is no longer in business.

- Driver's side window is slow to open/close: The owner replaced the electric motor brushes with NAPA part number E601SB and filed the brushes down a bit to make them fit.

- Transmission band adjustment: front, 72 inch-pounds and then back 2.5 turns; rear, 72 inch-pounds and then back 2 turns.

- Dowel pin worries on a First Generation truck: TDR writer Joe Donnelly examines a '90 model year truck with 200,000 miles and disproves the urban legend that the problem doesn't involve the '89-'93 engines. On examination he found the pin to be loose and he corrected the problem (page 87). A new exhaust manifold was also installed.

The loose dowel pin on Joe's First Generation truck. The dowel pin have moved out about a quarter of an inch meaning it is ready to fall out.

Second Generation 12-Valve (pages 24-27)

- Batteries died and, after 10 days of sitting, the replacement batteries died: The alternator was removed and the repair shop confirmed that there was a bad diode in the alternator.
- Transmission shifts in and out of overdrive between 55 and 60mph: The owner checked the wiring at the transmission temperature sensor, cleaned the terminals, reconnected the wires and the problem was solved.
- The brake pedal slowly goes further toward the floor after the '96 Turbo Diesel 2500 is stopped. Recent service included new pads, and brake shoes: The problem was solved with the replacement of the master cylinder.
- Fuel leak only when fuel tank is full: The owner dropped the tank and found corroded fuel supply and fuel return fittings at the top of the fuel tank. With air pressure applied, they were found to have rust holes.
- Adding used oil or ATF to your diesel fuel for lubricity: In a word (words, many folks offered advice), NO.
- Heater core replacement advice: See Issue 46 and 59 for help.
- Horsepower increase for a '97 engine: Joe Donnelly covered it all in "Prescriptions for Power," "TDBG, Volume 1," pages 51-72.
- Is there a difference in the 2WD and 4WD manual transmission (the NV4500)? Yes, the 4WD version has a shorter mainshaft and a different tail housing. Therefore, they're not directly interchangeable, but parts can be swapped to make them work (4WD mainshaft kit and 4WD tail housing).

Second Generation 24-Valve (pages 28-30)

- Belt to bypass the air conditioner compressor: Yes, the non-air conditioner belt can be used if there were an emergency, your belt for the A/C broke, or the A/C compressor needed to be bypassed.
- Proper antifreeze for a 2000 year model truck: The table for all model years (coolants and capacities) was presented in Issue 62, pages 42-43. The most recent summary that takes us to the current trucks is found in "The Perfect Collection," pages 142-144.
- The owner of a '99 Turbo Diesel truck was having the typical dead-throttle-pedal problem. Members pointed the owner to either a problem with the VP44 injection pump or the accelerator pedal position switch (APPS). The APPS was replaced. Adjustment instructions were found in Issue 60, pages 30-31.
- Fuel filter leak on a '99 Turbo Diesel: Repair instructions for '97-'99 fuel systems were covered in TDR Issue 64, page 29. The problem is likely an O-ring.
- Low fuel pressure after installing a fuel pressure gauge: Congratulations, you installed the gauge for this very reason, to monitor for low pressure and, thus, correct the problem before the VP44 starves for fuel and causes a big-dollar repair. See the "TDBG, Volume 1," to get the full story. The pages to read, 337-365.
- How to change/remove the injectors: Joe Donnelly references his how-to article that was in Issue 51, page 95. Special tools aren't needed.
- How to change/remove the water pump: Again, Joe Donnelly gives reference to his article in Issue 66, page 104, for the removal. Hint: it is real easy to service the water pump.
- How to replace the heater core: A broken record, Joe Donnelly references Issue 46, page 12, and Issue 59, page 90. All of the above are available digitally to TDR members.

Third Generation 5.9 HPCR (pages 32-36)

- A replacement fuel control actuator (FCA) failed after only 100 miles in operation: The owner was advised to check for fuel contamination and bad fuel was found. The tank and fuel lines were cleaned and the problem was solved.
- Special tools needed to remove FCA: The proper tool is a T25 Torx and we all know those can be a pain to remove. (The folks at Geno's Garage include a set of 5mm Allen head screws to replace those pesky Torx.) Additional access to the FCA is found by removing the plastic inner fender liner.
- Engine ticking sound: The owner placed his finger on the number five injector line and discovered that the line was loose in its blue clamp. Problem solved.
- Idle speed vibration on a truck with a G56 manual transmission (106K miles): The clutch was replaced and the vibration problem was solved.
- Wastegate solenoid code P0243: The wastegate solenoid was replaced and the new part solved the owner's problem.
- No warm air in the cabin after driving about 10 miles: The truck was low on coolant and at full thermostat-open there was not sufficient flow to the heater core to warm the interior.
- How to change a water pump: TDR Issue 64, page 104, has the how-to. Mopar, Cummins or Gates were suggested brand names that owners have used with success.
- The difference in the 2004 and 2004.5 engines: The effective date was 1/1/2004 and the newer 325hp engines met a different set of emissions rules (TDR Issue 43, page 30, has the details.) The "TDBG, Volume 1," pages 130-136, discuss the big picture of emissions and engine evolution/higher hp.
- Modifications to improve fuel mileage: Those were the days… TDR writer Joe Donnelly suggests the "TDBG, Volume 1," "So You Want Fuel Economy," pages 97-120.
- The turbocharger compressor wheel was damaged: Joe Donnelly suggests removal and cleaning of the intercooler and grid heater to check for errant pieces of metal.
- Clutch throw-out bearing and clutch replacement at 246K miles, should the owner "freshen" the NV5600 with a rebuild? Joe Donnelly says yes. The editor: If it ain't broke, don't fix it.
- Automatic transmission fluid service: how to change all of the fluid? Issue 64, pages 11-12, have the answer.

Third Generation 6.7 HPCR (pages 38-41)

- Engine warm-up procedure: TDR writer Stan Gozzi tells us, start the engine, wait for adequate oil pressure and drive it normally.

- Frequent oil change intervals on the '07.5-'12 6.7-liter engine: Issue 65, page42, "Ask the Engineer" and "Engine Oil Essentials" on page 43 were the answer-of-the-day. Most recently, our Issue 101, pages 60-63 gave '07.5-'12 owners a 10 year later update. Words to the wise; oil change intervals based on EVIC logic on this vintage engine should be followed.

Fourth Generation (pages 42-48)

- The Fourth Generation truck was introduced in late 2009, so what did we know in the short four or five months before the magazine went to the printer?

  Good question.

  In December 2009 we were fortunate to have Ram's help at the TDR website with a live Q&A forum titled "Ask the Engineer." Folks, this is a great re-read, but at a length of six pages it is too much to repeat. So, fire-up the computer and take a look back at Issue 68. You won't be disappointed, it gives a great look at how we have evolved with the Fourth Generation truck in these past 10 years.

FEATURE ARTICLES

Paint Care and Paint Protection

If a TDR article has been incorporated into any of the "Buyer's Guide" books or the "Perfect Collection" it should certainly be noted. Okay, here is the note: Doug Leno's "New Again: Machine Polishing for Mortals" can be found in the Perfect Collection book, pages 127-134.

I took some time to check his 10-year old article for relevance. In the paint care world of polish, polish and buff, buff nothing has changed. As a matter of fact I used Leno's paint care techniques as recently as Issue 105, "Paint Protection Evolution," pages 18-24. So, it is now the middle of spring and your truck needs a good cleaning—really a reread might be helpful.

The Best Of…by Greg Whale

Again, the theme for Issue 68 was for the writers to talk about thier "Best Of" articles.

TDR's Greg Whale took the assignment seriously and went back to Issue 1 and did a brief summary of topics that were of interest. I couldn't help but take a trip with Greg down memory-lane and I was lost for 30-minutes reading his reviews. Wow, we have covered a lot of subjects.

The Best Of…by Mark Barnes

TDR's Mark Barnes also took the assignment to heart and "idiosyncratically" selected his Top Ten. So, if you've got some time for reading (did your company send you home for a two-week vacation due to the virus thing that made your investments drop 30%?) check out "What Makes Us Tick," a collection of Mark's contributions to the TDR that started in 2001.

Now here are the titles that Mark liked the best:

- A Cure for What Ails Us: Issue 30
- Chrome: Issue 58
- Feels Like the First Time… Again: Issue 47
- Get Lost: Issue 37
- Giving Ourselves a Hand: Issue 33
- Necessity is a Mother: Issue 53
- The Best Tool Ever: Issue 52
- The Call of the Open Road: Issue 35
- The Joy of Maintenance: Issue 34
- The Top Ten Reasons a Truck is Better Than a Human Being: Issue 44

This relisting (and rereading) of Mark's contributions has prompted me to ask him to do another Top Ten from his latest work (Issues 68 to current). Stay tuned to see what we come up with.

The Best Of…by John Holmes

John was quick to remind the audience that one of his first articles was the how-to on wiring in a torque converter lock-up switch, aka Mystery Switch, for the '94-'02 trucks. Reference "TDBG, Volume 1," pages 321-322.

The Best Of…by Joe Donnelly

Joe referenced his series of articles "Air + Fuel = Power" that were raptured in the "TDBG, Volume 1," pages 51-90. His contributions to "So You Want Fuel Economy" are found on pages 97-120. In Joe's Issue 68 article he purchases a new-to-his '90 model truck and talks about exhaust manifold shrinkage, killer dowel pins and water pumps—you know, all the typical need-to-do things a new owner should address.

Backfire

Our very own lube-oil-guru, John Martin, talks about the latest oil marketing buzz-words "Titanium Enriched." John's response, "Really?"

Shop Floor

Andy Redmond takes us back to the basics with an article on "You're A/C System." It is a really good article. To save you from looking it up, it is such good reference material that it has been added to the "Perfect Collection."

Robert Patton
TDR Staff

A feature article about a TDR member, vehicle or travel adventure.

RAMbling ABOUT – How a Ram Diesel Gets a Swiss Couple Around the World

by Ozy and Steffi Steiner

Some of you might already have met us on our "One Lap of America" in 2015, or during 2019's TDR Rally in Columbus. We're Ozy and Steffi Steiner from Steinen, Switzerland. If we haven't met, you may have noticed our home on wheels. It stands out a little bit among other rigs: first for its comparably tiny size, and secondly, for its construction. It faintly resembles a pick-up camper, but here the "living room" is (almost) permanently attached to the frame of our Third Generation Dodge Ram.

So, how did this adventure begin?

It all started with a Ram 2500 Quad Cab that was assembled in 2004 in Mexico. After being used as a company car in Canada, it was bought by an elderly Swiss couple who put a pickup-camper on the bed to explore North America. They loved their vehicle so much that they took it home to Switzerland with them. When they were too old to travel, they sold it to a specialized used car dealer.

We already had a nice camper box that had been built years ago by a friend of Ozy's. But we didn't have a truck for it since it was, especially by Swiss standards, very heavy (more than one metric ton or 2200 pounds). So we needed something with enough payload, power and durability. This brought us to our Cummins/Ram, which had by then roughly 124,000 miles on the odometer. We purchased the truck in May of 2012 with 120,000 miles on the odometer.

The Steiner's steed, a 2004 Ram 2500 Quad Cab.

The First Trip Out

We mounted the box on the vehicle and Ozy went to work like a SEMA addict: snorkel, diesel fueled engine preheater, exhaust brake, air compressor, TransGo shift kit, new leaf springs and so on. Thus equipped, we test drove our rig to Iceland in 2013. We were excited about how the vehicle handled the 940 highway miles to the ferry in Denmark, as well as all those bad gravel roads in Iceland, and didn't care about the occasional fording of a river (we even made the 2014 TDR calendar).

One of the first trips out with Box One installed.

Trip Number Two

After having experienced almost 24 hours of daylight during the Icelandic summer, we thought to ourselves that 24 hours of night might also be interesting. So the next winter we went north as far as the Scandinavian North Cape and Lapland, which lie on about the same latitude as the northernmost part of Alaska. There we not only experienced almost complete darkness and light-absorbing snow (which subsequently led to a massive upgrade in our lights) but also prolonged stretches of temperatures as low as -15°F. Unfortunately, the Box One was not properly insulated for this since it had been built to travel in warmer climes. After two winter vacations in the north where we experienced ice build-up in the *interior* storage compartments, we decided that we needed another box for our Ram.

2015 – First Trip to the US

We found a German company, Ormocar in Hauenstein, that would build a new box to our needs and specifications. It is made of a sandwich construction with polyurethane foam insulation inside fiberglass walls. A special feature is the tilting roof with foldable, solid sidewalls (ours was a prototype). Because the fixed walls are two inches thick, and the foldable walls 1.2 inches, the insulation is excellent! While the new box was being built in 2105, we shipped the old rig to Halifax and took it on one last big journey: a three-month trip around Canada and the US. The shipping is relatively easy and doesn't cost too much. (Depending on the size of your rig; it was about $2100 one-way on a RoRo cargo ship).

During our three-month trip in 2015, we fell in love with "overlanding" (which TDR writer Whale defined as camping with too much Velcro and floppy hats), the US and its inhabitants. Some of them were fellow TDR members, like Maine's Mike Wilson, whom Ozy knew already "digitally" from the TDR forums. He and his lovely wife Sandy were very kind and gracious, and it was the start of a wonderful friendship that has lasted until today. In 2015 we drove once around, counterclockwise, from Halifax to Vancouver, down the West Coast to Los Angeles, through the southern states back to the East Coast and up again to Halifax. We loved it so much and there was so much more to see, we felt that we had to come back for a longer period of time.

During our three-month trip in 2015, we fell in love with "overlanding" the US and its inhabitants.

"Box Two" – Finally Installed

Shortly after the US/2015 trip, we had the Box Two mounted on our Ram in Germany and started furnishing it at home. Ozy did it all himself, including the electric stuff, which is mainly 12-volt DC (the air conditioner and the Nespresso coffee machine run on 240-volt AC from a 2.5kW inverter). The furniture is made of road case materials, Ozy having been coached in the best way to work with this system by a friend of ours. Our "living room" is now equipped with, among other things, a diesel-fired heater and stove (Eberspaecher and Webasto, respectively), a three cubic-foot drawer-fridge with a quarter cubic-foot freezer compartment (Isotherm) and a small air-conditioning unit (Truma Saphir compact), that helps not only cool but de-humidify the interior if needed (when it is cold and humid, we can run both the heater and the air conditioner at the same time). Twenty gallons of fresh water, purified by a Seagull filter, and five 100-watt solar panels feeding a 265 Ah LiFeYPO battery allow us to get lost in the wild for longer periods of time. If you've not lived or traveled in Europe, things are typically smaller there…beer mugs excepted.

2019 Time to Travel – New Equipment

After four years of preparation, we now have fulfilled our dream of full-time traveling.

We started in Switzerland at the beginning of April 2019 and crossed the Atlantic Ocean together with our rig on one of Grimaldi's RoRo Cargo ships from Antwerp to Halifax. We found that the voyage on a such a vessel is very different from a trip with Queen Mary 2: We could visit the bridge any time and had our meals together with the officers in the mess, but apart from that there is not much space to spend the eight to twelve days it takes for the crossing.

A cold weather test of the camper "Box Two." The first camper allowed ice build-up on the interior storage compartments.

New England and Columbus, Indiana

From Halifax, we drove directly down south to visit with Mike and Sandy Wilson. As it was still very cold in Maine—the lakes were just beginning to thaw—we drove steadily down the east coast toward New York City, exploring Cape Cod and a bit of New England on the way. In New York, we were delighted to meet again TDR member Wayne M. who introduced us to local specialties and showed us around Staten Island. After the hustle and bustle of the huge city, we drove up the quiet Hudson River Valley to Lake Ontario, visited the US side of the Niagara Falls, and followed the southern shore of Lake Erie to reach Detroit. There we visited The Henry Ford Museum and were invited to join TDR's Ontario Chapter for an interesting tour of FCA's Sterling Heights Assembly Plant. (Thank you again, Robert Schwarzli). Afterward, we all drove together to the next highlight, the TDR Rally in Columbus. (A big thank you to the organizing staff and all the helping hands)! We enjoyed very much talking to a lot of great people and seeing so many special vehicles—and of course not least the visit to CMEP, where our engine was built.

The Henry Ford Museum.

The TDR Rally.

Canada

As it was now mid-June, we retraced our steps and drove up north again. From the Canadian border crossing in Sault Ste. Marie, we went steadily east, passing Ottawa, Montréal and Québec City. Finally we reached Baie-Comeau, a small town on the north shore of the huge Saint Lawrence River, and gateway to the more than 1,000 mile-long Trans-Labrador Highway (including 350 miles of QC-389 to the QC-LN-Border). This road crosses sparsely populated terrain and still has an aura of adventure—you can even borrow satellite phones to take with you. But apart from the many mosquitoes and the occasional wildlife that tried to cross the road, it was not as "wild and dangerous" as we had imagined. Though some fellow European travelers we met along the way complained about the bad road conditions, our Ram we didn't find the driving especially difficult or strenuous. The most interesting part for us on that nine-day trip was the guided tours to the different hydro power plants (Manic 2 and 5, and Churchill Falls), and a huge iron ore mine in Fermont, all of which you can see for free.

Via ferry we reached Newfoundland, the easternmost point of our journey and where we were closer to Switzerland than to Seattle. We explored the island for three weeks and our Ram allowed us to reach beautiful, remote spots to watch feeding and playing whales or just stay overnight and enjoy the awesome views.

Back in Nova Scotia we tried to drive some trails but found many of these are now only explored by ATVs and therefore too narrow for us. (It took us hours of cutting brushes to decide this and, subsequently, three days of polishing.)

But apart from the many mosquitoes and the occasional wildlife that tried to cross the road, it was not as "wild and dangerous" as we had imagined.

Oops, too narrow for Turbo Diesel travel.

Onward to Utah

After again visiting Mike and Sandy at our North American home base in Maine, and some maintenance on the Ram, Ozy drove solo across the US to Utah while I was on "home leave" for three weeks. Flying back to Salt Lake City, I brought a friend of ours from Switzerland, who would join us for three weeks. It was his first time in the US and we explored together some of the great national parks and famous sights of Utah, Colorado and Nevada. Awed by the vastness of the landscape and the fantastic geological formations, he was swept off his feet by the kind and welcoming people we met, some of them TDR members (thank you, dear Steven and Vicki for letting us stay in your wonderful home).

On location in Utah!

Death Valley

On our own again, we set out from Las Vegas toward Death Valley National Park, one of Ozy's favorite spots to "get lost" in the desert. We entered by way of Titus Canyon and explored some of the backcountry roads. We then drove the Steel Pass road to Saline Valley and spent wonderful, relaxing days at the hot springs where we met some "old-timers" who have visited the springs regularly for decades. They told us we were probably the largest vehicle that made it through Dedeckera Canyon so far. A shortage of beer and quite a sunburn caused us to leave this great spot after a few days.

A bumpy road brought us via North Pass to the Owens Valley, where we stayed near Lone Pine to explore the famous Alabama Hills, location of countless Western and occasional science fiction films. That put us in the mood for Universal Studios in Los Angeles, before heading further down south to Baja.

This could be a "Western" movie set.

TDR RALLY PHOTOGRAPHS - JUNE 2019

Front view of our truck.

From the back.

Baja Pacific

We crossed the border at Tecate, which seems to be one of the better spots to do so because there is not too much traffic and all the necessary offices—Mexican and US immigration—are in close proximity to each other. After having successfully arrived in Mexico, we stayed for a week on a beautiful ex-KOA campground near Tecate to get ourselves used to the Mexican way of life. The borders in Europe are more like U.S. state borders and during our travels we'd never experienced such an immense difference between two adjacent countries.

Our view of the Baja Pacific.

From Tecate we drove on the Ruta del Vino to Ensenada on the Pacific. We just wanted to spend a night or two but, in the end, we stayed more than a month in the Campo 7 Minas near La Bufadora. We felt that we needed a vacation to reset ourselves after having traveled for six months and having seen and experienced so much during this time. We relaxed, sorted our countless photos and spent long evenings with fellow travelers who stopped here, sometimes also for a longer period.

When the weather got colder and we felt again ready to travel, we followed MX-1 south, enjoying an impressive, ever changing arid landscape full of dunes, desert and mountains and filled with gorgeous forests of immense Cardón cactus and Cirio trees which to us look more like upturned carrots. On the west coast, we spent a week all alone in a huge bay north of Bahía de los Ángeles at the Sea of Cortez, listening to the wind and the sound of the waves. We then passed the border to Baja California Sur on the 28th parallel which runs on Mountain Standard Time. Not far from there is Guerrero Negro, quite a recent town that owes its existence to salt production, where we enjoyed a delicious dinner in a widely known restaurant. On the way to the west coast we visited the beautiful mission of San Ignacio that is embedded in a date palm oasis. Having again reached the Sea of Cortez in Santa Rosalia we followed the coastline to the amazing Bahía Concepción where we spent a few days on Playa El Coyote marveling at the turquoise waters. Finally we arrived in Loreto, a very nice little mission city on the shore of the Sea of Cortez. We stayed there in an RV park for Christmas and the New Year, not least because of the very kind people we met there. We then ventured down a rugged and quite narrow road to Agua Verde, a very small fishing village in a beautiful bay. This was our southernmost spot for this time as we had to get back to the US around mid-January to explore the west coast and drive all the way up to Alaska.

Favorites – Compare and Contrast

You may ask, after having travelled for some time, what are our favorite places or what was the most spectacular scenery? This is a difficult question to answer. On the one hand, there are so many great places and beautiful scenery, and on the other hand, we usually like the place best where we are staying at that moment.

However, one thing that sure never ceases to impress us is the vastness of North America. Being used to small-scale Switzerland, the distances and huge stretches of open land give us a unique feeling of freedom—and frequently caused us to underestimate traveling time. As the saying goes, 100 years is a short period for Europeans and 100 miles a short distance for Americans.

Been there, done that. The sign in the background is proof.

In Switzerland (and Central Europe), everything is quite close together. It's usually not necessary to remember to fuel up because the next service is hundreds of miles away. Or having to drive for several hours to reach the next shop (or restaurant). Or being in danger of getting lost in the wild. Speaking of the wild: We feel also closer to nature here—in Switzerland there is nothing very dangerous or potentially lethal: there is no poison ivy or poison sumac or other really vicious plant life. You don't have to be afraid of treading on a poisonous snake, of getting attacked by a bear or a cougar or of being trampled by a bad-tempered bison or elk when you're hiking. (This may explain why European tourists are sometimes behaving stupidly around those animals—they've just never had to learn the rules).

Speaking of the wild: We feel also closer to nature here—in Switzerland there is nothing very dangerous or potentially lethal.

Favorites

We haven't been to many places yet where the scenery is not something interesting or beautiful to enjoy. What stuck most are the sandy beaches, lighthouses and ponds of Cape Cod; the forests and European-influenced wood architecture of New England; and the area around New York's Finger Lakes with their rolling hills and vast vineyards. We were awed by the amounts of crystal clear, bluish water that roars down the Niagara and Bridal Veil Falls and rises to house sized waves in the Niagara River Gorge; the shores of the endless Great Lakes with their beautiful sunrises and sunsets; the huge mountain ranges of the Rockies; the endless prairies full of waving grass. We felt dwarfed by the sheer walls of canyons like Black Canyon of the Gunnison, Green River Canyon in Dinosaur NM, Glen Canyon and—of course—the famous Grand Canyon. And we never cease to be fascinated by the amazing variety of shapes and colors that geology and erosion bring forward, especially in the Southwest where the red, orange, yellow and white of the rocks clash with the deep blue of the infinite sky. And by the colors of sky, land and water, which we found to be especially intense in Newfoundland (at least when the sun is out which is not very often, though perhaps this is good because it would be too much to take in otherwise). On Antelope Island State Park (Davis County, UT) we found a subtle, almost unearthly light. We marvel at the ever-changing colors of the prairie at dawn or at sunset and bathe in the silvery light of the many stars that burn so brightly that you still can discern your surroundings in the middle of a moonless night.

The middle of a moonless night and enveloped in stars.

Part of the experience is also the food. Some Europeans still think that "the Americans" live only on hamburgers. But of course, the cuisine is as different as the regions and landscapes we are visiting. We think that trying out the local dishes, and learning about the different ingredients and tastes, adds an important aspect to our travels.

The Best Part of Travel

Finally, what we appreciate and treasure most and what keeps us traveling, is the feeling of being welcome. First, by the many gracious people we meet on the way and with some of whom we develop a deep friendship, and second because the United States is so easy to travel and explore. You have countless National Parks, forests and monuments, historic sites and other public spaces that are well developed and have beautiful campgrounds that come with benches and firepits (with firewood for sale right there), boat launches, wonderful hiking opportunities and so on. On top of it all, you have vast areas of BLM Land, especially in the west. As Swiss (and coming from "Old Europe"), we treasure this enormously. It makes us feel happy and at the same time deeply grateful that we may use it, too. Apart from Scandinavia where you may stay for one night in any spot as long as it's not visible from a house or otherwise prohibited, there is no such thing as BLM land in mainland Europe. There is almost no place that is not privately owned where you simply can be and enjoy the beauty and tranquility of the landscape that surrounds you.

Finally, what we appreciate and treasure most and what keeps us traveling, is the feeling of being welcome.

I could go on rambling…

You see, we are not yet tired of traveling! We now are very much looking forward to heading north again and we hope that you will be able to "join us" for more adventures in coming issues.

Ozy and Steffi Steiner
Steinen, Switzerland

TDR Review

A Product, Event, or Article Review

DOUG LENO BUYS A NEW TURBO DIESEL – PART II

In TDR Issue 105 (page 8), I wrote about the purchase of a model year 2018 Mega Cab 3500, with Aisin transmission and Laramie trim. I wrote about several "new truck firsts," such as the first oil change, first modification, first DEF fill, and first impressions of fuel economy, along with a few observations that would require additional study.

This article provides the additional study. I begin with a more detailed look at "Average MPG," particularly the observation I made in Issue 105 (quite without evidence) that the numbers on the EVIC screen were influenced by "Recent Miles." Following the discussion of "Average MPG," I will present some additional information and tips for optimizing the shelf life of Diesel Exhaust Fluid in very warm weather—especially when the truck is not driven regularly.

Understanding the "Average MPG" numbers

The suggestion that some miles are more "average" than others produces a bit of dissonance in my head because of the way I interpret the word, "average." I tend to think the way Lexico.com does:

"Average: A number expressing the central or typical value in a set of data, in particular the mode, median, or (most commonly) the mean, which is calculated by dividing the sum of the values in the set by their number."

It turned out that my definition of average as it relates to Ram's "Average MPG" was about to change.

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My fuel economy EVIC screen, showing 17.2 Average MPG since the last reset, and a nearly empty fuel tank, with "Range mi" equal to 50 (note also the low fuel indicator in the lower left of the photograph). Resetting the "Average MPG" calculation every 100-400 miles allowed me to see the influence of "recent miles" upon the Average MPG of larger trips.

My first step toward a better understanding of this topic was to talk to my local dealer and Ram Customer Care. This effort netted a few generalizations about driving habits and road conditions, and the admonition to take the truck in for service if I thought something was wrong.

I began to think I was trying to crack open some proprietary algorithm or, perhaps more likely, a policy of avoiding statements that could be checked for accuracy. During one particularly amusing exchange with Ram Customer Care (which, by the way, I find delightful to work with), I asked what it meant when "Range mi" on my FUEL ECONOMY screen approached zero. I received a very nicely worded email emphasizing that driving the vehicle under these conditions is not recommended, and that "Depending on overall driving habits; weather, towing, topography, fuel mileage, like Range, is based on many factors."

They didn't mention "recent miles" as one of the factors.

Having exhausted the official sources of information, I determined to see what the truck itself would tell me in actual, over-the-road, data. First, I needed a reality check on my original observation: Were the numbers on the screen really influenced by recent miles? To settle this, I performed a quick experiment. I had logged 7,143 miles and averaged 17.2mpg implying, of course, that 415.3 gallons of fuel had been consumed over that distance. I put the truck into "tow/haul" mode and drove around some local country roads, unloaded, with a heavy foot, for an additional 53 miles—just to see how the numbers would react: Sure enough, "Average MPG" for Trip B (now at 7,196 miles) had had dropped to 16.0mpg!

This was an astonishing result: the last 53 miles of a 7,196-mile trip had reduced Average MPG by 1.2 miles per gallon! How could this be? With my brain still thinking that "Average MPG" meant, "miles driven divided by gallons of fuel consumed" I used a calculator to determine that I had just burned 34.4 gallons of fuel over that 53-mile trip (1.54mpg)—enough to reduce the Average MPG of that long trip by 1.2mpg. Really?

Okay, but my tank doesn't hold that much fuel, and I didn't stop to refill, so those numbers couldn't be right.

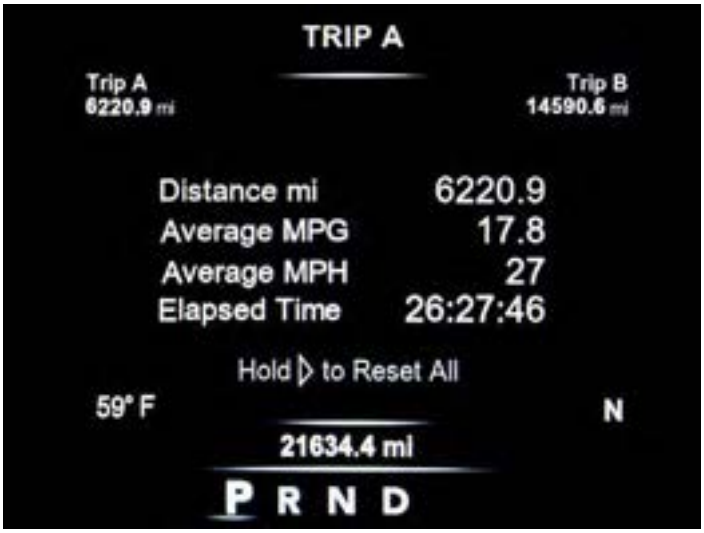
I got similarly amusing results while performing the experiment in reverse. I started with 7,241 miles on the odometer, with "Average MPG" reading 16.2, and then drove 30 additional miles—this time with a very "light foot" over a flat, 65mph stretch of freeway. The technique raised the Average MPG back up to 17.0 over these 30 additional miles! This time, my calculator told me that someone had mysteriously added 19 gallons of fuel to my tank over that 30-mile stretch—something that has never happened to me before.

Entertainment Value Only?

Clearly, I had stumbled onto a new definition of "Average MPG," and it wasn't the one they teach in school. However, nobody would articulate what seemed obvious to me—that recent miles are more important than other miles. In any case, I couldn't shake the voice of our esteemed Editor, Robert Patton, still in my head from discussing the makings of this article: "Doug, you're better off ignoring the pretty numbers on the screen. They don't mean anything."

"Doug, you're better off ignoring the pretty numbers on the screen. They don't mean anything."

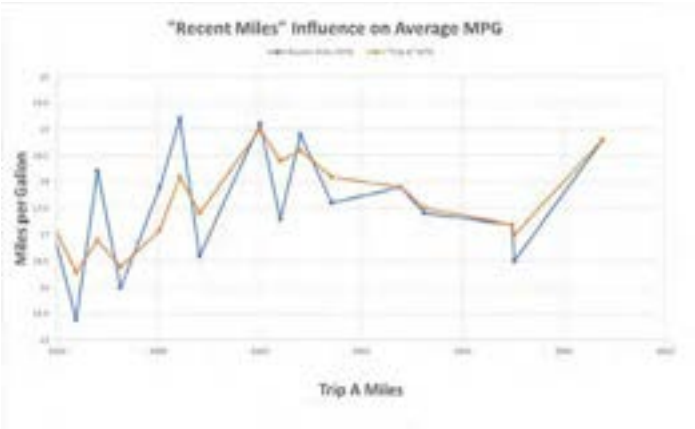
However, I have an insatiable curiosity to understand what cannot be understood, and thus began my quest to learn what "Average MPG" really means. If you are content with the Editor's advice (and you probably should be) then you can turn the page to find something more interesting to read. However, if you would like to know more about the definition of "Average MPG" in our Turbo Diesels, read on!



The "Trip A" screen allowed me to watch how Average MPG behaved, as the miles accumulated. The Average MPH here indicates that the last 6,000 miles has been predominantly city driving.

Using the Truck to measure itself

Putting aside the accuracy of the "Average MPG" numbers, I set out to better understand the "Recent miles" behavior that I had observed. To do this, I used the Truck's own "Average MPG" calculators.



Trip A Average MPG (the orange line) plotted long with the Average MPG of "Recent" miles (the blue line). The right-hand portion of the graph shows that Average MPG is completely determined by the last 400 miles or so.

The results of my experiment are shown in the graph above. Each individual data point on the graph represents a short trip and shows the influence of recent miles (the blue data points) upon the Average MPG (the orange data points).

I did not expect the (blue and orange) numbers to ever be the same because of the way averages are supposed to work.

The right-hand portion of the graph is where the plot thickens. During the experiment, I lengthened my "short" trips to approximately 400 miles, producing an astonishing result in the data: At approximately 6,000 miles, my "Average MPG" was completely determined by the most recent 400 miles! It was as if the previous several thousand miles did not even exist. The data suggest some very interesting conclusions:

- The graph shows that movements in Average MPG of about 2mpg are completely determined by the most recent 400 miles, although the actual number of influential "recent miles" could be less than that. Further test suggests that this number could be as little as 250 miles.

- The graph also suggests that the Average MPG of the most recent 100 miles is still very influential—even upon trips where thousands of miles have accumulated. As noted earlier, Average MPG can be influenced by as little as the most recent 30 miles.

Why would they do that?

On a recent road trip over the Continental Divide, in Southern Wyoming, I found myself pushing the limits of my fuel tank's range. I was on a familiar stretch of the road, running unloaded and with all the usual fueling stops in mind. Glancing down at the "Range mi" parameter on my FUEL ECONOMY screen I realized that I would not make it to my usual fueling stop. The route adjustment was easy, however, because I paid attention to the "Range mi" calculation, which was heavily influenced by fact that I had been bucking very heavy winds for the last 200 miles or so with reduced fuel economy.

This is a situation where I want calculated fuel economy to be influenced by recent miles. Apparently, however, the system is unable to perform the "Range mi" calculation (appropriately influenced by recent miles) without also impacting Average MPG for Trip A, Trip B, and the FUEL ECONOMY screen. The consequence is that one cannot depend on these trip computers for a meaningful fuel economy calculation.

Editor's note: "Doug, you are better off ignoring the numbers on the screen."

Actually, your tests prove that they do have merit. Unfortunately, not merit that will insure you make it to the next exit when the EVIC shows "0 miles remaining."

Or, do you trust the "0 miles" indicator? I don't want to find out. I'll leave "How far can you travel at 0 miles?" to a future article from Doug. For now, I'm sending him a 5-gallon fuel jug to give it a try.

Also, just how accurate is the EVIC compared to the paper-and-pencil fill up logs that I'm sure many of our Members keep? Stay tuned as I have assigned that project to Doug for the next issue.

For now, I'd like to give you some insight on the "0 miles" situation. Here are some excerpts from Issue 24 that may give you some comfort should you find yourself at 0 miles. Hint: the OEMs don't want you to run out of fuel for two reasons: you're likely upset at the gauge, not yourself, for the error; fuel pumps don't like to pump air.

So, let's crank-up the Wayback Machine to TDR Issue 24, page 23, where we quoted from a Motor Trend article on fuel gauges. Yes, the manufacturers want to help by leaving a few extra gallons in the tank when the gauge says empty.

For now, I'd like to give you some insight on the "0 miles" situation. Here are some excerpts from Issue 24 that may give you some comfort should you find yourself at "0 miles."

From Mac DeMere's Motor Trend article: "There's a liar in your car, staring you right in the face. Does your gas gauge stay on 'Full' a long time before dawdling down to the halfway mark and then plummeting toward 'Empty'? With the gauge showing half-full, have you ever pumped nine or more gallons into a 16-gallon tank? Have you ever driven 50 miles or more after the gas gauge said 'Empty'? Observant drivers won't be surprised by confirmation that fuel gauges are, by design, pathological liars—and most drivers wouldn't have it any other way.

"According to Cadillac Powertrain Engineer Al Cline, there are myriad reasons for this intentional lack of veracity. 'It's my duty as a GM engineer to build cars that perform flawlessly up to the point the gas gauge says "Empty,"' Cline said. 'If the gauge shows fuel in the tank, the owner should be able to throw [the car into] a tight freeway transition ramp without fear it will starve for fuel, or park on a 15 percent grade and be confident it will restart when he returns.'

"In addition to protecting you with pessimistic reports about the last few gallons of gas, your fuel gauge likely displays another falsehood. 'People not only expect to go a ways on "Empty," they expect to drive awhile on a full tank,' said Cline. 'We were deluged with complaints of poor fuel economy with the '85 DeVille, though it got better mileage than the previous car.' The problem was traced to the car's then-new digital fuel gauge, which accurately showed the number of gallons remaining in its 18-gallon tank. Especially when the tank wasn't completely topped off during a fill-up, the gauge dropped from 'Full to '17' too rapidly for many people's tastes.

"'We recalibrated the gauge to skip "17" and go directly from "Full" to "16," and the complaints evaporated,' said Cline.

"A Pollyanna when full and a Chicken Little as 'Empty' approaches, your fuel gauge never tells the truth. And you love it that way."

And now, a personal observation: As the owner of an '03 truck I was surprised to read about the empty tank feature that was incorporated into the truck's fuel delivery system. Quoting from the Owner's Manual, *"When the fuel gauge pointer is on 'E' (equivalent to Distance To Empty [DTE] = 0 on the overhead console if so equipped) there is reserve fuel capacity, which corresponds to approximately 10% of tank volume. This reserve capacity was put in place to prevent the likelihood of customers running out of fuel when operating at maximum load conditions in areas where there aren't many gas stations. Wow, does anyone actually read an Owner's Manual?"*

Does anyone actually read an Owner's Manual?

Exhaust Fluid Follow-up

In Issue 105 (page 10), I recommended that care be given to the management of DEF refills when ambient temperatures are high, and especially when the truck is not driven regularly. I summarized the situation as follows:

> Nevertheless, a bad choice of fluid followed by sustained hot weather and limited driving, even in normally inhabited climates, could approach the danger zone. But these risks are easily mitigated with these precautions:
>
> • Avoid purchasing or storing DEF in Death Valley
> • Always purchase fresh fluid and only when needed
> • Maximize the turnover rate of fluid in the tank with partial fills.
>
> Partial fills can be accomplished by filling in small quantities.

These recommendations are echoes of Stan Gozzi, who writes the following recommendation in Issue 102 (page 104):

> To put it into perspective, the shelf life of DEF is infinite at 32 degrees, 10 months at 95 degrees and 1 week at 140 degrees. That is why you don't really want to keep the DEF tank full if you live in a warm climate. It is best run it down, and refill with fresh properly stored DEF.

According to the makers of Peak BlueDEF, the "nominal", or target, Urea concentration of diesel exhaust fluid is 32.5%. The acceptable performance specification is between 30.8% and 34.2% Urea. The lower end of this spec arises from the effectiveness of the fluid and the dosing agreements already made between manufacturers and the EPA. The upper spec reflects what happens when fluid is stored over a long period and/or at high temperatures—the water content evaporates, causing the concentration of Urea to rise. Quite simply, when enough water has evaporated, the concentration of Urea approaches 34.2%, which is not a good thing.

The reason you want to run your DEF tank down as far as possible, before adding new fluid, is because the new Urea concentration will be determined by the proportion of old versus new fluid amounts, and their respective Urea concentrations. You want the influence of the old fluid to be as small as possible.

It is interesting to note that the DEF warning system in our Turbo Diesels appears to have been designed by the Legal department instead of the Engineering department. It's as if regulators cared more about scaring us into adding DEF to the tank, rather than preserving the quality of the fluid and avoiding potentially expensive repairs. I suppose that stands to reason—err on the side of disabling or repairing the truck, rather than a few more oxides of Nitrogen in the air. Right?

The DEF gauge is rather a blunt instrument -- I get my first "DEF Low Refill Soon" message when the needle the reaches this point, at approximately one gallon of fluid left in the tank (ignoring the reserve). The needle returns to this point when I add approximately 1 gallon of DEF to the empty tank.

I was able to perform some experiments on my truck to help me figure out how to run with as little DEF as possible in the tank.

At the crux of the matter is one's own ability to ignore the promises of certain apocalyptic doom, delivered by the EVIC display, while running the tank down as far as possible. Here is the process I followed:

- As the DEF level in the tank drops to approximately 1 gallon (ignoring the reserve), the first warning appears on my EVIC display with the message, "DEF Low Refill Soon." Whenever I am tempted to act on this warning, I sit down and let the feeling pass, but I do start checking out the date codes on the BlueDEF boxes at my local Costco.

- Ignoring the reserve amount, the next milestone occurs at approximately ½ gallon in the tank, when the system chimes and gives the warning, "Speed limited to 5mph in 200 miles." At this point, the system is no longer measuring the actual fluid level in the tank, and has shifted to a mile-by-mile countdown, before entering "limp mode". I normally scroll through the EVIC display to the "stored messages" screen, where I can see the real-time countdown in progress, without distractions. You'd be surprised how quickly you can cover 200 miles!

The "200-mile countdown" is odometer-based and precise, down to the mile, so you can run it down as low as you are comfortable with. When the count dips below 50 miles, it's time to get serious. I have taken my truck down as far as 2 miles remaining before "Limp Mode" just to prove that it could be done.

- When the warning message reads, "Speed limited to 5mph in 50 miles," it's time to get serious. Sometimes I find that advanced planning is necessary, for example, to carry a new box of fluid with me—particularly when the cabin is occupied and, therefore, at a temperature that represents a very long shelf life. I will add fluid any time the counter dips below the "50 miles to go" point—sometimes as low as 2 miles remaining! For this article, I added fluid at the "24 miles to go" mark, as illustrated by the "countdown" in figure 8, which corresponds to the DEF gauge position shown in figure 9. At this milestone, the DEF tank has reached its reserve level. To me, it's important not to let the counter go to zero: The message I prefer not to see is, "5MPH Max Speed on Restart, Long Idle or Refuel—Refill DEF"!

2020 AMELIA ISLAND CONCOURS

"Hello Kitty" was on the show field during Saturday's local club day.

Fill with as little as possible

In extreme situations, it may be necessary to fill with the smallest possible amount of DEF that will clear all the warnings, keeping the tank as empty as possible to maximize fluid turnover. But how much is enough?

The "official" answer (in the manual) is that it can take "up to 2.5 gallons." I find that on my truck only 1 gallon, approximately, is enough to more the needle to 3/8 of a tank. Why do I add only one gallon when I have already purchased more than that and am now faced with storing it? The reason is that I can store unused fluid in a controlled environment (the refrigerator in my garage), instead of the DEF tank which can get very warm in the summer months, including overnight. In actual practice, now that I know where the limits are, I find that I no longer need to press them and I have returned to adding 2.5 gallons or more at a time. This also avoids startling my wife with the sight of Exhaust Fluid in the refrigerator!

It would be incomplete of me to ignore the fact that the manual plainly admonishes us to, "Completely fill the DEF tank through the diesel exhaust fluid fill location at every maintenance interval or before if prompted by the instrument cluster display." I would point out, however, that the manual concerns itself with uninterrupted operation of the truck within EPA emissions standards and not with the shelf life of Diesel Exhaust Fluid. Nevertheless, I leave it to the discretion of the reader to determine when, if ever, to follow the suggestions I have outlined.

One other point worth mentioning, especially for the faint of heart, is that there is very little virtue in taking the DEF tank down to "2 miles left" as opposed to, say, "50 miles left" before Limp Mode. It is very satisfying to do so, but the difference in the actual amount of fluid in the tank is very small—on the order of 8 ounces (1 cup) or less.

Conclusions

I can be accused of paying too much attention to detail, and sometimes my insatiable curiosity gets the best of me, but I'm happy to have applied this trait to something practical with the following summary points on the EVIC and miles-per-gallon topic.

- Whenever you are looking at "Average MPG" on the EVIC screen, you are looking at the Average MPG of the last 30 to 400 miles or so—no matter how many miles are on the trip odometer.
- The advice of our Editor, Robert Patton, is still in my head: "Doug, you're better off ignoring the pretty numbers on the screen. They don't mean anything."
- I remain pleased, and even thankful, that "Range mi" on the FUEL ECONOMY screen is influenced by the Average MPG of recent miles, because this parameter has the very useful purpose of influencing the next fuel stop.

On the DEF topic:

- Aside from contamination and the influence of UV light, the primary mechanism of DEF degradation due to age is evaporation, which causes the concentration of Urea to exceed the acceptable performance spec. This also explains why the shelf life is so easy to predict—evaporation is well understood and easy to model.
- The DEF warning system has reserve built into it, so every time you add fresh fluid you are mixing it with the old fluid already in the tank. The best practice is to add new fluid to a tank that is as empty as possible.
- To avoid accumulating a steadily aging reservoir of DEF, avoid "topping off the tank" unless of course you anticipate the miles to burn it down.

In conclusion, I would like to point out that the idiosyncrasies of the EVIC screens pale in comparison to my enjoyment of this very capable truck. Now that I understand the numbers for what they are, I can apply them where they make sense and ignore them when they don't. I'm particularly pleased, for example, to know that the "Range mi" parameter on the FUEL ECONOMY screen is influenced by as little as the last 30 miles. The "Average MPG" on that same screen is also useful, now that I understand it, and because I reset it on every fill. As for the other Average MPG numbers – they move and they look nice on the various screens, but I'll be ignoring them from now on, in favor of much more enjoyable things—like listening to the 6.7-liter Cummins engine.

Doug Leno
TDR Writer

2020 AMELIA ISLAND CONCOURS

Next to Hello Kitty was a Camaro with a Lambo-door kit. Saturday. Fun. Stuff.

TECHNICAL TOPICS

Service/Parts Updates

DIESEL'S DEMISE, PART III

by Robert Patton

Wait, you don't recall the first two parts of the story? Let me help you: Issue 97, August 2017 and our "TDReview" of the subject. The Volkswagen scandal had played out and there were multiple press releases from European manufacturers wherein they were cancelling their future product plans that were diesel-related. Ouch!

So, now three years later, where do we stand? I did a product search for diesel options at the dieselforum.org website and at the various manufacturer's websites. The following is the data for 2020:

General Motors			
Chevy	Colorado	2.8	I4
	Silverado 1500	3.0	I6
	Cruise	1.6	I4
GMC	Canyon	2.8	I4
	Sierra 1500	3.0	I6
	Sierra 2500/3500	6.6	V8
Ford	F150	3.0	V6
	F250/350/450	6.7	V8
	Transit 150/250/350	3.2	I5
Jeep	Gladiator	3.0	V6
	Wrangler	3.0	V6
Land Rover	Discovery	3.0	V6
	Range Rover	3.0	V6
	Velar	2.0	I4
Mazda	CX-5	2.2	I4
Mercedes Benz	Sprinter 2500/3500/4500	3.0	I6
Ram	1500	3.0	V6
	2500/3500/4500/5500	6.7	I6
	Van 1500/2500	3.0	I4

As the Looney Tunes character used to say, "That's all folks."

"That's all folks."

I did a quick glance at the dieselforum.org for data for 2019, Q4 sales, I noted that the three vehicles from Land Rover sold a combined 265 units; the Jaguar brand, 28 units. I really don't expect to see these brands continuing to offer diesel options in 2020. (Side note: the Jaguar USA site did not mention a diesel for 2020. Land Rover, did.)

Seriously, that list is a far cry from 2017's list that had multiple automotive offerings from BMW, Mercedes, Volkswagen, Audi, Porsche and others.

HOW ABOUT THOSE AV, EV, PEV, BEV, AND HYBRIDS?

Yes, too many abbreviations can make reading about the different systems complex. Wait, I thought AV meant audio/visual equipment. Right? Let's use these common terms:

Autonomous Vehicle (AV)

Electric Vehicle (EV): aka, BEV, battery electric vehicle; aka, PEV, plug-in electric vehicle

Hybrid – Typically a gasoline/battery combination

So, here are the sales numbers from the Bureau of Transportation Statistics to update the numbers from Issue 97.

	Total Vehicle Sales	Gasoline Hybrid and Electric Vehicle Sales			
		%	TOTAL	HYBRID	EV
2006	17,1000,000	1.47	251,900	251,900	-
2007	16.6	2.13	352,100	352,100	-
2008	13.5	2.31	315,800	315,800	-
2009	10.6	2.78	290,300	290,300	-
2010	11.8	2.32	274,900	274,900	-
2011	13.1	2.19	284,300	268,800	15,500
2012	14.8	3.29	487,800	434,300	53,500
2013	15.9	3.72	593,400	495,000	98,400
2014	16.9	3.33	570,200	444,500	125,700
2015	17.4	2.79	498,300	384,400	113,900
2016	17.5	2.88	505,600	347,000	158,600
2017	17.2	3.24	558,400	363,000	195,400
2018	17.3	4.07	704,800	343,200	361,600

Looking at the sales numbers, EVs and Hybrids will be 5% of the U.S. market place soon.

The Big Picture for EVs and Hybrids

However, we really need to reflect on the big picture: the marketplace for EVs and hybrids is not here in the United States. A quote from 2017's article in the TDR will serve as a reminder. Automotive New's Nick Bunkley was the author of the 2017 article.

"Now, let's learn about what is happening in China:

"It's easy to become blasé about China's auto market, especially now that growth there has gone from white hot to merely off-white hot.

"But just stop and marvel for a moment at the volume even a plateauing Chinese market represents—24 million passenger vehicles last year, according to IHS Markit.

"With numbers like that, it ought to be China—not the US, Europe or Japan—that dictates the future of what we call global vehicles.

"China's industry ministry hinted at the mother of all zero-emission vehicle mandates last week in calling for electric vehicles and hybrids to make up at least a fifth (20%) of its vehicle sales by 2025."

Update: "Last year" was 2016. New estimated numbers for China in 2019: 1,210,000 electric vehicles were sold. Total vehicles sold, 21,300,000. EV percent of market 5.6%.

5% number is a big surprise. They have a loooong way to go to get that percentage up to 20%.

Yes, your Editor has been following EV/Hybrid/AV stories for several years. As a balance for the "electrification" of the automobile, Kevin Cameron (pages 126-127) reminds us that ICE offers us a "Wider Range of Choice."

Update for 2020.

Okay, 2025 is now only five years away.

Okay, let's go from Automotive News in May of 2017, to an update from AN's Urvaksh Karkaria, in their 1/13/20 magazine, "New EU Emissions Rules to Delay Benz EV in US."

"Most of the demand for Mercedes-Benz's upcoming electric EQC compact crossover is expected from Europe—so the automaker is delaying the model's US launch, Daimler CEO Ola Källenius said here last week.

"The EQC was to be shipped to US dealers in the first quarter. Now the launch into the world's second largest auto market has been delayed to 2021.

"'Demand [from Europe] by far outstrips supply, even though we are ramping up and adding additional battery lines to the productions,' said Källenius.

"The new urgency to capitalize on European demand followed the EU Parliament's mandate for a 37.5 percent cut in new-vehicle emissions by 2030.

"That will require Europe's auto industry to dramatically slash fleet-average emissions levels to roughly 60 grams per kilometer or face steep noncompliance fines.

"Tighter emissions regulations led Mercedes to decide 'to go all-in on Europe,' Källenius said.

"The EQC is the first of 10 EVs that Mercedes intends to launch globally by 2022.

"EV adoption in the US, which hovers at less than 2 percent of total sales, remains patchy.

"A far more important factor in growing US demand will be bringing down the cost of the vehicles, he said."

Conclusion

My conclusion: Let's all go back to the 10th grade. Remember the Economics class and the discussion about supply and demand?

US market: No demand and the price is too expensive to attract much attention from automakers that can charge a higher price from countries that need and/or have regulations requiring EVs.

Got it, currently the US market doesn't matter.

Now, on to the next article: the cost of electrification.

THE COST OF ELECTRIFICATION

You are a car-guy, gear-head, diesel owner. No doubt you have cussed or discussed the environmental impact of your diesel truck versus… there is no EV alternative for you Ram Turbo Diesel. Yet, in a social conversation or at the local car show we've all wondered, "What is the long term cost of ownership of an internal combustion engine (ICE) vehicle, versus a battery vehicle (BV)? Yep, just what does it cost to mine the raw materials for the batteries; the coal, natural gas, water, solar, wind-based cost of electricity to recharge; the cost to operate; and the cost to dispose and/or recycle?

Darned good questions. And, until I ran across this article in Financial Times, those questions were often answered by emotional/non-factual mini-rants from those on both sides of the ICE/BV spectrum.

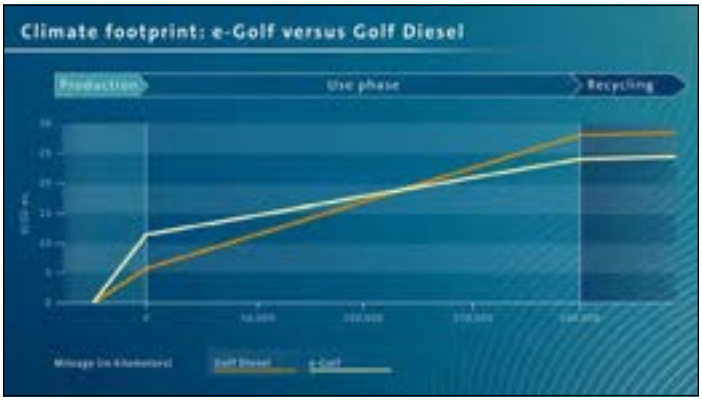
So, here are excerpts from the 1/24/20 Financial Times article by Jamie Powell:

"What would be your immediate answer to this question: What has a lower carbon footprint—a diesel car or an electric car?

"You probably guessed an electric car. However, the answer, like most things in life, is less clear than that. In fact, according to Volkswagen, the answer is really 'it depends.'

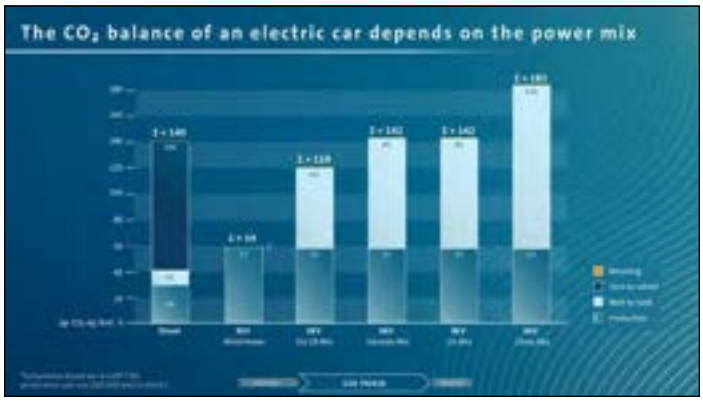
However, the answer, like most things in life, is less clear than that. In fact, according to Volkswagen, the answer is really 'it depends.'

"We came across this graphic from 2019 which Volkswagen released as part of the marketing for its new e-Gold. It sort of blew our minds:



"Yep, that's what VW estimate the carbon footprint is for its new e-Golf, versus its diesel equivalent. The most striking thing is that, due to the energy intensive nature of battery production, it takes roughly 120,000 kilometres (about 75,000 miles) of use for the e-Golf to have lower emissions.

"Of course, it does depend on where the electricity used to charge the car comes from. But VW addressed that issue too:



"Mazda has made similar noises about the relative carbon output of electric cars, according to Tesla's proxy investor relations website Electrek.

"A few points to be made here. First is that carbon emissions are not the only negative externality that electric vehicles mitigate—they also reduce air and noise pollution, which have a detrimental effect on many things, from house prices to health.

"The second point is to be made is that battery technology is still incredibly inefficient to manufacture (it makes up 43.25 per cent of the e-Golf's total carbon footprint) as we should expect this to improve as technology improves, although perhaps not at the rate of Moore's law.

"A final observation here is that, as Emissions Analytics—a leading consultancy—has argued, hybrids are the best means we have right now to reduce carbon emissions.

"Emissions Analytics goes on to argue that incentivizing the uptake of hybrid tech allows time for countries to develop the necessary infrastructure for electric cars—whether it be in the form of cleaner power sources, or mitigating the various supply chain issues of battery tech—so emissions goals can be met by 2030.

"Sure, owning an electric car may make you feel good. That you're doing *your bit* for the planet, but as it turns out, unless you're planning to drive one to obsolescence, while using clean power sources, they might not be the best option to ensure Mother Earth's survival today."

Now that an answer has been presented, do you trust the data?

Again, darned good question. Is the research biased?

My observation: Nope. This is not government data, not snowflake data, this is research from the engineer over in the corner office at Volkswagen that is trying to tell his/her supervisor what the product mix should be for the future. Credible data: Yes.

Final answer: I'll stick with Jamie Powell's answer, "It depends."

IS THERE A CONCLUSION?

Let's review, again.

North America/United States: Aside from state-enforced (California) rules, there is not a pull/demand by the consumer for EV or Hybrid vehicles.

Europe: These are European Union government guidelines that require the automakers to offer a mix of vehicles that will satisfy an EU Parliament mandate for a 37.5% cut in new-vehicle emissions by 2030.

China: Twenty-percent of new vehicle sales will be hybrid or EVs by 2025.

As was noted in the AN article "New EU Emissions Rules" production of these vehicles will be used to fill the demand in Europe and China when the vehicles are being legislated into place.

I struggled to come up with a conclusion. While procrastinating, I read the following at one of my favorite websites about car collecting, www.turtlegarage.com. Website owner/collector/writer Philip Richter gave the audience his "Collector Car and Industry Predictions for 2020 and Beyond." I think one of Richter's predictions can serve as a conclusion.

"Auto manufacturers are 'betting the ranch' on electric drive. To us, it is anything but clear that electrification is the solution. Back at the turn of the century, Henry Ford had a historic discussion with Thomas Edison about what should power his motorcar for the masses—steam, electricity, or gasoline. The answer was that nothing beats the energy density and practicality of petrol. The same still holds true today except that vehicle efficiency has increased, and emissions per vehicle have dramatically declined. With nuclear power on the run and a very underinvested power grid here in America, something will have to give should we all start driving EVs over the next decade. The move to EV vehicles is simply a shift from one not-so-great energy source (rock oil) to others (coal, natural gas, nuclear, and to a considerably lesser extent, wind and solar). As Stephen Hawking said, "I would like nuclear fusion to become a practical power source. It would provide an inexhaustible supply of energy, without pollution or global warming." Today, there is no free lunch when in comes to energy consumption. However, regardless of these facts the market has spoken and the EV ship has sailed. Even today, very few R&D dollars are being allocated toward improving the internal combustion engine."

EVs for Europe and China, yes. In the USA, we'll wait and see.

Robert Patton
TDR Staff

AUTONOMOUS VEHICLES PART II

by Robert Patton

My research back for Issue 97 noted that China is the world's largest auto market, at about 25 million units per year, versus the US at 17 million. The move to battery vehicles is a mandate by the Chinese government that calls for 20% of year 2025 vehicle sales to be electric vehicles or some type of hybrid. Quick math: that is 5 million vehicles.

To put that into context, 5 million vehicles would be 30% of the vehicles sold in the US.

Wow, imagine that, 30%. However, based on *consumer* preference only 4.07% of the vehicles in the US were a plug-in or hybrid in year 2019. Funny how government mandates act to tip the scale.

So, shifts in Europe and in China are quickly approaching and the shifts are effecting the product planning for all automobiles.

Okay, so you've got the big picture on the vehicle's drivetrain, what does that have to do with autonomous driving? Truthfully, nothing.

However, in light of how many folks perceive the market, the EV is somewhat synonymous with the AV.

Not so fast. EVs still have steering wheels, accelerator and brake pedals.

Interestingly there were reports from the consumer electronics show (CES) that happens every year in January in Las Vegas that AVs were not the front-and-center focus that they had been at previous CES shows.

Why?

I'll let the folks at Automotive News answer that question. The article was written by Jamie Butters and it appeared in their 1/13/20 magazine, "Tapping the Brakes, At CES a Pragmatic focus on Helping Drivers, Not Replacing Them." Here are some quotes form Butters' article.

"Volkswagen isn't trying to put hundreds of thousands of self-driving Golfs on the road this year. Its ambitions are more realistic: Start deploying automated commercial vehicles for specific uses in limited areas half a decade from now.

"The plans for VW's new autonomous driving unit, announced last week, reflected a growing sense of pragmatism in the air at this year's CES event here. Gone for now are the promises of fully self-driving robotaxis being commonplace in 2020. Expectations for Level 4 autonomy—still a six-figure-per-vehicle proposition—have been reset. The hottest trend now might be widespread adoption of advanced driver-assist systems that don't let the driver tune out.

"Asked whether people were overly optimistic about the rapid deployment of ubiquitous autonomous cars, Alex Hitzinger, CEO of the VW subsidiaries tasked with bringing autonomous technology to scale, didn't hesitate: 'Absolutely,' he said. 'This is one of the hardest problems we have right now in the world. It is like going to Mars.'

"He calls the commercialization of autonomous driving 'the mother of all systems-engineering problems.'

"Here's why: Basically, three expensive groups of ingredients are needed to bake up a Level 4 system that can function without human involvement in a defined geography under certain weather conditions or other limitations, he explained. Sensors must perceive the environment; the computing hardware must process the inputs like a brain; and the software must provide the knowledge to translate all the inputs into useful information and decide what to do with it.

"The type and placement of the sensors determine what algorithms are needed, and the nature of the software determines what hardware is needed to execute the programs.

"Given the low volume of current pilot programs, a reliable Level 4 system costs upward of $100,000 per vehicle—even as much as $300,000, he said. By working through that circular optimization, he said, the price may fall to more like $10,000 by 2030.

"Among its business lines, ZF makes components needed for automated driving systems. But its immediate growth opportunities are in supplying parts or entire systems for advanced driver-assist systems that take some burdens away from drivers but leave them responsible for the vehicle's safe operation.

"Last week at CES, ZF announced a contract with a major Asian automaker to supply a full Level 2 system for much less than $1,000 per vehicle.

"ZF CEO Wolf-Henning Scheider said he doesn't see Level 3—where the computer can drive the car but the human has to be ready to take control—as one that can work in the real world.

"'In terms of passenger cars, we're convinced that integrated Level 2+ systems are the right path to follow,' he told reporters at CES. 'First of all, because there is currently no uniform legal framework for public-road operations on Level 3 and higher in any major market. Secondly, due to the associated high cost for higher-level automatic driving systems, we see no viable business case for individual car ownership.'"

I could go on and on with news form CES that was reported by different publications, but the comment from ZF's CEO Scheider where he talked about the 800-pound gorilla, the "lack of uniform legal framework for public-road operations" puts a damper on any news I could present.

The lack of uniform legal framework for public-road operations" puts a damper on any news I could present.

Don't you hate it when facts get in the way of speculation?

(Gee, I do, 'cause I've gots lots of other press clippings I coulda shared with ya.)

Yes, your Editor has been following EV/Hybrid/AV stories for awhile.

Just One More Example

Okay, I understand, you would like to see comments from at least one other corporate honcho that backs up the thought of VW's Hitzinger and ZF's Scheider. Here goes: Automotive News, 1/27/20, Hannah Lutz writes, "GM Envisions its AV as the Next Model T." Excerpts follow:

"Cruise Automation, GM's self-driving unit, last week announced plans for a ride-hailing service and the Cruise Origin, a self-driving, electric shuttle that could help the company leapfrog Uber and Lyft.

"Still, each of the self-driving experimenters faces the same challenge: no federal regulatory framework.

"There's industrywide consensus that widespread AV use is further away than forecasters once thought because of the lack of regulation, along with technology and cost hurdles.

"Self-driving technology industrywide continues to advance, even without a federal regulatory framework.

"Most AV companies, along with Cruise, haven't announced launch dates for their self-driving vehicles. They are working on AV technology in the interim to be ready whenever NHTSA outlines the regulation around it.

"'The regulation issue is a problem for everyone and has to be settled at the federal level,' said industry analyst Mike Ramsey. 'The biggest issue is determining who does what. It's hard for states when they don't know what feds are going to do. It's a big barrier.'

Wait, perhaps there is an answer to the legal quagmire. Go ahead, turn the page to the discussion on 34-35.

2020 AMELIA ISLAND CONCOURS

Here is the 1990 "CERV III" mid-engine concept car.

Here is the 1973 "Aerovette," a mid-engine concept car with a rotary engine.

GM's Corvette display was very popular with the crowd. As a part of the display, GM brought in over 10 of their Corvette mid-engine concept cars that you may have seen at automobile shows during Corvette's 67 year history.

SIDEBAR

AUTONOMOUS DRIVING – AN EXPLANATION OF LEVELS 1-5

The following are excerpts from a Car and Driver article from October 2017 that does a great job of explaining the autonomous "levels" that are discussed in AV Part II.

"Because no two automated-driving technologies are exactly alike, SAE International's standard J3016 defines the levels of automation for automakers, suppliers, and policymakers to use to classify a system's sophistication. The pivotal change occurs between Levels 2 and 3, when responsibility for monitoring the driving environment shifts from the driver to the system.

Level 0 _ No Automation

System capability*:** None. • ***Driver involvement*:** The human at the wheel steers, brakes, accelerates, and negotiates traffic. • ***Examples: A 1967 Porsche 911, a 2018 Kia Rio.

Level 1 _ Driver Assistance

System capability: Under certain conditions, the car controls either the steering or the vehicle speed, but not both simultaneously. • ***Driver involvement:*** The driver performs all other aspects of driving and has full responsibility for monitoring the road and taking over if the assistance system fails to act appropriately. • ***Example:*** Adaptive cruise control.

Level 2 _ Partial Automation

System capability: The car can steer, accelerate, and brake in certain circumstances. • ***Driver involvement:*** Tactical maneuvers such as responding to traffic signals or changing lanes largely fall to the driver, as does scanning for hazards. The driver may have to keep a hand on the wheel as a proxy for paying attention. • ***Examples:*** Audi Traffic Jam Assist, Cadillac Super Cruise, Mercedes-Benz Driver Assistance Systems, Tesla Autopilot, Volvo Pilot Assist.

Level 3 _ Conditional Automation

System capability: In the right conditions, the car can manage most aspects of driving, including monitoring the environment. The system prompts the driver to intervene when it encounters a scenario it can't navigate. • ***Driver involvement:*** The driver must be available to take over at any time. • ***Example:*** Audi Traffic Jam Pilot.

Level 4 _ High Automation

System capability: The car can operate without human input or oversight but only under select conditions defined by factors such as road type or geographic area. • ***Driver involvement:*** In a shared car restricted to a defined area, there may not be any. But in a privately owned Level 4 car, the driver might manage all driving duties on surface streets then become a passenger as the car enters a highway. • ***Example:*** Google's now-defunct Firefly pod-car prototype, which had neither pedals nor a steering wheel and was restricted to a top speed of 25 mph.

Level 5 _ Full Automation

System capability: The driverless car can operate on any road and in any conditions a human driver could negotiate. • ***Driver involvement:*** Entering a destination. • ***Example:*** None yet, but Waymo—formerly Google's driverless-car project—is now using a fleet of 600 Chrysler Pacifica hybrids to develop its Level 5 tech for production.

AV'S: A QUICK ANSWER TO THE LEGAL QUAGMIRE

Often (too often?), I can find an obscure song lyric to eliminate lengthy paragraphs of discussion.

Here goes: 1994, the Eagles, "Get Over It," lyrics by Don Henley and Glenn Frey.

You say you haven't been the same since you had your little crash
But you might feel better if they gave you some cash
The more I think about it ole Billy was right
Let's kill all the lawyers kill 'em tonight
You don't wanna work you wanna live like a king
But the big bad world doesn't owe you a thing
Get over it
Get over it
If you don't want to play then you might as well split
Get over it
Get over it

(And all along I thought Henley's reference to "Billy" was to that of Jimmy Carter's brother Billy. Research says: William Shakespeare, "Henry VI, part II.")

So, the quick legal answer: kill all the lawyers.

Seriously, which government will be the first to establish a legal framework for the inevitable accident?

Seriously, which government will be the first to establish a legal framework for the inevitable accident?

Is there already a precedent?

Yes, and it was presented in Issue 97, page 40. The simplistic answer was found in the article "Next Up: The Editor Talks About Vaccinations." So, go ahead, appoint TDR members to the Congress, the Senate and the presidency and we can solve *all* of this country's problems. Here are a few excerpts from Issue 97:

"Drum roll, please…How does this discussion on autonomous vehicles relate to vaccinations?

Up until I read the article in Automotive News March 27, 2017, magazine, "A Shot at Justice," I was all too quick to poo-poo the concept of this autonomous driving thing. My reasoning: "It'll never happen, there are *way* too many lawyers involved."

After reading "A Shot at Justice," by Katie Burke, perhaps there is a workaround. Here are some quotes from Burke's article that made the light go on for me:

"'Across the street from the White House, there is a small court staffed by eight judges. Despite its high-profile location, few people know what this court does and why it exists.

"'Without it, the face of American health care could be radically different. And the structure of this court could hold the key to figuring out how the world of self-driving cars will unfold.

"'In the 1970s and 1980s, health care providers were seeing a troubling trend: Some children were suffering severe brain injuries after getting the DPT vaccine, which protects against diphtheria, pertussis (otherwise known as whooping cough) and tetanus.

"'The injuries put the pharmaceutical industry in retreat. The children's families had begun suing the vaccine manufacturers, some winning $5 million or more in settlements.

"'Fearing that the primary defense against these potentially fatal diseases was going to be sued out of existence, Congress passed the National Childhood Vaccine Injury Act in 1986. The legislation established a special court within the US Court of Federal Claims, called the Office of Special Masters of the US Court of Federal Claims, which is dedicated to hearing vaccine injury claims.

"'With the development of the vaccine court, pharmaceutical companies no longer were liable for the vaccines they produced. Instead, claims could be filed against the Department of Health and Human Services, and a panel of three—later to be expanded to eight—judges, referred to as 'special masters,' would decide the legitimacy of the case.

"'An excise tax on vaccines provides the money for damages and legal fees, which the government pays regardless of the case's outcome. Awards are capped at $250,000.'"

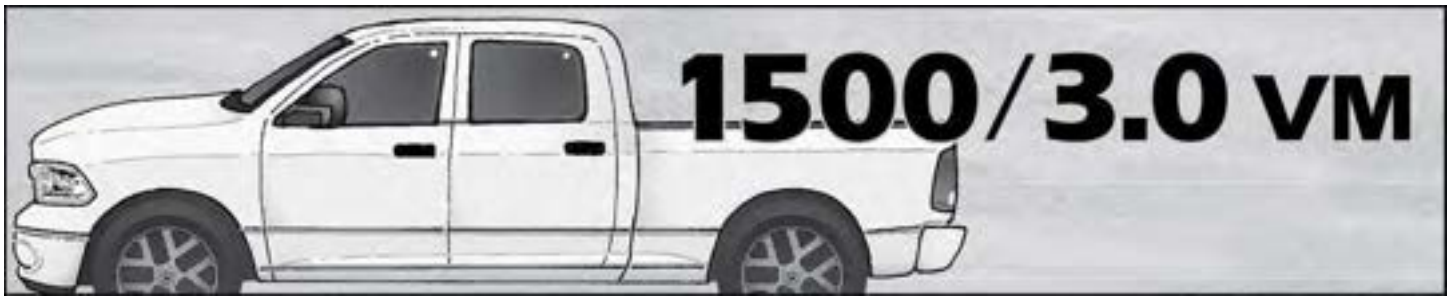
And, now, the simplistic answer from Issue 97:

"Well, now, wasn't that easy? An award capped at $250,000 and a tort system that is governed by a US Federal court. Insurance companies still exist to compensate for the inevitable fender-benders. The above gives you something to think about."

Conclusion

Truthfully, which government will be the first to establish the legal framework? Therein, perhaps, lies the answer to autonomus driving in the future.

Robert Patton
TDR Staff



Owner-Specific Articles on '14-Newer EcoDiesel Trucks.

WHERE IS THE NEW 2020 ECODIESEL EVALUATION ARTICLE(S)?

by Robert Patton

Back in October of 2019, the press was invited to Minnesota to drive and evaluate the 2020 EcoDiesel. The invitation was not sent to the TDR offices.

Snubbed. That's okay. Perhaps it is too obvious I was/am not a big advocate of the 2014-2017 EcoDiesel engine. Perhaps an oversight. Perhaps it doesn't matter. Let's move on and look at some comments from other magazines about the new 2020 truck. After the 2020 evaluation, we'll talk about the 2014-2017 "V08 Reflash" and Class Action Settlement Claim fiasco.

Truck Trend Evaluation

First up, a Truck Trend article from their January/February 2020 magazine written by Chad Kirchner. Here are a few of the highlights:

"Horsepower and torque are rated at 260 and 480 lb-ft, respectively. That's an 8 percent improvement in power and a 14 percent increase in torque over the previous version of the engine. The EcoDiesel's 480 lb-ft of torque is also best in class, beating out Ford's 3.0L Power Stroke V-6's 440 lb-ft and GM's 3.0L I-6 Duramax's 460 lb-ft.

"Out in the real world, where people do actual work, EcoDiesel-equipped Rams are rated to tow up to 12,560 pounds—which is also presently best in class for diesel-powered ½-ton pickups. Ram hasn't released fuel economy numbers yet, but we suspect they will fall right in line with the competition.

"Fast-forward six years, and the diesel ½-ton market is hotter and more competitive than ever before. Because of this, Ram couldn't just reintroduce the same EcoDiesel engine.

"For 2020, the EcoDiesel engine block remains constructed of compacted-graphite iron, robust and relatively lightweight material that helps quell vibrations and adds rigidity. Forged steel makes an appearance on the crankshaft and connecting rods, with lightweight, oil-cooled aluminum-alloy pistons. Redesigned aluminum cylinder heads hide chain-driven dual overhead camshafts with four valves per cylinder. The compression ratio has been increased from 16.0:1 to 16.5:1 to optimize combustion. High-pressure fuel injector nozzles have been redesigned to match the enhanced combustion chamber and run at up to 29,000 psi. A new-generation water-cooled turbocharger increases efficiency. And the exhaust gas recirculation system has been updated to a new dual-loop (low- and high-pressure) system.

"After an hour of mostly two-lane highway driving, the Rebel's onboard computer indicated around 25mpg. Considering this is the least aerodynamic version of the truck, with off-road tires and gearing not optimized for fuel economy, that number seemed quite reasonable.

"One drivability peculiarity we did notice involved initial throttle application. If we were cruising along and wanted to overtake a slower vehicle, there was a slight but noticeable delay between applying the throttle and the truck accelerating, After prodding some engineers, we were informed that the behavior is part of the truck controlling the emissions output. If you lived with the truck every day, you'd likely eventually not notice it, but it does seem more prominent here than with Ford's 3.0L PowerStroke.

"Compared to a base V-6 eTorque truck, the EcoDiesel adds $4,995 to the price. The cheapest EcoDiesel you can buy is $38,675 with destination charge. Or, to put it another way, it's $3,300 more expensive than the eTorque V-8, except on the Limited, where it's only $3,000 more. Fun fact: The base 2020 Ram 1500 equipped with the EcoDiesel engine is nearly $10,000 less expensive than either GM or Ford's base diesel-equipped ½-tons.

"Ram's modern interior remains best in class, and advanced technology makes the truck easy to live with every day."

Automotive News Evaluation

Next up an Automotive News article from their August 19 weekly newspaper written by Vince Bond. Here are a few of the highlights:

"Fiat Chrysler's truck brand is doubling down on diesel by offering it across all trim levels, which is welcome news for those who have wanted a diesel engine in the attitude-laden Rebel model.

"Ram has put its multiyear lead (first in the market in 2014) to good use. The new EcoDiesel's 480 pound-feet of torque is 14 percent more than the previous generation's, while horsepower rose 8 percent. The latest engine was bolstered with redesigned aluminum-alloy pistons and a new vacuum pump to improve fuel economy.

"With the rollout of the third-generation EcoDiesel, Ram is moving past the costly lesson it learned with its early diesels. US regulators said FCA used defeat devices to cheat on emissions tests, which led to a settlement worth around $800 million announced in January. (Recall V08/Settlement)

"It included payments of about $2,800 to owners of 2014-16 Ram 1500 diesel trucks and Jeep Grand Cherokee diesels. The settlement encompassed 104,000 vehicles sold or leased in the US."

Ram EcoDiesel in Rebel trim.

Ram EcoDiesel in Tradesman trim.

Car and Driver Comparison

Tired of EcoDiesel reviews? Truthfully, I find correspondence on the truck to be educational and I often wonder how I could be so wrong in my opinion. The positive: I'm open to learning and keeping an open mind.

The folks at Car and Driver did a three-page truck comparison of the three diesel-powered 1500 series trucks: Ford's 3.0 PowerStroke, Chevy's 3.0 Duramax and Ram's 3.0 EcoDiesel. Here are the comments from writer's K.C. Colwell and Josh Jacquot:

"We lined up the Big Three's new half-ton diesels and let them slug it out.

"We gathered four-door crew-cab versions with four-wheel drive and two-speed transfer cases, five-seat leather interiors, and five-figure asking prices that start with '6.' In other words: These aren't strictly work trucks.

"The Duramax makes the most power of the bunch, with 277 horses on tap, and the second-most twist, with 460 pound-feet. For the record the Ford has power ratings 250/440 and the Ram offers 260/480.

"The Ford and Chevy share a transmission, but you would never know it by driving them. It isn't so much that the Ford's version is conspicuous, it's that the Silverado's works as seamlessly as the inline-six that turns it. Chevy's powertrain shines all the time but never so brightly as when it's hooked to a 6650-pound trailer. If all we ever did with one of these trucks was tow, the Duramax might be enough to win us over. It is that nice.

"The Silverado also tops a lot of objective stats, including payload, as-tested price, and acceleration. It is the lightest in the test, too.

"But this truck is no match for the Ram's supple ride and adept handling.

"Objectively, Ram's EcoDiesel isn't the best at doing truck things. As the charts reveal, the Ram's payload is lower than the Chevy's, and its tow rating is topped by the Ford's. But the differences are negligible. About the only gripe anyone had with the Ram was its labored feeling when trying to keep a 70mph pace with a trailer in tow; 65 was just fine.

"The real knockout punch came at the fuel pump. Returning 30mpg, the Ram bests its competitors by a wide margin.

"In the end, this wasn't anything more than a sparring match for the 10Best-winning Ram 1500. The upset will have to wait. We're sure that Ford and Chevy will mount another title challenge soon enough."

Robert Patton
TDR Staff

A 2020 ECODIESEL REVIEW

by Andy Mikonis

Looks like my concerns about EcoDiesel One (yes, the 2014-2017 truck) were warranted. After my subtly scathing review of the 2014 in Issue 83 (and one in a major city newspaper) I got "the call" from Ram PR. This was primarily about my reported fuel mileage, or lack thereof. I elaborated on this in my review of the 2015 in Issue 89. Some reader/owners even stepped up in EcoDiesel One's defense. How's that working out for you?

Seriously though, the dialogue between the members exchanging ideas is one of the best things about the TDR. For me, *the* best thing about TDR is this is one place where we can tell it like it is. It hasn't happened a whole lot, but there have been other outlets that have asked me to change certain statements—or changed them for me—for the sake of advertisers, manufacturers, dealers, etc. Auto and truck reviewing is a delicate game.

Auto and truck reviewing is a delicate game. For me, the best thing about TDR is this is one place where we can tell it like it is.

Another aspect is that, as a professional auto journalist, this business is based on personal relationships. I know, like, respect and even admire many people who create all the fine vehicles out there. It can be tough to write a bad review. Luckily, there are mostly great products out there these days, or as I like to put it another way: "they're all nice when they're new."

The Test Drive

On to the new. At the annual Midwest Automotive Media Association Fall Rally in October, I had a taste of a 2020 EcoDiesel. So, confirming said EcoDiesel was in the local press fleet, I signed up to get it for a one week loan. I think I was the last in the area to get it, as it turned 10,000 miles while I had it in December. That is more than you typically see on press fleet vehicles, which are not known to be treated kindly. But it's good to have seen one that's theoretically had some abuse; I can start out on a positive note that this truck showed no signs of wear and tear.

The subject vehicle was a 2020 Ram 1500 Longhorn Crew Cab 4x4 at base price of $54,140. Options were fancy paint ($500), body-color bumpers ($195), Advanced Safety Group ($1695), Longhorn Level 1 Equipment Group ($3895), Multi-Function tailgate ($995), RamBox ($995), trailer brake control ($295), Air suspension ($1805) and a 3.92 axle ratio ($95). With the $1695 freight charge the grand total came to $66,305. The only new-for-2020 Longhorn item it didn't have was 22-inch two-tone wheels. It had 275/55R20 Bridgestone Dueler H/L Alegras.

Andy's test drive, the 2020 Ecodiesel Longhorn Crew Cab.

Since I wasn't on the initial press launch event for this generation EcoDiesel, I didn't do a deep engineering dive into what's new with the engine. I could have set up an interview to dig into it, but G.R. Whale hashed out the details for us in Issue 106. If you are just joining us, Greg reported the engine is about 80% new. (Hey, wait a minute. Do you think I wasn't invited because of my earlier bad review?)

Under the hood is the third generation of the 3.0-liter VM "EcoDiesel" engine. The first was VM's A630 for the European market. The second was the L630 for the 2014-2019 U.S. market. Details are in Issue 106, pages 20-21.

The Multi-Function tailgate on the Limited truck is a $995 option.

When I get a press truck on loan, I try to do some towing and/or hauling for a more thorough review. Often this is a run between Chicago and southern central Michigan to a friend's place where I keep some cars. This trip was hauling some parts both ways, not too heavy a load, in order to sell something from my menagerie of 1961 Chryslers. It gave me a chance to test real world fuel mileage on some familiar roads and to work with the Multi-Function tailgate for the first time.

Total mileage for the week was 402.7 at an average of 23.4mpg. This was mostly mixed highway driving, about a third interstate, with the rest two- and four-lane rural highways with a few stoplights, but no traffic snarls. Though this is probably closer to "combined" driving than pure "highway" driving, only about 20 miles was actual city driving. The 4x4 EcoDiesel is EPA rated 24 for combined driving. So, we're in the ballpark, but for about $5000 more than the gasoline V6 eTorque that's rated 22mpg combined. Granted the Ecodiesel has more towing and hauling capability than the gas V6, though that will be reduced by the weight of this configuration and options. From a cruising range perspective, the tester was showing 3/8ths tank of fuel and 7/8ths tank DEF at the end of the trip. Greg Whale did better on mileage than I did, as did Car and Driver recently. Though interestingly, a colleague at pickuptrucks.com came within a tenth of a mile of my results. Should also note it was a mild week in December; on a couple cold mornings it didn't noticeably preheat and idled up to 1300rpm while warming up.

The Ram box on the Limited truck is a $995 option.

Truck beds have certainly gotten more interesting in the last few years. I'm still not 100% sold on the new Ram Multi-Function tailgate, but it's built better and makes much more sense than the GMC deal. You can drop it like a traditional tailgate (it does not slam down) or open it 60/40 to the sides. Using the "barn door" function, I found myself maneuvering around the doors more often than not the way they opened. Maybe getting to the edge of the bed to load or unload wasn't as much of an advantage with the parts I was loading. It reminded me of testing a Honda Ridgeline (its tailgate either slams down in traditional fashion or opens in one piece to the side) loading bags of rock salt a few years ago. In that case I thought it helped a lot. So, think hard about how you will be using it before you buy. Since it also works like a regular tailgate, there is really no downside other than the extra cost.

Another EcoDiesel Crew Cab in "Limited" trim. This photograph was taken at the Atlanta Auto Show in early March.

The Ram box on the Limited truck is a $995 option

Nothing to fault with the comfy cowboy interior. With the four-corner air suspension, this was a real luxury ride. My only nitpick is the engine sounds tinny at city speeds, rasping from stop sign to stop sign, kind of like the old one. The F-150 mini Power Stroke is quieter (and got me 24.2mpg in similar driving). I haven't had the opportunity to drive the light-duty Chevy diesel yet. The EcoDiesel is quiet on the highway, though, with adequate passing punch on two-lane roads. Overall, a very nice truck to drive. Let's hope things work out better with this generation.

Andy Mikonis
TDR Writer

My EcoDiesel and the V08 Recall

You may know that I have owned an EcoDiesel since April of 2014. Mine was one of the first wave delivered. It isn't a bad truck, but when you've been spoiled by the capability of a Cummins, the performance and fuel mileage were a disappointment. Major disappointment.

The good 'ole Cummins in my 2010, 2500 truck would give a solo/75mph highway number of 19mpg, the EcoDiesel was good for 24mpg. Towing, the 2500 would give 11.5mpg, the EcoDiesel 12.5mpg.

The EcoDiesel has had its share of visits to the shop:

- Loss of coolant inspection
- Water pump change
- EGR cooler replacement
- Throttle position switch replacement
- Factory emissions recall notice
- Still a loss of coolant (another EGR cooler?)

Aside from the installation of accessories that could be used on a Fourth Generation Cummins Turbo Diesel, you've not seen me discuss the truck in any detail. Obviously, other TDR writers have had better luck with their EcoDiesels.

So, now that many EcoDiesel owners are involved with the V08 recall and settlement process, I asked several folks that I know to give me an update. The following is a reprint of the typical response.

> My question: What is your latest impression of your truck now that you have been through the "V08" reflash and settlement?
>
> Response: The emissions settlement reflash was awful. It made the truck a complete dog and also mpg dropped by 10%. Part of the problem seemed to be new shifting logic. It is as if the emissions tune hurt mpg so they tried to win some of that back with early shift points. But the early shift points meant that the truck was often below its power-band.
>
> I drive like an old lady. When I notice that the truck has no power, it *really* has no power. It took me only a week to decide to get an aftermarket tune, something I'd not even considered for fear of messing with the extended warranty. With the Green Diesel Engineering tune my mpg went up to 10% better than original, or 20% better then emissions tune. A month later the feds went after GDE and shut them down.
>
> Sadly, I went cheap on the tune, so I do not have my original computer. So now I live in fear of a dealer reflashing it. With GDE out of business, there'd be no undoing that. If I found an original EcoDiesel computer for cheap, I'd buy it.
>
> On the positive side—with the emissions check I bought an old Mini Cooper S as a daily driver. It's a hoot to drive.
>
> (I type three words per minute, so my responses are short.)
>
> My response: Thanks for the update.
>
> Reflash for emissions: Done
>
> Wait for the refund: A cluster, it seems that they lose paperwork each time it is sent in via mail or internet. (The wife is really good at the internet and even she is ticked-off.) The settlement check finally arrived in January, six months after I started the process.
>
> Performance: Didn't tune prior, will not tune after. I do not want to jeopardize warranty or legality. The latest reflash has earned the truck a new name, "Mic" as in anemic.
>
> Impression of engine/performance/mileage prior to reflash fiasco: Marginal, I just wasn't a big fan, too many nagging fix-it problems under warranty. Whatever miles-per-gallon advantage the engine offered was negated by the higher price of the diesel fuel.
>
> Impression after: Is there a buy-back option? It is anemic. I will stick with it until the FCA extended warranty expires. Really, anemic.

My bottom-line assessment: The truck is fine, it has a solid Fourth Generation chassis and driveline. When folks ask my opinion of the 3.0-liter engine I simply shake my head from side-to-side and say, "Hemi." And, that was before the reflash.

Conclusion

So, TDR audience, there you have it. Aren't you glad that you asked?

I am spoiled by the Ram/Cummins combinations that I've owned throughout these past 28+ years and spoiled (somewhat) by the 2014-2017, pre-V08 reflash EcoDiesel. Maybe the 2020 EcoDiesel is more like/better than the 2014 truck prior to the recall?

Robert Patton
TDR Staff

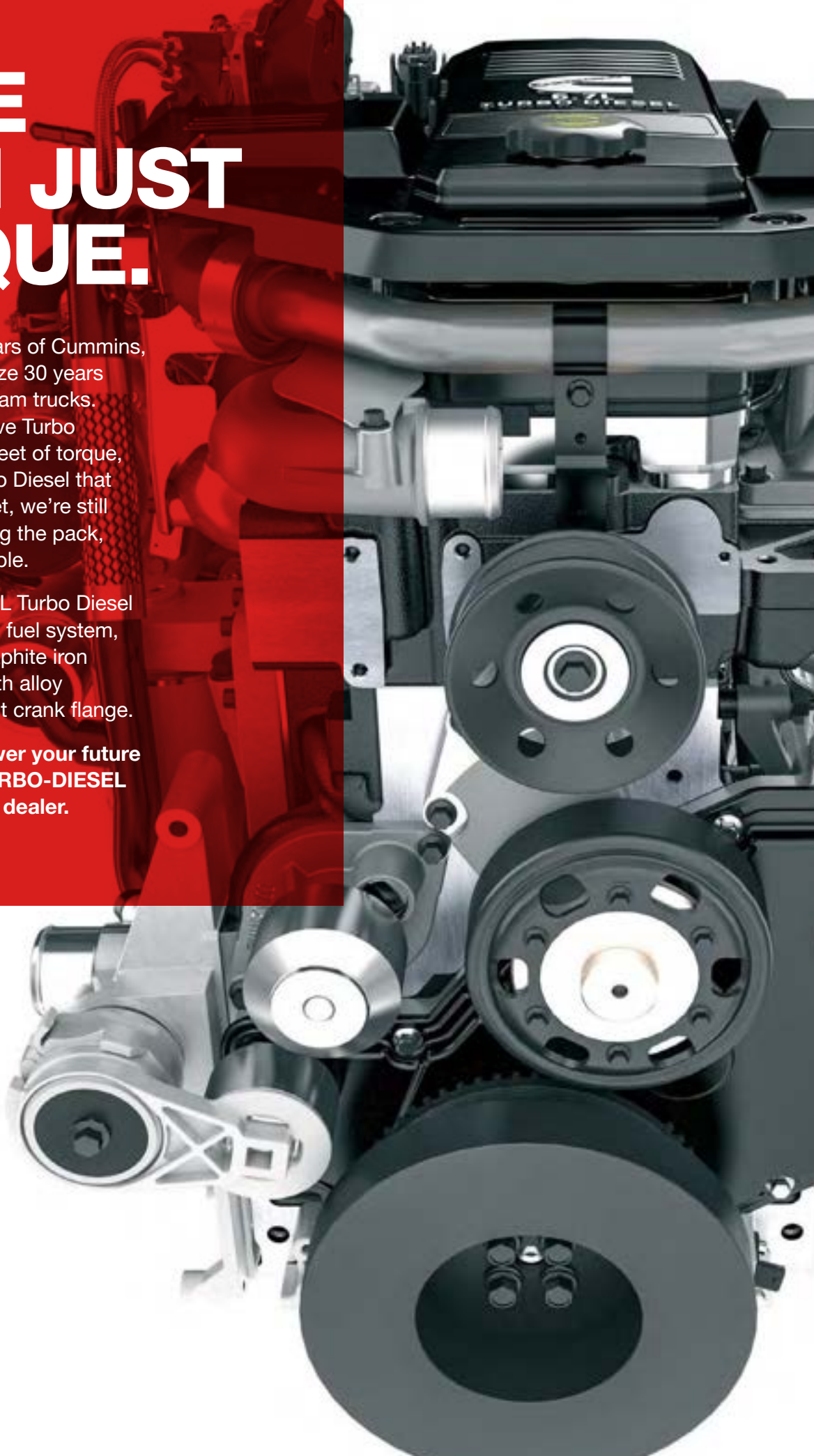
So, TDR audience, there you have it. Aren't you glad that you asked?

MORE THAN JUST TORQUE.

As we celebrate 100 years of Cummins, we also want to recognize 30 years of Cummins-powered Ram trucks. From the original 12 Valve Turbo Diesel with 400 pound-feet of torque, to our current 6.7L Turbo Diesel that delivers 1000 pound-feet, we're still breaking records, leading the pack, challenging the impossible.

This next generation 6.7L Turbo Diesel features higher pressure fuel system, stronger compacted graphite iron block and higher strength alloy crankshaft with a 10-bolt crank flange.

Learn how we can power your future at CUMMINS.COM/TURBO-DIESEL or visit your local Ram dealer.



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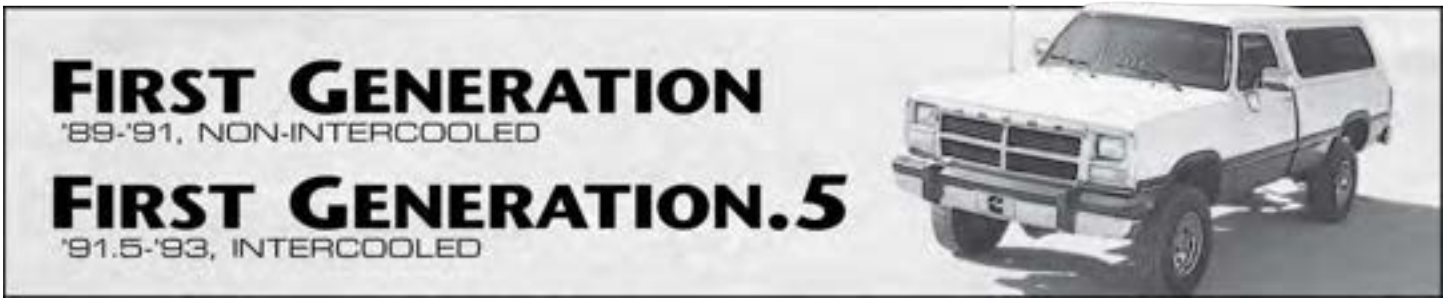

Coverage of the '89 through '93 Model Trucks.

BLINKING TEMPERATURE GAUGE

I have a 1990 250 that is a workhorse. But whenever I hook up my trailer my blinkers slowly show up on the dash and my temperature gauge bounces. I've changed my trailer plug and not found any bad wires yet. Anyone know why the temperature gauge and blinker would share juice? By the way, this is just the first of a few electrical issues.
hesstonman

It is time to start chasing grounds. My 1966 D200 would light up the dash lights any time I hit the brakes or turn signals. The ground was bad from the bed to the frame. Start adding jumper wires to figure it out.
DonFitzwater

HOT WEATHER EQUALS DIRTY OIL?

I do 4,500-mile-interval oil changes using Rotella 15/40 and Fleetguard filters. My most recent oil change appeared blacker, dirtier than usual. It's typically been 100° here for the last couple of months and I drive 14-60 miles a day hauling 400 pounds or less. Do high ambient temperatures lead to dirtier oil?
Bluebird

It's possible. Hot air/ambient is less dense, so you get more soot in the cylinder and eventually in the oil from the incomplete combustion.
cerberusiam

The oil change indicator on my brother's 6.7 Ford will really shorten the interval during high ambient temperatures, so it's possible. I believe you should run an oil analysis, as you are likely dumping good oil at 4,500 miles.
AH64ID

First Generations often do have dirty oil…at least both of mine do. Mine have always used some too.
NIsaacs

My daily-driven First Generation, albeit overfilled, with 10,000-mile oil/filter changes, neither has dirty oil nor uses any oil between changes. Good air filtration and clean ring packs are key, along with proper AFC tuning.
ofelas

GETRAG STUCK IN GEAR

Yesterday, when I was getting off the freeway, I downshifted to third coasting toward the stoplight. When I stopped and went to shift to second the gearshift wouldn't move. It was stuck in gear and I couldn't shift it into any other gear. I pulled the shifter out and looked down inside. I didn't see any metal or anything else that shouldn't be there. The truck and transmission have about 350K miles. The transmission has been out once to change the rear main seal and clutch at 175K. I checked the oil level and it is about a pint-and-a-half low.

I have heard the shift forks are aluminum and that the 3-4 unit can wear or that a set-screw could loosen and let the fork slip on the shaft. I will drain the oil tomorrow then pull the PTO covers and see if I can see the forks. If the fork is the problem, I will pull the transmission and change one or all of them, according to wear.

The truck has never towed anything heavier than 5000-pounds and that was probably 15 years ago. Its use is mostly empty road miles. Any ideas?
jdross440

I had an old Mopar 833 get stuck in gear once. It was the synchro "strut" and I don't know if the Getrag has these, but basically it's a spring loaded button in the synchro slider that keeps the shift ring in place like a detent. It could be something like that.

If it's an expensive fix, my vote is to move up to a 4500 or 5600.
Wayne M.

Today, after removing the shifter, I took a large screwdriver through the opening and was easily able to move it into neutral from third gear. I filled it with new oil and started it. After letting it idle for a short time, I got out and looked underneath and oil was pouring out.

I crawled underneath and saw it coming from between the transmission case and rear bearing support. I shut it off, grabbed a socket and found that the four lower bolts were loose about two rounds. After looking further up at the other four, the heads are broken off. After tightening the lower four, the oil stopped coming out and I put the shifter back in and was able to shift through all the gears. Third was a little difficult at first, but it got easier. I drove it around my neighborhood and it shifted good and sounded okay. Before driving it anymore, I will pull the transfer case and the bearing retainer to get the broken bolts out. They should come out easily as only the heads are popped off. I will replace all eight bolts with grade-8 bolts. Then I will see if it works normally. It was almost out of oil.
jdross440

RADIATOR SOURCING

I bought an all-metal radiator out of a 1992 with approximately 200K miles on it. Printed on top is “Radcor Thailand.” I noticed the top rows DO NOT go all the way to the top as my original, and there is no top bracket/framing to meet the shroud at the top. Will it work with the gap at the top and maintain the needed cooling capacity? Thank you for your experiences and knowledge.
Bluebird

With a gap you’ll lose quite a lot of cooling capacity. The air goes where it is easiest and that’s through the gap not the radiator. I would try to close that gap.
Ozymandias

Thank you. I know it’s minimal but I’m concerned about the missing rows, since I don’t know the history of these Thailand parts and it’s routinely 100° or more in my area. Perhaps I should just locate a new one.
Bluebird

This might work for you. https://radiatorexpress.com/product/all/dodge/1992/d250/base/59l-l6/221202/1086162
NIsaacs

That’s an outstanding resource. Thank you NIsaacs and all TDR members.
Bluebird

SECOND GENERATION
'94-'98, 12-VALVE

SECOND GENERATION.5
'98.5-'02, 24-VALVE

Coverage of the '94 to '02 Model Trucks.
Website Correspondence Edited by G.R. Whale.

12-Valve Engines '94-'98 Trucks

MOTOR MOUNTS

I'm looking for a set of motor mounts for a 1994 2WD and local parts houses say they've been discontinued. Does anyone have any ideas?
randol3

If you're just looking for the rubber inserts because of dry rot or wear, Energy Suspension sells replacements and Geno's Garage has them. If you lift the motor out of the cradle on the frame, you can replace them with the mount still attached.
Signal73, Timd32

INTERMITTENT CRUISE CONTROL

When I press the cruise control "set" button, it may or may not engage. If it does engage, it may stay on for a short time or it may hold for miles. I have checked the vacuum lines and could not find a problem. Any help would be appreciated. Thanks in advance.
JMLambert

Check to see if you have a worn out brake light switch.
Ozymandias, mothertrucker

I hope it's something as simple as the brake light switch for you. (Note: don't play with the new one, read the instructions to set it up first.) On mine, the left battery (OEM) leaked down on the cruise servo and the acid ate through the rubber diaphragm. It was about $70 at the dealer back then, and I'm surprised to see this many years later its only $83.
Joe Mc

I tested all vacuum lines (all held pressure) with a hand-held pump. Then my air bag warning light came on (almost continually), so I got a new clockspring at NAPA. While I had it apart, I checked all the electrical connections from the cruise control switches through the steering column to the brake pedal switch. The air bag warning light is off and the cruise control is now functioning properly. Thanks for all the input and help.
JMLambert

STEERING COLUMN CLIPS

I dropped my steering column on my '97 Ram 3500 and these clips fell. I'm not sure of their orientation going back in. Is anybody familiar with these?

Jaymor70

I had the same problem a few years ago and posted on another forum. I was sent this, which I think will help you: https://www.youtube.com/watch?v=kdYEgK-OFlY&feature=youtu.be
GAmes

2020 AMELIA ISLAND CONCOURS

Introduced for the 1963 racing season, the Chapparal won 22 of 38 races in the years 1963-1965.

REPLACE A BROKEN HEAD BOLT?

I know there will be differing opinions, I have two or three myself!

A year ago when I replaced injectors, I "retorqued" the head bolts. I should have left them alone because some felt a little weird or "stretchy." On a trip last week, I noticed a faint coolant smell at fuel stops. Coolant was a tad low but I couldn't see where it was coming from, so I topped off the radiator and continued home. It never got any warmer than normal, no smoke, and runs great. Then Saturday, after I got time, I put a pressure tester on it and I found the head of the head bolt between cylinders 2 and 3 laying loose between the valve covers. The coolant is seeping up around that head bolt.

So, I need a head gasket and hardware. I know the cool trick is ARP studs, cut the head, mill the rocker stands, etc., but the reality is I need to drive this thing over the river and through the woods to grandma's in a couple of weeks.

I'm inclined to pop the head off, clean it up and reassemble with OE gasket and new bolts. At the moderate power level and a stock turbo at 30psi max, I don't think studs are necessary, and I'm willing to gamble that the cylinder head is flat. The bolt is broken off nearly flush with the head, but the remnant backed right out with a screwdriver. What do y'all think?
Bamtech1

If it were me, I'd get the head surface checked and trued-up at a machine shop. Get a new head gasket from a Cummins shop close to you and "new" head bolts. That head bolt you found between 2 and 3, was it just the head or the whole bolt? From your post, it sounds like you may have busted one, and what you have is a broken piece of bolt stuck in the block. If this is the case, you'll have a blast trying to get the head off the engine block while in the engine compartment. Good luck.
Joe Mc

Back to the stud question: boost doesn't blow head gaskets. If you advance your timing a lot (like over 18), then you run the chance of blowing a head gasket without studs. If it were me I would take the opportunity to get a valve job done, but if you don't have the time at least check for flatness with a good straight edge. I would install a set of new head bolts, torque to factory specs and then LEAVE THEM ALONE. Felpro head gaskets are identical to Cummins (I truly believe they are made in the same factory) and cost less.
GAmes

Thanks, GAmes. Timing is at 17°. I'm now considering a hybrid option 3: Put a new bolt in that hole and wait until after my trip to really tear it down. I just don't have the days off between now and then to get it all done.
Bamtech1

I think that would work fine. I would just check for coolant in the oil or oil in the coolant, as mentioned above. It is certainly worth a try.
petersonj

Also as mentioned, no sealant, just a light coat of engine oil after you have cleaned the threaded hole in the block. Personally, my guess is that you will still have coolant escaping the bolt hole. There are five other bolts around the cylinder to clamp the gasket and the head won't flex downward when you torque the bolt.
GAmes

Tonight I chased the bolt hole and cleaned it out with brake cleaner and compressed air. I put one new OE bolt in, oiled and torqued to spec. I pumped the cooling system to 15 psi and found no leaks cold. I ran the engine up to 190°, thermostat cycled, and there was still no leak and no fluids mixing. I took it for a short drive and parked it outside the gate to commute tomorrow, and if all goes well I will leave it this way. Keep your fingers crossed.
Bamtech1

In 2015 I overheated the engine and broke a head bolt on the exhaust side at 350k. It broke the same as yours did, sheared flush with the surface of the head. At the time there was a national back order on head bolts, so a friend that owns a diesel repair shop gave me a 24-valve head bolt that he had laying around and said good luck. The 24-valve head bolts are a fair bit longer than 12-valve bolts so I had to put a bunch of washers under it. I figured I'd rebuild it in a few months, so what the hell. A few months turned into 4½ years and it's still clamped, gets 18mpg, and has 425k on it. I think yours will be okay

Flinty

2020 AMELIA ISLAND CONCOURS

Roger Penske drove the Chapparal 2 in several races in 1964. I'm betting this may have been the first 1/18 scale model you assembled in your childhood days.

SIGNAL SOCKET CONNECTION FAILURE

I've been having trouble keeping a good connection between the indicator lamp socket and the circuitry on the back of the instrument cluster in my 1997 Club Cab 4WD 2500. I had it working for a while with a little different style socket, but it has lost its connection again. When it loses contact, the turn signal bulbs will flash very dimly and fast. I believe that the circuit needs the resistance from the indicator bulb to function properly. Has anyone experienced this problem and what were your solutions? I have not yet tried to find a replacement cluster circuit panel.
Seabee

That is a new failure. I don't think the plastic circuit board is detachable from the housing, but I do have one if you want it. Where are you? You might be close to my route on the next trip.
GAmes

Thanks for the instrument cluster, Gary! I was able to get my dash light working with one of your bulb holders. Unfortunately, I still have the blinker problem. I've done all of the normal troubleshooting (cleaning grounds, running temporary ground to the battery, checked voltage at bulb, etc.) but no luck. The left side flashes normally, but the right is fast and very dim. When I turn on the headlights, it doesn't flash at all. I'm inclined to think the flasher switch in the column has an issue, but I hate to just change parts to change parts. I think that I need to do some cipherin'.
Seabee

Turn on your emergency flashers (the emergency flasher is not load sensitive) and check that the front right bulb and the rear right bulb are burning at the proper intensity. My bet is that one is burning dimly. If so, that bulb likely has a poor ground.
petersonj

Considering what "petersonj" said, there are many causes that come to mind. When you say the right turn signal flashed fast and dim, are both right front and right rear turn signals dim? Sounds like a burned out signal element and possibly a bad ground. Maybe corrosion in the bulb socket or wrong bulb installed? I have seen similar problems where one bulb element burned out and arced over the second element. Then there is the flasher itself. I don't remember when the flashers went from mechanical to electronic.
brucejohnson

Both front and rear are dim. I jumped the front bulb ground directly to the battery with no change. I cleaned the socket bulb connectors and tried a different bulb. I recently installed the Sport headlight conversion and the Brite Box light set-up. The signals worked correctly after the conversion (for a short while), but I wouldn't think that the conversion set-up would cause a blinker problem.
Seabee

With this information it acts like there is a large current draw in the right side turn signal circuit. The four-way lighting check will help a lot. It could be any number of things, like chafed wire, trailer tow electric socket issue, instrument circuit board issue, front or rear bulb turn signal/brake element broken and shorting through the running/parking light ground side (this one I have experienced on two occasions).

When you check the turn signal lights, be sure to check both elements for proper activity. A bad ground can cause the "other" element to conduct through its circuitry to its associated ground, adding additional elements, front and rear, which will glow dimly, and add current. When the lights are turned on, it creates potential at the bad point and cancels out the flasher circuit.
brucejohnson

I tried the four-ways tonight. They worked great. I removed the multi-function switch and did a continuity and resistance check on it. Sure enough, there was a lot of resistance between two of the right turn terminals (44 ohms). The wiring looked great as far as I could trace it into the cab.

I replaced the multi-function switch, but no improvement. I am no rookie to electrical diagnostics, but I have to admit that I am at a dead end. The four-ways and the left turn work great. The right turn is fast and dim. I have checked all of the usual suspects—grounds, bulbs, connections, etc., but for the four-ways to work great, the bulbs, wiring, etc., has to be good, right? The only thing I can think of is with the four-ways on, whatever problem the right turn has is being accommodated/compensated for via the left-turn circuit. Once the power leaves the multi-function switch, either right turn or four-way, it travels through the same wire to the bulb. Am I not seeing the forest for the trees?
Seabee

Then, one week later…

Well, I just can't leave something sit, so I went back out tonight and did a bunch more testing. The results were getting even crazier and I'd share them, but they would really make you scratch your head!

I had been procrastinating about undoing all of the trailer wiring under the back of my truck, but finally bit the bullet tonight. I have three different connectors—fifth-wheel plug inside the bed, a bumper seven-pin and a bumper four-pin. That is a lot of wiring.

I had the right turn flashing and I started jerking and moving the harnesses, when, a couple of times, I got a bright proper flash on the right rear! So I begin un-taping and it turns out that my four-pin harness had the right turn shorting to the tail light circuit. Once I separated them, all was well. Of course, this was after I had cut loose the seven-pin connector because the screws had rusted enough that I couldn't get it apart. (I'll feel better with a new unit in there anyway.) I appreciate the help, guys.
Seabee

24-Valve Engines '98.5-'02 Trucks

WEEPING PLUG

I have a '99, 3500, 4WD, automatic with a NV241HD transfer case. I changed my transfer case fluid the other day, torqued the drain plug and now I have an oil weep at my hex-head plug. Is there a better plug out there or is thread tape the fix?
2Farr

Just tighten it more, you're not going to hurt it. It has tapered threads.
KATOOM

My neighbor showed me a great fix. The Cummins oil pan drain plug is the same size and thread pitch as the transfer case plugs. You can even use the drain plug gasket. I had an extra in the shop, so I used it and it works great with no leaks.
2Farr

Or you could do what I did as a quick reference for how much fluid is in there.

KATOOM

That is a neat deal. It is something I will incorporate on my G56 the next time I change the oil in it.
GAmes

PAN/PICKUP TUBE CLEARANCE

I have a '01, 3500, 4WD manual in which I recently dented the oil pan. The pan is dented in the sump area, about 3/8-inch deep at worst against a straight edge. My concern is that I have damaged the pickup tube/screen. I cannot find any definitive information on where this pickup is located in the sump, or how much clearance there is between it and the bottom of the oil pan. (I would assume that number is very small.) The only pictures I've found just show the tube runs along the passenger side and the pickup screen falls somewhere in the sump. I really would like to avoid a pan removal because it looks like a real PITA. I was thinking of doing an early oil change and seeing if I could feel around in the drain plug hole/ use a borescope to investigate. Any suggestions?
DownByTheRiver

There is not much clearance, but I've never measured it to be able to give you a number. I had a 6.7 with a dented pan and the rods would hit the pan. It was noisy as hell. That said, the pick-up assembly is very stout.
Bob4x4

I have a pickup tube and a pan in my parts shed. I estimate there is about a ½-inch of clearance between the tube and the pan. The pickup portion is behind the drain bung and is perpendicular to the pan. I doubt you could stick a finger into the drain hole and feel the tube, but maybe you could see it with a borescope. I have a theory that once the oil is drained you could give the bottom of the pan a whack with a rubber mallet and hear the tube rattle if it is in contact with the bottom of the pan.

GAmes

The pickup sump has a screen on it and is not flat, but rather somewhat rounded, perhaps 18-gauge steel. It's pretty tough. From what I've seen, the distance from pan to sump pickup varies from truck to truck. I've seen oil pans with huge holes in them and the sump bent, but very seldom is the tube ever bent. I had a '98 that the pan was pushed up to the sump screen, and it ran well over 100k with it like that.
HHhuntitall

NO-START PARTS

I recently took my '00 Turbo Diesel to do some errands. On the way home, I got a chime and the check gauges message: the voltmeter was on zero. I wasn't far from home and when I tried to start it back up I heard one click and that was it. Now it won't even do that.

The batteries check out good, close to 13 volts, and the lights are good and bright. What would make that gauge stop working and then not start the truck when batteries are still showing good voltage?
Red Rattler

You can have good voltage on both batteries, but the alternator is not charging and the starter just clicking directs me to the ground on the engine block. An easy way to check is to fiddle a small-gauge wire between one negative battery post and the engine block and try to start the truck. If the wire burns up, you nailed it.
Ozymandias

After running tests all morning, starting at the battery, I finally got to the starter relay. I wired around it from the fuse box and the truck fired right up, so I went to parts store to get a new relay, and bingo, the truck starts.

I checked the alternator while it was running and it is bad, not charging at all. I wonder if the alternator problem caused the bad relay. I'll replace the alternator later because I wanted to make sure the relay was the no-start problem, and the alternator swap is easy. Thanks for the help guys, I really appreciate it.
Red Rattler

Save the old alternator and rebuild it. As BigPapa noted, there's a lot of bad karma from some store-bought units.
DavidC

PLASTIC AUTOMATIC TRANSMISSION PAN GASKETS

Has anybody found they have to use a greater torque setting than the factory recommended 13 ft-lbs to get the transmission pan-leak free with these newer-design, reusable plastic pan gaskets? (I think that's what they're made of, maybe some composite material.) Twice now I've had to go close to 20 ft-lbs before they stopped leaking on my aftermarket aluminum pan. Does anybody see a problem with that higher torque?
rotohead

I have never had that problem with the original or aftermarket aluminum pan.
DavidC

I've had the same problem with stock oil pans, but usually not so much with the aftermarket pans with a wide flange. I usually over-torque those since I've had problems with them coming loose, so I don't think 20 ft-lbs is too much. Although, I must point out, an 8-mm heat treated bolt, scoring 9.8 hardness, has a minimum shear capacity of 36Nm or 26.55 ft-lbs, according to my book.
HHhuntitall

I've installed hundreds of transmission pans over the years with no leaks…except for my truck. It has leaked since I can remember, and it didn't change when I upgraded to an ATS transmission. I have tried cork and rubber gaskets, torqued in every which way, with no luck. I'm sure vibration from the Cummins doesn't help. I was planning on trying the new style gasket next.
JMcCoy

Geno's has that gasket also, that's where mine came from. If there was an issue, I would think they would know about it.
DavidC

I would also check your dipstick tube seal. It's a fairly common leak and often mistaken as a pan gasket leak.
BigPapa

I've since torqued the bolts to 18 ft-lbs, driven a couple of hundred miles and only had one drop hit the garage floor. Much better than two weeks ago when it was leaking all along the front edge of the pan. This issue wouldn't be such a big deal for me if the seal was easily replaced, but draining ATF and removing the pan is such a mess.
rotohead

SECOND GENERATION FIREWALLS

I am building a truck putting a 1978 Dodge Ramcharger body on a 1996 Ram 2500 frame. I have installed a dash from a 1999 Ram 2500 so it looks like my 2001 Ram 2500. I will be installing all the wiring, vacuum lines and the HVAC box from the 1996 so everything will be plug-and-play (hopefully). To mount the HVAC box, I plan to cut out the passenger side firewall from a '94-'02 Ram and weld it to the '78 Ramcharger body so the HVAC will be bolt in. Is there a difference in the firewall and how the HVAC box bolts up between the '94-'97 and the '98-'02 models?
BRI7070

I think they are the same. I'm not sure about hooking the wiring from a '96 to your '99 dash, though.
GAmes

Gary's right: The '99 cluster is driven by the ECM and the '96 doesn't have an ECM. The firewall should be the same, I would think.
BigPapa

Given the overall width of the cabs and their differences, I would think it would be quite a chore to get the newer dash in the older truck. I'm curious how it'll turn out. Please post pictures when you are finished. As for the firewalls, they're almost identical, with only some minor differences on the driver's side where the clutch master cylinder bolts in. Everything is easy enough to swap over. I've done several cab swaps to the older 12-valve trucks, using later 24-valve cabs.
HHhunitall

A Better Mousetrap?

‘98-‘02 Ram Replacement Dashboard

DRD8-2: **$259.95**
($40 flat shipping fee to continental U.S.)

Short Story: Back in 2016 we were looking for a dash replacement for our 1999 truck. So was the engineer at the small plastics company that now makes the dash.

A Better Mousetrap?: The dashboard is formed from ABS plastic for more durability and to help prevent cracking, unlike the original dashboard which is known to deteriorate. But remember, our plastic’s vendor is a small business, the only color we offer is black.

Really, A Better Mousetrap! Unlike the Mopar dash ($400) ours is less expensive. And unlike other aftermarket dashes, ours features five molded-in plastic dash-to-cowl reinforcements to help keep the screws from pulling through the dash mounting tabs.

Made in the USA

Shop us for dash replacement parts and accessories too.

Dashboard includes detailed installation instructions.

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THIRD GENERATION
'03-'07, 5.9L HPCR

THIRD GENERATION.5
'07.5-'09, 6.7L HPCR

Coverage of '03 to '09 Model Trucks
Website Correspondence Edited by G.R. Whale.

5.9 HPCR '03-'07 Trucks

THRUST BEARING AGAIN

My dad's '04, 3500 with the NV5600 transmission has, for the second time in 525,000 miles, ripped the rear thrust bearing off the main crank bearing and dropped it in the oil pan.

I know he doesn't rest his foot on the pedal while driving, and he tries to have as little clutch-in time as possible. That being said, would it help much to take the main cap and get it machined to take a thrust bearing too, so the crank would have a full 360-degrees of bearing surface opposed to the factory 180? Since this is only the second time in over half a million miles it's not like it's a regular thing, but it is still a pain in the ass days' worth of work when I could be doing something else.

Has anyone else had this issue or know the cause of it, or a way to prevent it from happening it again?
RWherley

There have been several discussions about it, so you might do a search. I don't recall the exact cause or correction.
sag2

Replace it with a one-piece bearing. I think Clevite is the supplier. The OE thrust washer (in all 5.9s, some 6.7s) is a known issue and falls out for no discernible reason. They will also come loose and sit in there and rattle, making it near impossible to chase down.

Without tearing it down completely and measuring, it's hard to tell what could be wrong, if anything. With a manual gearbox, the iron powder rods, and the torsional harmonics these things generate, it is likely due to lugging the engine down into the harmonics range too often and hammering the crap out of it. The one-piece bearing will probably stop the issues with that, all else being good.

I'm not sure there is a full circle bearing available, but that would help overall efficacy. It is not unusual to have the problem once, but multiple times in 500,000 miles is a bit strange.
cerberusiam

ELECTRIC SEAT MOTORS

I talked to a dealer regarding an estimate to repair a motor on my electric seat base that has stripped a gear, and they said they did not have service parts and would have to replace the entire seat base for $1200 plus labor. Can anyone recommend alternatives?
B.G. Smith

Are you familiar with the parts that Geno's sells for that repair?
jgillott

My brother-in-law replaced the gears (the motors were good) in my former '03 2500, and it was easy and very inexpensive.
Wiredawg

The Geno's parts work well, but it takes a lot of time to remove the seats...I had to redo the rear lifter.
CharlesHoward

I just replaced the seat cushion, and the rear lift blew as I was undoing everything. It does look like a big job with the entire frame looking like it needs to come out, rivets drilled, etc. I'll dive into it if another motor goes bad. I'm also considering the National brand, air-ride suspension seat like MWilson and Ozy did.
Wayne M.

It is kind of a big job, but totally doable. I think I replaced a motor and gear for the rear up/down and just a gear for the front up/down.
Patrick Marshall

I have a Good Sam extended warranty, so I called them to see if the seat motor was covered. They said it is, take it to the repair shop and have them call us with an estimate. I took it in today, estimate still $1200 plus labor, Good Sam was notified and they denied the claim saying the stripped gear is not part of the electric component. Afraid I can't recommend Good Sam too highly after this. I've had them since the 100,000 warranty ran out.

So I bought the replacement front and rear motors from Geno's. (My rear motor is the problem, but thought while I'm in there…) I replaced the rear motor assembly yesterday but backed out on replacing the front motor. I found it a very difficult procedure to accomplish without damaging something. The knurled pin is difficult to see to get out, and the pin that holds the motor is near impossible because it is between obstructions. By the way, mine was a rolled pin rather than a split pin and I guess I deformed it on removal as it was way too tight going back. I did things doing this job that if I saw another mechanic do, I would not let him work on my truck.
B.G. Smith

48RE SLIPPING SECOND GEAR

My '03, 3500 has 127,000 miles. It has towed a dozen or so times at 10,000 pounds and it's not been abused. The transmission was rebuilt at 60,000 with an upgraded torque converter, external filter, deep transmission pan with gauge and regular fluid changes. It slips in second gear under moderate or hard throttle, and a fluid change with Amsoil and adjusting front and rear bands made no difference. Could this be a governor pressure solenoid or sensor, or something else?
sheffield442

Are you sure it is slipping in only second? In manual/second can you feel it slip if you give it too much throttle? If the front band adjustment feel is off, you might have broken the band anchor on the band itself.
cerberusiam

I tried it in manual/second yesterday, and it slips, but only in second. I think I will take a look at the band and have the parts ready to replace it if needed (with a heavy-duty kick-down band strut).
sheffield442

If that is the only gear in which it slips, then it is a good bet something has gone wrong with the band. I have had good luck with the Red-Eagle slip-in bands. They seem to be heavier and better built than even some of the new HD flex bands. A regular band you cannot replace in the truck, you have to drop the transmission and disassemble.
cerberusiam

Where do you buy the Red-Eagle bands?
Eisbury

www.ctpowertrain.com
cerberusiam

ZERO OIL PRESSURE AT START

Just after I started my truck this morning, it began dinging with the check gauges message and my oil pressure read 0. I switched it off and restarted it, and again oil goes up to normal then down to 0. The oil level is full. I took the filler cap off and have plenty of oil circulating in the valve area. I drove it around and it seems to be working fine now, so I'm wondering if this is a common problem, or is it just a glitch in gauge or sender, or what?
mfurrh55

I'm betting it's a pressure switch.
Bob4x4

The ECM has a delay built into the fake gauge for the startup pressure delay, which is why it goes to normal then 0. As mentioned, the switch has likely failed. I would check the connection on the switch and, if that's good, replace the switch.
AH64ID

FRONT PINION SEAL REPLACEMENT

I need to replace the pinion seal on my '05's front axle. Once you take the U-joint carrier loose and pull it to access the seal, do you have to check the backlash or pinion depth, etc., or just remove, replace and re-torque the pinion nut? I've heard and seen mixed instructions and would like to hear from someone who has done this job.
odp

If you are adventurous, just make a mark on the nut and pinion shaft, and after you change the seal, just torque it down to the marker and a tiny tad more. I've done it more than once that way on Jeeps and never had a failure from it.
Ozymandias

When I did mine, I used a dial caliper and measured the distance from the nut to the end of the pinion. I tightened the nut back to the same dimension after replacing the seal.
GT Dodger

There is a procedure in the factory service manual (FSM) detailing how to replace the seal, no new crush sleeve required, and there are alternative procedures that can be used if you have the experience to pull it off. The average DIY guy can end up doing more damage by attempting a seal replacement then just keeping an eye on the fluid level until it becomes more than a slight seepage.
Bob4x4

On my 2004, I followed the instructions on mine and had no problems. They were good instructions similar to the FSM: http://www.carbonitecummins.com/Documents/Front Pinion Seal.pdf
NonFord

AIR BOX GAP

Yesterday I changed my water pump and removed the stock air box, per the suggestion of the Motor City Mechanic in the Geno's water pump video. I didn't pay attention when removing it, but when I reinstalled it I noticed that the opening on the lower half of the box has about an inch of separation between it and the opening behind the headlight. The pins on the bottom of the air box are in the grommets, and the front fits easily over the threaded rod that holds the lower part of the box.

Has something deformed on the air box to cause the gap, or was there something like a flexible tube that connects the air intake behind the headlight with the lower part of the air box? I don't think it adversely affects the operation of the air box, but it definitely doesn't seem like the way it was designed.
Crunch

There is a foam gap filler from the factory that comes apart with age. So, no worries.
Bob4x4

RUBBER BUMPER WEDGE

Does anyone know the part number for the wedge-shaped rubber bumpers that are located on either side of the radiator near the lower headlight mount? I almost doubt that they are available, as I have not been able to track them down. All they do is damp the forward/backward movement of the grille, but they have both rotted and fallen out. The parts guy at the dealer didn't know what I was talking about. I'd try a junkyard, but anything there would probably be similarly degraded.
Crunch

I ordered this 55077387AA Overslam Bumper.
https://www.factorychryslerparts.com/products/BUMPER-Grille/4535843/55077387AA.html
jghflys

Bingo! That's the part, and the prices in the link you provided are about half of what Amazon charges. I don't think Amazon is selling both of them as a set.
Crunch

It is the same part number as the Mopar. It is in StarParts: "Group 13-235 Frame and Bumpers, item 17." $16.10 retail. Remember, any item number with a dash is not pictured. Sometimes that can be really annoying!
sag2

CLUSTER FIX

When I start my truck ('84 2500) there is no display for the grid heaters on the cluster. The gauges work and light up. The turn signals work, but they don't flash on the cluster, and none of the warning icons come on. I just pulled the cluster and looked at the solder, but I have no idea what I'm looking at.

Several days later, I discovered the problem. On the back of the cluster is a black square labeled Q5. The solder broke there and just needed to be re-soldered. Now it is back to new.
CPesce

MISSING STEERING RESERVOIR CAP

The power steering reservoir cap keeps falling off or blowing off on my '06, 3500. I have lost five in the last three years. I double-check them to make sure they are on tight. I installed a Borgeson steering box and steering shaft from Geno's about the time this started happening. I've verified all the air is out of the system and have more than 37,000 miles since the installation. Is there a chance that the Borgeson builds up too much pressure, or does anyone else have this problem?
Ghosterbear

I had a problem with power steering pressure causing my brakes to come on. It was due to the PS cap not venting correctly. I even tried the updated factory cap—there was a TSB on, but that didn't help in my case. I had to drill out the vent hole a little bit and that fixed it. There are threads here about the cap blowing off and brake lights staying on.
bigceltic

The factory PS caps have a vent that is perhaps too small and/or easily blocked. The solution is to find the factory vent hole underneath the cap gasket and enlarge it or simply make your own hole underneath the cap gasket on the other side, but in a way that allows the pressure to escape.
seafish

I lost one on my '09 4500, so on the replacement I drilled it, installed aircraft safety wire through the cap, and wired it to the power steering fluid neck. It never came off again and I never dropped the cap when checking the fluid level.
Wiredawg

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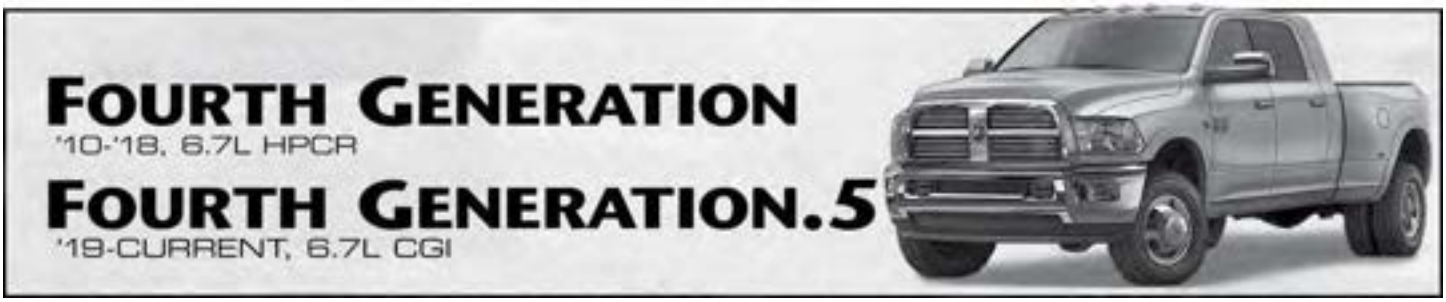

Coverage of 2010-2019 Model Trucks.
Website Correspondence Edited by G.R. Whale.

6.7 HPCR '10-'18 Trucks

UPDATING EVIC FOR LARGER TANK

I find 32 gallons of fuel to be inadequate. I have located a 50-plus gallon replacement tank, but I know the "distance to empty" and other EVIC displays will be incorrect. Can the EVIC be updated to reflect the proper readings for the new larger tank?
waltk

To my knowledge, not yet. Member AH64ID is trying hard to make it happen with the AlfaOBD.

AlfaOBD is way more than a scanner, it is almost as capable as wiTECH. You can do full diagnostics, enable and disable features, program TPMS and way more with it. Check the forum; we have threads running about it.
Ozymandias

I also find 32 gallons to be inadequate and annoying, and am overly surprised at how much of a difference three gallons makes. What really made my mind up was the HUGE mpg hit I took at elk camp this year. My 2005 would get 8-9mpg on the slow dirt roads at elk camp, and the 2018 was getting 5-6. When you're in the woods for ten days that is a LOT of extra fuel to carry. I'll be putting a 55-gallon tank in this spring.

I have played with AlfaOBD and been able to change the tank capacity but it didn't have any effect on "driving to empty" (DTE). What it did affect was the fuel gauge, so I am guessing that at some quantity the Body Computer assumes two tanks and is looking for the second tank sender. I need to play with it more to see what that volume is.

My truck's DTE has always been inaccurate and optimistic, especially when I go from town to towing, to dirt road, back to towing, so I am not sure why I want it to work. I did take DTE off of my dash as a constant gauge, and really don't care that I can't see it anymore. It's not that hard to go off a fuel gauge and average mpg.
AH64ID

NEED HELP WITH HEATING

On my '13 Turbo Diesel the EVIC shows coolant temperature of 188° to 192° when warm. With the heat on full and dash vents selected, when I turn the fan on high, I get a burst of hot air from the vents, but after about ten seconds the air goes lukewarm at best. If I turn the fan back off and wait about 30 seconds, it does the same cycle again. I would greatly appreciate any advice. My truck has 96k miles.
TMyers

Do you get full/steady heat from the floor ducts and windshield defroster? If so, start by checking blend door operation. If you get the same spotty performance from the floor and defroster, I would probably start with the heater core.
KCJackson1

I did a heater core flush in both directions, several times. After flushing, I poured distilled water into the hose until it filled the heater core, then blew it out. I did this three or four times to rid the core of regular water.

I've owned the truck a little over two years. It's never heated well until yesterday. I wish that I had tried to catch what was flushed out of it. I don't know if it was sludge or solids. If I got all of the sediment out, the heater core doesn't have very much volume and it wouldn't take much to restrict it. Just eyeballing my distilled water jug, it didn't take a quart to fill the lines and the core.

I literally have to turn my heat down now!
TMyers

MANUAL REGEN FOR SMOG TEST

I took my Smarty off for a smog check and cleared the only code there, which was "disconnect PCM." I have a nice Bluetooth device, BlueDriver, to check codes and do things the Smarty can't. I ran smog check readiness scan for smog testing and everything is ready except the regen stuff. I've been driving multiple times and up to 30 miles and still have that issue. I think if I try to smog it will give an error. Can you manually regen to get sensors all cleared?
brillmtb

With some code readers like AlfaOBD you can do a stationary de-soot. Otherwise, it might take up to 24 hours of engine run time to induce a regen.
AH64ID

FACTORY FLARES

Are there any “minimalist” fender flares on the market for a ’18, 2500? My truck is all stock except for Goodyear Duratracs in the standard size, and they tend to pick up the perfectly sized gravel in my driveway, chipping the paint at the edge of the 90-degree bend where the body panels turn into the wheel well. I understand the huge aftermarket flares are for bigger tires, and they look nice with them. But, I like my rig the way it is. Thanks in advance for any info.
nukegm

These come on the off road package: https://www.oemmopar.parts/oem-parts/mopar-molding-wheel-lip-82212208ac
Here is what they look like on the truck.

Moon22

These look just like my Bushwacker flares on my ’08. Same fit and style plus they can be paint matched to your vehicle’s color if you so choose. Here is a link: https://www.bushwacker.com/bushwacker-50917-02-oe-style-fender-flares-front-and-rear
Jim W

EARLY FAN CLUTCH DEFECT

Today I made a stop for about an hour and when I started the truck (a 2019 with 1700 miles), the fan was on and it would not kick off. It rarely comes on in Oregon during the winter, and it went off eventually. Normal coolant temperature of 180°-190° was shown and switching AC/defrost on and off had no effect. I stopped by the dealership where I bought and made an appointment a week out. Any ideas?
Rams over Fords

Any way you can reach the fan clutch plug? (I think is on the driver side half way down the fan shroud.) That’s if it’s still in the same spot as mine. Maybe you can unplug it and see if it still turns on.
Randomrunner12

I was able to unplug it and the fan still ran. In the PDC the only thing I saw that was close was “Relay K02 Rad Fan HI Spd*” but that relay location was empty (there is a note that says *IF EQUIPPED).
Rams over Fords

Sounds like a mechanical failure of the clutch mechanism?
DonFitzwater, AH64ID

Well, it took two days but the dealer finally decided it was the fan clutch and replaced it. The problem is solved. I think it may have been on its way out for a while because the truck is so quiet now, I don’t even notice it. Also, now I can spin the fan by hand, while before I couldn’t.
Rams over Fords

NO POWER

I just bought a 2010, 3500 and on the way home it was fine, but yesterday when I got on the freeway the truck did not respond, even if I floored it. The rpm was 1500, but no power. I got codes P0191, P226B and multiple P0087. Any advice is welcome.
Freddy B.

Most of the codes are related to the rail pressure sensor and the 226B code is turbo issues. Did you buy it from a dealer or private individual? Did you do an aggressive test drive before pulling the trigger?
p-Bar

Start with a clean fuel filter.
EDankievitch, HPSimpson

Private party sale. I did a normal test before buying it and everything was good. Last Friday I drove the truck for two hours, half city and half highway, back home with no problem. The next day the problem began on the freeway. A few days ago I took off the fuel pressure relief valve and the seal appeared to be out of position, so I put it back and it’s not exhibited any problems for two days.
Freddy B.

MONITOR, PROGRAMMER, WARRANTY WORK

I took my truck in a while back with 98k miles on it for an oil leak. It was not a pleasant experience. I was unhappy and second guessing myself about the true cause of the oil drip. However, I could not spend any more time dealing with it.

Fast-forward a few weeks and the leak was definitely worse. I returned and talked to the service manager (truck now has 106K on it, well past the warranty mileage). To my surprise there was no wishy-washy double talk over warranty at all. He pulled up the previous invoice, asked me some questions, and said he had a fair amount of leeway at least at the moment and when would I like to bring it in.

They diagnosed two oil leaks—one from the front crank seal and another one from the rear timing cover.

While this particular place has never been great to me over the last 25 years (just your typical run-of-the-mill corporate owned dealership) they did step up. Since we hear so many bad things about them (dealers and service in particular in general) I felt it appropriate to write a positive thread about at least one time.
BarryG

It is always good to get reports like this. I have used three different dealers in our area (100-mile radius) only because of my travels. Some are good, some bad...they have been good at recalls, just okay on service (I do my own oil changes the same way), but they always seem to forget to lube the one U-joint on the transfer case. Knock on wood nothing that has required warranty work. Yet!
Larry Sciblo

Last year I was developing a crank seal leak. I also had a leak between the transfer case and transmission that was very small, but there since it was nearly new. I had several recalls and the seals done. The mechanic—18 years experience and their Diesel expert—was awesome. He said he would replace both transmission and transfer seals since it will be apart. My dealer was Crystal Chrysler in Cathedral City, California.
Cummins12V98

If the problem was reported prior to warranty expiration, it is supposed to be covered even if the actual repair is outside the warranty period. You had history there so good to see they did what they were supposed to do.
lpennock

Well, hopefully I didn't jump the gun on posting this morning. I got a call earlier today from the service manager. He said Chrysler is pushing back on it since it had a programmer on it. He is fighting like heck for me though, according to him. I hope so since it has never, ever, had a programmer on it. It does have an Edge CTS2 monitor, but as you know that is not a programmer.
BarryG

They could have mistaken the CTS2 for a programmer.
lpennock

I stopped by and talked to the service manager. He said he got Chrysler to approve the work. When they do warranty work past the warranty period, they have to get approval. Part of that is sending a picture of the cluster, and my CTS2 showed in the picture, so Chrysler denied thinking it was a programmer. Chrysler required a copy of my truck computer file to verify no programmer. Apparently they were satisfied as he told me they are covering it and my truck was in fact in a bay being worked on. So again, kudos to them for stepping up and doing the right thing, and a caution if you've got a monitor, make sure the dealer knows that it is not a programmer.
BarryG

CABIN AIR FILTER

I see the 20,000-mile recommended maintenance schedule says I should change my cabin air filter. How do I know if my model has one?
Slaw32

Empty and open your lower glove box. You will see the tabs on each side holding it in. Pull in slightly on them so the door and box will come out. Look up under the dash where the door was. You will see where the filter goes (or could go). If you don't have one, you can order a kit to add it.
TMyers

Whether or not your Fourth Generation came with a cabin air filter depends on year and trim level. –Ed.

Okay, I found the filter door, but how do I open it so I don't break it in the process?
Slaw32

Maybe this image will help you see what you need in order to release it.

grbrockman

Thanks. A simple flick of a screwdriver worked for me. I found a lot of crud in the bottom of the pleats, so glad it's done. I appreciate the help!
Slaw32

TAILGATE RUST PREVENTATIVE

Living in the rust belt I'm always inspecting out-of-the-way areas on my truck to watch for corrosion. This morning while my tailgate was down I happened to look at the very bottom of the gate, the pinch joint area on the inside you can only see with the gate down. Something looked amiss, swollen almost, so I started poking around. Low and behold, a solid 12 inches of the coating had separated from the pinch joint and allowed moisture to creep in behind it. Fortunately, all but one spot still had the primer coat but once that seal is broken and the sheet metal starts oxidizing, things go downhill quickly. It appears they use some type of sealant in an effort to keep any contamination out, since there is lots of moisture and dirt in this location.

Good idea, but in my case poor execution. Notice the brown stain—where the corrosion had started

JR

Great find. Out I go to check my tailgate. Thanks.
HPSimpson

I removed my tailgate a few years ago and drenched the inside seam area with Eastwood's internal frame sealant and I did the same with the rocker panels.
DavidC

I do annual undercoating, but nothing would have prevented this. The sealant was attached just well enough to make the appearance of being intact, but allowed moisture in behind it. I ended up chiseling all of it off across the bottom and used a two-part marine grade epoxy paint.
JR

BIG WHEELS

Is anyone here running 24x12 wheels with 37-inch tires with a 6.5-inch suspension lift?
Braton Maturin

I know many people who did and quickly got rid of them. While it's possible to do, your truck will handle and ride like crap. I'm not trying to be rude, just a fact with the offset and low sidewalls that the combination would require. Also, you will be replacing unit bearings, ball joints and tie rods with every oil change.
AEdelheit

AIR SUSPENSION MESSAGE IN COLD

I have a '17, 2500 with air suspension that has about 20,000 miles on it. Temperatures for the last four days ranged between 15°-25°. Yesterday I turned the key to start without preheating. The crank was strong and the vehicle started quickly. A "service air suspension system" message immediately appeared, while the voltage window showed 8V in red and then began bouncing around between 11V to 14V. I turned the vehicle off.

The next day the truck started right up without an issue. I checked, there were no codes thrown, and drove for 40 minutes/25 miles without incident. I suspect that all the messages were fictitious but, I am just looking for any thoughts. I am confused as to the relationship between the air suspension system and the battery/voltage.
ram17

The voltage fluctuation was the grid heater cycling—normal in cold temperatures. You may have a battery going bad, which caused the air suspension warning. Had you waited for the truck to warm up and then restarted, you would probably have been fine.
lpennock

I'm betting your batteries are starting to fail. My truck would give all kinds of strange messages every time the temperatures were below 20° for more than two years before they failed last year.
EDankievitch

Whenever temperatures are below 20° and my truck ('18 at 133K miles) is off for a good ten hours, I get the "service air system" too, but once running it turns off almost immediately.
APay18

SLIDING REAR WINDOW INSTALL

I have a 2018, 2500 and I'm considering installing a sliding rear window. But, I've heard it's an awful pain. I have a lumber rack on the truck and I occasionally carry 18-20 foot stuff. I'd prefer to put it through the window and rest in on the tailgate. Any input on installers is appreciated.
nukegm

I would contact a local window tint shop and see if they have a deal with any windshield companies. You might get lucky and get a deal with them.
Randomrunner12

Call your insurance agent. I know they always seem to be able to find some company to do the work. I blew out the rear window on my old 2001 Chevy and the insurance company called a contractor and they showed up that same day.
Jim W

I had to have the slider on my 2003 replaced because of broken glass. Safelite did the installation, but the guys working on it had a few expletives to describe the guy who designed the removal and installation process.
FOXY005

REMOTE START...FOR TEN SECONDS

A friend has a '12 Turbo Diesel and when he uses remote start the engine runs for about ten seconds and then shuts down. He immediately goes out and inserts the key, and it fires up and stays running with no problem. Any ideas on the cause of the shut down with remote start?
jacknife

Not enough fuel in the tank is one reason for it. Doesn't the EVIC tell him why the remote start was aborted? Mine does. Otherwise there are a bazillion inputs to the ECM that all can switch off the RS.
Ozymandias

With WiTECH the dealer can pull the inhibits for the remote start. It will list the reason for the last eight times it didn't complete the start.
sag2

HIGH ALTITUDE A/C

My truck has lived at sea level since new for the last two years. Recently, I took it up to high altitude in Sequoia National Park, and while driving through the pass running my defroster (which cycles A/C) I heard what I can describe as a split-second crunching sound and hesitation coming from the passenger side twice intermittently. I was wondering if due to elevation change and cold temperatures the pressure in my A/C compressor was affected in some way?
cumminbighorn06

Likely what you are hearing is the compressor slugging the liquid R134a that condensed in the coldest and lowest parts of the system. The compressor is located low on the engine to improve oil return with R134a (versus high mounted on the engine R12 designs that had better oil return with the R12 vapor.) So the low point of the system is the compressor and it gets cooled by airflow generally when the engine is off and sitting. (High-mount R12 compressors were in the "hot" upper area of the engine and not the coldest part of the AC system.) This causes liquid R134A to condense in the cylinders and suction side of the cold compressor. Then the liquid will "slug" the compressor with the "thump" you hear when it kicks on. You can't compress a liquid so the compressor nearly suddenly stops for a moment with a big thump as it pushes the liquid out.

GM had this low-on-engine compressor design breaking compressor belts, ripping the tensioner off the engine, and blowing compressors in half. GM redesigned the belt drive to an elastic belt with no tensioner in later model years.
tuesdak

24-HOUR SOFTWARE UPDATE

For the last few days, I have been getting a message about a software update for the Uconnect system which "needs to be scheduled to install within 24 hours." If I click on "schedule update," punch in the time I want, nothing happens and I get the same message each time I start the truck. I tried it three times. It says to have the truck in Park with ignition off at the scheduled time. The kicker is this radio assembly is a replacement of the original, which failed less than six months ago. It seems strange it would need an update already. And by the way, you don't get a NEW radio, it's a refurbished unit and very expensive repair, so I'm glad I had the MaxCare warranty. Anyone know a workaround for this scheduled 24 hours thing?
endoscott

If it will not schedule, pull the radio fuse for a few seconds and try again. The inline fuse is near the master cylinder or over by the coolant bottle. It is NOT in the fuse box. It might take two ignition cycles to restore the radio configuration after disconnecting the fuse.
sag2

Go over to ramforum and download the 18.45.01 update and install it manually. Or check the Uconnect site with your VIN to see if you can download it from there. You'll need a 32-gig USB drive formatted to FAT32. It takes about 20 minutes for the update.
SBettencourt

So I checked my system info and found software version 18.43.01. I'm not sure how it differs from 18.45.01, but there was a post on ramforum by a tech who said if you are getting the update "infinite loop" you should pull the fuse for at least 20 minutes. So I did and after a couple ignition cycles it's all working again. Guess my refurbished radio is okay.
endoscott

TPMS RESET WITHOUT DEALER VISIT

Today I was able to reset my TPMS minus a trip to the dealer for the elusive PIN. I purchased an OBDLink MX+ for $80. (This software tool was discussed in Issue 107, pages 90-91, by writer Scott Dalgleish.)

The OBDLink was the most expensive component but I have also used it to get CEL codes and reset the CEL on other vehicles so it is well worth it to me. The second piece was AlfaODB for $49 on my Android phone. In the drop-down menus, it says it is only applicable for vehicles through 2017 but it connected and worked on my 2018. Third was an AEV Security Module Bypass cable for $25, and last was the Chrysler PIN puller app on my phone. For $14 this app will display the Radio Frequency Hub PIN that is required to finalize the TPMS reset. After the dealer gave me the runaround about the PIN, I decided that $14 was easy.

I now have my 2500 set to 55psi front and 50psi rear with no TPMS light or ding every time I start my truck.
J VanSteenwyk

That's strange, my dealer gave me my PIN, no problem...he just asked why I wanted it.
kthaxton

I had called the only Ram dealer in my area and was told that whatever computer program they use was down and they couldn't give me the code. However, this morning the dealer called me and gave it to me over the phone. I am just impatient when it comes to accessing information that I am paying for already.
J VanSteenwyk

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reman

Blowin' In The Wind

BITW is a forum to report on industry trends and vehicle development. Compiled/written by Robert Patton.

NEW VEHICLE SALES STUCK AT 17 MILLION (IS THERE A NEW VEHICLE IN YOUR GARAGE?)

To close-out year 2019 the folks at Automotive News did a recap of vehicle sales for the past five years. Here are the numbers:

2015	17,482,841
2016	17,553,429
2017	17,238,915
2018	17,318,961
2019	17,108,156

Okay, 17 million is the number. However, somewhere along this sales path the numbers tend to lose perspective: 17 million as compared to what?

Let's try 17 million as compared to the US population. The Google search tells me the 2020 US Census projects 340 million people and about 35 million of those are under the driving age of 16. To make the math easier, let's toss out another 5 million as too old or not interested in driving. That gives us about 300 million "drivers." So here is the math, 17 ÷ 300 = 5.66% Rounded up, 1 in every 18 people gets a new vehicle each year. Were you the lucky one?

Interesting.

Rounded up, 1 in every 18 people gets a new vehicle each year. Were you the lucky one?

But wait, how about used car sales?

I am in a fortunate position. When purchasing a vehicle as a cash sale (new or used), the dealership(s) where I have purchased often say, "What, you're not going to finance the purchase?" Undoubtedly, there is money to be made in the "Finance and Insurance" department of a car dealer. In several instances, I have financed the vehicle only to pay it off in the following two to six months, just enough to let the dealer/system/rebates play-out. The big picture—the dealer is not the enemy. Profit keeps him alive to service the brand. Mini-rant over.

So, we've established that money is made in the F&I department and a vehicle's transaction price could be a loss leader to the dealership's making money in F&I. Now, the importance of *used* vehicle sales really starts to come into focus. Here is an eye-opener from Automotive News:

> "If you're looking at the Penskes, the Auto-Nations, the Sonics of the world, you're talking about a market that is 40 million used cars sold every year in the US.
>
> "This spells opportunity. CarMax, the biggest used-vehicle retailer, has roughly a 2 percent share of the market. CarMax retailed 721,512 used vehicles in 2018. Carvana, which retailed 94,108 vehicles in 2018, has set a goal of 2 million in vehicles sales, or about 5 percent of the market."

Wait, did you notice that number? Forty million. That's *big*. Let's do some more math to make a point: 40 million used + 17 million new = 57 million vehicles. Now, 57 ÷ 300 = 19%. Rounded up, 1 in every 5 people get a new-to-them vehicle every year. Were you a lucky one this past year?

Wow!

But wait, there is more: How about private party-to-private party vehicle sales? Sorry, I've not run across a way to track those numbers. What would your guess be, another 10 million? Regardless. 1 in every 5 is a substantial number. Look around, did you or one of your four friends get something new-to-them this past year?

Again, interesting data.

HOW ABOUT RAM

The January 13 edition of Automotive News brought good news for the Ram faithful: Ram surpassed Chevrolet for the number two position in truck sales in 2019.

Yes, this is big news. Ram trucks were up by 18% for the year. Here are the numbers from AN:

Big sales of big pickups
Ram beat the Chevy Silverado for the first time, and full-size pickup sales rose to a record."

	2019 Sales	Change
Ford F series	896,526	-1.4%
Ram pickup	633,694	+18%
Chevrolet Silverado	575,600	-1.7%
GMC Sierra	232,323	+5.8%
Toyota Tundra	111,673	-5.6%
Nissan Titan	31,514	-38%
Total full-size pickups	**2,481,330**	**+2.5%**

Fantastic, again Ram sales were up 18% from 537,028 to 633,694 units. In a year where the overall market was down a tick (17,318,961 in 2018 versus 17,108,156 in 2019), one might think that Ram's 18% increase would equate to a larger market share. Not so fast—only really big (or little) changes make a dent in the market share numbers. Here is the data from AN.

Market-share movers
5 brands saw their market share change by more than a quarter point in 2019.

	2019 Share	Change
Ram	4.1%	+0.7
Tesla	1.3%	+0.3
Chevrolet	11.5%	-0.3
Ford	13.4%	-0.3
Nissan	7.2%	-0.6

Trucks (and SUVs/Crossovers that are classified as trucks) continued to grow as a percentage of vehicles sold. And, with an American population that is aging, the easier access and egress for passengers is a reason to consider these "trucks." Here are the data from AN:

Keep on truckin'
US light-truck sales set a record for a fifth consecutive year.

	Light Trucks	% of MKT
2019	12,317,310	72%
2018	11,976,738	69%
2017	11,115,865	64%
2016	10,657,658	61%
2015	9,916,173	57%

FIGURES DON'T LIE

In mid-January, we posted the big "18% news" number at the TDR's website. TDR members were quick to point out that, yes, we were ahead of Chevrolet, but the GMC truck is essentially the same thing as a Chevy.

So, as a follow-up, how did Ram's 18% increase fare against General Motors' total pickup truck sales, 2019 and 2018?

Let's do some backward math to arrive at the 2018 numbers:

	2019	2018
Ram	633,694	537,028
Chevy	575,600	585,542
GMC	232,323	219,586
Total GM	807,923	805,128

When you compare the *total GM*, their 2019 number was slightly up, (575,600 + 232,323) 807,923 versus the calculation for 2018 of 805,128. So good for GM. However, you cannot overlook Ram's 18% increase.

"PREMIUM" DIESEL FUEL

After last issue's discussion about gasoline (octane, performance and "Top Tier" detergents, pages 60-61), I sent an email to the folks at Top Tier asking about a certification/specification for diesel fuel. The short answer: ASTM specification D975-19.

The long answer: In a follow-up phone conversation I learned that getting the ASTM; the engine manufacturers; consumers/big truck fleets; the Truck Maintenance Council; the fuel suppliers and the retail fuel vendors into a room to hammer-out a better specification (read: premium or Top Tier designation) has proven next to impossible.

I'll let you know if here are further updates. For now your best answer about a premium/Top Tier diesel fuel is Doug Leno's summary from ten years ago which is found in our "10 Back" column on page 12.

The short answer:
ASTM specification D975-19.

DO YOU LIKE YOUR TRUCK? PROVE IT

Some interesting data about owner satisfaction based on length of vehicle ownership crossed my desk in mid-January. Here is some data from the folks at www.iseecars.com:

Top 15 Vehicles Owners Keep for 15 Years or Longer

Rank	Car	% 15+ Year Old Cars Kept by Original Owners	Compared to Average
1	Toyota Highlander	18.3%	2.4x
2	Toyota Sienna	15.5%	2.0x
3	Toyota Tacoma	14.5%	1.9x
4	Toyota Tundra	14.2%	1.8x
5	Subaru Forester	12.8%	1.7x
6	Toyota RAV4	12.7%	1.6x
7	Honda Pilot	12.6%	1.6x
8	Honda CR-V	12.4%	1.6x
9	Toyota Prius	11.9%	1.5x
10	Toyota 4Runner	11.8%	1.5x
11	Honda Odyssey	11.6%	1.5x
12	Toyota Corolla	11.4%	1.5x
13	Toyota Camry	11.0%	1.4x
14	Honda Civic	11.0%	1.4x
15	Toyota Land Cruiser	10.6%	1.4x

Okay, let's talk pickup trucks. Do you still own a 2004 or older Turbo Diesel? Here are the percentage of folks that have kept those vintage trucks. Again, from www.iseecars.com:

Ranking of Light-Duty Pickup Trucks Kept for 15 years or Longer

Rank	Car	% 15+ Year Old Cars Kept by Original Owners	Compared to Pickup Truck Average
1	Toyota Tacoma	14.5%	1.9x
2	Toyota Tundra	14.2%	1.9x
3	Chevrolet Colorado	10.3%	1.3x
4	Nissan Titan	9.5%	1.2x
5	Nissan Frontier	9.3%	1.2x
6	GMC Canyon	8.9%	1.2x
7	Chevrolet Silverado 1500	7.9%	1.0x
8	GMC Sierra 1500	7.9%	1x
9	Ram 1500	6.5%	0.9x
10	Ford Ranger	6.4%	0.8x
11	Ford F-150	5.9%	0.8x

LOCAL CAR DEALER ADVERTISEMENTS AND NEXT YEAR'S FORD F-150

In the town square of yesteryear we had the "town crier." Today's town crier: the local small-town car dealership guy and his advertisements on the local FM radio channel. "I've never seen so much cash-on-the-hood of these new F-I50's and I've got SUVs in the back lot and the delivery truck doesn't have a place to park. And GT350s, I've never seen them with a factory rebate, etc., etc."

Seriously, that was the verbiage. This is written after the big stock market dip of 2/21-3/12—it is not going to be a good year for auto sales.

So, in early March the editor predicts a bad year for auto sales. It is now mid-May, how is my forecast?

Regardless of the sales numbers thus far, year 2021 has the potential to be an exciting one for truck buyers. How so?

Aside from the Ram, Ford, GM competitive positioning, the Ford folks are in the midst of a F-I50 redesign and 2021 will bring a new truck. The following from Automotive News, 2/24, by Michael Martinez, tells us a little bit about the truck.

"The next-generation pickup, due out this year as a 2021 model, was spotted in light camouflage by spy photographers near the automaker's Dearborn, Mich., headquarters.

"The crew cab caught undergoing road testing features stacked headlights, horizontal fog lamps and a grille resembling that of the mid-size Ranger pickup. The new F-150 also appears to have a more-raised hood than the current model.

"The interior of the truck is expected to undergo a more radical overhaul with at least a 12-inch touch screen, following the success of a similar-size screen in Fiat Chrysler Automobiles recently redesigned Ram pickup."

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F-150 SPECULATION

"Okay, TDR audience, the AN's, Michael Martinez made reference to the new Ford F-150s lamps and grille resembling the Ranger pickup. I'm starting to see more of the newish Ford Ranger out on the road and I often have to do a double-take to make sure it isn't the new 1500 Ram.

The new Ford Ranger pickup. Looks like a Ram 1500 to me.

Do Ford and Ram share the same truck stylist? The front grille bears too much resemblance. Time will tell if the trucks really do look-alike.

INTERESTING NUMBERS

We've already noted that Ram sold more trucks than Chevrolet in 2019. So, it was interesting to catch a press blurb from Automotive News on 12/30/19 titled "By the Numbers." The folks at FCA were noted in three of the ten feature highlights. Here are those FCA numerical highlights.

"3: US sales ranking of the Chevrolet Silverado in 2019. It marks the first time Fiat Chrysler Automobiles' Ram pickup outsold the Silverado on an annual basis. Both trail Ford's F series, which is about to seal its 38th consecutive year as the nation's top-selling vehicle line.

"1,000: Pound-feet of torque generated by the latest-generation Ram Heavy Duty EcoDiesel, the first pickup to reach four figures. Ford then ratcheted up the torque war even more with a rating of 1,050 pound-feet for the 2020 Super Duty diesel.

"$40 million: Fine that FCA paid to the Securities and Exchange Commission for four years of inflated sales figures. The SEC, in an investigation that corroborated Automotive News reporting, found that FCA paid dealers to report false sales and keep a 'cookie jar' of unreported sales that were to be used whenever the company's growth streak would have ended."

THE EPA AND THE DIESEL BROTHERS

Elsewhere in this issue ("10 Back" page 12) there is discussion about performance modifications to a '03-'07 5.9 HPCR engine. TDR writer Dough Leno increased the horsepower from 305 to over 600. Yes, it required a different ECU program. I wonder if that program/chip/ECU/flash/whatever is still available in today's marketplace? I wonder because each year I go to the SEMA meeting where unapproved (read non-California Air Resource Board, CARB) products are, by default, not EPA compliant. And, each year I report to you industry happenings as seen through EPA enforcement.

So, what is the latest from the EPA and/or others in enforcement?

Here is the 3/12/20 headline from the folks at the website Jalopnik: "Discovery's Diesel Dorks Ordered to Pay $850,000 Fine for Rolling Lots of Coal." Here is the lead-in paragraph from Bradley Brownwell's article:

"The Diesel Brothers—a collective nickname for Discovery Channel's truck-obsessed super polluter television show, David 'Heavy D' Sparks, Joshua Stuart, Keaton Hoskins, and David 'Diesel Dave' Kiley—have been ordered by a Utah judge to pay over $850,000 in fines for violation of the Clean Air Act. In the process of building trucks for customers at various businesses owned by the men, it was uncovered that they were removing pollution control devices and installing devices to bypass emission controls."

But, wait, the fine didn't stop at 850K. Further in the article we learn, "Documents from the court show that none of the levied fines can be avoided or discharged by way of bankruptcy. The judge also ruled that the plaintiffs may submit their attorney fees, allegedly $1.2 million, to be paid by the defendant. The lawsuit was filed by Utah Physicians for a Healthy Environment in 2017. This group went to great lengths to prove that the so-called Diesel Brothers were building trucks with intentionally polluted far more than legally allowed. The defendants are banned from ever removing emissions equipment, or selling vehicles modified in this manner again. While it was already illegal, if they do commit such an illegal act again, they could be found in contempt of court, which could mean some actual jail time."

And, finally, in closing the article Brownell makes an observation about the folks that produced the television show: "It's interesting that the Discovery Channel, a network which once focused on science, technology, and history has devolved in a way to air shitty reality television and science ignorant programming like this. Shame, that."

Mr. Bradley Brownell, I concur.

A network which once focused on science, technology, and history has devolved in a way to air s....y reality television and science ignorant programming like this.

Ready to Travel

TDR Writer or Member Travel Adventures.

The movie "Ford versus Ferrari" opened in theaters on Friday November 15 and I was there. However, I'm not a movie kinda guy. The last time I attended, popcorn was $1 for the big-tub size. (That's a tall tale, I was at the the movies one month prior to see "The Art of Racing in the Rain.")

The "Ford versus Ferrari" movie and the Academy Award accolades (best film editing and best sound editing—it was also in the running for the big prize, best picture) created much interest in the 24 Hours of Le Mans race. All of a sudden my non-racing friends were asking me, "Have you ever been to Le Mans?" Sadly, I had to answer, "No," but Le Mans is on my list.

Fortunately, for me and others, our own Mark Barnes made the trip to France last summer. He files the following report for our "Ready to Travel" column.

24 HOURS IN LE MANS

by Mark Barnes

Few, if any, racing venues in the world can match the storied past of Le Mans. It consists of two slightly overlapping courses: Circuit Bugatti, a rather tight, undulating 2.76-mile track built in 1965, and Circuit de la Sarthe, a sprawling 8.47-mile loop (in its current configuration) incorporating both public and private roads south of the raceway, and host of the famous 24-hour automobile endurance race each June since 1923 (minus the WWII years). TDR readers may be interested to note there's also a truck version, although the vehicles involved are tractor rigs, not pickups.

The 24-Hour of LeMans racetrack.

For any motorsports enthusiast visiting Paris, the two-hour drive southwest to see this iconic facility is well worth the "trouble" of cruising the A10's pristine pavement through gorgeously rural French countryside. The trip is half as long by high-speed train, but then you won't have a vehicle for circulating the big course, much of which is routinely used by local traffic.

On site is the Le Mans 24-Hour Museum (lemans-musee24h.com; click "EN" in the upper right corner for English), featuring approximately 120 cars spanning 100+ years and illuminating a multitude of technological advances achieved in pursuit of not only speed (well over 200 mph on the big course), but also the ability to go the distance in terms of both time and miles (3,750+ miles for victors in the 24-hour automobile event). The old racing adage, "to finish first, one must first finish," couldn't be more cogent than it is here. A combined ticket, allowing perusal of all museum exhibits *and* access to the spectator areas of the closed-circuit track is a mere ten euros ($11 at the exchange rate during my visit). And most of the 24-hour race course can be driven for free, beginning just a quick jaunt from the museum parking lot.

The 24-Hour Museum is immediately adjacent to the racetrack, with the latter's entrance visible in the background here.

Two Wheels on Display

Although the museum's impressive collection of race cars dwarfs its selection of motorcycles on display, the bikes are immaculate examples of artisnal restoration (the museum's active workshop is clearly visible through a glass wall). A '29 A.J.S. M4 Deluxe Sporting, a '33 BMW R11, and a '64 Velocette Venom were particularly beautiful among the older models, while an assortment of Honda and Suzuki endurance racers represented recent decades, including the 1000cc Honda that won the first two years of 24-hour motorcycle competition at Circuit Bugatti in '78 and '79. Other bikes from obscure and extinct European marques offer a peek into two-wheeled history rarely, if ever, seen in stateside exhibits.

Except for the Norton closest to the camera, the rest of these endurance racers were from Honda and Suzuki. The 24-hour motorcycle events take place on the smaller closed-course Circuit Bugatti.

Race Cars on Display

As for the four-wheeled racers dominating the museum's interior, the variations in design are mind-boggling—not surprising for a century of mechanical (and, most recently, electronic and electric) evolution. Cars racing at Le Mans have always been at the cutting edge of engineering development, given the durability requirements of the 24-hour race and the huge rewards of top speed on the 3.7 mile long Mulsanne straight, where drivers would spend nearly half a lap (an entire minute!) at full throttle prior to the 1990 installation of two evenly spaced chicanes to reduce speeds and improve safety. Of course, modern race cars are capable of acceleration yielding speeds on the resulting segments comparable to those of older cars on the uninterrupted version.

A great deal of progress in tire technology, vehicular aerodynamics, and even driver restraints and headlights, along with many other elements, are attributable to team efforts to win—and keep their drivers alive—at Le Mans. The appearance of disk brakes on a Jaguar C-Type in 1953, for example, halved (!) the braking distance needed at the end of the Mulsanne straight. It's no wonder adoption of this design spread like wildfire immediately afterward. Other revolutionary innovations emerging at Le Mans include front-wheel-drive in 1927 (Citroen took note of this vehicle's 7th place finish and snatched up the design for its production cars); regenerative braking on a 1998 hybrid racer by Panoz; and halogen headlamps on a '62 Ferrari that doubled the distance drivers could see in the dark (a tremendous asset at 200 mph!). Audi later pioneered LED and laser headlights at this raceway.

Going back to 1969, in response to the rising death toll in top-tier racing, six-time Le Mans winner Jackie Ickx protested the signature "Le Mans start," which had drivers run across the track from the other side, jump in their cars, start their engines, and take off as quickly as possible—often forgoing the fastening of their safety belts in order to save a few seconds. Ickx strolled leisurely across the track at the start of the 1969 race, calling attention to the folly of this approach. There were yet more casualties during that race among the sub-group of drivers not wearing their safety belts. Starting the next year, drivers began the race in their cars with mandatory safety belt use; this also sent a message to the public about the practice.

Jackie Ickx's 1969 Ford GT40 winning race car.

Editor's note: Jackie Ickx and co-driver Jackie Oliver won the 1969 race after a last lap duel with a Porsche 908 with both cars suffering from mechanical problems. The margin of victory was just a few seconds. Can you say "good fortune."

Cars that have participated in the 24-hour race comprise the primary permanent exhibit, while other collections illustrate general automotive history and themes that change every few months. The most important car for an American visitor to see simply must be the aforementioned Ford GT40, the one rushed into existence by a furious Henry Ford II after his rejected attempt in 1963 to buy Ferrari and instantly acquire a line of sports cars capable of competing on the world stage. After DNFs (did not finish) in '64 and '65 for this fledgling race car built from scratch, Ford would ultimately enjoy sweet revenge in '66, soundly trouncing Ferrari with 1-2-3 finishes at the most prestigious and demanding race on the planet and ending the Italians' six-year winning streak. It was no fluke; Ford's GT won the next three years at Le Mans, too. The enormous amount of R&D Ford pumped into this project forced all manufacturers to do the same, greatly increasing the rate of technological progress across all brands, much of which has found its way into now-common feature sets on consumer automobiles and motorcycles.

How many cars can claim the legendary status of Ford's GT40? With incredible determination, the American manufacturer stalked and eventually dominated rival Ferrari with this machine. A 4.7L V8, 335hp, 210mph top speed, and unique quick-change brakes all made this possible.

At 240mph, a driver needs all the aerodynamics he can get. Porsche's "long tail" racers, like this 1971 917LH model, had 4.9L flat-twelve motors and extremely slick bodies that proved tricky to control. Porsche won at LeMans with the 917 in 1970 and 1971.

Aside from this particular gem from Ford, visitors are treated to a surprisingly intricate 1924 Bentley alongside the company's otherworldly 2003 Speed 8 LMP (Le Mans Prototype) racer, a sensuous blood-red Ferrari 166MM from '49, icons like the '71 long-tail flat-12 Porsche 917, and a plethora of production-car-based GT's from BMW, Peugeot, Renault, Citroen, GM and a slew of other European and Japanese manufacturers.

The Bently Speed 8 LMP was capable of 217mph in 2003, courtesy of its 3.6L twin-turbo V8. Newer cars pair internal combustion and electric motors for even more power, challenging F1 performance levels.

Especially noteworthy LMP cars on display include a 2013 Audi E-tron Quatro (a ground-breaking diesel-electric hybrid), and a Bugatti "Speed 8" the 2003 Le Mans winner.

With 490hp from its 3.7L V6 turbo-diesel in the rear, and another 203hp from its two front-wheel electric motors, the 2013 Audi E-Tron Quattro R18H maxed out at 203 mph.

Avenue of Heroes

In addition to showcasing the spectacular machinery that has graced Le Mans pavement, the museum gives considerable attention to the personalities involved. The "Avenue of Heroes" section contains photos, memorabilia, and text (including English translations) that bring to life characters like Ettore Bugatti, Enzo Ferrari, Ferry Porsche, Henry Ford II, Steve McQueen, Jackie Ickx, and many other drivers and team bosses. There's a huge, slightly bizarre room with literally thousands of miniature sports car replicas (think Hot Wheels) in Plexiglas cases covering its walls, and a giant, highly detailed model of the 24-hour course on a platform in the center, with smaller models showing the extensive changes in the grandstands and pits from era to era. Circuit de la Sarthe has been revised repeatedly over the past century, though its most recognizable features, like the Mulsanne Straight, have remained constants. The course itself is as fascinating as the cars and drivers responsible for the movement on it. Even the artwork that has publicized and memorialized racing there over the past century has been thoughtfully preserved. As you'd expect at Le Mans, the museum is among the very finest in motorsports.

The "Avenue of Heroes" features stories and memorabilia of many larger-than-life personalities that played upon the stage of Circuit de la Sarthe.

The Race Track

Just outside the museum's back door is where all that history took place. Circuit Bugatti shares its start/finish line, front straight and grandstands (capacity: 100,000), along with a handful of corners, with Circuit de la Sarthe. The smaller track has hosted the French motorcycle GP, as well as the 24-hour bike race, and I stumbled upon some two-wheeled action while there; a club just happened to be holding a track day event, with the expectable hodgepodge of bikes and widely varying rider skill levels. This added a bit of realism to my speculation about what it would be like to watch an actual race there. As is often the case at racetracks, the view from the densely packed seating along the front straight might afford exciting finish-line views, but allows almost no visibility of corners where the vast majority of racing drama typically plays out. The exception is the easily recognized Michelin Tower, which provides well-heeled spectators the comforts of an enclosed, climate-controlled space and a panoramic view of not only the finish line, but also much of the twisty section leading up to it. Since the pits are under the grandstands on the "cheap" side of the front straight, all the action there is only visible to those seated across the track (or in the Michelin tower). Race attendees who don't mind getting a little exercise would do well to save the money charged for grandstand seating and instead roam around the fairly compact track to enjoy multiple vantage points at its eight curves, each of which has its own distinct character.

Looking toward the entry of the front straight,s with pit garages visible beneath the grandstands on the other side; the better seats on the right put pit action in plain view.

"24H Camions" is what Le Mans calls its endurance race for trucks. Can you imagine the sound?! (photo courtesy of Le Mans Museum)

The iconic Dunlop Bridge sits atop the rise incorporating a set of esses immediately after the front straight exit. A motorcycle track day was underway on this afternoon.

While it was definitely cool to drive the public sections of Circuit de la Sarthe (How many people can say they've sped down the Mulsanne straight?!), several disappointing aspects should temper expectations. First, there's traffic. I'm embarrassed to admit that my anticipatory fantasies completely overlooked this limiting factor, leaving me quite frustrated with the pace allowed by local drivers on their way home from work. I certainly had no aspirations of breaking any speed records in my Jeep Renegade rental (definitely *not* the car I'd originally reserved), but I wound up in rush-hour congestion that kept everyone moving at a very sedate pace and dashed all hopes of a photo-op at any of the famous landmarks around the course. Some elements of the racing circuit were understandably inaccessible to public traffic, though they were still clearly visible. The two chicanes on the Mulsanne straight obviously serve no purpose for normal traffic, but there they were, readily apparent behind moveable barriers. Likewise, the current iteration of the final approach to the Mulsanne corner—infamous as one of the most severe tests of braking in all of racing, with drivers shedding speed from well over 200mph on the seemingly endless straight to about 40mph for this flat, narrow, acute-angle turn onto a crossroad. The turn now features a more complex intersection for public travel, with a (barricaded) diagonal chute to slightly reduce the angle of attack during races.

Only the first half of the return leg is accessible, allowing passage through the close-coupled left-right sequence of 90-degree corners named Indianapolis and Arnage, but not the subsequent set of flowing sweepers beginning with Porsche Curve and ultimately returning through the Ford Chicane to Circuit Bugatti's front straight. Similarly, the initial portion of the large course, as it meanders away from the closed circuit and traverses the famous Tertre Rouge hillside corner, is inaccessible to the public. There's some consolation, however, in that what remains drivable is most of the original course's final route back to the small track, prior to construction of the Porsche Curve section, which was designed to reduce speeds leading up to the especially treacherous Maison Blanche kink.

While racing's importance to Le Mans cannot be overstated, this ancient town (population ~150,000) is home to many other attractions, including Roman walls from the third century and stone monoliths thought to be evidence of organized habitation as long as 7,000 years ago. Rising up from the close quarters of the foot-traffic-only medieval streets and their multitude of tiny shops and eateries, the hulking mass of Saint Julian's Cathedral is undoubtedly the most impressive edifice. Romanesque portions erected in the 11th and 12th centuries blend with Gothic sections built over the following 300 years. Although these vastly different architectural styles might normally seem aesthetically incongruent, somehow they come together at Saint Julian's in a breathtaking display of artful design and structural engineering. Its stained glass rivals better-known cathedrals like Notre Dame and Chartres, and includes the oldest example of this medium. The atmosphere inside is truly awe-inspiring, and a visit would ideally allow several hours to savor all the elements, whether the viewer's interests are historical, religious or artistic. If a raceway visitor were to see just one other thing in Le Mans, this cathedral should be it.

St. Julian's Cathedral showcases an extraordinary combination of Romanesque and Gothic architecture, a product of its construction having spanned five centuries.

In addition to its even older heritage, Le Mans was an extraordinarily busy hub of activity during the Renaissance, and numerous buildings, museums, exhibitions, and seasonal festivities celebrate its multi-layered cultural wealth. One could easily spend a week or two there and still leave many stones unturned. Unfortunately, given the scant 24 hours allotted for my visit in the middle of a whirlwind tour of Paris and its surroundings, I couldn't even scratch the surface. But there will certainly be another attempt to do it justice, maybe in conjunction with attending the spectacle of a 24-hour race. If you're of like mind, be aware that local lodging can be booked years in advance for that event, with the associated carnival lasting over a week (there is camping on-site for the brave). Also note that, while it's common to find Le Mans residents fluent in English, knowing some basic French (or at least having a translation app on your phone) can be very helpful during occasional encounters with non-English-speakers.

A short list of movie dramas and documentaries about the fabled 24-Hour race at Le Mans (in no particular order):

- *This Time Tomorrow: 1966 Le Mans Documentary*
- *The 24-Hour War*
- *Le Mans* (1971 – with Steve McQueen)
- *Le Mans '66*, a.k.a. *Ford vs. Ferrari* (to be released by the time you read this)
- *Ford vs. Ferrari, the Story of the Ford GT40* on Speedvision's "Behind the Headlights"
- *1968 24 Hours of Le Mans* (mini-documentary)
- *Journey to Le Mans*, and its sequel, *The Return*
- *Le Mans: 100 Years of Passion*
- *Truth in 24* (I & II)

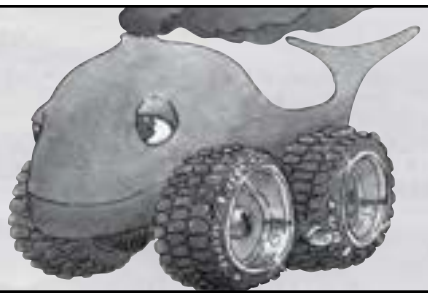
(Check YouTube and Amazon DVD listings for titles unavailable on your favorite streaming services)

Mark Barnes
TDR Writer

Editor's note: Thanks, Mark. I really enjoyed your historical write-up. As a bucket-list item, I will make it to LeMans. The 2020 race date was postponed until September 19-20.

Another car on display at the LeMans museum, the BMW M1. A highly tractable straight-six engine contributed to the 1981 BMW M1 ProCar's racing prowess, gracing it with 470hp and a top speed of 193mph.

Four Whaling



Journalist G.R. Whale talks about all things Diesel.

THE PLIGHT OF THE AUTOMOTIVE MAGAZINE

I'm frequently quizzed on why I use paper boarding passes for travel, to which I reply with another question: Have you ever tried to board an airplane with no boarding pass? Quizzical looks ensue, but once a dead battery or "smart" phone glitch leaves you pass-less at a gate, it doesn't happen again.

I like paper. It appeases more of my senses than a hard metal case or glass, I can use it more than once, secondarily for BBQ starter, garage mop-ups or window cleaning, and I can even write on it. I frequently find stuff on paper in my office faster than I can find it online…and my office is controlled chaos. If reading something on it, I can pass it around to strangers or acquaintances I don't want to hand my phone or email address to. Finally, with all the videos and pop-ups online, paper is usually a faster read as well.

So the holidays were a bummer. First up AutoWeek sent out their final print version referencing a sale to Hearst (the same people who think New York City is a good place for a car magazine and that Road & Track can be set up like any other car-shopping site to generate revenue) and there would be communication forthcoming for subscription holders. I'm still waiting.

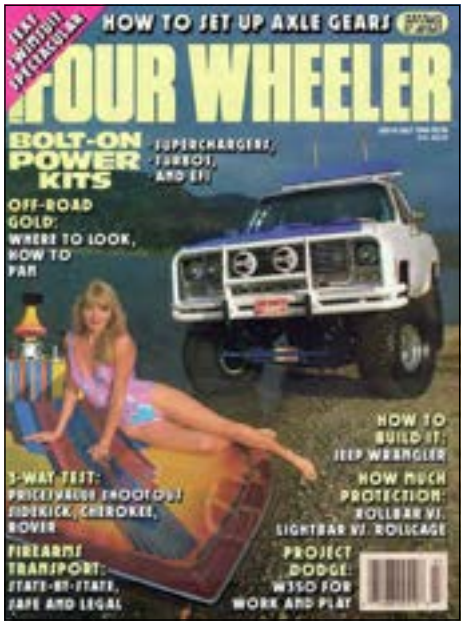
Second, the First and Pike newsstand in Seattle closed at the end of 2019 while I was there, ending a 40-year run, with me wishing I was still sober enough to zip down there and buy something.

And lastly, the entity known as TEN Publishing (The Enthusiast Network…for which the MotorTrend Group, a joint venture with Discovery Communications, provides editorial and sales support) and a few others over the years, performed yet another Fall bloodletting, killing the print version of most of their automotive magazines. That's 19 "car" titles no longer in print, sadly, including more than a few I worked for, including one I worked with over its entire history. Hell, when I joined the media circus, there were at least four "off road" titles all owned by different companies, eventually all absorbed by or beat-down by one, and just Four Wheeler (which turned 68 this February) is left.

Curiously I was in a multi-story bookstore on the same trip up north, after the Christmas shopping season, and it was a madhouse inside: Throngs everywhere, lines for the men's room, traffic jams on the stairways, all this while it was an unusually pleasant day outside and no sales underway. At least I'm not the only one fond of paper!

The official word from TEN/MTG was they're going to double-down on "our best-in-class digital experiences, while maintaining our support of the three most popular, profitable and strategic brands across digital and print—MotorTrend, Hot Rod and Four Wheeler." They said the online versions of the killed print titles will continue. The unofficial word, which comes from the people in the trenches actually making the magazines, not the same old executives who have terminated people and titles for decades, is no one really knows what's happening with online, who will still have a job, etc., but at least some of the names are still posting six weeks after the announcement.

I get that the 'net is superior in many respects (and it saves my beloved paper), not least of which is the abundance of photos and opinions. There are some forum entries (TDR and elsewhere) that would require a Sears Roebuck size-catalog to print, neither sensible nor cost-effective these days. But there are still times I want to just climb in the hammock (or a truck), where my phone doesn't work, and read a print magazine. I'm grateful to every member who keeps the TDR in print, even if the first thing they do is rip out my contributions to light the fireplace or line the bird cage.



The July, 1989, *Four Wheeler* cover, one of two "swimsuit issues" I'm aware of. It was a great seller on the newsstand because many subscribers reported their copy was tossed at home, so they had to go buy a replacement.

TRUCKING ALONG/EMISSIONS TESTING

It was just a snippet in a banner along the bottom of the screen at the airport lounge in Washington, but it announced the end of vehicle emissions testing in that state. Recently testing was performed only in a few specific areas, generally near population centers, and I believe the cost was $15. I think it's $11 next door in Idaho.

When I hear about that I think about moving. I've been in California since their emissions testing program began, and it had issues even before it got started. I have found standards (for regular, non-commercial passenger cars) tightened retroactively, and my first subject-to-test car was once "failed" because it didn't have a heat shield between the exhaust and the floor which would, supposedly, delay catalyst light-off. Since it was a California car originally, had all its stock pieces, and the "missing" heat shield was two feet *behind* the cat, the referee agreed it wasn't an issue. The "certificate" (a keystroke) to the state to verify you pass was $8, on top of the $40-75 you might have to pay for the test at an independent shop.

My three vehicles requiring testing all renew within a few months. First up was my latest acquisition, a 2006 Subaru with 84,000 miles, and it passed despite me being told the new (two weeks) battery and suspect-looking second cat—which looked "iffy" because the California inspector apparently hadn't seen what New Jersey salt does to pipes. Second up was a 2004 VW with 48,000 miles, and it was my fault it didn't pass the first time because I had disconnected the battery for a seat-heater fix (there's an airbag in the seat that had to come out) a week earlier and apparently hadn't had enough cold starts for one of the OBD readiness monitors to set. Actual vehicle emissions were well below standard, but that one monitor that watches things for the first minute it runs wasn't "ready," so it passed the next time I tried.

The last car, a 1996 Nissan with 98,000 miles, is apparently known as being temperamental, alongside Altimas and Camrys of that year, which the (trustworthy) smog technician attributes to the first year of OBDII (but California doesn't rely only on that, as both my 2004 and 1996 get dyno'd). It's enough of an issue that he says the CARB should put a waiver on the OBD port test…since the cars connect easily to any scanner or Nissan system you attach, just not CARB's approved equipment.

And sure enough, the connection put up a fight, but the car failed NO_x at one of the two road "speeds" tested. Since the dyno is meant to mimic an incline test weight is part of the process, and CARB's weight for the car is 3500 pounds, which is 11% higher than its actual weight with me in it. Those extra parts per million for the 3,000 miles it covers a year were a problem, though virtually none of them are done cruising at 15mph in second gear.

So the tech looked around, mentioned the cat doesn't look high quality (it was a 5-year/50,000-mile unit put on 7 years and 24,000 miles ago, before I got the car, but it has CARB's required certification), and since the high NO_x could readily be explained by the lean burn (the CO measures 0.00 to 0.01 %), he checked the EGR valve, plumbing and so on, and neither of us could find anything wrong. I did change an O_2 sensor a year ago using factory replacement parts and no MIL or problems since, no change in fuel economy, etc.

Thoroughly disgusted I kept driving normally and left it parked for vacation. After that I went for a second round, same methodology as before, with similar weather and a good run first to get those cats good and hot. This time the car passed, having gone 232 miles since the previous test failure, and despite no work done on the car (I didn't even wash it) and the same tank of fuel, NO_x was magically 75% cleaner at the lower-speed test it previously failed and 62% cleaner at speed. I'm no rocket scientist but I'd expect a change that big only happens if you change a piece of equipment, programming or the smog fairy visits it overnight.

Just another reason the California system doesn't work as well as it should or could, and should your state ever consider adopting it, fight it tooth and nail.

2020 AMELIA ISLAND CONCOURS

Porsche's first LeMans win was in 1970 with car #23. Since 1970, Porsche has won LeMans a total of 19 times.

Under the "hood" of Porsche #23.

Lucky For Me

Lucky for me my truck is too old for California testing. (I'll need something to drive when all the other stuff fails!) Rather than a few particulate matter emissions over at parking lot speeds, I'll be putting down PM down at 1993 levels, and simply based on twice the mass, generating more bad stuff than any of my "failing" cars. I'm sure my truck wouldn't pass because the "Check engine" light is on, and with no OBD plug it'd be difficult for me to prove it's because of the alternator.

That same truck has received exactly zero love beyond a car wash. I have it stored because of construction at my house. I've kept myself truck-busy diagnosing a friend's 2006 injectors, and offered to help him change them, but he either didn't have time, didn't trust his own mechanical skills (I got others' opinions as to whether or not I could do it) and had it done. At least my diagnosis, backed up by the Third Generation forum, was correct.

Then it was solving his headlight-out, not the bulb issue. Again the forums showed me the way and my dislike for the TIPM is growing to match that of owners. We checked the wires, connections and did a hard reset, all to no avail, so I spliced in from the "good" headlight output, ran a new wire and it's all good now. I'm amused how he, an electrician who works with 120 and 240 VAC all day, doesn't want to mess with 12 VDC; then again, I avoid 120 any time I can.

Lastly, there is yet another truck lurking, this one a 2004 Duramax a friend wants me to sell for him since he's working 80-plus hours/week…I said I could answer the ads and show it, but I wasn't selling it. Now I have to learn more about Duramaxes…

GOING ELECTRIC? LET'S TALK A MINUTE

The first time I ever heard of the Consumer Electronics Show (CES) was in the late 1970's from a pal who worked at Radio Shack and mentioned it relative to some discussion about regulating CB radios. Last century automotive stuff there generally amounted to alarms, stereos, two-way radios and so on. But now CES is approaching a must-be presence for automakers because of the electronics involved (though it probably helped that Vegas' winter weather was favorable to Detroit's), and the Super Bowl had more commercials for electric cars than internal combustion engine (ICE) cars.

Sentiment at this year's show was that "self-driving" cars aren't coming as fast as most predicted, and simply making cars electric won't speed up the self-driving part. I'm sure it didn't help the cause that a grad student was able to trick a "self-driving" car using a projector—the test was done on a Tesla with Autopilot 2.5, deemed one of the better integrations out there, but worked on anything using Mobileye's 630 Pro driver-assist system.

Those are just a few indicators that transportation is going electric. I get daily releases and tidbits related to it, and I really doubt that any TDR driver in this country (outside retroactively-legislating California) will live long enough to have to give up their Cummins for lack of fuel, but the approaches seem as varied and disorganized as some of those for regular cars.

Governments are, of course, a big driver behind electrification. China, which may charitably be described as a totalitarian regime—search "Tiananmen Square" or "reeducation centers" if you don't accept that—wants one-quarter of new cars electric by 2025. According to a Deloitte consumer preference study, 19% of China buyers want full electric for their new vehicle, despite China's incentives now dropping, compared to the U.S. (8%), Germany (9%), S. Korea (11%), Japan (12%) and India (15%). In that study, Japan is the only Country where gas or diesel isn't the majority choice—it's hybrid. While Japan, China and U.S. buyers have minimal interest in CNG, hydrogen fuel cells and other new alternatives, Germany and Korea are both in double digits.

Newly seated British Prime Minister Boris Johnson has said he wants no internal combustion engines in new cars and vans (including hybrids) in 15 years. Last year, while embroiled in the uncertainty of Brexit, electric cars had a best month of 2.3% of all car sales, about a tenth of diesel sales, which are falling. (The last time I was there diesel cost more than gasoline, unlike most of Europe.) I'm aware battery costs come down daily, but from 2.3% to 100% in fifteen years sounds optimistic to me, never mind where they're going to put all the required chargers and make and distribute the power. (If the average electric car uses 28 kWh/100 miles and covers 8,000 miles/year, that 50,000,000 kWh has to come from somewhere.) Applicable to every electric vehicle market, and despite motors like those in BMW's new (electric) iX3 that use no rare earth materials, does anyone yet know where the lithium, cobalt, and other yet-to-be-synthesized elements for 100 million car batteries come from?

Across the North Sea and channel in Europe similar mandates keep adding up from cities to countries. Despite auto companies investing in "tech" partners, they are also seeking government help in shifting to electric cars, with Germany's National Platform for Future Mobility suggesting the change puts more than 400,000 jobs at risk in that country alone. And, don't forget that despite all those actions, PM from diesel is on par with gasoline now.

Electric cars and trucks are now popular enough they'll be advertised in the most optimistic terms. GMC's tagline for the Hummer EV is "Pairs Incredible Ability, Zero Emissions" while a Mercedes' truck release is more accurate, "Quiet and locally emission-free." Most people think emissions from tailpipes or fuel tanks, but there are others involved, and my guess is that a 1,000-horsepower GMC Hummer EV driven as other Hummers are (at least around here) will make more emissions from the tires and brakes than a Prius overall, and that doesn't count power plant emissions to charge the GMC Hummer battery. The most recent Michigan (where it's built) data I could find says 37% of the state's electrical power comes from coal and 26% from natural gas. There will also be number jiggering, GMC claiming 11,500 lb-ft of torque, which sounds to me like it's at one rpm or at the axle. Any HD diesel pickup puts down more than that at the wheels in lower gear (a new HO, if it makes peak torque in second/low, is 22,300).

The Cost of Refueling

There's also the cost of "refueling" your electric car. The difference between the lowest and highest average gasoline prices by state is often around 70%, California (special gas) and Hawaii (shipping) at the top, and anything around Texas, and South Carolina is cheapest. The price per kWh at my house varies that much by hour of the day (and again at a twice-yearly season change). Not only that, but electric charging stations vary dramatically, with variables including how long it takes, how much you take, where you take it, time of day, and finding out what the final amount will be is much harder than multiplying $n by x gallons. To amplify the point, Motor Trend took two Hyundai Konas, one electric and one ICE (a 1.6 turbo), on a 514-mile round trip from LA to Paso Robles, California. The ICE did 29+ mpg with two refills totaling 10 minutes, at a cost of $63.03. The electric version did 102.8 mpg-e, required 4 hours and 36 minutes of charging, and cost $140.97; the projected cost using ABetterRoutePlanner.com was 3:25 and $98.60.

Electric vehicles are great for city use and ideal for commercial vehicles with known routing and overnight charging—trash trucks, street sweepers, busses, postal service—and if I had room for another car and a roof full of solar cells, I'd have one. Indeed, there is nothing wrong with a Hyundai Kona, and if you didn't mind the inconvenience on a rare road trip, the electric one may be the way to go, especially if you have solar power or qualify for a tax credit. But the Trump administration did not update the Federal tax credit as some automakers had asked, so GM and Tesla, which have already sold the 200,000 units at which the incentives start dropping, will feel it first, with Nissan, Ford and the Germans next in line.

How the masses will learn and choose may be as polarizing as Congress. I recently saw a media outlet job posting noting, "Our ideal journalist is not just into cars generally, but specifically acquainted with the latest high-tech vehicles. Sorry, petrol heads; we're seeking a journalist with experience writing about electric vehicles." I've yet to determine how "cars" and "electric vehicles" are defined here, because I would think that electric vehicles are cars first, electric second.

But, until electric trucks start getting advertised by range at max towing, diesel will reign supreme for genuine working trucks.

Chevy was right when they introduced the Volt suggesting 35-odd miles was enough electric range for *most* American drivers, and Deloitte's more recent research shows the average American does "just over" 27 miles a day…but 40% of consumers think a battery electric car should have 300 miles of range. I can think of gasoline cars lacking that range (though "fill-ups" are much faster) and liken this to the "what if" buyer who needs a three-row crossover, SUV, minivan or pickup for two weeks a year but drives the energy hog all year. Bear in mind I rent a car for 800-mile weekend round trips to races (where "parking lots" are often dusty or muddy fields) because renting the car is cheaper than detailing the bugs and muck off mine.

I think if people focused on the charging infrastructure and speed first, and range later, more people would be interested in electric cars. But, until electric trucks start getting advertised by range at max towing, diesel will reign supreme for genuine working trucks.

QUARTERLY AMUSEMENT

The funniest thing I've seen comes from Business Insider, in particular the caption for an F-150 bed photo, "Bed liner protects the metal from rust and corrosion." I thought aluminum stopped that problem, but maybe theirs was "Magnetic" grey in color.

G.R. Whale
TDR Writer

Motor Minded

Reflections on the human side of the man/machine relationship by clinical psychologist and motojournalist, Mark Barnes, Ph.D.

MECHANICAL EMPATHY

I realize that some TDR readers are not particularly interested in auto racing, but bear with me for a few paragraphs and I'll get to something I suspect all subscribers to this magazine can relate to: the quality of attunement between drivers and their vehicles.

"Sim racing" uses a computer and highly realistic controls—steering wheel, foot pedals, stick shift, etc.—to simulate driving a race car. Visuals are provided by large monitors or a VR (virtual reality) headset, and motion-creating devices can produce vibrations and g-forces through the seat/cockpit, replicating the sensations associated with vehicular motion. Such setups can cost anywhere from $2k to $100k, and get used for casual recreation, big-money global competition (e.g. E-Sport Championships), and track familiarization for genuine racers. It's a whole world of high-tech hardware and driving enthusiasts that remains unknown to most folks middle-aged and older.

There are aviation and motorcycling versions, though bike physics aren't yet compellingly reproduced via electro-mechanical mimicry. The visual and visceral stimuli of driving a car, however, are replicated with startling vividness, power and nuance. Track representations come from laser-scans of the actual venues, and cars of all sorts are designed to accurately deliver the driving characteristics of their real-life counterparts, replete with myriad user-selectable chassis, engine and transmission adjustments authentically mirroring those on the physical vehicles. Graphics can be virtually indistinguishable from television racing footage. This is definitely *not* your grandkid's video game, but rather an extremely sophisticated immersive experience for discriminating adults.

After returning from the Grand Prix of Alabama last year at Barber Motorsports Park (IndyCar and support races), I was despondent, knowing I'd never drive the exotics I'd just watched with awe. But I discovered that, for a tiny fraction of a Lamborghini Huracan Super Trofeo's price, I could have a sim racer in my den—and drive not only that car, but countless others, on any famous racetrack I chose. No maintenance or repair costs, no travel expenses, no time lost from work, no risk of physical injury or financial ruin.

No-brainer.

I purchased a semi-serious rig and have enjoyed it immensely ever since. So has everyone else who's tried it, even those with no passion for motorsports. The most disinterested person willing to climb into the driver's seat has had to be pried out of it many hours later. It's that seductively fun.

As a psychologist resigned to playing an observer role during these lengthy stints, I've occupied my time noticing how my guest racers engage the equipment involved, both the physical interface and the simulated vehicle under their control. This home laboratory has revealed three types of relationships between drivers and their vehicles. The same categories apply in real life; I've seen them all play out in the actions of family, friends and the occasional stranger behind the wheel, as I watched from a passenger seat. It's remarkable how clearly these get expressed in a synthetic setting, paralleling real-world behavior and attitudes elsewhere.

This home laboratory has revealed three types of relationships between drivers and their vehicles. The same categories apply in real life.

The first category is **Unempathic**. These drivers don't understand and/or don't care about the effects of their behavior on their machine. I have to turn the simulator settings for damage realism down to zero or they'd never complete a lap. They'd either blow up the engine with constant over-revving, or destroy the car by repeatedly slamming into barriers and other racers. They grind gears and wrestle the controls like the equipment is a strength-testing contraption at the county fair, and they continue to do so even after I point out that a) the force they're applying is unnecessary and counterproductive, and b) they could end up breaking a component for which they'd owe me hundreds of dollars. They might lighten up briefly after such an intervention, but the excitement of the situation soon finds its way again into impulsive and overly enthusiastic exertion. The (motorized) steering wheel does exert considerable force against the driver's hands, delivering feedback from the road surface, tire grip, and other dynamics. But rather than noticing this as meaningful/useful communication, these drivers take it as a challenge to their dominance and frantically apply more muscle to impose their will.

This bullying doesn't yield impressive lap times. Not only do these drivers ignore the potential and actual damages caused by their violent approach, they also ignore the fact that it is not getting them what they ostensibly want, which is to get around the track faster or around an opponent ahead of them. Nevertheless, they enjoy themselves. What's most important to them seems to be discharging a type of tension. The driving experience—in my den or in their car—gives rise to aggressive energy, whether it's competing with others on the road or simply taking charge of the machine. They are jockeys that mainly just love whipping horses, with other factors, like where they finish a race, assigned lesser meaning. Their solution to every frustration is more aggression. We can see this kind of approach in how people pilot their vehicles (e.g. road rage), and we can see it in how they handle tools and mechanical tasks (allow me to coin the term, "wrench rage"). Many a stripped thread and broken bolt owes its demise to the latter. And who has ever reached their destination significantly sooner because they cut off somebody who angered them?

The second group is the **Inaccurately Empathic**. They are in many respects the polar opposites of the prior category. They believe they'd hurt the car if they got the tach anywhere near redline. They avoid hard braking and abrupt cornering because it feels like they're being abusive. Never mind that it's a race car designed to be driven vigorously, and a *computer-generated* one at that! Real damage isn't even a possibility, but you'd think they were handling delicate crystal or a human newborn by the gentleness applied.

Some of this is timidity and unfamiliarity with the kind of fast-paced inputs involved/required in hustling a car around a track. But more of it is based on a gross misunderstanding of how machines work, with vehicular anthropomorphizing filling in for the missing knowledge. Whereas a good racing engine may "happily" run at high revs all race long, these drivers imagine *a person* forced to run at full speed indefinitely. Said person would certainly *not* do so happily, which makes the one doing the forcing cruel. This implicit judgment in turn prompts guilt and self-restraint. And whereas a lively steering wheel is simply conveying data about what's going on with the front tires, these drivers interpret it as the car *complaining*, which leaves them feeling further chastised and reticent. The possibility of doing harm, even on an imaginary basis, makes them recoil from anything that could be construed as recklessness.

This group doesn't often wreck, but they leave tons of performance on the table, with the expectable effect on lap times. They seem to be thrilled by the fact that the car responds to their inputs at all, and they dare not ask too much of it. Rather than relating to the vehicle as their servant, they want to have a more egalitarian connection, extending the Golden Rule to inanimate objects. The problem is that their intended care and respect are distorted by erroneous assumptions about the other entity's needs and reactions. A host doesn't do their dinner guests any favors by serving the host's favorite foods without considering what the guests *really* want to eat. Likewise, excessively frequent servicing, "scrupulous" avoidance of any sudden acceleration, braking or steering, and other types of "babying" a vehicle can be not only a waste of resources, but also yield unanticipated problems, including collisions that such caution was supposed to preclude. Just as straining harder didn't work well as a blanket policy in the first group, uninformed concern can cause trouble for the second.

Finally, there are the **Accurately Empathic**. These drivers demonstrate an appreciation of what *actually* harms a machine and what doesn't. They routinely redline the motor, but also back off when it starts to overheat. They respect cold tires' grip deficit, but push warm tires to their limits and slightly beyond, always assessing where the threshold of traction is at any given point. In general, their light touch on the controls transfers just enough force to do what's needed without obscuring haptic feedback and upsetting the car's stability; more robust inputs are reserved for moments when they're genuinely required. Such drivers hypothesize improvements (more downforce at one end or the other, different gearing, adjusted front/rear brake bias, etc.) and experiment accordingly when they return to the pits. They're able to drive and modify the car in ways that improve performance over time. All this is because they've learned about the physical world in ways the other groups haven't, and their lap times show it. And they continue to learn, lap after lap.

I don't mean to suggest here that good driving requires extensive mechanical engineering credentials or the sensitivity and strategic insights of a race car driver. My point is that operating a machine well involves first understanding that one is dealing with *a machine*. It does not respond to yelling and strong-arming with submissive compliance with its driver's wishes, and may well go completely out of control instead. It also does not feel gratitude for weekly waxings and exclusively delicate application of control inputs; there will be no reciprocal protectiveness of the driver's well-being, nor any credit earned for his/her kindness.

While it's undeniably true that many, if not all, of us develop emotional relationships with our vehicles, what ultimately matters is how closely our treatment of them lines up with the applicable physics. Just as a child can be limited later in life by early abuse or overprotective indulgence, our driving success will suffer from care that disregards, or is out of sync with, the factors actually relevant to the vehicle. Empathy toward humans or trucks begins with putting our impatience and assumptions on hold long enough to learn what is truly happening inside the other person or vehicle. The better our understanding of another person, the better we'll be able to navigate that relationship. The better our understanding of the machines we drive, the safer we'll be and the more effective our maintenance, repairs and modifications.

Mark Barnes, PhD
TDR Writer

Ranch Dressing

Esoteric Dissertations on Manure Shoveling by John Holmes.

NEW 2020 ECODIESEL

Moving right along, I mentioned in the last issue that our 2020 Ram 1500 EcoDiesel Longhorn was held up in production due to us ordering the optional 3.21 rear gears instead of the standard 3.92:1 ratio. The dealer kept saying there was no chance we would see it in 2019 because it was still showing as held up in production in early December. However, Santa Claus came through big time. We happened to be at the dealer on 20 December for routine service on the Jeep when the Sales Manager announced that he had just gotten a notice that our truck was in San Antonio and on its way to our dealer in Kerrville. Sure enough, about an hour later, there it was on that big 18-wheeler.

3.21 Gear Ratio

Let's go over this new rig. First, since we mentioned the gear ratio, we ordered the 3.21s because we live about 30 miles from anything in either Kerrville or Junction, you know groceries and other important stuff. If we're headed East for Kerrville the speed limit is mostly 75mph on I-10 or if we're headed west toward Junction it's 80mph all the way. Since about 75% of the miles we put on are on that freeway, I wanted to keep the revs down for better mileage. We got it—at 75 we're turning only 1750 and 80 puts us at 1800rpm. That's right where you want to be. Oh yes, just for fun, I usually check the 2000rpm mark and found the speedo sitting at 87mph! Enough about that. So far on this new engine (1500 miles) we're seeing 21-22mpg day-in-day-out. Like on our other trucks, we saw a drop of .5mpg on the freeway due to the aerodynamic drag of the grille guard.

Since about 75% of the miles we put on are on that freeway, I wanted to keep the revs down for better mileage.

Interior

This is the quietest and smoothest truck we've ever had. The optional air suspension is the way to go. It's like a big old Cadillac. Speaking of luxury automobiles, the interior of this Longhorn model is absolutely beautiful. The tooled leather, bronze trim and wood-grained dash makes it hard to call it a "truck." It drives not only better than our '14 Ram, but is also better on road noise than our '16 Grand Cherokee.

Since the 1500's introduction in late 2018, the press has given many accolades to Ram for the interior materials, fabric and leather. Our Longhorn is beautiful.

Things I Like

I like the extended running board back to the rear wheel so you can step up and get something from the cross-bed tool box. FCA finally got smart and deleted the mufflers. You don't need them (previous articles show no difference in sound with them off) with all of the emissions equipment. This rig has awesome headlights and with 6-lug hubs (instead of 5-lug) and much bigger brakes than our '14. It's more like a ¾ ton rather than a 1/2 ton. We got the extended 8-year warranty to cover all of those pesky computer modules. Funny, by that time I'll be 90 and the state will have taken away my license. If you get a 2020 Ram, you can be assured that the way to eliminate that awful DING-DING when backing up to the trailer, without your seat belt on, is the same procedure that I outlined in Issue 93 and 87, and Robert just repeated it in Issue 107, on page 8. I won't repeat it again here. Yeah, the warning light will still be on the dash.

Small Dislikes

There are a couple of small things that I don't like. Why did they eliminate the permanent oil pressure and coolant temperature gauges near the top of the panel by the tach and speedo? You can select them to be placed in tiny spots near the bottom that are hard to see and they are cocked at 45-degree angles so that the normal position isn't straight up. Weird. As I have worked on it, I wondered if the designers gave any thought to on-going maintenance, like why would you make the nut on the negative terminal on the battery 10mm and the nut on the positive terminal 12mm? How about making both the same so you can use just one wrench? Another small thing is the license plate mounting bolts. On the front, the 3/4" bolts weren't long enough to accommodate both the license plate and an optional frame, while on the back they used tiny Allen-head screws that were so small the head went right through the mounting holes in the license plate. Oh well, the worthless bolts for the front worked perfectly on the back since the backing plate isn't recessed where the bolts fasten in the rear bumper area. I know, I'm nit-picking, but I'm just giving you a heads-up in case you buy a 2020 Ram 1500.

One last negative thing that really blew me away was the jack package. After reading the whole 500+ pages of the Owner's Manual, I thought I'd better check out their seemingly complex directions on getting ready to change a flat tire. You have to take off the plastic side panel of the front passenger seat to get at the big yellow nut that takes umpteen turns to free up the jack package (including the lug wrench and numerous extensions for lowering the spare tire). In following the directions on removing that seat side panel, one of the little plastic tabs on the back left corner broke off (not critical to hold it in place). After I finally got it all out from under the seat, I decided to store it under the passenger side section of the rear seat, so when I have to change a tire on a cold rainy night, I can get to it quickly. On our '14 Ram 1500 the side panel has "Pull" instructions labeled on it to show you how to get it off (unlike the '20), plus the connecting tabs are metal instead of plastic and the wing-nut is easier to get off. It is a better setup. You don't have a choice on the '14 of storing the jack package under the back seat on the passenger side due to the audio woofer taking up that space. Oh yes, when you try to get the spare tire down on the '20, you'll find that the access to the crank to lower it is hidden by a little black plastic panel that has to be knocked out, right near the rear license plate. Check that out on your truck before you're in crisis mode...maybe it's the same on the 2019 too? I was really surprised to find out that the spare was totally different from the other four tires. Those on the ground are P 275/55 R 20s whereas the spare is a LT 275/65 R 18. In the future, when there is a need to replace tires, the four on the ground will all be LT 20s or maybe I can find a deal on 18" wheels like the spare. Please, no more passenger-car tires.

Accessories

As always, I went to the Geno's catalog to see what I needed for this new rig. They had just gotten in the new style fuel cap for the fuel filler neck. With that crazy green plastic rim and inside tabs, you can't use the old style magnetic cap like I use on the '14 and the Jeep for our dusty roads. Of course I needed mud flaps and they sent me a set of universal fits by Husky. The rears fit fine (be sure to pull the wheel off first), but the fronts need to be at least 3" wide at the top instead of the 1 3/4" to fit right with the fender flares (you can just turn the front wheels hard right or hard left to mount them without having to pull the front wheels).

Here in Texas it's not entirely an option to drive without a grille guard. We hit three deer this past year. Since the whole front of this rig is chrome, we went with a stainless steel model. It's more expensive initially, but it comes out about the same if you plan on painting it to match the truck instead of staying with the universal black. Trouble reared its ugly head immediately because it was the new '20 and worse yet, it was a diesel. The intercooler and air controller box makes things complicated just behind the grille. At that time, no manufacturer had built one for the new EcoDiesels. We got one that would have worked perfectly if it had been a Hemi, but it wouldn't work without modifying all the FCA stuff up front. With an 8-year warranty, I wasn't about to cut holes in any of those plastic factory items. This meant we had to manufacture different mounting brackets to anchor the guard to the frame (a day of welding and grinding). Xtreme Outfitters did a great job on it.

A custom-fit grille guard by Xtreme Outfitters was needed to make the part fit our EcoDiesel.

Block Heater and Battery Charger Plugs (and Tips)

Once the grille guard was in place, on went the TDR badge, and then I had to adapt two of Geno's Block Heater Bumper Plugs to the new guard. It was pretty easy by using the existing bolt-holes on the guard that couldn't be used since it wasn't a gas truck. The hardest part was routing the wiring through all of the mess between the grille and the engine. We ordered the block heater cord with the truck and we immediately saw a problem with the stock setup. Unlike our '14, this engine sits way back away from the grille. They apparently used the same old cord length that used to work fine, but now it's only long enough to get to the firewall/hood hinge area just over the edge of right front fender, instead of being able to have it reach the grille where you could get to it in cold weather. (The Owner's Manual says the plug is right behind the right headlight under the hood—no way—not there). The factory hides the AC plug where it is impossible to see or even feel. It's tied up under the intake air-box and had to be spotted by going under the truck and flashing a light upward through the maze of wires and tubes. I just added a female AC socket on the end of Geno's heater cord so I could just plug it into the stock factory plug near the air-box. Now it's easy to plug in the block heater without lifting the hood. I hope FCA will come out with a TSB providing a free change-out of that old short cord to one of the proper length. I used the second block heater bumper plug to make an exterior accessible hookup for the battery maintainer. While I'm at it, if you do this, figure on 2-3 days of charging before the new battery peaks up enough to turn off the maintainer. Then after a day's driving, it will pick up the charge in about two hours. I do this with all of our vehicles and usually get from 10-15 years out of a battery by always plugging it in every time I park the vehicle at home. Of course, I couldn't leave well enough alone, so I added two tow hooks on the opposite sides of the grille guard from the block heater bumper plugs. Just bolted both together through the existing mounting holes. You see, we had to remove the nice factory chrome tow hooks that came on the truck so we could fasten the grille guard to the frame with the custom made brackets. Probably I'll never have to use those tow hooks, since this new Ram came with an electric locking rear differential. I love the Off Road and Trailer-Tow Group options!

Back Up Lights

One more thing. I still have the old White Knights (backup lights for trailer hitches that Geno's used to have) that they quit making, and I use them on both of our trucks. They are so great when you need to hook up a trailer at night, in addition to getting lots of light in reverse in rural areas with no street lights. I had to modify the light package this time, since I couldn't mount it under the truck's stock trailer receiver. On the '20, there isn't a nice flat platform to bolt to, plus the spare is jammed right against the back of the receiver. To slide the tow hitch through the White Knight (an original option), I had to get out the drill and file to modify the housing since the hitch had a big brace that angled down and interfered with the light sliding back against the bumper. Oh well, you do what you have to do to make it work. The only unsightly aspect were the holes left in the top of the housing, so I used a big decal to cover them up. It matches the other red TDR bumper decals! The wife says I'm silly.

Other Options

Oh yeah, we tried to order the new-fangled tailgate, but the factory refused to add it to the order at first. Later, when they approved that option, and the truck was still being held, they wouldn't let the dealer change the order. We thought it'd be fun to try the feature of having either the barn-door opening or the traditional drop-down tailgate. Maybe it's just as well, because the truck that came in after ours with that feature was giving the techs a hard time getting the release triggers to work correctly. I'm sure they'll get the kinks worked out soon.

Ram's "barn-door" tailgate (a $995 option) that was on another truck on the dealer's lot.

I was really disappointed that Ram didn't finally add an exhaust brake for the 2020 EcoDiesels. I even asked Brian Roth, of BD Diesel Performance, to please develop one for his catalog. It can't be that difficult, after all, it's already got a variable geometry turbo.

2020 AMELIA ISLAND CONCOURS

Once in a lifetime: A Lancia Stratos in the '68-'69 race car category.

LAST ISSUE RECAP

TDR 107 was great as usual. Be sure to read the editor's procedure to eliminate the annoying DING-DING when you don't have your seat belt on while moving the truck out of the garage (page 8). Yep, it works on a 2020 and you still keep the warning light on the dash. Geez, Robert, you told me not to mention oil anymore and you just devoted a whole section to it starting on page 22—good article. Be sure to read James Langan's bit on the Banks and Mag-Hytec differential covers on page 29. I hold both companies in high esteem. On page 31, James talks about seeing the Ram OTG (Off The Grid) concept at the SEMA Show and how he liked the 33-gallon fuel tank and push button rear locker. Yep, got those on our 2020, but be sure to have a novel to read while you're filling that sucker up. Great write-up on SEMA and we sure do miss attending like we used to. Robert did a good job summarizing the EPA mess we're in with trying to certify aftermarket performance parts (pages 36-39). On page 55 I was glad to hear that Andy Mikonis got that cool Chrysler 300G. I love old cars like that. Another good section to read is "Blowing in the Wind," starting on page 56, describing the FCA/PSA merger. In "Four Whaling," on pages 66-69, it outlines lots more government BS. Stan Gozzi tells of working with young students and touring the SEMA Show on pages 96-99. I sure have enjoyed working with students around here. On page 104, Moses Ludel talks about Harbor Freight tools...my wish has come true with the opening of a new Harbor Freight store here in Kerrville. Even my wife liked it too. The upcoming 2020 May Madness was mentioned on page 108. It sure does bring back memories of starting that whole thing many years ago. And last, Kevin Cameron questions how fast we can get to 100% renewable energy on page 110. Be sure to review it. ***Editor's note: Oops, I asked that the writers not mention lube oils, and I was the one to ignore the instructions? I had to reread my own mumbo-jumbo to make sure I wasn't out of line. Sure enough, I made allowances, and John Martin was the actual author. Whew!***

2020 AMELIA ISLAND CONCOURS

The artist at work, capturing the moment at Amelia Island.

STUFF I'VE READ

Let's review the Wall Street Journal articles about FCA since our last magazine. First there's "GM's New Suit Aims Right at a Rival" complains that Fiat Chrysler betrays a competitive nervousness investors shouldn't ignore. GM's lawsuit accuses FCA of "racketeering" by colluding with the United Auto Workers Union in collective bargaining agreements that caused GM "massive monetary damage in the form of higher costs"...Boo hoo. Next you read, "GM Faces Stiff Tests in Fight with Rival" where to win the suit, the car maker needs to show harm from the alleged fraud in Fiat's talks with the UAW. Then there's, "UAW, Fiat Chrysler Reach Accord" which was an important step toward ending a grueling round of labor talks.

Further in the WSJ, "Auto Makers Say Merger Talks Are Advancing" tells about how FCA and Peugeot are moving forward on their planned $50 billion merger while brushing aside the recent lawsuit by GM which could threaten the auto industry's biggest deal in decades. Some analysts think the GM suit could slow down the merger talks. The headlines keep coming with, "Fiat Deal Boosts New Hires" showing the union pact would expand health benefits and speed timeline to reach top wage brackets.

Next in the WSJ FCA's problems are noted, "Fiat Chrysler Hit for Back Taxes." Italy is demanding $1.6 billion in unpaid taxes for when it acquired Chrysler while it tries to complete the merger and fight GM's suit. Sounds like fun! The good news comes with, "Fiat Chrysler Workers Approve New Contract, Ending Labor Talks" where wage increases and better health-care benefits are approved, but not approved were job security guarantees.

Finally, "PSA-Fiat Chrysler Deal Advances" indicates that the FCA and the Peugeot boards are backing a binding merger agreement, which comes at a time of mounting cost pressures in the global car business. That is followed by, "Peugeot, Fiat Chrysler Turn to Face Regulators" where the formation of the third-largest auto maker must get government backing to complete their trans-Atlantic tie-up. "Fiat Chrysler Wins in Peugeot Deal" talks about how the recent negotiations have sweetened the terms for the French car maker, but it still shoulders more risk. Stand by, it'll take another 12-15 months to get government approval. It keeps going with, "Fiat Faces Rough Road to Merger." European sales are down.

In other automotive news in the WSJ "Self-Driving Cars Roll Up Slowly" says that Waymo is testing self-driving Chrysler Pacifica hybrid minivans. "U.S. Car Sales Hit Brakes in 2019" says the multiyear boom in U.S. auto sales slowed down this past year. For 2019, overall FCA's sales were down 1.4%, GM had a 2.3% decrease, Ford was down 3% and Nissan had a huge 9.9% drop. FCA teaming up with iPhone assembler Foxconn gets the story, "Fiat Chrysler Enlists Help on Electric Cars." The WSJ is closely following, "Bid to Ease Emissions Rules Leaves Car Industry in Limbo" where it says Ford miscalculated on the California deal. The next headline reads, "U.S. Ends Probe of Auto Makers, California," where the Justice Department closed its antitrust investigation of the four auto makers that had reached a deal with the State over emissions.

MAGAZINE MADNESS

Car and Driver had "Tugs of War" where they tested the Ram 1500, the Ford F-150 and the Chevrolet 1500, all with diesel engines. "With big fuel tanks and efficient diesel engines, these trucks offer long-haul range and, in the Ram's case, near-luxury-car comfort." After pulling heavy trailers, checking fuel economy and other points of evaluation, they rated the Ford in 3rd place, the Chevy in 2nd place and the Ram in 1st place by saying, "Remarkable ride and handling, as polished as a luxury car, and sips fuel." (Further review of the Car and Driver article is on page __-__.) They also wrote up the Jeep Gladiator saying, "It's a convertible pickup wagon dreamed up in the vein of an 83-function Swiss Army Knife for the road." They went on to call the Ram 1500, "The Cadillac of Pickup Trucks, But in a Good Way." Then, "Ram has made this possible by envisioning the light-duty pickup as a luxurious yet utilitarian carrier of families, fertilizer, and dreams. But the Ram 1500 isn't just the best truck out there; it's one of the best vehicles. Its supple ride, rich interior, and fluid power delivery elevate it to a place we never thought possible for a pickup". The magazine evaluated the 2020 Jeep Wrangler Sahara EcoDiesel pointing out that its high torque made it both efficient and surprisingly quick.

Automotive Fleet, the car and truck fleet and leasing management magazine, had two write-ups on synthetic oils. One emphasized the need to use it in extremely cold climates and the other talked about how the industry is transitioning to synthetics and going to thinner blends. Fortune had a series of articles on what's going to happen in this new decade. The one that caught my eye was one that predicted, "We'll witness the end of the internal combustion engine era." We have to get rid of those nasty engines if we're to save the environment...right? Diesel Power mentioned that Cummins had produced its 3-millionth diesel engine for Ram trucks. They also noted that the new Ram 1500 Limited Black Edition, the Heavy Duty Night Edition and the 2020 Jeep Wrangler EcoDiesel were all very cool.

RV Pro also wrote an extensive article, "Cummins Powers to 100," where they say that the engine and generator supplier has been innovating power systems since back when most modes of transportation truly were horse-powered.

HDT magazine always has the latest truck sales figures for Class 3, 4 & 5 (10,001 – 19,500 lbs) through the month of December and for the year 2019:

	Dec. Sales	YTD Sales	YTD Share
Chevrolet	3,183	35,041	8.07%
Ram	23,198	197,488	45.50%
Ford	17,278	150,534	34.68%
GMC	1,417	15,712	3.62%
Isuzu	2,256	20,770	4.79%

Other articles that were good: They mention that synthetic diesel oils are much better at removing ash that cause DPF soot deposits and that electronic devices are the big maintenance problems today...no kidding. And there was an article emphasizing the necessity of picking the right tire for the job plus maintaining the correct air pressure.

Of course Motor Trend always has lots of good stuff. They tested lots of vehicles including the little Jeep Renegade where power, MPG, real off-road chops and a smart cruise control were liked. Naturally the Jeep Gladiator came up with comments like, "Stand out design, good packaging and off-road chops." The Ram 1500 got the following highlights: 29mpg highway, air suspension and barn-door tailgate option. Then comes the biggie, "Motor Trend Truck Of The Year 2020 – Ram HD." "Three-Quarter And One-Ton Trucks Are Jack-Of-All-Trades Machines. Hitting Diverse Needs Isn't Easy, But Ram Delivers." That sort of says it all. In their long term keepers, they always write up their experience with the vehicle like Christian Seabaugh's comments, "I don't often get sentimental about long-termers, but the Power Wagon is going to be greatly missed." He was talking about a 2018 Ram 2500 Power Wagon after 12 months and 22,266 miles. Ten months and 16,283 miles on their Chrysler Pacifica brought, "It's hard to beat the Pacifica when it comes to flexible cargo storage solutions."

INTERNET INSANITY

Auto Service Professional.com always sends me lots of goodies like Technical Service Bulletins. A Ram Air Suspension TSB was about 2019 Ram 2500 and 3500 trucks with Auto Level Rear Air Suspension that might need a reprogramming of the control module. There was another TSB for 2018-2019 Ram 1500s that might not have enough gear lube in the rear differential. Next came one on 2016-2017 Ram 3500 pickups plus the 3500/4500/5500 Cab Chassis models equipped with the Cummins/6-speed Aisin automatic transmission that might get a MIL (check engine light) or experience no reverse. 2017 Ram 3500/4500/5500 trucks with the 6.7L can get a MIL that indicates a possible problem with fuel injectors. "Ram Recall" says some Ram 2500 and 3500 trucks equipped with AEV wheels can fracture, resulting in rapid air loss. "No Dodge Ram Blink" says FCA is recalling some 2013 Ram 1500, 2500 and 3500 trucks that were equipped with optional tail lights. "Bad Ram Fan" highlights some 2015-2017 Ram ProMaster City Vans with possible fan issues.

Worktruckonline.com had a story about the Jeep Gladiator being named "North American Truck of the Year." They said that the 2020 Ram pickup sales were up 18%. Next, there was a lengthy article about Ram celebrating a decade of Ram trucks. Some thought it was crazy to break the Ram away from Dodge and make it a stand-alone brand. Since then, however, there has been a decade of milestones:

- 2009, RamBox
- 2010, New Crew of Ram Heavy Duty Pickups
- 2011, Chassis Cabs and the Laramie Longhorn
- 2012, 6-Speeds & Tradesman
- 2013, Reinventing the Segment
- 2014, Ram Commercial Formed, 3.0L V-6 EcoDiesel Engine and Ram Promaster Launched
- 2015-2016, Ram 1500 Rebel
- 2017, New Standard Features and Editions
- 2018, More Special Editions
- 2019, No-Compromise Ram 1500 and Multifunction Tailgates
- 2020, Ram 1500 EcoDiesel and IIHS Top Safety Pick.

Then there was, "2020 Ram 1500 Earns Trio of Truck Awards." Those were: Truck of Texas at the Texas Truck Rodeo, where it won every category it entered, securing eight awards, the most of any brand at the event; 2020 Green Truck of the Year for the second time by the Green Car Journal; and making Car and Driver's 10 Best Cars and Trucks List again for the second time. Of course they had a nice story about, "Cummins, Ram Produce 3-Millionth Engine" where it tells about the new 6.7 CGI engine, the first pickup engine to break the four-figure torque barrier. They mention that, "FCA Recalls Ram 2500, 3500 for Fire Risk" where the company is notifying dealers and owners that there could be a transmission problem on some 2019-2020 models equipped with the 68RFE automatic transmission.

Truckinginfo.com said, "Autonomous Trucks Possible in Lower 48 by Year's End." They're already testing them in 17 states. Be sure to read the long article on, "Gasoline or Diesel: What's the Difference?" Their points sure do apply to which engine to order on your next Ram, depending on how you will use it. There was a comparison chart that was used as a summary:

At-a-Glance: Diesel versus Gasoline

	ADVANTAGE
Acquisition Cost	Gasoline
Fuel Economy	Diesel
Price per Gallon	Gasoline
Towing Capacity	Diesel
Maintenance	Gasoline
Engine Life	Diesel
Emissions Equipment	Gasoline
Upfitting	Gasoline
Resale Value	Diesel

The winner: It depends on the application: Gasoline for low mileage, light-haul applications, diesel for heavy towing, high-mileage applications.

Trucktrend.com had, "2019 Ram 3500 Heavy Duty: 2020 Pickup Truck of the Year Contender" where they spoke about barrier-breaking torque in a massive package. Then there was, "2020 Jeep Gladiator Sport S: 2020 Pickup Truck of the Year Contender" where they said that compromises were made in the name of fun. Next comes, "Cummins vs. Duramax vs. Power Stroke – 2020 Diesel Engines" where the 1000 torque mark is being pushed. This was an interesting story: "Ducted fuel injection is that breakthrough the researchers have developed. It is a method of fine-tuning the air-fuel mixtures to such a high degree that between 50 and 100 percent of soot normally developed in the engine (depending on speed and power output) can be eliminated. The concept works by using multiple tubes or ducts to direct the fuel mixture from the injector to the point of ignition in the cylinder. This makes it so that fuel is exactly where it needs to be injected for proper detonation. Isn't technological innovation wonderful! Also, did you notice that, "Macy's Thanksgiving Day Parade Taps Ram Truck to Lead Parade Floats." Yeah, Ram was the official truck for the parade to pull every float, including Santa's Sleigh...a bunch of showoffs! "Is Diesel Tuning Dead?" is a great article that perfectly follows what the editor said about the future of companies that offer diesel-performance accessories in the last issue. And it can be a problem for those who install tuning hardware/software if your state requires annual inspections. If you do use such products, be sure it meets federal emissions regulations and/or CARB certification.

Now for lots of stuff from motortrend.com. "10 All-Time-Best Diesel Pickup Trucks" with torque, power, capability and more. They did a history thingee going back to 1989-1993 with the First Generation Dodge Ram 250s and 350s with a Cummins. Then came the Second-Gen from 1994-2002 when the "big rig" styling really changed the way pickups look. The Third-Gen is rated, "2002-2008 Dodge Ram 2500 and 3500 Heavy Duty – Best Used Diesel Value." Next, the 2010-2013 Ram 2500 Heavy Duty – Most Capable Diesel." Things chug along to where they mention the "2020 Ram 3500 Heavy Duty – First 1,000 lb-ft Diesel." "2020 Ram 1500 Rebel EcoDiesel: Pickup Truck of the Year Contender" describes this model in their "Diesel in the Dirt" contest. "Dueling Diesel Duallies: 2020 GMC Sierra 3500HD vs. 2019 Ram 3500HD" where GMC and Ram luxury trucks battle for tow/haul supremacy. First place went to the Ram 3500HD Limited Cummins.

MotorTrend had a really good article titled, "Top-7 Tires for Towing Heavy Loads" touts their choices as follows: 10-Ply Tires for Trucks:

- Toyo Open Country H/T II
- Firestone Transforce HT2
- Maxxis Bravo Series HT-770
- Michelin Defender STX M/S and
- Goodyear Wrangler DuraTrac

Moving on to Trailers:

- Maxxis M8008
- Carlisle Radial Trail HD

We've had really good service from Carlisles on our trailers and B F Goodrichs on our trucks. They had, "Best Trucks to Buy in 2020" where their two top picks were the 2020 Ram 1500 and the 2020 Chevrolet Colorado. Also, in their top five where the 2020 Ram HD, Jeep Gladiator and Ford F-150, out of the 15 rigs they evaluated.

MY 2014 ECODIESEL SETTLEMENT UPDATE

First, let's talk about the recall/settlement "VO8" emissions mess. This is like a broken record: I still haven't received my settlement check from FCA. To recap: We sent in the original pile of paperwork, which they received on 6/3; then came the second round of paperwork after they agreed we had legitimate claims for the '14 Ram and the Jeep. After we got everything notarized, we sent off the second stack, certified mail, back to FCA as directed by their legal mumbo jumbo. Next we got emails saying we hadn't responded to their requests for more paperwork. Our quick response pointed out that they had received all of the requested papers on 12/20. Their response was we should have emailed our response since they don't have time to look at the mail, and not to expect a check for another 8-12 weeks. Just as I'm writing this, I get another email notice (2/11) saying again that I haven't sent in the required papers. My response wasn't polite. What a great way to handle this problem, compared to the excellent way VW handled it. They say they are just following the Court's directives. Yeah, and we were just following the FCA's directives to mail in the stuff.

SIDE STORY – FACTORY HELP

Before I go any further, I must share with you an item my friend, Monte Beck, shared with me about a car that was allergic to vanilla ice cream. The guy had a new Pontiac that would start just fine when he went to buy ice cream at the neighborhood store, so long as he bought any kind of ice cream other than vanilla. If he purchased vanilla the car wouldn't start. He wrote the president of GM's Pontiac's division, and naturally he was very skeptical about the letter, but sent an engineer out to investigate the problem anyway.

The engineer found a well-educated man who had just purchased the Pontiac and arrangements were made for the engineer to ride along with the after-dinner trips to the store. Sure enough, when the fellow bought chocolate or strawberry ice cream, the car started right up, but when he bought vanilla it wouldn't start.

The engineer knew this Pontiac wasn't allergic to vanilla ice cream, but rode along several times with the owner taking down lots of data like time of day, type of gas being used, and time to drive back and forth from the home to the store. He discovered that the vanilla ice cream, being the most popular flavor, was located at the front of the store whereas the other flavors were in a separate freezer in the back of the store. It took much longer to buy chocolate or strawberry and then check out than it did vanilla.

Once the engineer found that the time was the problem (not the vanilla ice cream) he quickly came up with the answer: vapor lock. It was happening every time, but the longer wait for the other flavors allowed the engine to cool down enough to start. With the quick pick-up time for the vanilla the engine was still too hot for the vapor lock to dissipate. No, the owner wasn't insane. I remember those carburetor days. It was a big problem with those old flat-head V-8 Fords.

FINALLY

My wife says, "Camping is a tradition in my family." I say it was a tradition in everybody's family until they invented houses.

John Holmes
Ye Old TDR Writer

2020 AMELIA ISLAND CONCOURS

John Holmes once owned a Pantera. "Offered without reserve" the expected value of this car was $130-160,000.

LOVE YOUR DODGE BUT HATE THE STEERING?

We can get your Dodge truck back in-line.

BORGESON STEERING SHAFTS

A worn steering shaft assembly will cause loose, wandering steering. Borgeson U-Joint and shaft assemblies give a tight precision feel to the steering.

Original steering shaft assemblies are not designed for towing, plowing, off-road use or body lifts. Borgeson joints are so strong, they will probably outlast your truck.

For '79–93 trucks ***Extreme Duty*** unit must have a removable column Rag Joint.

'94–02 FULL SIZE

'79–93 FULL SIZE

REPLACEMENT RAG JOINT

DODGE PICK-UP & RAM CHARGER STEERING BOXES & ASSEMBLIES		MSRP
000940	'79–93 Full Size w/Rag Joint	$198.00
000941	Replacement Rubber Rag Joint and Hardware	$17.50
000943	'79–93 Extreme Duty Two-Joint System*	$248.00
000945	'94 Full Size	$284.00
000950	'95–02 Full Size	$284.00
000952	'03–08 1500 2WD/4WD, 2500 2WD, 3500 2WD	$320.00
000951	'03–08 2500 4WD, 3500 4WD	$284.00
800123	2003–2008 Dodge Box Upgrade, All New	$695.00
800328	1994-2002 Dodge Diesel Pump	$195.00

*** Verify that the column has removable rag joint**

1994–2002 DODGE DIESEL PUMPS

Part #800328 Manufactured from ***all new components*** this is a direct replacement Hi-Flow power steering pump for the 1994-2002 Dodge Ram 2500 & 3500 trucks with the Cummins Turbo Diesel motor. This pump has the output pressure/flow calibrated to 1450-1550 PSI and 3.5 GPM to provide your Ram with all of the power its steering needs. Includes new powder coated reservoir, cap and drive key.

'94–02 #800328

BORGESON 2003–2008 DODGE BOX

#800123, Borgeson has sourced and adapted this brand new massive "6-Bolt" power steering box for the 2003–2008 Dodge trucks. Similar to Chrysler's offering for the 03-08 Dodge trucks this Borgeson "Dodge Box" offers the largest piston diameter for the most available power assist and a modern variable valve that allows for stable highway driving and effortless parking and maneuvering. Borgeson has adapted the pitman shaft to be compatible with all OEM and dropped pitman arms that fit the stock box.
#800123 Fits all OEM and after-market pitman arms.

'03–08 #800123

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BORGESON

Steering You Forward

Polly's Pickup

A Feminine Perspective by Polly Holmes.

NEW TRUCK'S ARRIVAL

Well it finally arrived. The truck was delayed due to a special differential ratio (3.21) that John had to have.

When we went out and did a walk around of the truck, I saw that the back panels had a light gray marker decal that said it had the "Off Road" package. The light gray didn't match anything (including the beautiful mahogany brown interior). So, when we went to have the name of the ranch put on the side of the truck, those light gray "Off Road" decals were removed and changed to a chocolate brown, plus a big ram's head was added. It made the new truck much better looking and more classy... one of a kind.

This truck seems to be the quietest and smoothest riding truck we have ever had. The interior is truly outstanding. The flat floor boards in the back seat area make loading items easier, and I am amazed at how much room there is for passengers in the back seat.

We are still working out some of the settings on the doors, mirrors etc. We have been back to Juliann, our salesperson at the dealership, just to get all the digital settings the way they work for us. One day while I was at the dealership, Mel, the sales manager, was helping another customer who was confused about how to lock her car with all the new digital aids. He was very patient and went over it with the customer several times on just how to lock her vehicle and have it stay locked (keep your fingers out from behind the handle). John has had to remind me to not touch the handle after the car is locked or it will "think" you want to get back inside. Grrrrrr!!!!!

John has remarked in his column about some of the technical things he has run into, so I suggest checking out his column "Ranch Dressing" in this issue. He has read the entire Owner's Manual for the new truck, which reminds me of when we got our first '94 Dodge/Cummins and he read the entire Shop Manual. When that truck arrived, he knew more about it than did most of the techs. I think it's an engineer thingee.

For the first year, the Uconnect feature is included along with the satellite radio. In January, I got my first "Vehicle Health Report," which gives me a rundown on the vehicle systems and suggests action, if needed. Sort of like "big brother is watching you." Guess that is the world we live in with all of our digital devices.

WOMEN WHO KNOW TRUCKS

In the last Issue of TDR, I wrote about how Juliann Torres was saved by from a severe crash the safety features in her daughter's Jeep Compass. Juliann is a sales representative at Crenwelge Motors where we buy our trucks. She has always had an interest in vehicles since she learned to drive. Later on she got hooked on restoring classic Camaros, then started leaning toward Dodge products like her '73 Charger. She moved here to Kerrville about eight years ago from Salt Lake City with her husband, who is an artist and raises exotic sheep.

Juliann has been awarded 'Jeep Expert" by the factory and she is also an authority on the Ram 1500, which is Motor Trend's "2019 and 2020 Truck of the Year." She can explain all of those electronic features and she can pair your cell phone to the vehicle while taking you through the delivery process. If you are interested in a Heavy Duty Ram, she can explain all the advantages of the Turbo Diesel and the exhaust brake. In addition, she is certified in Commercial Vehicles and is an Ag specialist, which is very important in this ranching country.

Polly and Juliann check out a Charger with a 392 Hemi.

SELF DEFENSE

Recently, we attended our usual Preppers Meeting to find an overflowing full house to hear the Kerrville PD Officer's presentation on how to handle an "active shooter" situation. The Officer basically advised to always be aware of your situation no matter where you are. In a crowd or auditorium, he suggested we notice where the exits are and how to easily access other exits, rather than the main ones which might be blocked. Be watchful to see if something or someone appears out of place where you are. We all get used to going about our daily routines and don't pay much attention, but if you see something strange let someone know. Texas has an app that I put on my phone to notify authorities if I see something strange or unusual. I also put the number of the Sheriff's dispatch on my phone so I have it if I need to call. I don't have 911 on my phone since my phone isn't a Kerrville area code, so I actually have to dial the full number.

We receive a magazine entitled "Concealed Carry." In their January 2020 Issue, they are starting a series of articles entitled "Road Work, Truckers and Self Defense." The sad part is that truckers have been beaten and their loads stolen. This can also happen to RVer's and regular folks just going about their business. I would recommend that everyone try to develop "situational awareness," no matter where they are. If you see someone hanging around where no one usually goes or a strange vehicle, let the authorities know.

MOUNTAIN DRIVING

We live in the Texas Hill Country, and true to its name, we have lots of hills to drive. Between our home and Kerrville there are two 7% grades and if you go the other way to Junction, there are even more 7% grades. During dry, sunny weather these grades don't pose much of a problem, but during bad weather they can mean a recipe for a disaster if you are not aware of "The art and science of mountain driving" as HDT truck magazine mentions in its article from Nov 2019. "Mountain driving, like winter driving is an advanced driving skill." In a recent incident, we saw two 18-wheelers slide off the road near us on the same down-hill curve.

Gail Lawrence is one of the developers of a new app called "Road-Aware," which uses accurate topographical maps and engineering data from real trucks to calculate safe speeds in curves or mountain descents.

The Cummins engines are now equipped with an exhaust brake which will help to slow those HD Ram trucks on grades. However, my one big complaint with our new Ram 1500 is that the EcoDiesel doesn't have the exhaust brake, nor does our 2014 1500. John has talked with some manufacturers he knows about the problem, but so far no aftermarket parts. There is also a possibility that with the variable geometry turbos that this could be set up by just using software programming.

DRUG AWARENESS

Most of us take medications for various reasons. Some of these medications can affect your driving. In addition, the legalization of marijuana in a number of states can mean that you may encounter a driver who is impaired. Some trucking companies are now hair testing in addition to the DOT required urine tests. HDT magazine goes on to say, "Even if buying, selling or using marijuana is legal in a state, actually driving under the influence of marijuana is illegal in all 50 states and DC." So when you get the information on a medication you are taking, look at it to see if any of the side effects could hinder your driving abilities.

HAPPINESS IS

Two new stores have opened in Kerrville in January: one for me, Hobby Lobby, and one for John, Harbor Freight. At the grand opening of harbor freight, it was a parking lot full of pickup trucks and long lines to check out. Hobby Lobby also had a full parking lot, but they had more checkout lines and the lines were shorter. I had been watching both stores move in with much anticipation. So now I have a new app on my phone for Hobby Lobby and John is signed up so he can get email sale offers from Harbor Freight. This could be dangerous, so I need to take control of the situation.

DO YOU REMEMBER?

Continuing right along from the last TDR, here's are couple more of those crazy things on old cars. See if you remember:

Dealers would give you a "traffic light finder" to mount on the inside of the windshield molding for your new car. It was a little prism. Yep, many stoplights were hung up high at the center of the street and you had to bend down to look up at it if you were first in line stopped at the intersection (especially if you had a sun visor over the outside of the windshield – popular before air conditioning became optional).

Hey, how about oil bath air cleaners? In the carburetor days those were standard, and before disposable paper air cleaner elements became available, they were the best air cleaners available. To clean it you had to disassemble the unit, drain the oil, remove the accumulated sludge in the bottom of the pan, clean the mesh filter with gasoline, dry it, oil the cleaned filter material, fill the reservoir with fresh oil, then reassemble and reinstall the whole thing. These were called the good old days?

FINALLY

I don't mind going to work. It's the 8-hour wait to go home that really gets to me.

Keep on truckin'

Polly Holmes
TDR's Female Writer

Have Ram, Will Travel

Joe Donnelly's Truck and Travel Stories.

PROACTIVE VERSUS REACTIVE

In the good-ole-days we were proactive, modifying our relatively primitive Turbo Diesels to fit our needs and do a better job of towing, accelerating, etc. More recently, we became reactive as Ram has given us far more finished products with power, brakes, and suspension better suited to our needs.

It is now time for a bit more proactive approach. What else might be out there within our preferred platforms: Chrysler vehicles and the Cummins or VM diesel engines? First, let's consider reports on the VM engine and its suitability for towing.

3.0-Liter VM Overview

Ram has offered the 3.0-liter VM diesel in the 1500 truck since 2014. It has received mixed reviews, depending on whom you ask. Our editor reported (Issue 103, page 60) that "it's okay." I guess that means that Robert was not overwhelmed, nor underwhelmed, simply "whelmed." In contrast, Scott Gress reported one issue earlier (102, page 28) that he was very happy with his 1500 EcoDiesel while recognizing its limitations. He said that if you want to tow 8000 pounds over mountain passes, it would not be the best choice. Okay, we have the 2500 and 3500 Turbo Diesel pickups to do that. Scott really liked the diesel's low-rpm power for towing, while a gas engine would use very high rpm to make its power and would deliver low fuel mileage under those conditions. I have heard of a few cases where early software versions did not provide top-notch communication between the VM diesel engine and the truck, but such an issue is surely well corrected by now.

Next, how about the durability of the VM diesel engine?

In Issue 104, page 100, Stan Gozzi reported his findings regarding two VM diesel engine failures. At the beginning of his article, he talked about his purchase of a 2018 Turbo Diesel 2500 with Cummins and 68RFE transmission. His new Ram replaced a 1500 with the Hemi engine, which was a lot less expensive than the VM diesel back then. So, can we conclude anything negative about the VM diesel from his purchases? Likely no, the first time it was partly due to cost, and the second time, he opted for the more capable Cummins for heavy towing. That is in line with Scott Gress' recommendation for heavy towing.

Next, Stan recounted his findings on two VM engine failures, engines that were replaced under warranty. The root cause for the first failure was stuck injectors, with the rest of the engine looking good, including the bearings. It appears that the dealership technician ignored the service procedures of replacing the copper sealing washers and lubricating the injector bodies. On the other engine, the cam gear retaining bolt was not properly torqued, and the resultant out-of-time condition caused the rockers to fracture. Before you gasp that that would not happen with a Cummins, please recall that the Bosch P7100 12-valve engines used from 1994 through 1998 also relied on retainer bolt torque to retain the pump gear on its taper-fit to the pump shaft.

Where does that leave us? I think the VM diesel is most likely capable within reasonable limits for towing and hauling. If it needs service, make sure the dealership technician is knowledgeable and follows the factory requirements for service. So now we can look at the possible platforms for this engine. We have already considered the Ram 1500, and it is at least "okay" and may be much better than that now. (See related articles on pages 36-41.) Where else can we find this engine in the Chrysler lineup, and does it give us a platform worthy of towing light to medium weight and size trailers?

Jeep has just begun delivering Wrangler Unlimited (the 4-door version) Jeeps with the new 3.0-liter VM diesel, at a price premium of $4000 plus $2000 for the mandatory 8-speed automatic transmission. That transmission price is the same as for gasoline engines, although the gasoline-powered Jeeps are also available with the 6-speed manual transmission as standard equipment. Fuel capacity is reduced from 21.5 gallons to 18.3 gallons, allowing room for the diesel exhaust fluid tank. People who have tested the diesel Jeep are pleased with the low-rpm torque, but towing capacity is unchanged at 3500pounds for the 260hp, 442torque diesel option. Thus, the diesel option on the Wrangler has limited value, for me at least.

People who have tested the diesel Jeep are pleased with the low-rpm torque, but towing capacity is unchanged at 3500pounds.

Enter the Gladiator

Jeep just brought out the Gladiator as a 2020 model. It is a four-wheel drive pickup truck capable of towing 7650 pounds with its 3.6-liter gasoline engine, while retaining the Jeep capabilities and appearance. Jeep plans to offer the 3.0-liter VM diesel in the Gladiator this spring/summer. Will this platform offer us something useful, and perhaps complementary to the Ram diesels, for those who are not looking for a Ram 2500-3500 capable of very heavy towing? I believe so, even if the towing weight specification is not increased. The Gladiator is available with a Max Tow Package that includes245/75R17 all-terrain tires, heavy duty Dana 44 wide track axles, 4.10 axle ratio, a Class IV receiver hitch, trailer hitch zoom feature in the backup camera screen, heavy duty engine cooling, and a 240-amp alternator. Because of my Ram's length (and especially its width), I began using a 4-door Wrangler for hunting and off-road excursions about five years ago. The Gladiator's size and towing capacity are right between that of the Wrangler Unlimited and my 2013 Ram 3500 (rounded off to the inch):

Feature	Wrangler 4-door	Gladiator	Ram 3500 4x4
Wheelbase	118"	137"	150"
Overall Length	188"	218"	238"
Width	74"	74"	80"
Payload	1360 lb	1600 lb	4020 lb
Towing	3500 lb	7650 lb	17,150 lb

In conclusion, it appears that the Gladiator will be a useful compromise for those who want to haul, tow, and go off-road, even if its towing capacity is not increased for the diesel version.

Joe Donnelly
TDR Writer

This 2020 Gladiator with the 3.6-liter gasoline engine replaced my 2016 Wrangler.

ADVICE FROM TRANSENGINEER ON THE 68RFE

Condition: P0876 and delay going into reverse

When this code and your problem occur, the odds are you have a bad reverse input clutch. You reported delays engaging reverse, and that often indicates a cut seal that is leaking pressure out of one of the clutches.

Reverse gear uses two clutches: the reverse input clutch and the low/reverse (LR) clutch. The LR clutch also provides engine braking in manual 1st gear, so the fact that that works okay means the culprit is likely the reverse input clutch. You can drop the pan, remove the valve body assembly, and air check the input clutches (UD, OD, and reverse) to see if they are leaking. You just use a rubber-tipped nozzle to apply shop air (about 30psi) to each clutch's apply port on the bottom face of the case. Each clutch contains an air bleed, so a small amount of leakage is normal. But if you get a loud hisssss and lots of blowby, you've found a blown seal.

Note that the air bleed for OD (and reverse) is actually in between those two clutches (it connects the two). So when you blow air into OD, it is normal to get some oil / air dribbling out of the reverse clutch port (and vice versa). My guess is you'll find UD and OD hold okay (with only slight leakage) and reverse has a larger leak.

You can also air check the LR clutch (using the apply port in the rear drum) just for kicks, but I'm guessing that will be okay. You should also inspect the pan for any signs of clutch debris. A light coating of black powder (like toner powder) is normal. But chunks of debris, or mounds of black sludge, indicate a problem.

Either way (if you just find a blown seal, or you find clutch debris), you have to pull the transmission and tear it down to repair it. But doing the air check first will confirm where the problem is and will help you to know which seals you need to pay attention to when you tear it down.

For a 2014, I wouldn't think replacing the valve body is necessary. And in any event, you can rebuild the clutch, install the transmission, and if you still have issues, you can then replace the valve body (without pulling the transmission again).

Also, the converter has nothing whatsoever to do with a "no reverse" condition, so I don't see any reason to replace that.

The UD, OD, and Reverse input clutches are all in the input clutch assembly, which is the first big assortment of parts behind the front pump. The 2C and 4C clutch packs are behind the center bulkhead (which is the next "chunk" behind the input clutch assembly). The LR clutch (and the overrunning clutch [ORC], which is a mechanical one-way clutch) are at the very back of the transmission. You might want to simply inspect and rebuild the input clutch assembly (and leave the rest alone), especially if everything looks clean inside. Or, you can tear it all the way down and inspect the other clutches while you have the transmission out. Your choice.

Tag and label the snap rings as you take them out (especially the ones in the input clutch assembly). There are a LOT of snap rings, and many are similar in size, so it's easy to get them mixed up. Also note that some snap rings are tapered (one side is angled), and these MUST be installed with the tapered side facing the correct direction!

You can use feeler gauges to check the clutch clearances, rather than spending money on the official input clutch test fixture. One key thing to consider is that the OD and Reverse clutches are applied by the same piston (it moves forward to apply OD, and rearward to apply Reverse). That piston (which is really the outer shell for most of the input clutch assembly) is mounted with a Belleville spring, that brings it back to center when all pressure is released. This means that if you try to check clutch clearance using feeler gauges, and force the feeler gauges into the clutch space, you can force the piston to move, and think you've got more clearance than you actually do. So check that your feeler gauges are snug, but not so tight that you have to force them in.

When you reassemble the input clutch assembly, you MUST grease the thrust bearings (put a blob of Vaseline on them) to make them stick to the part that they sit against. Otherwise, they will fall out of position when you turn the assembly horizontal to put it back into the transmission. If one of these bearings falls out of position, you will have no front end play once you install the pump, and you will not be able to turn the input shaft by hand. You will also have a complete transmission failure about 300-600 miles down the road!

It is difficult to check output shaft end play (you need something to grab the output shaft with, so you can impart a LARGE force to measure the end play). But if you don't change any of the bearings or hard parts in the back half (behind the center bulkhead), you won't change the rear end play, so you should be okay there. Input shaft end play is fairly easy to check.

You will need to "re-learn" the PCM after a rebuild. A dealer scan tool can do a "quick-learn" procedure, which resets all the adaptive parameters and re-learns all the clutch volumes (in about 10 seconds), so after rebuild I'd recommend driving it GENTLY to your local dealer and having them run a quick-learn.
TransEngineer

Condition: P0713, limp mode in "drive"

This problem sounds like a failed Overrunning Clutch (ORC). If manual shifting works fine, but in Drive the transmission neutrals out after 10-15 feet, the ORC is the likely cause. Did you by chance recently have it stuck in sand, mud, or snow, and had to thrash it to get it out? That's what normally breaks the ORC.
TransEngineer

Condition: DTC P0740 when warmed up and higher rpm needed to hold road speed

I would suspect the problem is a worn torque converter control valve bore in the pump. Code P0740 indicates that either the TCC is slipping when it should be locked, or that the solenoid duty cycle required to maintain full lockup is above a certain limit. Since yours is okay cold, I suspect you have a leaky valve. As the fluid gets warm (lower viscosity so it leaks more), the solenoid duty cycle has to be cranked up higher and higher to accommodate the leak and still maintain lockup. Eventually you hit the limit and P0740 gets set.

Code P0740 inhibits lockup, so that's why the engine speed goes up. So it's the P0740 that causes the increase in rpm (not sudden TCC slippage that causes the P0740).
TransEngineer

Condition: Occasional limp mode, P0882

Code P0882 is transmission control module (TCM) Input Power Low, which means that the main 12V power feed to the TCM (from the transmission relay) has been cut. By the way, you have an ECM and a TCM (separate engine and transmission controllers). A PCM is the combination of these two and was used in 2010 and later 6.7-liter trucks.

The transmission relay is in the power distribution center (PDC) or totally integrated power module (TIPM). (Both names refer to the black box near the battery that contains fuses and relays.) I don't know why there are two different names, or which model years use which name, but they essentially mean the same thing. In some cases, the transmission relay is removable (and, therefore, replaceable). In others, the transmission relay is built into the main circuit board in the PDC/TIPM. (So, if it's bad you have to replace the whole thing.) Again, I don't know which years have which style.

The transmission relay receives direct battery power. When the relay is turned on, it feeds 12-volt power to the TCM (and to the transmission). Loss of the 12V power to the transmission will give you full limp-in mode (4th gear only, in Drive), and in fact the TCM commands limp-in mode by turning off the transmission relay (the TCM controls the relay). The TCM is also fed with other 12V power, but the transmission relay output is fed back to the TCM (at several different terminals on the TCM), so the TCM can check whether the power to the transmission is present or not.

When you roll the ignition key out of the LOCK position, the TCM goes through an initialization routine. As part of this routine, it checks the transmission relay output power. Initially, the transmission relay is OFF. The TCM first checks to see that there is NOT 12V power on the transmission relay output. (If there is, it sets a P0883 [TCM Input Power High] fault.) If that checks okay, it then commands the transmission relay to close and checks that there is 12V power coming from the relay. If not, you get the P0882 fault. Note that this is only checked at key-on. As far as I know, loss of power from the transmission relay while driving will not set a P0882 fault. (Although I think the PDC/TIPM itself may set a fault if this happens.) But, it sounds like you're losing the 12V power feed from the relay to the TCM/transmission while driving (which gives you 4th gear only).

Diagnosing a P0882 can be difficult, especially if it's intermittent (as yours is). That's because an intermittent wiring problem, for example, will usually check okay when you test it with a meter. Also, if you jumper 12V into the transmission relay output, you'll get a P0883 fault. I would check the wiring between the transmission relay and the TCM (both the main 12V feed that goes to the TCM and transmission, and the control wire that the TCM uses to turn the relay on and off). Note again that the transmission relay output goes to several different terminals on the TCM (4, if I recall correctly). Check for open circuits, or for shorts to ground or into other circuits. It sounds like you've already checked this and again, for intermittent issues it's unlikely you'll find the problem. You could try replacing the transmission relay if it's removable. (If so, you can also swap it with one of the other relays as a test.) If the relay is built into the main board, then maybe try another PDC/TIPM from a junkyard. Or, simply assume the wiring is bad and run new wires in place of the existing ones.

You can find wiring diagrams and connector pinouts at rambodybuilder.com. You have to drill down through a series of PDFs to find these, and you have to use Internet Explorer. (Chrome doesn't open the next PDF when you click the links.) For a 2008 truck like yours, I would instead look at the diagrams for 2009 model year. (I think some of the 2008 diagrams still show the old 48RE transmission wiring.)
TransEngineer

Condition: Aisin Multiple Codes and Service Lights from a 2018 Ram 3500 Truck

The following codes were found:

U0140 - Lost Comm with Body Ctrl Mod
UO121- Lost Comm with ABS Ctrl Mod
U1412- Implausible Vehicle Speed Signal Received
UO101- Lost Comm with TCM
UO415- Invalid data received from ABS Ctrl Mod
UO212- Lost Comm with steering column Ctrl Mod

Check the harness and connector inside the truck, under the dash (near the parking brake mechanism), and the harness and connector behind the wheel well liner of the driver's side front wheel. Your codes all seem related to loss of communication, so odds are you've got a wiring problem somewhere.

I do not think you have an ECM/TCM/or transmission problem. You have an electrical "loss of communication" problem.
TransEngineer

Joe Donnelly
TDR Writer

Back in the Saddle

Truck Accessorizing with Scott Dalgleish.

RESTORATION/MOTIVATION

Recently, I enjoyed watching the movie "Ford versus Ferrari." It took me to a place in my childhood when I attended Imperial Street Elementary School in El Segundo, California. The school was located on the south side of Imperial Highway. The school playground was several hundred feet above the south portion of the runway at Los Angeles International Airport. During the 60's, the south portion of the airport was undeveloped. It was the location for Shelby American and the test track that was depicted in the movie. I spent every recess glued to the chain link fence listening and watching as Shelby's cars ran hot laps around the test track. It was wonderful! I was close enough to not only see the detail but to feel the sound concussion from the cars as they ripped their way around the course. Who would ever want to play ball or engage in other playground games when you could watch and feel the sound of an AC Cobra or a GT Mustang? It was a great incentive to go to school. I loved that period in my life.

On weekends, we would ride our Stingray bicycles to the Shelby showroom located in El Segundo just blocks from our house. We'd park our bikes and run to the showroom door only to be cut off by the wise and weary salesman who blocked our entrance at the door and shouted to us to look at the cars from outside the full-length glass window. He knew the potential damage a half dozen excited boys could wreak on a carefully shaped aluminum body. Even though he always beat us to the door, we never stopped trying.

A few years later, I had the pleasure of taking a GT 500KR (King of the Road) out for a fun drive on an open highway in Prescott, Arizona. It was an experience that I can remember vividly today. The guy that owned it had just taken it out of winter storage for the summer. It was the 4th of July. Red with white stripes. When those cross-ram twin four barrel carburetors opened up you had better be paying attention to where you were going, because you were going there quick. There was nothing like the sound and feel of a Shelby-built car. I muse as I read articles about some of the 800-horsepower muscle cars of today. The writers still measure the car's acceleration and handling against an AC Cobra.

I've had a '68 Mustang coupe sitting in my barn now for about 15 years. I've stripped her down and straightened the sheet metal. I think it's time to build something fun.

Editor's Note: Timing is everything. Scott, take a look at those restoration articles in your previous TDR's for some great tips from writers Martin, Gozzi, Schwarzli, and the group at Cummins HRC (Issue 97, 103, 106 and this issue, pages 16-21.)

MAINTENANCE

I like getting caught up with maintenance items during the winter months. It keeps my Turbo Diesel ready, willing and able for summer when I like to travel. My truck "Art" has passed the 75,000-mile mark and I decided to change the front differential and transfer case fluids. I had previously changed the rear differential fluid back in Issue 99, page 86, when I installed the Mag Hytec differential cover and filled it with Amsoil Severe Gear 75W-140, so there was no need to change it again.

Access to maintenance items are soooo easy with the optional four corner air suspension. I put the truck into "off road 2" which increases the crawl space by approximately 2.5".

Art's front differential cover is furnished with both drain and fill plugs. There is no need to undo a dozen or so bolts and pry the cover loose. A 8mm hex bit will do the trick. A few years back, I received a Milwaukee battery powered 3/8" ratchet drive for Christmas. It has become one of my favorite tools. I particularly like the LED that lights the work surface.

I observed the fluid that drained and did not note any unusual coloring or accumulation of wear metals. I filled the front differential with Amsoil Severe Gear 75W-90. It is a quality synthetic lubricant. If there is anything the TDR has covered it is lubricants so I will not go into a long diatribe about the benefits of one brand of lubricants over another. Find a brand you like that meets or exceeds the manufacturer's recommendation and use it.

The fill capacity is 2.3 pints. I used a hand pump to fill the differential. Amsoil has a new package available that is a squeeze bag for filling differentials, gear boxes and the like. I have not had the opportunity to use it, but it appears to be a convenient product.

Servicing the Borg Warner 44-44

Changing the transfer case lubricant is generally drain and fill. Not so on the EcoDiesel. There is a carefully engineered obstacle that adds an extra step to the drain operation.

The drain plug is behind the harmonic/vibration counter weight. Inconvenient: yes.

The BW 44-44 transfer case (which I love) has a harmonic/vibration counterweight mounted right smack dab in front of the transfer case drain plug. ***Editor's note: You know, sometimes the editor-dude just gets lucky. Rather than suggest Scott fling the rubber donut into the trash, I was educated by the TDR's Stan Gozzi (pages 108-112) and now I'm in search of all those rubberized gizmos that I've discarded from the many vehicles I've owned. Seriously, to Scott and Stan, the timing of these two articles could not have been better.*** Weighing approximately four pounds, it is held in position with four T40 Torx bolts which in itself is not an issue as much as the positioning of the two bolts on the left-hand side. The space between the front of the fuel tank and the bolt head does not offer many options to get a tool in place to remove the T40 bolt. After reviewing my tool inventory, it became obvious I would not be draining the transfer case that day. I needed to find a Torx bit that was very short and had some type of a 90-degree drive mechanism.

I did find a very reasonable solution on Amazon for under $20. It is a small gear drive wrench with an assortment of Torx, Hex, Phillips as well as metric and American standard sockets.

A couple of days later I was back in business. I'll admit I was a little concerned if the little wrench would hold up under the pressure of breaking the bolt free, but it did so nicely. With the two tight bolts out of the way, I was able to make short work of the remaining two bolts using my 12-volt 3/8" ratchet drive.

A Torx bit is required to remove the drain plug.

With the assembly removed, there is now clear access to both the fill and drain plugs. The plugs fit a 3/8" drive and have pipe threads. I made sure I can remove the fill plug before I remove the drain plug. I didn't take the fill plug all the way out when draining the fluid to slow the drain rate and help eliminate excess fluid splashing all over the place.

Again, I used a hand pump to fill the transfer case. I use Amsoil Signature Series ATF. It took approximately three pints to bring the fluid level to the bottom of the fill plug.

Because the fill and drain plug are pipe threads, I like to use a thread sealer with silicon. Additionally, because it was a little more difficult than usual to remove the Torx bolts, I applied copper anti-seize prior to installing them back into the transfer case housing, hopefully making the job a little easier next time.

Rain Proof Windshield

With winter upon us in full force here in the Pacific Northwest, rain is the forecast every day. While the amounts and frequency of rain vary in the many microclimates found within Washington, it is safe to say it is wet most months of the year. That is why I like treating the glass and mirrors. Having the glass treated allows the wipers to be turned off and the airflow from motoring down the road clears the rain. The mirrors shed the water as well and water spots become a thing of the past.

There is no particular skill required to apply the glass treatment, just lots of clean cloth (microfiber if you like) and very clean glass. If your glass is not clean, Rain-X includes a clay bar in a kit and the necessary cleaning lubricant to properly clean the glass prior to applying the treatment.

I clean Art's glass regularly so I skip the clay bar process and clean the glass using a commercial glass cleaner like Windex. Once the glass is cleaned I apply the treatment with a clean cloth by applying a liberal amount of the treatment onto the cloth and wipe it over a small area of the glass. The applied treatment will dry to a light haze.

The trick I found in buffing the haze film off the glass is to constantly rotate the buffing cloth I use to provide a clean surface to remove and polish the glass. You can see the haze in the upper portion of the photo and the buffed area in the lower part of the glass. Buffing is the most difficult part of the task but it will all come off clean and clear.

Water beads up and moves off the treated glass making vision clearer during the rain. To me it appears that my night vision is improved with less glare from oncoming lights as well.

There are a number of glass treatment products available. I've tried most and they all work well: Aquapel, Gtechniq G1, Rain Clear, Rain-X and TriNova. The Gtechniq product is more than three times the price (approximately $70.00 as compared to approximately $20 for the Rain-X kit), but the manufacturer claims it lasts for up to two years. I have not had that experience with the G1 product.

Paint Protection Evolution
(Search for the longest lasting and deepest shine)

Back in Issue 105, on page 18, the editor started a discussion about the use of ceramic coatings as the last step product (LSP) for paint protection. In fact, he called me prior to writing the article and asked what I knew about ceramic coatings. I would consider myself an enthusiast who is well versed "in keeping things shiny" and while I had heard about ceramic coatings, the truth was I knew very little about them. Like Robert, I had seen a few YouTube videos with pictures of "ruff and tuff" guys pouring some gloopy goop down the hood of a very shiny car and then setting a clean rag on the same surface he just poured the goop down and the rag slid off with ease. I wrote it off as snake oil and went back to my preferred tried and proven method: a clay bar finished off with a good coat of carnauba wax. It has worked for me for years and years on every vehicle I have owned. And for those of you who know me know, I like my vehicles clean, slippery and shiny. One nice thing about using the wax is it fills the small tiny scratches and imperfections.

I don't own a power polisher. Never needed one. But, I never let the paint get that far gone. However, I am older now and, as was pointed out in Robert's article, elbow grease is not available in a spray bottle. So, a power polisher is probably in my future.

Currently my paint maintenance schedule is twice a year; maybe three times. As mentioned, I use the system of clay bar and carnauba wax. I wash weekly, keep vehicles under the cover of the garage and if they are out of service for periods of time (read: Harley in the winter) then I put them under a cover as well. In between washings I use a spray-on quick detailer and all is good. I think I may have washed the Harley five times since 2003. I just wipe it down at the end of the day using the quick detailer.

So, the question for me is, if I am going to invest my time and effort (it sounded to me like it was a LOT of prep work) how long will the ceramic coating last? I called Robert and he confirmed the prep time was not only extensive but paramount if I did not want to capture the paint's imperfections into the ceramic coating. As far as longevity, Robert's report to me was, "It extends the 'just waxed look' but the 'just waxed feel' doesn't last forever. And, if you can't live without the smooth 'just waxed feel' you have to maintain the ceramic with a top coat every so often. The ceramic coat does shine (literally) with its fantastic water-bead and water/dirt repel characteristics." If it is not going to last longer than what I already use, then it makes sense to continue using the same products I have been using, which have provided me excellent results.

It would probably be better to do a little research into what new products are available, given that technology generally can provide some advances and provide automotive enthusiasts with a better mouse trap. A product that offers longer lasting protection with an enhanced, deeper shine will be the mantra. I like using products from manufacturers that have a proven track record. I have favored Meguiar's products within their Professional line for the past 25 years or so. They have been in the business a long time and have a great reputation. I will start there and see where it leads me.

Next issue I will have tried several options for cleaning, polishing and protecting the paint both by hand and by machine. The search for the longest lasting, deepest shine begins.

Scott Dalgleish
TDR Writer

2020 AMELIA ISLAND CONCOURS

This Porsche 944 Turbo was like new with only 1,620 miles on it. In 1987 it had an MSRP of $41,862.

In the year 2020 it sold for strong money at $78,400.

The Five F's of Seat Cushions

Made in the USA

Here are the some **fun and fascinating foam facts for friends.** (Try saying that fast three times: fun, fascinating, foam facts for friends.)

Short Story: At the 2016 SEMA show we were the lookout for new products. If you own an older Ram you understand that a seat cushion was on the list. We found a manufacturer and the DuroFoam seat cushion (first introduced for '98-'02 owners) was built for us.

A Better Mousetrap? More fun and fascinating facts for friends: We've addressed shortcomings of the OEM cushion by using a higher quality foam known as DuroFoam. We've also raised the entry side of the cushion to match the other side and reinforced the bottom for better support.

Really, A Better Mousetrap! A final fun and fascinating foam fact for friends: We mentioned the DuroFoam construction. The material is twice as heavy as an OEM cushion; 2.5 times as heavy as the cheap $49.00 offshore/eBay cushions. Your bottom side deserves the best.

NEW 'FACTORY-MATCH' BOTTOM SEAT COVERS

Now at Geno's Garage you will also find our new bottom seat covers that are an exact match to the '98-'12 OEM covers in your truck. They work in bipartisan cooperation with our seat cushions.

Seat cushions for additional years coming soon.

CHECK OUT OUR WEBSITE FOR HUNDREDS OF REPAIR AND MAINTENANCE PARTS TO KEEP YOUR '89-'20 RAM TURBO DIESEL TRUCK RUNNING ITS BEST.

We've Got Your Seats Covered

OEM-Style Bottom Seat Covers

Replace a worn out bottom seat cover in your 1998 to 2012 Dodge Ram with these OEM-style replacement seat covers. These seat covers use the same style fabric top covers as the originals. All of the covers use either original or new production material.

Check the seat in your truck before ordering as they are not interchangeable.

(NOTE: Not all colors available at this time.)

Made in the USA

'06-'12 Leather/Vinyl Seat Cushion Bottoms - Driver Side

'10-'12, 2500/3500 & '09-'12, 1500 Laramie (All Cabs) Bucket Seat - *Waterfall Front*
DARK SLATE DR-12-DS-P-WF-AC-D: **$229.00**
PEBBLE BEIGE DR-12-LPB-P-WF-AC-D: **$229.00**

'10-'12, 2500/3500 & '09-'12, 1500 Laramie (All Cabs) 40/20/40 Seat - *Non-Waterfall Front*
DARK SLATE DR-12-DS-40-D: **$209.00**
PEBBLE BEIGE DR-12-LPB-40-D: **$209.00**

'10, 2500/3500 & '09-'12, 1500 Laramie (All Cabs) Bucket Seat - *Non-Waterfall Front*
DARK SLATE DR-12-DS-P-AC-D: **$229.00**
PEBBLE BEIGE DR-12-LPB-P-AC-D: **$229.00**

'06-'09, 2500/3500 & '06-'08, 1500 Laramie Bucket or 40/20/40 Seat - *Vinyl Flap Side*
KHAKI DR-08-KH-P1-P-D: **$219.00**
MEDIUM SLATE DR-08-MS-P1-P-D: **$219.00**

'06-'09, 2500/3500 & '06-'08, 1500 Laramie Bucket or 40/20/40 Seat - *Hard Plastic Side*
KHAKI DR-08-KH-P2-P-D: **$219.00**
MEDIUM SLATE DR-08-MS-P2-P-D: **$219.00**

'06-'09 Cloth Seat Cushion Bottoms - Driver Side

'06-'09, 2500/3500 SLT & '06-08 Ram 1500 SLT - All Cabs Bucket & 40/20/40 Seat - *Carpet Flap Side*
KHAKI DR-SLT-08-KH-P1-DC: **$159.00**
MEDIUM SLATE DR-SLT-08-MS-P1-DC: **$159.00**

'06-'09, 2500/3500 SLT & '06-08 Ram 1500 SLT - All Cabs Bucket & 40/20/40 Seat - *Plastic Panel Side*
KHAKI DR-SLT-08-KH-P2-DC: **$159.00**
MEDIUM SLATEDR-SLT-08-MS-P2-DC: **$159.00**

'98-'02 Quad Cab - Cloth

DRIVER SIDE

'03-'05 Quad Cab SLT, Electric, 40/20/40 - Trim Code M9DV
Dark Slate: HU-L03ADE-M9DV: ~~$225~~ $215
'03-'05 Quad Cab SLT, Manual, 40/20/40 - Trim Code V9DV
Dark Slate: HU-L03ADM-V9DV: ~~$225~~ $215

'98-'02 Quad Cab SLT, 40/20/40 - Trim Code R1AZ
Dark Grey/Agate: HU-L98QDX-R1AZ: ~~$199~~ $185
'98-'02 Quad Cab SLT, 40/20/40 - Trim Code R1C3
Light Grey: HU-L98QDX-R1C3: ~~$199~~ $185

'98-'02 Standard Cab, Trim Code R1AZ
Dark Grey/Agate: HU-L98RDX-R1AZ: ~~$245~~ $235
'98-'02 Standard Cab, Trim Code R1C3
Light Grey: HU-L98RDX-R1C3: ~~$245~~ $235

'98-'02 Standard Cab - Cloth

PASSENGER SIDE

'03-'05 Quad Cab SLT, Electric, 40/20/40 - Trim Code M9DV
Dark Slate: HU-L03APE-M9DV: ~~$225~~ $215
'03-'05 Quad Cab SLT, Manual, 40/20/40 - Trim Code V9DV
Dark Slate: HU-L03APM-V9DV: ~~$225~~ $215

'98-'02 Quad Cab SLT, 40/20/40 - Trim Code R1AZ
Dark Grey/Agate: HU-L98QPX-R1AZ: ~~$199~~ $185
'98-'02 Quad Cab SLT, 40/20/40 - Trim Code R1C3
Light Grey: HU-L98QPX-R1C3: ~~$199~~ $185

'98-'02 Standard Cab Trim Code R1AZ
Dark Grey/Agate: HU-L98RPX-R1AZ: ~~$245~~ $235
'98-'02 Standard Cab Trim Code R1C3
Light Grey: HU-L98RPX-R1C3: ~~$245~~ $235

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Product installations, evaluations, and gearhead commentary by James Langan.

MODIFICATIONS TO MY 2017 TRUCK – THE PACK MULE

TufTruck TTC-1224 Front Coils

In contrast to the typical modern approach of lifting the front of a new truck to remove all or most of the factory positive rake, I prefer to add most of the weight that a rig is going to haul and then make the desired chassis adjustments.

On a heavily loaded outfit, I still prefer a slight positive rake or as level a stance as possible. However, I did want, maybe even needed, a better approach angle for more clearance off-highway. Because the front axle is also carrying extra pounds, including a big front bumper from Buckstop and a Warn 16.5k winch, installing TufTruck's TTC-1224 heavy-duty front coils with a higher spring-rate made sense. Street price is about $340 a pair.

TufTruck TTC-1224 on the left, taller and made with larger wire diameter than the OE spring on the right.

Baseline and Installation

One of the potential negatives of raising the front is reducing caster and drivability. Up to a few inches is generally okay, depending on the vehicle, as long as there is sufficient caster to begin. Every chassis is different and you really don't know how a newly modified truck will drive until after installing the parts. It had been many months since my 2017 had been on an alignment rack, so I took it to a local Les Schwab Tires to get the current alignment numbers.

Starting the project with good data.

With live-axle trucks we are at the mercy of the axle manufacturers. Some vehicles come with better caster and camber numbers than others, and they will drive better or worse depending on the geometry. Adjusting the toe-in is all that's available unless one wants to go the effort of installing an offset ball joint, like I did on my 2014 (TDR 87, pages 94-95). I was prepared to add offset ball joints as needed after adding the TufTruck fronts because I demand excellent drivability, but I also hoped to avoid the cost and hassle.

Performing the front coil remove-and-replace was as easy as the rear: Disconnect the shocks and sway bar, support the frame, droop the axle to make the springs loose enough to pull out, and pop-in the new coils.

Two 6-ton jack stands support the frame and truck, floor jacks allow controlled axle droop, and smaller jack stands under the axle for backup.

Positive Results

TufTruck's TTC-1224 are intended to support snow plows and such, which are not only heavy, but they also extend forward farther than a winch bumper, which increases the load applied to the springs. They are designed to give 2-to-2.5" of front lift. My Buckstop bumper is not terribly heavy for a big bumper because the main blade is aluminum, but the flatbed camper and all the other gear I carry also add a few pounds to the front axle. On my 2500, immediately after installation, I received a whopping 3" on the right and 2.75" on the left. While more than TufTruck predicts, it's not too much for this chassis, and over time it will surely settle a little. The camper outfit sat almost perfectly level.

TufTruck TTC-1224 installed on 2017 Ram 2500.

I was not surprised the steering wheel was off-center after the new springs. If you let Ram weld the adjuster (instead of torque to spec) this can't be corrected.

Before the new coils the caster was high, well above the minimum spec, which is a great thing for straight-line tracking. Camber, which can also affect drivability somewhat but is even more important for tire wear, was also good. After adding the TufTruck springs the steering feel was a bit lighter, as caster was reduced 2.2°. I had it to spare (see chart). Tracking and overall drivability remained excellent. The toe-in was adjusted to the low-end of specifications at my request, and no additional modifications were needed.

Before	***Left***	**Right**
2017 Ram 2500	Factory Coils	Factory Coils
Camber	0.0°	0.3°
Caster	7.3°	7.8°
Toe	0.18°	0.27°

After	***Left***	***Right***
2017 Ram 2500	TTC-1224	TTC-1224
Camber	0.1°	0.2°
Caster	4.9°	5.6°
Toe	0.06°	0.07°

The TufTruck springs are a good fit for my application. They do not feel stiff or noticeably firm. Supportive is a better word, and the truck drives and handles very well. Because of the height increase, longer shocks were needed, so I ordered a pair of Rancho 9000XL 9-speed adjustable dampers ($110 each). The 'Mule now runs exactly the same shock, an RS999044, both front and rear.

The TTC-1224 coils have been installed for one year and 14,000 miles. Because I remain pleased with this upgrade, I am considering putting the same front coils on my 2014, which has the same front bumper and carries similar tools and accessories.

The truck looks dead level on flat ground.

SuspensionMAXX Links

It is optimal to keep the front sway bar near its stock position, so new SuspensionMAXX links were purchased from Geno's Garage. While ordering, I learned that the factory links sometimes have a pretty short lifespan, so an upgrade may be desirable even without lifting. Good parts at fair prices ($117), combined with a knowledgeable staff are some of the reasons Geno's Garage is the first place I look when shopping for parts…not because I write a column for the mothership.

Stock front sway bar link next to replacement SuspensionMAXX end-link from Geno's Garage.

Revisiting the Rear Suspension

In TDR issue 105, pages 96-97, I chronicled the removal of the factory rear coils and Air Lift 1000 auxiliary bags in favor of TufTruck's TTC-1225 rear springs. For months I ran only the TTC-1225 in the rear, hoping that they would be *enough* for my load, but after thousands miles they clearly were not. TufTruck says these rear coils are rated for an additional 500 pounds over the factory parts, but I carry much more than that.

I love the TTC-1225 heavy-duty TufTruck rear coils, but I needed more spring rate than they offered.

The factory suspension supplied by OEM is always a compromise intended to balance ride quality and weight carrying capability. Folks that don't use their rigs for heavy loads often want them to ride like cars, but if substantial weight is added to the chassis, it can become a wallowing, sloppy mess. There is nothing fun or safe about a heavy vehicle that is too softly sprung.

Some complain about modern heavy-duty trucks riding rough when empty, but I think they are drinking their bathwater, or possibly have limited historical perspective regarding what a rough ride really is or was. Modern heavy-duty pickups are extremely comfortable unloaded, particularly with appropriate tire pressures. They also handle weight impressively well. However, when you haul maximum loads that are not necessarily above the capability of the chassis, but are taxing the stock or aftermarket suspension, it is time for upgrades.

My camper outfit needed more spring-rate above the rear axle, and I wanted to avoid using air, if possible. I wanted to try something different and avoid air leak hassles. I had enjoyed using Timbrens on a Toyota Tundra with Four Wheel Camper after trying air, and I wanted to try their Aeon springs on my 2017 Ram.

Timbren DR2500D

In June 2019, before heading to the Cummins 100th/TDR Rally in Columbus, Indiana, I installed the Timbren DR2500D Rear Axle SES (Suspension Enhancement System) kit. The standard-duty double-convoluted Aeon springs were a fantastic improvement. Having a capacity of 8,600 pounds, body-roll (sway) was reduced, while stability and control were substantially increased, all for $215.

Timbren DR2500D rubber auxiliary Ram 2500 rear springs kit.

The Timbren DR2500D improved handling as much or more than replacing the factory rear sway bar with one from the aftermarket. This likely has much to do with the spring rate and also the location of the springs, which are outboard of the rear coils, closer to the wheels, similar to the packs on a leaf-sprung truck.

The Timbrens could not be easier to install on a late-model Ram 2500. Simply remove the factory bump stops and brackets, and bolt-on the Aeon brackets and springs. It's literally a half-hour job if you don't dally, or an hour if you take your time. While the chassis sat almost perfectly level when fully loaded, I generally prefer the rear slightly higher. Later I added Timbren's included one-inch spacer to add some positive rake.

The clean spot atop the rear axle indicates the OE bump stop had made contact.

It is worth noting that on a heavy and always loaded chassis like mine, the Timbrens are engaged and working all the time. On an empty or lightly loaded pickup, the rubber springs would be installed to have a gap and only engage when a load is applied, similar to what we traditionally called overload springs.

The rear axle load sitting on the Aeon double-convoluted rubber spring with the 1" spacer added.

Timbren DRTT 3500E

After 10,000 miles on the DR2500D, I wanted to try the single-convoluted, DRTT3500E *severe service* kit ($317) because I thought the chassis would benefit. The shorter, firmer, single Aeon springs are rated for slightly less weight (8,000-pounds). However, they are only suggested for the heaviest outfits. Timbren specifically suggests the DRTT3500E kit for *"truck campers and salt spreaders or any application that requires maximum stability."*

Timbren DRTT3500E single-convoluted spring kit, shown with the included 1" spacer on the left, and without on the right.

The double-convoluted springs were good, but compressed more than the singles, and were softer than needed under my maximum load. The DRTT3500E single-convoluted kit is impressively better for my application; I love them!

Remember that severe service springs are not desirable if you don't need them; they will be to too firm or even harsh. The double-convoluted auxiliary springs are recommended for most applications, and I plan to put them on my 2014 crew cab that carries the Hallmark "Milner" camper. Adding Timbren Aeon Rubber Springs to the rear of my 2017 Ram 2500 camper outfit has been the single best heavy-duty load support suspension upgrade I've made thus far!

These Timbren DRTT3500E replacement springs are quick and easy to install.

Other Rear Suspension Options

Kelderman sells a bolt-on rear air-ride kit for 2014-up 2500s that replaces the rear coils with commercial-grade air springs. They claim these double the effective capacity of the rear suspension. It sounds interesting; however, I'm not wild about the idea of eliminating the metal coils and completely relying on air. Leaking air-actuated components are legendary. One of their kits *lowers* the rear; they call it a reverse level, which is not appealing. Now they also sell a stock-height kit for $950. Do we have any TDR members that have used the Kelderman system?

The TufTruck rear coils, Timbren Aeon rubber, and the Air Lift 1000 springs that I recently reinstalled all add up to $850. They were added over time, and without the risk of eliminating the metal springs. My setup delivers substantial redundancy. Maybe the Kelderman Coil Replacement Kit is better, there's only one way to find out, but sometimes it's wise to proceed with caution.

Always Tinkering, So What Next?

My friend Brent has a 2016 SRW Ram 3500, loaded with an 8.5' hard-side cab-over camper, 100 gallons of extra fuel, tows a Dodge Durango, etc., and he knows heavy-camper handling characteristics; he lives in it full-time. On a recent overnight trip I had him hop into my rig to go for a ride. We drove on dirt roads, bumpy old blacktop, and briskly over rough railroad tracks, all at full tire pressures; 60psi in front and 80psi in the rear.

He said my outfit handles well and feels good, adding that I'd likely be hard-pressed to improve things, with the possible exception of spending thousands on custom shocks. That is what I had been thinking, but maybe I was the one drinking my bath water.

The heavy 2017 Turbo Diesel "Pack Mule" with the Hallmark camper chassis seems dialed, but I asked my knowledgeable friend for his opinion. He liked it!

There was one more aftermarket chassis modification I made recently, which had a dramatic impact on handling. I'll save that for my next column, but it involves a sway bar.

Tires as Suspension

In the high-performance car (and even sport-truck) world it's obvious that tires are a critical part of the suspension setup and the overall dynamics and handling of a vehicle. In the heavy-duty pickup world tires should be regarded with similar importance regarding how they handle loads, although it seems this is frequently ignored or overlooked until a problem arises. Such *laissez-faire* attitude seems more prevalent with those who infrequently work their trucks. ***Editor's note: James just described "The Editor."***

Unless one is never going to load their rig, generally aftermarket tire-and-wheel combinations should not have less capacity than the originals. However, just because a tire can support a particular load does not mean it is providing optimal performance. There are many potential differences, which include the tire size, load index, maximum psi, construction, tread pattern and compound, etc. Here is a real-world example of how dramatically tires can affect handling.

Surefooted Mule to Wallowing Pig

While driving to the 2019 Overland Expo West show last May, my 2017 'Mule started handling poorly. What I discovered, arriving in Flagstaff, Arizona, was that I had lost a bolt that clamps the sway bar to the rear axle. This rendered the bar useless and explained the sketchy handling I was experiencing.

On a coil-sprung vehicle, particularly one with a maximum and tall load, sway bars can be critical for safe handling, particularly during emergency maneuvers. To mitigate the then unexplained sloppy handling, twice I stopped to increase tire pressures. Adding 20psi and over-inflating the 65psi-maximum tires made a slight but still noticeable stability improvement. It firmed-up the relatively tall and flexible 35" tire sidewalls on 17" wheels, partially compensating for the looseness of the disconnected rear sway bar.

Missing bolt and bent Hellwig Big Wig rear stabilizer bracket explained the loose handling.

Thankfully my friends at Factor 55 had a block of titanium on which we pounded the deformed bushing bracket back into a usable shape. Another friend had a spare fastener. Seems losing sway bar bolts on late-model Ram 2500s is not that uncommon. My friend was carrying a spare bolt because he had previously lost one himself; we both have the same Hellwig Big Wig rear bar. Another acquaintance at the event had also found a bolt missing on his factory rear bar while in Death Valley. So owners of newer Rams might want to check their sway-bar hardware, add some Loctite, and torque 'em.

Air Supports Weight

It's important to remember that it's the total amount of air in a tire that supports weight; this includes the physical volume combined with the psi. This is one reason why some of the super-short sidewall tires are not appropriate for heavy-duty pickups. The ratings can be ridiculously low, partially because there is not enough physical volume space for adequate compressed air.

Unreasonably short sidewalls (think low-rider) will provide a firm, sometimes even jarring ride over small imperfections in the roadway, and in extreme cases potholes might bend a wheel because the thin sidewall does not provide adequate impact absorption. With that visual in mind, it can be helpful to think of tires as the biggest shock absorbers (dampers) on trucks. They can work in our favor or against us. Softer, tall-sidewalls can absorb impacts and improve ride quality for one application, or reduce control and handling on another. Adjusting the pressure or changing the size can improve or reduce overall performance.

Large 37x12.50R17LT Goodyear Wrangler MT/R is only a 50psi tire, but the tire volume makes the SRW rating 3,525-lb each. I prefer the handling attributes of higher psi tires.

My dislike for large diameter wheels with *silly short* sidewalls on four-wheel-drive pickups emanates from decades of actually using trucks for off-pavement travel instead of owning them as a fashion statement. What constitutes a silly short sidewall on a four-wheel-drive depends on the diameters of both the wheel and tire, but historically an aspect ratio below 70% might qualify. However, the aspect ratio alone does not tell the whole story, as it is a percentage of the width. A bigger wheel and tire combination with a lower aspect ratio might still have enough sidewall to work well off-pavement, while providing superior control on-road, particularly with a massive load.

Function Over Form

There's little doubt that the humongous big-wheel craze on pickups (20" and taller) is mostly the result of the street-truck culture, not farmers and ranchers, heavy haulers, or commercial industries. Brakes are much larger on modern vehicles, but it doesn't take 20" wheels to clear them. My recent interest in bigger wheels with shorter sidewall rubber is for *optimal chassis stability and performance* with my Hallmark camper; I prefer the traditional look of more tire and less wheel.

Many late-model Turbo Diesels are delivered with 33s mounted on 18" wheels, and have a 7.5" sidewall. (Overall diameter minus the wheel height divided by two equals sidewall height.) Increasing tire diameter to 35" on an 18" wheel produces an 8.5" sidewall, an almost 14% increase. The same 35" rubber on a 17" wheel produces a 9" sidewall, which is a substantial 20-percent increase over the stock LT275/70R18 size. Using a 20" wheel for a 35 brings the sidewall height back down to 7.5"; same as the factory 33 on an 18" rim.

People don't complain about the stock 275/70R18E having a short sidewall. SRW capacity is a respectable 3,640-lb at 80psi.

If you think a 35" tire is huge, think again. Most new heavy-duty Rams will fit a narrow 35" tire (LT285/75R18) on stock wheels with little or no rubbing, and only minor rubbing on the radius arms at full-steering-lock if a wider, 35x12.50R18 is squeezed onto the factory rims. By running *only* 35s on my Fourth Generations I'm in the smaller tire club; 37s on aftermarket wheels are the popular cool choice for many.

Cooper's AT3 XLT in 285/75R18E (34.84") with a 129 load index can handle 4,080-lb each at 80psi.

LT305/70R18 (35.1") Dick Cepek Fun Country is a 65psi design, rated for 3,750-pounds.

Are 19.5" Wheels and Medium-Duty Tires the Answer?

Some of the heavy-hauling crowd, particularly those with cab-over campers, tried an option decades ago with 19.5" medium-duty commercial tires when there were fewer tire size options.

I have read several comments online, and spoken to others who say 19.5" tires are too stiff over rough roads, both paved and not, even on *heavy* trucks. On unloaded rigs, the ride is sometimes described as downright jarring. Some are willing to tolerate an extra-firm ride, but it is worth remembering that unnecessary roughness will be transmitted to all chassis components, potentially reducing their longevity. Surely some folks love their 19.5" tires and wheels on SRW pickups, but they appear to be a small minority.

If someone wants to lend me a set I'd be happy to bolt them on and give them a spin. My extensive heavy-duty pickup and LT tire knowledge has repeatedly convinced me that I don't need to spend my time and money on medium-duty rubber for my pickups. Skipping the 19.5" wheels and going straight to modern, readily available twenties made more sense.

Cooper Discoverer AT3 XLT 18" versus 20"

In typical "RoadTraveler" James fashion, I did back-to-back evaluation drives to observe differences between almost identical rubber wrapped around different diameter wheels. To limit controllable variables, the same manufacturer and tread design was chosen. Without this approach, carcass construction differences and other factors would unfairly skew impressions. While construction matters (continue reading), sometimes much, the goal was to test what dynamics are affected by simply changing the wheel diameter. With that established, one can then seek tire construction and/or other suspension solutions as needed for their specific application.

18" wheel on the left, 20" wheel on the right, all other specs are very similar.

The good folks at Cooper Tires, one of the few American companies still making tires in the United States, supplied the rubber to facilitate the evaluations. The redesigned Cooper Discoverer AT3 family of tires was introduced at the 2018 SEMA Show. It includes three distinct models targeted at specific segments of the all-terrain market. Cooper describes the attributes of these AT3s as:

Discoverer AT3^{4S}: Severe snow rated with improved wet weather performance, snow performance, fuel economy, and with significantly improved tread wear.

Discoverer AT3^{LT} and Discoverer AT3^{XLT}: are designed to be powerful, shred-resistant all-terrain tires. With the Discoverer A/T^3 well-known for its long-lasting tread wear and dirt road performance, the new Discoverer AT3^{LT} and Discoverer AT3^{XLT} tires feature Durable-Tread Technology, enhancing durability, and enabling a best-in-class mileage warranty.

Longevity and durability have much to do with the application and duty cycle, but Cooper has certainly upgraded and expanded the all-terrain AT3 line to cover all consumers who want this type of five-rib tire. Turbo Diesel owners should look at the AT3 XLT version, as it comes in the largest sizes with the highest load ratings.

Similar But Different

Because I prefer taller and narrower sizes for most conditions, I chose the 34.84-inch-tall LT285/75R18, and the 34.57-inch-tall LT285/65R20. There is very little difference in height or width between these two sizes, for all practical purposes they are the same, with the exception of the wheel diameter, which gives the twenty a much shorter sidewall. The 285/75R18 has a 8.42" sidewall, and the 285/65R20 has a 7.28" sidewall. Both sets of tires were mounted on factory Fourth Generation Ram aluminum wheels.

Both tires have a 285mm section width, but look at the tread width difference, which is noted in Cooper's specifications.

Cooper Discoverer AT3 XLT	LT285/75R18	LT285/65R20
Load Index (SRW)	129 = 4,080-lb	127 = 3,860-lb
Height	34.84"	34.57"
Section Width	11.5"	11.5"
Tread Width	8.9"	9.69"
Weight	60-lb	62-lb
Tread Depth	17/32"	16/32"

Cooper AT3 XLT General Observation

Both sizes track straight and true, as one would expect with a five-rib all-terrain. While driving through dozens of miles in heavy rain, the AT3 XLT performed fantastically, evacuating water well, a forte of a ribbed tread pattern. Siping is generous to help with all slippery conditions. Though obviously not a mudder, some light, shallow mud was handled impressively well during a weeklong autumn camping trip in remote northeast Nevada.

Unless one wants a dedicated highway offering like the Cooper HT3, the AT3 XLT is a quiet, efficient design that should yield good fuel economy. The XLT has attractive, aggressive sidewall shoulder tread that looks good and should prevent both off-pavement and curb scrubbing damage.

Test Drives

Several back-to-back drives were performed over six months. The first with more off-pavement miles was a 45-mile loop that included 30 miles of freeway, five miles of rural highway, and 10 miles of rocky dirt on the historic Henness Pass Road trans-Sierra route. When the road got rough, I continued for several miles at full psi, before dramatically lowering the pressure at a specific point to improve the ride and traction.

Shorter 20" sidewalls are a bit less forgiving at full psi on the roughest roads, lowering pressure helps. This Cooper AT3 XLT 285/65R20 was initially tested at 37psi, but is at 30psi in this photo. Dropping the extra 7 psi was a big improvement.

Both sets of Cooper AT3 XLT tires, and other sets I have in my shop, were swapped on-and-off the 2017 'Mule for comparison. Both sets of Coopers also saw some miles on my 2014 truck, "Clessie the Carryall Crew Cab."

The 20s went on a 1,000-mile vacation with my wife. That trip included over 100 miles of unpaved roads, that were occasionally rocky, snow-covered, or rough washboard. I intentionally gave the 20s more time and miles, as I have much experience with 18s, including the previous AT3. As of this writing both sets have seen a combined 5,700 miles.

Remote northeastern Nevada camp during a weeklong on- and off-pavement evolution drive.

There are many potential variables to putting softer or firmer tires, and taller or shorter wheels on a chassis. If your suspension is stiff or the load is light, maybe a softer tire is better, as long as it's not overly susceptible to punctures. Softer suspension and/or huge loads may benefit from a stouter design. The bullet points below share the pros and cons of using 20" verses the 18" Cooper Discoverer AT3 XLT tires for big loads on heavy-duty trucks.

20" Cooper AT3 XLT Pros

- Substantial improvement in lateral stability when compared to 17" or 18" tires of similar construction. Feels like the improvement from adding a heavy-duty rear anti-sway bar compared to the factory bar.
- Steering feel is better, tighter, and more responsive with less delay.
- Slow, mountain turns and switchbacks with warning signs are less concerning.
- Freeway hop/bed-bounce caused by concrete freeway expansion joints is reduced.

My 140.5" wheelbase 2017 regular cab is stable and controlled over most surfaces with inherently little *hop* compared to the 149.5" wheelbase 2014 crew cab. Mounting the Cooper AT3 XLT 20" wheels on the 2014 crew cab both firmed-up the ride, as we'd expect, *and noticeably reduced freeway hop*.

An important safety consideration is that even if the chassis feels stable and composed enough to increase speed in certain situations, there is only so much *available traction*. When we use more of the total traction available, we are reducing our safety cushion, and putting more load on the tires, which causes wear and reduces longevity.

20" Cooper AT3 XLT Cons

- Noticeably less forgiving and rougher than the 18" tire over speed bumps and on rocky roads at full street pressure. However, when the going gets tough, reducing psi benefits all tire and sizes tremendously. To get the same ride over rocky terrain, the 20" tire liked being about five psi lower than the 18", particularly the fronts.
- Small bumps, cracks, or holes on the roadway are more noticeable, as the tire has less ability to absorb the imperfections. How noticeable depends on the tire construction, pressure, load, and surface. With my heavy Hallmark camper, the 20" Cooper AT3 XLT, which is admittedly a softer design, never felt harsh or uncomfortable on the pavement.

Conclusion?

My 18" versus 20" test driving quickly convinced me that with heavy loads a shorter and/or firmer sidewall that reduces some of the squishiness of a softer design was a positive. The biggest tradeoff is on the roughest, unpaved surfaces.

With a given design like the Cooper AT3 XLT used for this comparison, the shorter 20" sidewall was also firmer and less flexible. However, if you change the tire construction characteristics, you have changed the suspension, and you have a new baseline.

Mounting the stoutly constructed Cooper Discoverer S/T MAXX (or similar) with 3-ply sidewalls in an 18" size delivered better overall control than the softer 20" AT3 XLT. That is not a dig against the AT3, as it intentionally targets a different audience. Want or need another level of firm performance over an 18" Cooper Discoverer S/T MAXX? You can move up to one of the 20" S/T MAXX sizes. Modifications lead to modifications, and every change can affect something else.

Cooper S/T MAXX is a favorite heavy-duty hybrid/commercial traction design. Even a 1" wheel diameter difference is easy to see and feel. Both about 34" tall, 17" Power Wagon wheel (left), and forged Big Horn 18" wheel (right).

My travels include more off-pavement miles than many, so I am still evaluating how I want to make my long-term compromises. But, like everyone, most of my driving is on good, paved roads. My tire and suspension evaluations are continuing, and you can find additional information about these and other subjects on my RoadTraveler.net website, or on Instagram, @RoadTraveler.

The sign says, "TRAILERS NOT ADVISED BEYOND HERE". My outfit is frequently off-pavement, but most miles are on blacktop.

Resources:

Air Lift: airliftcompany.com
Cooper Tires: us.coopertire.com
Geno's Garage: genosgarage.com
Hallmark Campers: hallmarkrv.com
Hellwig: hellwigproducts.com
Kelderman Manufacturing: kelderman.com
Rancho: gorancho.com
SuspensionMAXX: suspensionmaxx.com
Timbren Industries: timbren.com
TUFTRUCK: tuftruck.com

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BACK TO THE FUTURE?

My journalism career now spans over 20 years, and my voracious consumption of periodical literature as an enthusiast, mostly automotive-related, is approaching twice that.

In the November 4, 2019 issue of AutoWeek, Publisher Rory Carroll announced that I was holding the last printed version of the magazine. AutoWeek had been printed in one version or another since 1958. In a somewhat curious arrangement, Crain Publishing did not sell, but entered a multiyear agreement with Hearst Magazines to operate the title as a digital brand. Hearst also owns Road & Track and Car and Driver. They sent me Road & Track to fulfill the remainder of my AutoWeek subscription.

December 2019, TEN Publishing (The Enthusiast Network) announced they were ending the print versions of 19 automotive enthusiast titles. I had subscriptions to two titles, Truck Trend and 4-Wheel & Off-Road. Another terminated TEN magazine probably of interest to the TDR readership was Diesel Power. The shuttering of so many enthusiast print titles is surely a blow to those that prefer hard copy, including me. While I read and create plenty of digital media, looking at a screen is not the same as holding and flipping through a paper periodical.

Nineteen enthusiast magazine titles are no more, including Diesel Power.

Digital Over Print

Enthusiast reading for many now revolves around forums, YouTube, social media or online publications. Two motivations to choose forums are because they are generally free (although the popup advertising can be annoyingly intrusive), and there is sometimes a perception that the forum information is less biased and untainted by traditional print magazine advertising influences. Seeing both sides of the coin for many years I have these observations.

Most of the time you get what you pay for. Free information does not come without bias. In fact, the limited experience of some folks on forums, and/or their inability to articulate facts or observations, and separate the wheat from the chaff, makes much of the information less helpful. I would argue that vetted, professional journalists that have had to jump through hoops to get where they are—traditionally many have journalism or English degrees, plus years of experience in their subject matter—know what they are writing about. Their journalistic integrity is worth much more to them than supplied products or advertising dollars for the mothership. Human nature being what it is, often people assign little value to free stuff…if you don't value your work, why should I?

Of course, there are exceptions. Many longtime participants on the TurboDieselRegister.com forum are obviously knowledgeable and generally more mature than those on other sites. The TurboDieselRegister.com is different, in a good way. It only takes a bit of web surfing to make the less cordial and/or juvenile behavior on some websites abundantly clear. The blessing and curse of the internet is that anyone can have a voice or platform. Still, forum posts can't replace the thought and detail that goes into traditional long-form journalism.

The TDR magazine audience has always been a senior group, and when it was founded I was certainly one of the youngest subscribers, then still in my 20s. Likely I am still *youngish* in my 50s. Recent correspondence with subscribers seeking my input on upgrades confirms that many older readers still prefer physical magazines to digital versions.

The traditional magazine advertising model relies on circulation, because without them, the ads won't sell. The TDR directly relies on subscribers because there is very little advertising. Paid subscriptions make periodicals viable and vibrant. However, no business can flourish without a periodic infusion of new customers.

Putting my money where my mouth is, I went to one of the two remaining bookstores in Reno, Nevada, and bought issues of Diesel World and Diesel Tech magazines. Both had more bling-bling trucks than I prefer. (I'm all about practical haulers.) Overall the Diesel Tech content was less interesting and quite thin. Diesel World had enough for me to earn a two-year subscription.

Back in the early 1990s, the TDR was *the* diesel-enthusiast publication. There were no Diesel Power, Diesel World, or Diesel Tech magazines. Like many of the shuttered 19 titles, Diesel Power was once the gorilla in the industry. Now it seems that the original, the TDR quarterly, has outlasted the upstart.

Do you appreciate the Turbo Diesel Register magazine? Follow my lead. Find a new subscriber to help invigorate the readership with new enthusiasts. Maybe give a gift subscription to someone; I've done so before. Many of us can afford to invest $35, which is less than half a tank of fuel.

Tell 'em you read it in the TDR!

James Langan
TDR Writer
www.RoadTraveler.net
Instagram @RoadTraveler

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The Rest of the Story

Stan Gozzi retired from Chrysler in 2017.
He has graciously agreed to stay active in this hobby.
His column "The Rest of the Story" will give you a glimpse of the trials and tribulations that the factory guy(s) have to endure.

NVH ANALYZER TOOL

The editor called me in January and said he had heard about a phone application (app) for identifying vibrations in vehicles. He had seen some of my posts on the forum about properly identifying vibrations and was aware that I had used several NVH tools while still working as a technical advisor at FCA. So he asked me if I would be interested in doing some research on the app and writing about it for issue 108. And as an added bonus he offered to pay for the app. Now who could pass up that kind of learning experience? So I agreed to purchase and test the software for the TDR audience.

As he described the software, I immediately recognized it because I was familiar with the developer from my work with FCA's technical training group. FCA has maintained a long relationship with Weber State University in Ogden, Utah. Although not personally familiar with them, I knew of them and the quality of the program they have developed over the years. I was also familiar with John Kelly, one of the professors and the developer of the NVH software app, by Vibrate Software. Weber State University Automotive Department also has one of the largest and most professional YouTube channels covering a wealth of automotive subjects. If you are sitting at your computer or browsing your phone, take a look at some of the videos they have produced. You can get lost for hours looking at the content that is available.

Let's Review

Before we get to the software, how about a little background on vibrations, what causes them, how they differ, and how they might pertain to our trucks?

First, there are a couple of key things to remember when it comes to vibrations. The first, and most important, is that anything that rotates has a natural frequency that it vibrates at, known as the resonant frequency. The frequency is the number of times the vibration occurs per second. A tire vibration has a low frequency because it is turning about 10-15 times per second at highway speeds; a driveline vibration has a higher frequency because it is turning over 30-60 times per second. The secret to keeping vibrations and objectionable noises out of the passenger compartment is to engineer them so the frequency of the rotating part is outside the range we can hear. Alternately, we can "tune them out" using different methods.

One of the most common things you will see on our trucks today are isolated weights hanging in different locations on the vehicle. They have rubber isolators to keep the weight from directly contacting the bracket, and the weight and rubber are tuned to the natural frequency of some part of the vehicle that is rotating, like a wheel, engine, or driveline. The weight absorbs the vibrations and keeps them from annoying the passengers. We used to call them hum suckers, because they did a very good job of keeping noise and vibration to a minimum.

One of the first examples I remember (working for Chrysler in my younger days) was a large weight under the horn pad on "K" cars.

One of the first examples I remember (working for Chrysler in my younger days) was a large weight under the horn pad on "K" cars. Because of engine vibrations from the little 2.2-liter, 4-cylinder engine, it caused the steering wheel to vibrate like crazy at certain engine speeds. So instead of making the engine smoother, the engineers added a several pound weight mounted on rubber that vibrated at the same frequency as the steering column. The result was the weight "absorbed" or cancelled-out the vibration, making the car much more fun to drive.

Just like vibrations we can feel, there are also vibrations we can hear. Stereo speakers are the best example. They vibrate at frequencies we can hear and feel (think sub-woofer), sometimes pleasant, sometimes not. One of the vibrations I became most familiar with was the 68mph drone on 2500, 4x4, Quad Cab short bed, Turbo Diesel trucks equipped trucks with 3.73 axle ratio. Many of you may have owned one of those trucks back in the 2000's. Some were plagued with an annoying drone at the 68-72mph, especially when driving a slight grade. The noise you heard was a combination of a natural third-order engine firing frequency reacting with a first-order driveline vibration. The result of those two natural frequencies was the annoying drone. Many dealers were unable to repair it, because they lacked a basic understanding of what caused it, and didn't use the tools FCA made available to identify what was happening.

So let's back up again and try to understand the natural frequency of objects. Because our trucks are equipped with an inline, six-cylinder engine (and every other inline-six) has a natural third-order engine vibration. So you ask, what does that mean? Well think about the four stroke engine. In our case the engine fires all six cylinders every two revolutions of the crankshaft. Break that down further, and the crankshaft speeds up and slows down three times on every rotation. That, in turn, causes a natural vibration that occurs three times per rotation, or a third order vibration. A tire or driveline that has a low or high spot has a first order vibration (it vibrates once per revolution) and a driveline that has the wrong angle (think lift kit) has a second order vibration because it vibrates twice per revolution as the U-joint changes angles. Driveline vibrations are probably the most misunderstood, as you cannot correct a second order driveline vibration by having it balanced. You can only correct it by changing the U-joint angles.

Driveline vibrations are probably the most misunderstood.

Wait! I thought we were talking about the drone on our older trucks. What does all this have to do with the drone we "hear"?

There are ways an engineer can keep those frequencies from being annoying or reacting with another frequency. But it isn't easy sometimes. The first way is to have motor mounts and transmission mounts that isolate the vibration from the frame. The engine still has the third-order vibration, but now we can't feel or hear it. However, we have yet another dilemma. Anything attached to the engine also shakes at the same order and frequency as the engine. Remember the weight attached to the power steering hose on Third Generation trucks? That was to "hum sucker" the resonant frequency of the power steering system that was getting into the cabin. The exhaust pipe? It acts like a long tuning fork that also gets excited by engine vibrations. That is why the entire exhaust system is isolated with rubber grommets to keep engine vibrations out of the cabin. Those isolators are not just placed anywhere, they are placed in specific locations and are made with specific durometer rubber to keep vibrations out. You might also have had a buddy that altered the exhaust system by adding, removing, or changing a muffler/catalyst/pipe and ended up with the annoying drone. By now you should start to see that an automotive engineer's job is more than just making sure all the parts fit in the vehicle. The parts also have to be engineered to play nice with each other.

That was to "hum sucker" the resonant frequency of the power steering system that was getting into the cabin.

2020 AMELIA ISLAND CONCOURS

**The name is Bond, James Bond.
The expected price on this 1958 DB2/4 was $300-400,000.**

**You would look good on the set of "Miami Vice" in this
1993 Ferrari Testarossa. Expected price: $150-200,000.**

The New Tool

This seems like a long way around to get to the review of a new tool to find, identify, and repair noises and vibrations in our trucks. I tell my students all the time (also known as Stan's Automotive Diagnostic Rule), if you don't know how something works, you can't fix it. So before we can use a new tool we have to understand what to do with the tool and what to do with the data the tool gives us. And before we get to the new tool and app let's take a look back at some of the other tools we have to diagnose vehicle vibrations.

I tell my students all the time (also known as Stan's Automotive Diagnostic Rule), if you don't know how something works, you can't fix it.

Old School – Do the Math, Part I

The most simple vibration tool is called a Treysit Sirometer, and it is used to check the RPM of small engines. It also shows the frequency of a vibration in Hz, or cycles per second. It is a little complicated to explain how it works. However, there are YouTube videos that show how it works. The Readers Digest version: the engine vibration frequency excites the metal spring to vibrate at the same frequency, and we use math to determine the RPM. Well, actually, the tool does the math by looking at the two dials. Bottom line, they are simple, they work, and they are inexpensive. Down side, unless you only want to know the RPM of your lawnmower, you have to do some math to fix your truck with it.

Old School – Do the Math, Part II

The next most common automotive tool is the EVA, or electronic vibration analyzer, made by SPX Kent Moore Tools. They were a mandatory tool for most GM dealers and an optional tool for Chrysler dealers in the 1990's. You can still find them today for $200-$600 online. They only came with one sensor, and that sensor cost as much as the tool. So, if you were to purchase one, be sure it has the sensor. It was/is a great tool, but most sat unused in the box for years because no one was trained on its use, or they were not comfortable doing the math to figure out what was vibrating. As technology advanced, a company named Vetronix introduced the MTS 4100 Vibration Analyzer. In theory it is exactly the same as the EVA, but it went one step further and performed the math equations for you. So, if the screen on the EVA said you had a 37 Hz vibration at 65mph, that's all you knew. However, when the MTS 4100 said you had a 37 Hz vibration at 65mph it also told you that was a first order driveline vibration. I think we all know great technicians that can diagnose and fix just about anything, but most of them were not math majors in school, and that includes me. So the MTS 4100 was a major breakthrough in diagnosing vehicle vibrations.

Old School – Do the Math, Part III

Any of the tools mentioned above give us some of the information we need, but not all. So it takes a little math to isolate the problem. For our example we are going to figure out what four vibrations are on our fictional test truck. Our test truck had been lifted 4 inches, and has 35x12.5 R20LT tires on it. We also know that the axle ratio is 3.73. And when we test drive our truck at 60mph with the EVA vibration analyzer we see on the screen that it is picking up four different vibrations. The first is 10 Hz, the second is 37 Hz, the third is 74 Hz, and the last is 90Hz. What does the data mean?

As a side note, some of us were born with a natural vibration analyzer of sorts, commonly known as an "assometer." It is very useful in determining the general frequency of a vibration just by sitting in the seat. For instance, our truck has a 10Hz vibration and that is a low frequency vibration. If your assometer is working properly you might know that you have a tire vibration, because the only logical part of your truck rotating at 10 revolutions per second is the tires. You also feel a faster vibration (perhaps the 37, 74, or 90 Hz) but those are not as easy to diagnose using you're built in tool. So, let's get back to the math to calculate and identify the source(s) of the vibration.

There are a couple of ways to find the tire information we need. We can look at the tire manufacturer's data/website and find the diameter, circumference, and possibly the revolutions per mile. We can also use a tape measure to find the diameter. We can use a string and put it around the tire to measure the circumference. Or, the method I like best, put a dab of grease on the tire, and roll the truck one revolution of the tire, then measure the distance between the grease spots. That actually gives a true loaded rolling circumference of the tire. You will see that the NVH app will require the tire's diameter, so here is the simple calculation to determine the frequency (Hz). The test truck tire measures 33.75" with a tape measure, or 105.5" using the grease spots. If we divide the 105.5" by Pi (3.14) we get an actual diameter of 33.6". Now if we want to find out how many times the tire rotates per mile we can look it up, or we can calculate it. There are 63,360 inches in a mile (5280 x 12 = 63,360) and our tire measures 105.5". So the revs per mile are (63,360 ÷ 105.5 = 600.56) 600. Now at 60mph it takes one minute to travel that mile, so we can then calculate the frequency of a first order tire vibration of 10 Hz (600/60 seconds=10 revs per second).

Now that we know the tire specifications, we need to measure the driveline speed. We know the tires are rotating at 10 Hz, and our axle ratio is 3.73 to one, so now we know the driveline turns 3.73 times faster than the tires. So 10 Hz x 3.73 = 37 Hz for a first order driveline vibration. Since a second order (U-joint) vibration occurs two times per rotation, it is twice as fast as the first order, hence a second order vibration would be 74 Hz at 60mph.

If our test engine is turning 1,800rpm at 60mph, we can calculate the engine frequencies. A first order engine vibration would be 1,800/60 seconds = 30 Hz, third order would be 90 Hz. Now when we see 90 Hz on the tool, we know that is the normal firing frequency for a six cylinder engine. If we didn't have a fancy tool that did the math for us, we just identified the four vibrations to look for on our test truck.

Modern NVH Tool Does the Math

Finally, we get to discuss the new tool that uses our phone or tablet to do everything we just did above, and a whole lot more. The NVH app for Android and Apple is an app you purchase on Google Play Store or the Apple App Store. As previously mentioned, it is from Vibrate Software and was developed by John Kelly, at Weber State University. It works with most smart phones and tablets that already have built in sensors that measure vibrations. Before I purchased the app, I contacted the developer to make sure it would operate on both my Google Pixel 3a phone and my tablets, both Samsung TAB A devices. They got back to me a day or so later and said my phone would work for sure; the tablet more than likely, but without the full model number they could not tell for sure.

I purchased it and installed it on my phone. I was able to use it to help diagnose a Lemon Law vehicle I was inspecting so I had a real world example for my first use. The truck had a severe shake at highway speeds and the tool confirmed three primary vibrations. All I had to do was input the truck information and set the phone on the dash or console and make several recordings. The tool was fairly intuitive to set up and use, but that may be because it followed some of the same conventions as the MTS 4100 I was very familiar with while working with FCA. In just a couple of minutes I was able to confirm what my built in tool (assometer) was telling me: this thing had a really bad first order tire vibration and two driveline vibrations, a first order (balance) and a second order (angle). They were much harder to identify from the seat of my pants.

The tool is designed for a passenger to use, because you could easily be distracted while trying to observe the tool and drive. But I can say that once the tool is configured for the vehicle, you can simply clip the phone in your phone holder, or place it on a solid surface and hit the record button. You can record for several minutes, the longer the better, as the tool learns the vibrations as you drive, and it tunes in on the significant frequencies, while ignoring the ones (bumps in the road) that pop up here and there. Once you have completed recording, you can save and replay or print out reports that pinpoint the problems.

But there is much more. Now that you know a vehicle has a specific vibration, there are diagnostic pages for each type of vibration to guide you in the diagnosis and repair. They are broken down by the three main categories: wheel, driveline, and engine vibrations. Sometimes engine vibrations can be difficult to pinpoint because not only is the engine spinning, but all the accessories are as well. And, unfortunately, the engine driven accessories do not all spin at engine speed. If the tool didn't have the pulley diameters in the database (the database is large), you would have to measure all the pulleys and calculate the frequency of each one based on the RPM at which you felt the vibration.

There are pages and pages of diagnostic help included with the tool. This is perhaps the most powerful part of the tool, guiding you how to repair each specific vibration. The database has information on 10+ years of vehicles, and if your vehicle isn't listed, you can custom add any vehicle configuration so you can use it on virtually any vehicle on the road today. Another cool feature of the tool is it uses the phone/tablet built in GPS for speed information.

Testing in the Real World

The Lemon Law truck I tested had larger wheels and tires and the speedometer was off approximately 6mph. Using the tire data and the speedometer with the MTS 4100 would yield erroneous results as the road speed indicated in the speedometer would not match up correctly with the frequency observed, complicating the diagnosis of the vehicle. More on this truck in a moment.

Testing on My Truck

In doing further testing with my 2500 Turbo Diesel truck, I added extra wheel weights to a wheel, and used a hose clamp to add additional weight to the rear of the driveline. The tool was able to identify both vibrations I induced into the vehicle. It should be noted it was not as sensitive as the tools with remote sensors, like the EVA and MTS 4100. I made quite a few recordings with wheel and driveline imbalance using added weights. I also made recordings with both my phone and the tablet at the same time, but I did not see any significant difference between them. I also tested it using different locations in the vehicle, sitting on the dash, console, floor, and even tried it in the bed of the truck. It was interesting that when it was in the bed it seemed less sensitive to the vibrations than when placed on the other surfaces. That seemed odd to me since the imbalance I induced was on a rear tire and the rear of the driveline. It did seem to better identify the vibrations when longer recordings were made and when the speed was held steady. I did try to use my two Bluetooth OBD adapters to get accurate engine RPM data, but I was not able to connect them to the app. If you are going to use it to diagnose an engine vibration, you probably should purchase one of the compatible OBD adapters.

Stan's 2015 Ram 2500 truck.

My Impression

So what are my overall impressions of the NVH Analyzer app?

Pros

- Easy to configure
- Problems are displayed in easy-to-understand format (first order engine, first order tire, etc.)
- You can download it to multiple devices as long as the device has the same Google/Apple account on it
- Accurately identifies suspect vibrations for diagnostics
- Contains all the diagnostic information you might need to repair the vibration
- Has pages of additional information about vibrations, diagnosis and glossary of terms that will provide you with more information on vibration than you ever wanted
- Has available OBD Bluetooth Data Link tool to load accurate engine speed information to the App when diagnosing engine related vibrations
- Priced competitively ($399) compared to EVA (approx. $400 used) or MTS 4100 ($3500 new, $600-$1,500 used)
- Unlike the MTS 4100, the tool does not require purchased updates to make setup easier
- Includes help screens, online help, video help from their website, and a wealth of diagnostic information built right into the tool that you will not find anywhere else ($ priceless)
- You don't have to perform any complicated math equations to know what is wrong with your truck

Cons

- It is not quite as sensitive as the standalone EVA or MTS 4100 which use remote sensors that can be placed directly on the engine, transmission, axles, etc.
- The developer was a little slow to answer several additional questions I had that were not available on their site

Conclusion

The bottom line: This is a great tool that can be purchased and used by just about anyone, at a price that is about the same as a couple of hours of labor for a professional that still might misdiagnose your problem and suggest unneeded parts replacement. I can't recall the number of TDR members that wasted two or three times the price of this tool replacing drivelines and other expensive parts, because they tried to diagnose their vibration without the accurate data this tool provides.

Even if your editor hadn't paid for the tool, now that I have actually used it I would purchase it again just to have in my toolbox. Just like many of you I have tools I paid more for that are used less, and are not nearly as important as this one to accurately diagnose a problem.

Oops, The Rest of the Story

Hey, but what about the truck with the larger wheels? To get back to the story, the truck was highly modified. Luckily the dealer had advised the owner that steering and suspension repairs would not be covered under warranty. The modifications included some really offset custom wheels with a very aggressive mud tread. The tires were also much larger diameter. The truck was lifted four inches, so the suspension had been moved around, but the kit used seemed to be good quality.

The owner started to have a concern with shaking and the dealer found some worn out front end parts. The owner paid to have some of the repairs completed.

The truck still shook, so that's when I got involved. I made a couple of observations. First, the large offset in the wheels increased the track by 5", and the scrub radius is really affected. I could tell it was considerably out of OEM specification because the steering was really stiff when the wheels were turned from straight ahead. It was so bad that the power steering pump was not able to build enough pressure to turn the wheels if you were hard on the brakes. The front of the truck also lifted much more than a stock truck when turning the wheel. I confirmed the ball joints were good using a dial indicator, not just shaking the wheel. I never got it to shake side-to-side like the owner described, but I was able to feel a significant tire speed vibration.

Without mounting a set of OEM tires on the truck, there was no way I could confirm the tires were way out of balance. But using the NVH app confirmed that the tires were indeed significantly out of balance. The tool also identified a second order driveline vibration caused by the lift and a first order driveline vibration because the shaft was also out of balance. I didn't fix the truck because that wasn't allowed as part of the inspection, but by looking at it, making some measurements, and using the tool, I did identify the problems contributing to the shake.

The obvious: Highly modified trucks do not drive the same as a stock truck, especially when there isn't much thought put into mixing and matching the aftermarket parts. But should a manufacturer have to stand behind the modified product because it prematurely wears out parts or doesn't drive down the road correctly? You will have to wait for a couple more editions of TDR to find that out. The wheels of justice turn very slowly. In fact, so slowly that we can't even use our NVH app as evidence of the problem.

Stan Gozzi
TDR Writer

A Better Mousetrap?

Made in the USA

MAKES A GREAT GIFT!

SPLASH WHAM-O TAILGATE PROTECTOR ('09-'19)

'10-'19, 2500/3500 & '09-'18, 1500: $79.95 ($19.95 shipping to continental U.S.)

Short Story: We had some family problems: What to do about Splash and Wham-o? Begrudgingly, let's talk about these errant kids.

Splash was a problem the first time you opened the Fourth Generation truck's tailgate. Water accumulated on the plastic aero-lip of the tailgate cover and you got a splash on your front side when you dropped the tailgate. Such a poopie design.

Wham-o, he came along a little later, like the first time *someone else* dropped the tailgate onto a close-by trailer jack. Bam/thunk! Now there is a big dent in the tailgate's horizontal edge that *no one* knows anything about. Such a poopie design.

A Better Mousetrap? Our plastic tailgate protector corrects the problem that Splash created with a flat surface instead of the aero-lip. Our plastic tailgate protector corrects the problem that Wham-o created by wrapping (covering up) the tailgate's horizontal edge to protect it from future dings. This is a heck of a lot cheaper than repairing a tailgate.

Really, A Better Mousetrap! The Splash Wham-o tailgate protector is similar in texture to the factory plastic cover. We supply new mounting clips and 3M double-sided tape to hold the cover in place. Keep yourself dry and protect (cover up) your tailgate with the Splash Wham-o tailgate protector.

SPLASH

WHAM-O

GENO'S GARAGE

RAM TURBO DIESEL
PARTS & ACCESSORIES
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The Long Haul

Turbo Diesel adventures with journalist Moses Ludel.

"EXTENDING HIGH PRESSURE FUEL PUMP AND INJECTOR LIFE"

The Cummins diesel is a longevity engine. When serviced properly, the engine should last 500,000 to a million miles between teardowns. Peripherals like the turbocharger, fuel injectors and the fuel pump, however, can wear out or fail much earlier.

A well maintained fuel system can keep injectors going for 250,000 miles or more. The original common rail diesel injectors and CP3 pump in my 2005 Ram have been trouble free for 180,000 miles now. These injectors have delivered good performance and fuel efficiency. There are no signs of spray pattern issues, fuel surging or leakage.

Long injector life depends upon adequate fuel supply, quality fuel filtration and clean injector components. In addition to routine fuel filter changes, I periodically clean the fuel system. Purging the high pressure pump and injectors helps maintain peak performance and reliability.

When symptoms of wear, leakage or a fault code point to injector trouble, the injectors should be bench tested on a Bosch test stand. If pilot injection, full load flow or the volume of return fuel fails during this test, the injector needs precision rebuilding or replacement with a new unit.

Many shops and owners prefer genuine Mopar, Cummins or Bosch new or remanufactured injectors. A full set of new injectors may also provide a design upgrade, perhaps better durability or performance than the original injectors. In any case, a full set of new Bosch injectors will be costly.

Early symptoms of injector failure include rough starting and cold idling or surging from poor sealing and fuel pooling. There may be a lack of power or more black smoke than normal. If an injector is defective, routine service will not improve performance.

Inadequate or faulty fuel filtration or lift pump troubles can quickly damage the high pressure pump or injectors. If contaminated fuel or water gets past the fuel filter, the high pressure pump and injectors are at risk. Change the fuel filter routinely to preserve the pump and injectors. Do not allow debris to fall into the filter canister when changing the fuel filter. Make sure the filter seals properly.

To protect the CP3 pump and Bosch injectors, I change the OEM fuel filter at regular intervals. My 2005 Ram 3500 4WD Quad-Cab has racked up 180,000 miles. My preventive engine care includes high pressure pump and injector flushing with Sea Foam Motor Treatment and an SUR&R FIC203 Fuel Injection Cleaner Kit.

Pump and Injector Preventive Care

Although I use and recommend certain products for flushing and cleaning the fuel system, there is no substitute for fuel injector bench testing. If symptoms of a defective injector or a Check Engine code indicate a more serious injector problem, consider bench testing the injectors. The injectors should be tested on a Bosch EPS205 or equivalent machine for the rate of fuel return, pressure readings, leaks, fuel dripping at the nozzles and spray patterns. Severe engine damage can result from running with a leaky injector. A bad spray pattern that does not atomize fuel properly can etch away a piston crown.

Unless a Bosch injector is defective, injectors can be cleaned without removing parts. For purging contaminants and debris from the high pressure pump and injectors, I flush the injection system with Sea Foam Motor Treatment. One flushing method is no more difficult than changing the fuel filter. The other method involves use of an SUR&R (surrauto.com) part number FIC203 Fuel Injection Cleaner Kit.

I use the following steps on my 5.9HPCR engine (2004.5-2007). Determine which Sea Foam delivery method will work best for your truck's fuel system and diesel injection type. With either service method (add product into fuel filter canister or add product from FIC203 kit), the engine will idle and run unloaded on pure Sea Foam Motor Treatment.

Fuel Filter Canister Cleaning Method

The fuel filter gets replaced routinely. For the simpler service method, warm the engine then shut it off. Carefully drain the fuel filter canister while avoiding engine heat and hot surfaces. Use a safe drain pan or container. Keep fuel away from heat.

During a routine fuel filter change, fill the canister with Sea Foam Motor Treatment. On restart, the engine can idle unloaded on pure Sea Foam. This is an easy way to routinely flush the high pressure pump and injectors. The engine's combustion areas and upper cylinders get purged as well.

Pour Sea Foam into the fuel filter canister, allowing enough space for the filter to fit without spilling over. Permit the filter to saturate with Sea Foam while lowering the filter into place. Another approach is to install the filter without the cap attached and slowly fill the canister with Sea Foam and saturate the filter. When the canister is full, carefully attach the cap to the filter without damaging the filter.

My service technique: Prime the fuel system and start the engine. Run the engine for 60-90 seconds before shutting it down. This allows the Sea Foam Motor Treatment to run through the pump, injection system, and combustion areas. After a 20-minute heat soak, restart the engine. Allow oil pressure to normalize then take the truck for a run under heavier throttle.

I change the engine oil and filter after performing this service. At each fuel fill-up, Sea Foam Motor Treatment gets added to the main fuel tank. The auxiliary fuel tank gets an occasional dose as well. Although no cleaning or maintenance will prevent pump or injector wear, preventive care like this can extend parts life and improve both performance and fuel efficiency.

Ford: Diesel Injector "Stiction"

The buzzword "stiction" ("static" plus "friction") has become popular in diesel forums. Fortunately, it is not a significant Cummins issue. The term applies primarily to the HEUI style diesel fuel injectors used in Power Stroke Ford 7.3 and 6.0-liter, Navistar-built engines.

Ford Power Stroke stiction issues have spawned a number of aftermarket fuel and crankcase additives. The HEUI injectors would benefit from either of the injector cleaning methods that I use on my truck. Equally important would be keeping the HEUI oil pressurized components clean and minimizing engine oil gum, sludge, oil breakdown and static/friction issues.

Ram: A Brief Look at Injectors

Fortunately for Ram owners, Bosch fuel injectors (from the 12 and 24-valve engines with mechanical injectors to today's solenoid actuated HPCR 5.9 and 6.7 engines) do not use pressurized engine oil to boost the fuel pressure. The Cummins HPCR fuel pump and injectors are capable of higher fuel injection pressures than Ford's HEUI injectors.

Mechanically actuated 1989-2002 injectors are reliable and easier to service. Precisely timed, highly pressurized fuel forces open the spring counter-weighted injector needle. Fuel flows from the nozzle. While internal pieces can stick, this is less likely given that diesel fuel has a degree of lubricating ability. These mechanical injectors generally fail from overuse, broken or binding parts, corrosion and severe pitting or leaks. Until that point, they can benefit from periodic flushing.

With these injectors, fuel dripping and lower needle or nozzle opening pressures are signs of a weak spring, needle and nozzle damage or worn seats. This shows up during injector bench tests as leakage, early fuel flow or drip and an improper nozzle spray pattern. A poor spray pattern always means incomplete fuel atomization. Be aware that when *any* mechanical or electro-magnetic injector stops atomizing fuel properly, severe engine damage can result. This includes piston or cylinder head failure.

High pressure, common rail injectors (2003-current) use a heavy duty electro-magnet (solenoid) with a spring balanced check ball system. There is also a spring balanced servo piston and nozzle. The injectors rely upon high pressure injection pump pressure. Fuel injector failure is the result of mechanical wear, a cracked housing, pitted nozzle, corrosion, a solenoid armature short or internal sealing issues.

Though often difficult to control, the quality of fuel can be a large contributing factor when injectors fail. Ultra low sulfur diesel (ULSD) fuel has less lubricity and is hygroscopic. Diesel fuel will also draw moisture from the atmosphere and drag it through the fuel system. This is an additional load on the injectors.

Water promotes injector corrosion, and lack of lubricity can lead to seal failure. Poor fuel lubricity can also cause expensive, even catastrophic pump damage. Quality fuel filtration is the best defense against water. Mopar/Cummins NanoNet fuel filters are your best protection.

The SUR&R FIC203 Fuel Injection Cleaning Method

For a more thorough cleaning, the SUR&R FIC203 Fuel Injection Cleaning Kit bypasses the truck's diesel fuel supply. Remote canister cleaning is popular with repair shops, fleet operators and do-it-yourself home mechanics. Once a year, I use the SUR&R kit, idling and heat soaking the engine with two 16-ounce cans of pure Sea Foam.

SUR&R makes a variety of automotive service tools for shops and serious DIY enthusiasts. The company is now a subsidiary of Husky Corporation, the manufacturer of commercial fuel nozzles. Among the many useful tools and products are the SUR&R fuel injection testing and cleaning kits for gasoline and diesel engines.

Clean compressed air pressurizes the FIC203 canister, delivering fuel just like the OEM fuel tank pump. The remote canister's adjustable air regulator can be set to the same pressure as the OEM fuel tank pump. The engine fuels directly from the FIC203 canister, and the OEM fuel pump is temporarily off line. With this system, the excess volume of fuel returns to the fuel tank. Any Sea Foam Motor Treatment returning to the fuel tank will help keep the fuel injection system clean while driving.

The engine should be warmed before starting this procedure. Use a suitable catch pan and open the drain valve at the fuel filter canister. Drain the fuel from the filter canister. Keep away from engine heat and disconnect the fuel supply line at the filter canister.

The SUR&R FIC203 Injection Cleaner Kit comes with several common adapter hoses for EFI gasoline and diesel engines. Additional hoses shown are part of the SUR&R FPT22 Fuel Injection Pressure Tester Kit. These hoses cover nearly all gasoline EFI engines but will only work on the low pressure side of the Cummins diesel fuel supply system. This FIC203 remote fuel canister will work with clean shop air or a portable air compressor.

The factory in-tank electric fuel pump should be disabled for the SUR&R FIC203 cleaning procedure. For the 2005 Ram, this is done by removing the fuel pump fuse at the fuse and relay box. Bring the engine to operating temperature and shut it off before removing the fuel pump fuse. Confirm that the pump does not operate when the key is turned on.

Once the tank pump or lift pump has been disabled, I disconnect the fuel supply line at the fuel filter canister. The correct FIC203 adapter hose attaches at the canister supply pipe. A long connecting hose attaches to the FIC203 fuel canister. If the fuel filter needs replacing, do so now.

Select the correct FIC203 adapter for the Cummins filter canister. The hose attaches with an SUR&R quick connect elbow and hose coupler then runs to the remote canister. Route the hose carefully, away from heat and sharp edges. To prevent backpressure in the system, fuel can flow normally from the fuel filter canister back through the fuel return line.

The SUR&R FIC203 canister uses shop or portable air. The regulator can be adjusted to normal lift pump pressure. This setup can also be used to move a stalled vehicle with a non-operative lift pump or tank pump. Hook up the FIC203 kit by following the flushing operation steps. A portable compressor or air storage tank can serve as the remote fuel canister's air supply. With fuel pressurized in this canister, start the engine and carefully move the vehicle a short distance. Filled with Sea Foam, the air pressurized FIC203 fuel canister is set to a steady 11 PSI. This simulates the OEM fuel pump supply pressure at an idle under no load. When fueled by the FIC203 kit and started, the warm engine can run at an idle for over a minute on pure Sea Foam before signs of running low on fuel. While the engine idles on Sea Foam Motor Treatment, excess fuel returns to the fuel tank.

Start the engine. When the canister of Sea Foam is nearly empty, the engine idle will begin to roughen. *Shut off the key before the fuel canister runs dry or the engine dies.* This is especially important on earlier engines with mechanical fuel injectors. Running the engine dry may require injector line bleeding for a restart.

By now, pure Sea Foam has run through the high pressure pump, injectors and combustion areas. Sea Foam recommends heat soaking the injectors and upper engine for twenty minutes. This can be done while refilling the FIC203 canister with a second can of Sea Foam Motor Treatment. After the heat soaking, restart the engine. Idle the engine until the second canister of Sea Foam is nearly empty. Again, listen for the first sign of a low fuel supply. Before the engine starves for fuel and dies completely, shut the key off.

Unhook the FIC203 canister, hose and adapter. Hook the OEM fuel supply line back up. I install a new plastic coupler fitting when reattaching the supply line at the OEM fuel filter canister. This is cheap insurance against a fuel leak.

Be certain to rotate and seat the retaining clip fully into the coupler before sliding the coupler onto the pipe. If the clip aligns properly, the hose coupler will click into place with only slight resistance. Forcing the hose coupler will create a leak or damage the expensive factory hose and pipe assembly. The goal is to install the retainer clip properly within the coupler.

The fuel supply line from the OEM fuel tank reattaches to the pipe at the fuel filter canister. This 3/8-inch hose fitting uses a blue retainer clip in the hose coupler end. At $2 per clip, this is the Dorman 800-498 five-piece clip package available online at Amazon.com. Carefully align and install the clip in the coupler before sliding the hose into position. Listen for the click.

Reinstall the fuel pump fuse at the fuse box. Before starting the engine, prime the fuel system to bring tank fuel to the canister and purge air from the supply lines. Priming the fuel supply system is not difficult on my truck (a 2005) with the in-tank electric fuel pump. The bump-key method works well here: 1) gently bump the key to the crank position just enough to rotate the crankshaft slightly *without allowing the engine to start;* 2) release the key to the ON position, and this will run the fuel pump for twenty-five seconds; 3) turn the key off then turn the key back ON and gently bump the key to the crank position; 4) again release the key to the ON position.

Each time you perform this cycle, the bump method will run the low pressure fuel pump without starting the engine. When primed, try starting the engine. If it fails to start, turn the key off and wait for at least five seconds. Repeat the priming process until enough air is purged from fuel lines.

Priming the fuel supply system is not difficult on my truck (a 2005) with the in-tank electric fuel pump. The bump-key method works well.

When the engine starts, it may run roughly for a moment. Once the engine reaches normal oil pressure and stabilizes, give the truck a good run under heavier throttle. The MIL/Check Engine lamp will likely be lit. Don't panic. This diagnostic trouble code (DTC) is from running the engine with the fuel pump fuse removed during the FIC203 cleaning process.

After running the engine with the fuel pump fuse removed, a Check Engine light needs cancelling. Once the system is operating on the OEM fuel pump, a simple code reader or scan tool can display a stored code like this P0628. If you do not have a scan tool or reader, AutoZone and other retail parts stores will scan and clear codes for free. Harbor Freight sells an inexpensive code reader that can clear a code. Once the code has been cleared, the Check Engine lamp will stay off.

This preventive maintenance routine has kept my truck reliable and minimized expenses. That's not bad for a fifteen year old truck.

For more details on Sea Foam Motor Treatment:
https://seafoamsales.com

For more details on SUR&R Tools:
https://surrauto.com

Moses Ludel
www.4WDmechanix.com
TDR Writer

Editor's note: Back in the earlier days of May Madness there was a seminar where the Concrete Cowboy (me) would have a lively discussion with the Rancher Dude (John Holmes). The back-and-forth banter over how to do this and how to do that was lively and entertaining. The bottom line(s): There is more than one way to maintain a truck and we both wanted the best for our vehicles.

To this day the Concrete Cowboy orders a Tradesman truck and spends countless hours (and dollars) making it into the Laramie trim that the Rancher Dude orders direct from the factory.

How does this relate to the "Long Haul" story? The Concrete Cowboy has never done any injector/fuel system maintenance or cleaning. On the other side of the ledger, Moses does the injector cleaning once a year.

Your truck, your choice: the writing staff tries to bring you both sides.

Solving the Dodge Ram Steering Problems on 2nd and 3rd Generation Trucks ('94-'07)

For years, people have struggled with their truck wandering or drifting while driving down the road. In many cases this will become a more serious problem known as the "death wobble" or violent shake. The number one cause of this problem in Dodge trucks comes from the track bar.

With over 25 years in the business, Luke's Link designed a kit that converts the weak ball joint ends of the OEM track bar to a fully adjustable end. With a Luke's Link adjustable end, the track bar is guaranteed to never wear out again. Luke's Link been featured in 4X4 Off Road magazine and has been selling all over the US and Canada. Why keep paying for track bars that last a few months, when the ball socket end is the only part wearing out?

Luke's Link is the best way to permanently fix your steering problems at a fraction of the cost of OEM parts without spending hundreds of dollars.

Third Generation Dodge trucks ('03-'07) Luke's Link offers heavy-duty Polyurethane bushings for the '03 -'07 Dodge track bars. No need to buy a new track bar.

Luke's Link adjustable end can be installed in less than 45 minutes using basic hand tools and is fully adjustable by adding spacers if it ever becomes loose.

Here's how to check for tracking bar problem:

1. Wheels pointed forward on hard surface.
2. Steering wheel unlocked (Engine not running).
3. Strong person rock the steering wheel in both directions.
4. Check for movement in the upper and lower end of the track bar. You may also check the tie-rod ends for movement.

LUKE'S LINK
P.O. BOX 466, LA JUNTA, CO 81050
TOLL FREE: 1 (800) 962-4090
CELL: (719) 468-1906
info@lukeslink.com

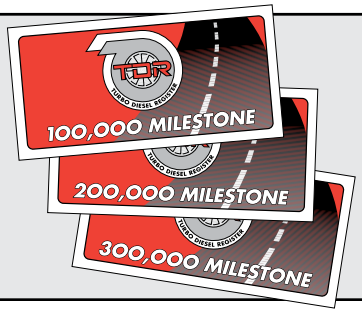
Luke's Link also fits Dodge tie-rods ('94-'02), Ford truck tie-rods (up to '98), and Jeep track bars.

Please note that our kit will not fit on a MOOG track bar. A MOOG track bar is 2-1/8" in diameter across the grease fitting. If your truck has a MOOG track bar, call us and ask about our track bar exchange program.

US Patent #4613250

www.lukeslink.com

TDR/R/R



TDR/REFERRAL/RECOGNITION/REWARD

Thank you for your help in increasing the TDR membership. Your efforts via discussions, copies, and brochures handed out to other Turbo Diesel owners are noted each time a new owner joins us.

This referral program is ever more important. In the early years, the TDR had support from Chrysler in the form of new truck owner information. With internal changes at Chrysler, this information is no longer available. Thus, the TDR membership has to be self-reliant in its marketing efforts.

Many members have asked for additional brochures and have commented about their work distributing the material. For the efforts put forth, you would expect a higher number of responses. Don't be discouraged! Your positive discussions may not immediately net a new TDR member. Many people have the intention, yet find it hard to part with dollars.

Referral

The subscription number listed on the top of your address label is a valuable tool that the TDR uses to keep track of subscriptions and to recognize/reward those TDR members who are active in new subscription referrals.

Recognition

How do you participate? It's easy. On the TDR brochures that you pass out in a "grassroots photo-copy membership drive," or on an original TDR brochure, be sure to include your name and subscription number. As new subscribers join us, we'll check the application for a referral name/number. Then, we will recognize TDR members for their participation in the "TDReferral/Recognition/Reward" column each quarter.

Reward

Recognition is great, but how about a WIIFM (what's in it for me)? How does this sound? For your help in expanding the membership of the TDR, we will send you a Cummins Diesel Power cab plate. I love incentives, don't you?

Let's give away some money. It's fun to get a surprise cab plate in the mail. But we would like to add a bit of excitement to the TDR/R/R program. Here is the deal. For each referral, we will put your name into a hat for a quarterly prize of $100. Obviously, numerous referrals per quarter increase your chances of winning. Our winner this quarter is Garrett Sanders.

TIM ARNOLD
ROBB BASHAW
BRENDA CLENNIN
E.W. COX
CLAY DICKERSON
DENNIS GEORGE
DOUG HARALSON
BOB HUMPHREY
JAMES LANGAN
CORY LAVASSEUR
MARVIN H LEE
ROYCE MACKAY
TOM MADSEN
DAVID MARDEN
DAN MCINTRYRE
GEORGE NASH
GARRETT SANDERS
MIKE SMITH
WILLIAM THOMPSON
ROBERT TORREY
NATHAN WOODROW
TIM ZENKE

HIGH MILEAGE RECOGNITION

In Issue 22 (Fall '98) we started a program to recognize/reward high mileage Turbo Diesel trucks. We developed a TDR milestone tag to commemorate mileage achievements. The tags are sent at no charge to members. Proof of mileage by a photo of the outside of the truck and a picture of the odometer is appreciated. (If you can't get a good focus on the odometer, we'll trust you.)

If you would like a high mileage tag, please send in your photos. Include $5 in postage or cash to cover shipment of your no-charge tag. Tags are given out at 100,000 mile increments, i.e., 100, 200, 300, 400, and 500K miles. Over 500K miles? Sorry, we've not yet developed a tag, but we'll send additional 100K tags to collect and display.

This quarter we sent a 400K and 500K tag to:
Luke Oosterhouse

Luke Oosterhouse 400K and 500K

This quarter we sent a 700K tag to:
Dale Hall 700K

TcDR

Recognition of those individuals who have gone out of their way to help a fellow TDR truck owner is important. Therefore, we have developed a grille badge that we will send to those when we learn of their assistance to a machine-down traveler. The award is called the TcDR: Travel Companion Distinguished Recognition. The TcDR badge will look great on that big Ram grille.

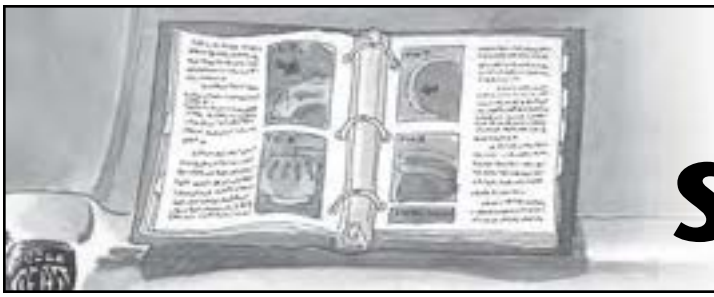
The generally accepted rules for TcDR badge distribution simply require an e-mail or letter from the traveler who was offered and received assistance. Be sure to include your name, address and phone number and the phone number of the member who provided the assistance.

The TcDR grille badge is available to those members that help out others in need. Please send your TcDR nominations to:

TDR
1150 Samples Industrial Drive
Cumming, GA 30041

2020 AMELIA ISLAND CONCOURS

Do you remember ABC's "Wide World of Sports"? Do you remember the International Race of Champions (IROC) season, 1973, where the drivers raced in identical Porsche 911 RSRs? This is Mark Donohue's winning race car.



From The Shop Floor

A STEP ABOVE—AMP RESEARCH POWER STEP INSTALL ON A 2019 RAM MEGA CAB.

One of my customers recently purchased a 2019 Turbo DIesel, Mega Cab, 4x4. He raved about his new ride, but his family was not happy about the difficulty of vehicle entry/exit. AMP Research retractable steps were discussed and he ordered a set.

AMP Research has a good reputation for attractive and durable steps. AMP rates this installation a "4/Complex." However, a skilled do-it-yourselfer would be able to install the kit. Since the kit provides an adequate installation manual, the following should be considered a "Cliff Notes" installation guide.

Editor's note: I was excited to see Andy's write-up on the AMP Research steps. Wow! The owner must have read the previous Issue 85 article on the steps and my recommendation of the steps for my 2014 EcoDiesel/Fourth Generation truck. Nope.

Okay, he read the two-year follow-up story of the AMP steps on my '07.5 truck. Nope. Perhaps he found an old TDR (Issue 49) and read TDR writer Jerry Nielson's glowing recommendation of the AMP steps. Nope.

I know, he watched the 19.20 minute how-to video at the Geno's Garage website? Nope. The AMP Research video at their website? Nope.

Do you see a trend?

Regardless of how the owner "found" AMP Research, again, I was excited to read about and learn from another owner/shop experience.

I thought, "Gee, these AMP steps are finally catching on in the marketplace."

Perhaps they are, but their popularity (or lack thereof) is not reflected by sales of AMP steps at Geno's Garage. But the Geno's data could be skewed—this product should be purchased locally by the shop doing the work on the truck. A Geno's purchase is directly to the do-it-yourself owner. Geno's sales are few in numbers. Yet, with Amazon-this, eBay-that, and direct to consumer-other, it is impossible to know the product's popularity.

My take-away: I love the steps. Andy's customer purchased them. We think alike. We are cool. Other steps aren't. We are the best. Blah, blah, blah.

Seriously, while the steps are expensive, nevertheless, I have installed them on four trucks since 2003. It is a quality product and, with the instructions and videos that are available, they can be installed by the DIY owner. So, let's take a look at some of the things Andy and his customer found during their installation.

This was my first installation on a 2019 and I encountered a few difficulties on the installation, which ultimately required warranty claim. However, let's get started.

The kit (part number 76239-01) was well packaged and complete. It is important to note that each shown motorized drive linkage and idler linkages are left and right-side specific. The motorized linkage fits to the front of the truck and the idler at the rear. Each left and right pairs will have a cast male "leg" that supports the step board and they will point *towards each other.*

2020 AMELIA ISLAND CONCOURS

A post-war dream machine, the 1951 Buick LeSabre show car was at the Amelia Island show. The car is from the GM Heritage Collection and it featured a 335hp supercharged, aluminum V-8 engine.

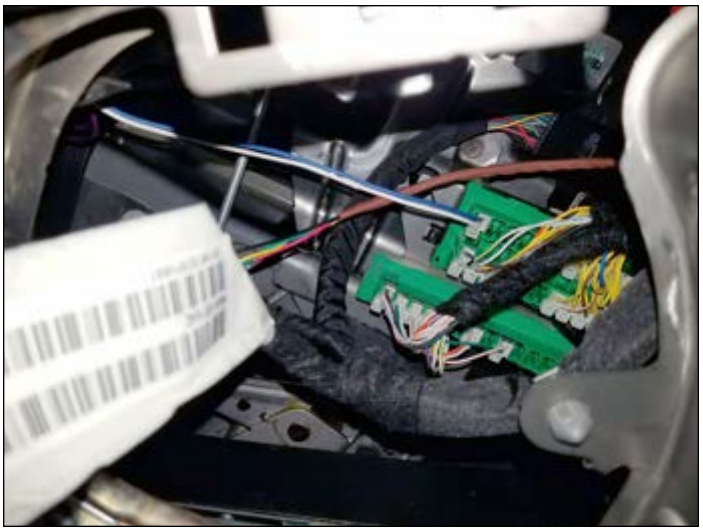
A pneumatic cut-off wheel was used to cut into the rivet nuts/thread-serts head. Not shown was a sharp chisel and hammer that completed cutting the head from the rivet nut for removal from the inner rocker panel. It was necessary to remove these, as they weren't the correct thread pitch for the AMP fasteners. The AMP kit contains new rivet nuts and an installation tool, with small brackets that support the inner rocker panel sheet metal. The steps' motorized linkage and idler arms attach to the AMP-supplied brackets.

On the passenger rear idler, the cast male leg faces forward. Repeat motorized linkage/idler installation on the driver's side.

Notice the bottom of the motorized linkage where socket head bolts are used to position the step boards. At the end of the installation the fasteners will be tightened and torqued.

I installed the front passenger motorized linkage. Notice the cast male "leg" where the step board will attach that points rearward. A 13mm gear wrench was used to turn the fasteners.

The AMP folks provide a control module/wiring harness that "drops-in" beside the brake master cylinder. The step module has been wired with the included harness and the wires to the passenger side were hidden across the wiper cowl and secured to the OEM wiring with zip ties.



The AMP steps are triggered when the door(s) are opened. This requires a tap-in to the truck's open door signal. The easy connection is at the Mopar "Star Connector" which is above the parking brake lever. A small piece of the instrument panel fascia was removed to photograph the connector.

Here is a reason to hire a professional. Seriously, notice that the boards are binding and striking the pinch weld of the rocker panel. An adjustment with a tap-tap here and a file-away there and the step cleared the weld.

To seat everything into place, we are walking and lightly jouncing the board. This seats the boards on the linkages. It also helped the pinch weld interference problem.

The warranty claim: the right idler snapped during the jounce/seating step. AMP was contacted and the part was replaced.

Here is a picture of the board in its lowered position. It is 13.5" from the ground. The ground to lower door is almost 22", so the boards allow easy in/out of the truck.

This is a worthy modification to your truck at a cost of $1,499 plus about 6-8 hours of labor.

Andy Redmond
TDR Writer

EXHAUST NOTE

BY KEVIN CAMERON

Thought Provoking Discussions
with Automotive/Motorcycle Journalist Kevin Cameron

A WIDER RANGE OF CHOICE

At present we are left to assume that an electric future is coming for cars and light trucks, with more extreme voices suggesting that heavy trucking and even some aircraft can be battery powered.

At the same time, Honda CEO Takahiro Hachigo has publicly stated that because almost none of the infrastructure to support electric cars is in place in the US, his company considers hybrid powertrains the best response to ever-tightening emissions standards. Hybrids are more fuel efficient than purely combustion-powered vehicles, and they are well supported by the 160,000 gas stations that exist throughout the US. These are substantial reasons to choose hybrid.

Surface vehicles are not the only energy consumers under review. Many people assume that solar and wind power will smoothly and shortly replace the present "triad" of natural gas, nuclear, and coal, which supplied 80% of US electricity last year. But those who investigate further see at once that solar and wind can never do that whole job, because the existence of night-time and windless days require that renewables must at all times be backed up by base-load-capable systems that can fully take their place. And, as has always happened when several years have passed since the last nuclear plant melt-down or other failure, many voices are announcing that "now it's time to accept new, safer, and more reliable forms of nuclear power."

Back when Nuclear Magnetic Resonance Imaging was first available, the marketing folks decided the "N-word" was scaring away business, so they trimmed it back to Magnetic Resonance Imaging (MRI).

Marketing is expected to make this possible. Back when Nuclear Magnetic Resonance Imaging was first available, the marketing folks decided the "N-word" was scaring away business, so they trimmed it back to Magnetic Resonance Imaging (MRI). Can marketing do the same job with the public's memory of Windscale, Three Mile Island, Chernobyl, and Fukushima? Originally it was hoped that US electricity would one day be 100% supplied by as many as 1000 carbon-free nuclear plants. The history of failures has had the powerful effect of limiting their number to just over 100, supplying about 20% of US electricity. We'll see in the next few years if marketing is up to the task.

Similarly, even the idea of Diesel power is now under attack, with European and British cities planning to ban them from populated areas (Madrid, Paris, etc.) or even to forbid their sale at some future date. What will then do the job of long-haul trucking?

I am happy to report that alternatives to stopping every 50-100 miles for a quick (20-30 minute) half-charge at a Tesla 'SuperCharger' charging station are being researched—alternatives that do not require us to believe that a capable charging infrastructure will appear as if by magic.

Spark-ignited gasoline engines are prevented from reaching high efficiency by their moderate compression ratios (typically 10-to-one or lower) and by their intake throttling. Push their compression ratio too high and detonation—engine knock—damages parts. Because spark ignition engines require a constant air/fuel mixture, their intake air must be throttled, producing the pumping loss that causes their low efficiency at small throttle angles. (My Hyundai Accent gets a miserable 26mpg on local roads but a much more attractive 40-45mpg on the Interstates.) Emissions cleanup is relatively easy by means of the usual three-way exhaust catalyst.

Diesel engines have proven difficult and expensive to clean up because of their combustion compromise: if you make combustion more intense to lower soot and UHC emissions, you create more NOx. If you cool off combustion with cooled EGR, NOx production falls but soot and UHC rise. Yet overall efficiency is high because compression ratio is high (16-17-to one) and pumping loss is greatly reduced by unthrottled operation.

I have previously discussed on this page the HCCI combustion scheme (Homogeneous Charge Compression Ignition) which can come close to Diesel fuel economy but at a lower cost in emissions clean-up technology. Mazda call their HCCI engine "Skyactiv-X".

The central problem of HCCI has been to accurately control where in the cycle peak combustion occurs. Too early and the engine works against itself. Too late and effective power stroke is wasted. An early means of control has been to recycle heat from previous cycles, varying the ratio of exhaust gas to fresh charge to control the point at which peak pressure occurs. Not only has it been difficult to control combustion timing this way, it has been impossible to extend HCCI operation down to idle and low-throttle operation, and all the way to full throttle. At idle there is too little heat available for reliable compression ignition, and at or near full throttle, the large mass of cool fresh charge present is difficult to heat to its ignition point.

In spark-ignited gasoline engines this is achieved by correct timing of the ignition sparks, while in the classic Diesel cycle it is determined by the timing of fuel injection. Both have proved sufficiently accurate for efficient operation.

A group at University of Wisconsin—Madison, under Professor Rolf Reitz, has explored a more effective means of control in a scheme they are calling RCCI or Reactivity-Controlled Compression Ignition. It employs two fuels of widely differing reactivity. Gasoline has been developed to have low reactivity so that it can *resist* the abnormal form of combustion called detonation or engine knock. The measure of this resistance is Octane Number. Diesel fuel, by contrast, has been developed to have high reactivity so that it will readily ignite when heated by compression. The measure of Diesel fuel's *ease* of ignition is its Cetane Number.

RCCI as presently developed has achieved efficiencies never below 49% and as high as 58%, whereas modern Diesels typically achieve 40-45% efficiency.

RCCI also meets EPA 2010 emissions levels without exhaust aftertreatment. Its production of that most troublesome of all pollutants, oxides of nitrogen, is far below mandated levels, and production of particulates also meets current legislation. This means no need to carry SCR fluid for NOx reduction and no Diesel Particulate Filter (DPF) to cycle through its periodic burn-off to remove accumulated soot.

HCCI burns mainly gasoline as fuel and uses the high reactivity of injected Diesel as its "spark plug," controlling when peak pressure occurs. At present, says Prof. Reitz, "Maximum load remains a hurdle, an issue," meaning that something like high-volume exhaust gas recirculation may have to be used to enable ignition at high loads.

When I asked how RCCI achieves low particulates emissions, he replied that, first, little Diesel fuel is used, and second, the combustion of the gasoline main charge serves well to assure more complete combustion of the higher-molecular-weight Diesel fuel fraction.

I am not suggesting that service-ready RCCI engines will start coming off assembly lines by next Friday. Major changes to prime movers require time and the sustained confidence of investors and potential users. The reason I am presenting this information here is rather to show that there is plenty left to be learned about the internal combustion engine and the many ways it can be improved. As research work accumulates it is becoming clear that there are many possibilities other than the two presently in use—spark ignition and Diesel.

The reason I am presenting this information here is rather to show that there is plenty left to be learned about the internal combustion engine -and the many ways it can be improved.

Much testing has been done on a single cylinder engine of Caterpillar dimensions, so this research is aimed first at heavy truck applications. A small automotive-sized four-cylinder engine has also been used to prove the concept.

Where do we go from here? I suspect that the progress of electric vehicles will be delayed by the lack of necessary infrastructure, just as Honda's Mr. Hachigo notes. During that delay, research into advanced combustion systems may discover a way forward that does not require first financing and then constructing the electric charging equivalent of the 160,000 gas stations that presently serve US transportation.

Many people are surely assuming that they can just drop a brown 110V zipcord out a back window, plug in their electric car, and charge it that way (this is called Level 1 charging). Tesla estimate that 110V charging can provide roughly 3 miles of driving per hour, so if you get home at 6PM and leave again at 8AM, never, ever forgetting to plug in, that 14 hours of charging potentially provides 3 X 14 = 42 miles for your commute. If you spend 8 hours at work and can find parking there with 110V charging available, that adds another 24 miles of range for a workable total of 66 miles. This is why most people will want either to charge from the equivalent of a clothes drier outlet (220V, or Level 2 charging) to get twice the charge per hour, or to buy a lighter, lower-powered electric, such as a Nissan 'Leaf', for which the range per hour of 110V charging is estimated to be 4 ½ miles.

It will be interesting to see how this all plays out. I haven't seen it yet, but I can imagine the intrepid all-electric family setting out for their annual Thanksgiving reunion, towing a little utility trailer. On that trailer is a trusty Onan single-cylinder stand-by generator pounding away, plus several jerry-cans of gasoline, all held in place with bungee cords. Running from generator to tow car and secured here and there by duct tape is the 220V electric cable that will surely bring them to turkey, mashed potatoes and gravy, followed by pumpkin and mincemeat pies.

Jeez…

Kevin Cameron
TDR Writer

2020 AMELIA ISLAND CONCOURS

The Penske-Sunoco McLaren M6A CanAm car laid bare. Looks like mostly big American V8 here.

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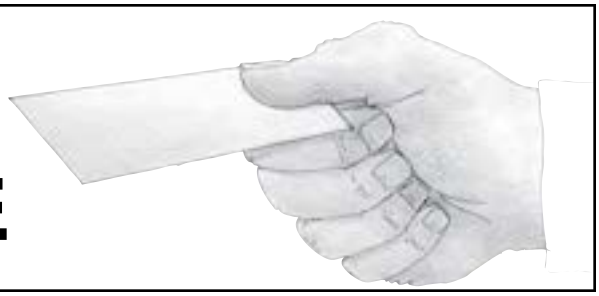

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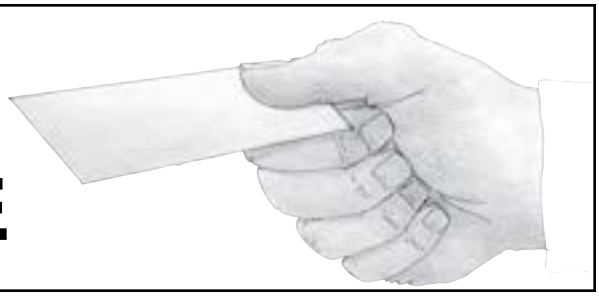

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2003 - 2006 Dodge Cummins

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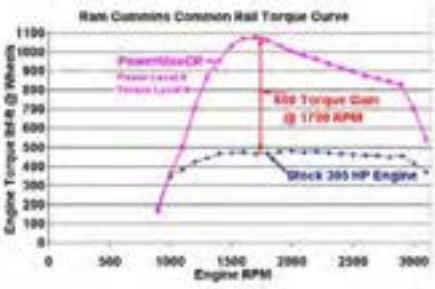

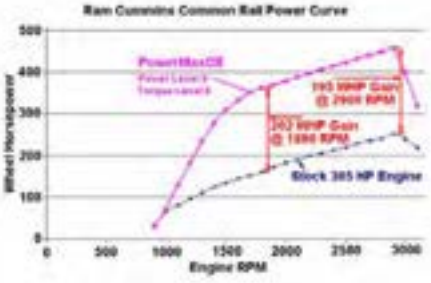

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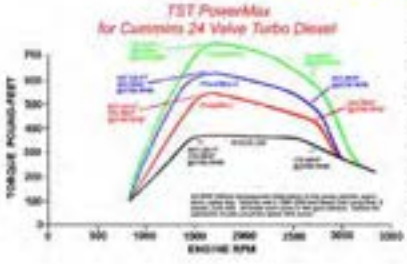
1998.5 - 2002 Dodge Cummins



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