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If you love advanced technology in the automotive industry, the last few months have been exciting times, with, among other things, the announcement of two new electric vehicles: the Ford Mustang Mach-E and the Tesla Cybertruck. I’m not so excited, though.

Both vehicles have received their fair share of criticism—most of which has addressed the looks and functionality of each. The Cybertruck is beyond ugly. I’ve read speculation that, to keep the sticker price down, Tesla designed the car with flat panels that wouldn’t need complicated stamping processes. If that’s the case, I can forgive the vehicle’s looks, but just barely. Less forgivable is calling a battery-powered SUV a Mustang. I get the notion of drawing on brand heritage, but for a brand to have heritage, it needs purity and focus, among other things. The Mustang barely survived the Pinto-era ’70s and narrowly missed becoming a front-wheel-drive sport coupe in the ’80s. The Probe was, instead, introduced as a separate car line, allowing the Mustang to stay on-trajectory and become a world-class GT in the decades since. Building an SUV and calling it a Mustang hurts the Mustang more than it helps the Mach-E, in my opinion. Mustang is an enthusiasts’ version of the Falcon, Fairmont, or Lincoln LS platform (depending on the generation), and though most customers statistically didn’t buy V8-powered GTs, they all choose to buy a Mustang over the stodgier cars it shared a basic architecture with, and that’s the point.

The bigger issue here is the shift toward electrification, however, and I’m unsure how to feel about that. As an enthusiast, I can’t get excited about a glorified golf cart. I really don’t care how much torque it makes, or how quick it is to 60 mph. I’m fine with electric cars as commuter vehicles, but they feel too devoid of soul and passion to be an enthusiast’s car. I watch a lot of racing on YouTube, especially motorcycle racing and vintage sports car and Trans-Am racing. A huge part of the mystique and appeal of performance cars are the sounds they make. More than that, it’s the dynamics of torque curves and horsepower peaks, upshifts and downshifts, and the smell of race gas that is so captivating. I love the insane, turbocharged Cosworth and Illmor-Chevrolet V8s of CART Indy Car racing of the ’80s and ’90s. By contrast, I’ve watched several Formula E races on YouTube and have yet to feel any sort of passion for the whine of an electric motor. From a fan’s perspective, also, it seems that the more work the car does for the driver, the less impressive the overall performance is. Watch videos of Ayrton Senna manhandling his McLaren MP4/5 around the circuit at Monaco in 1990, it’s spellbinding. With the car on the ragged edge of control, he works the gearshift lever (not paddle shifters) and makes instantaneous steering corrections, all playing against the backdrop of that glorious Honda V10. By comparison, Formula E is about as exciting to watch as people at a gaming console. I know there is a ton of driver skill in that series, way more than I possess, but the driving doesn’t seem as exciting as it did in the past.

Ah! There it is: the clichéd grumpy old man argument! If ever there was a more obvious way to lose an argument, yet feel like you won, I can’t think of it. All things are relative, and we will always be biased toward the heroes of our youth on an emotional level. To someone my dad’s age, Senna may have been a mere apprentice next to Graham Hill or Jim Clark, but a real old-timer could point to the days when race cars required a passenger to manually operate the fuel pump and oil the valves on-track as a true testament to racing grit and talent. It’s all relative, and that’s our challenge with HOT ROD. Plus, I don’t feel I’m quite old enough yet to use the grumpy old man argument, so despite my personal indifference to them, we have to pay some attention to electric cars, which are making their way into more forms of motorsport. Volkswagen’s recent performances at Pikes Peak and the Goodwood Festival of Speed are two noteworthy examples.

I enjoyed most of the vitriolic comments to the recent Cybertruck and Mach-E posts on our social media channels. Many said that neither of these vehicles belong in HOT ROD, and I tend to agree, but the next generation’s performance car may be a hybrid or (gasp) full-electric vehicle. That’s the beauty and curse of our demographic. Combining our print, online, and social media audiences, we are a broad swath of ages, races, and income levels who follow various, disparate trends like the currents in a vast river. You can go with the flow like everyone else, or you can stay to the periphery and become stagnant, but if you try to fight the current, well, that’s why the expression “swimming upstream” is prominent in popular discourse. Innovators stay in front of a trend. So, will you see electric cars in HOT ROD? Yes, but in small quantities and on the right subject matter. Otherwise we risk losing our focus and diluting the brand. Can we afford to ignore hybrids and their associated technology? No, I don’t think so, but know that those decisions will be made through gritted teeth. I may not like it, but you don’t get very far swimming upstream.
We Want Cybertruck! The Windows are Bulletproof

By Douglas Glad
Network Content Director @douglas.glad

If George Peppard were here to see the 2022 Tesla Cybertruck, he’d chew his cigar a little faster and maybe rub his hands at the prospect of a Damnation Alley remake. Don’t get the reference? Google it. We’ll wait. Any human who views Elon Musk’s angular stainless steel swipe at the lucrative half-ton market will have a similar reaction. What does it remind you of? Cylons? That hot chrome Stormtrooper from Star Wars: The Force Awakens? For us, it was Dean Jeffries’ gleaming Landmaster used to fight radioactive scorpions. We really couldn’t imagine it towing a race car.

Somehow, we got a third-party look at the ultra-secret photos and spec sheet before the launch of the Cybertruck in Tesla’s Hawthorne, California, facility on November 21. We were interested to see if it is, in fact, a truck a guy could use. Since we don’t have one to drive, let’s look at the facts and make some wild guesses.

Starting with the business end, we can’t see a receiver for a hitch, but the reported towing capacity is 7,500 pounds with what we believe to be the GCVWR of 14,000 pounds and a payload capacity of 3,350 pounds. A quick cross-reference with a Ford F-150 shows this to be average against the best-selling half ton.

We don’t expect the bed and tailgate development to be at the level of automatic fold-out steps, beer coolers, or gun safes, but we are going to presume there will be Tesla-style tricks that certainly include automatic up-and-down, and it looks like there is a small storage area at the rear of the bed floor. You can’t see it in the photos, but the rumor is a roll-away tonneau cover that disappears between the fore-end of the bed and the cab, like a storefront shutter in that neighborhood you don’t go into.

The bed is 6.5 x 4.5, so it is going to pass the standard sheet-of-plywood test with the tailgate down, like your Home Depot parts runner. We’ve also heard that the entire body is made from 3mm stainless steel, a metal that is known to be hard, but heavy. The properties of good stainless are resistance to rust and corrosion and a durable finish. In a move typical of Elon Musk, the body and windshield reportedly can repel a round from your 9mm. Their words, not ours.

The cab, again, looks like something from a modern half-ton Crew Cab. There is a third seat in the front row and three seats to the rear. Since this is a Tesla, there are no gauges, just a giant touch screen. The rearview mirror is more than likely a screen as well with 360-degree cameras. Hopefully one is pointed at the trailer hitch.

We’re not sure what is under the hood, if anything. But, somewhere on the truck are a pair of electric motors that MotorTrend estimated to make around 650-700 hp and 825 lb-ft of torque, if you believe in the conversion factors. There is also a three-motor “Plaid” combo that boosts the calculated horsepower to 800 and torque to 1,000. The plaid reference is a nod to something faster than ludicrous speed from the movie Spaceballs. Range is 300-450 miles, depending on the battery options.

Would you feel comfortable backing your bass boat down the ramp or towing the drag car in the Cybertruck? We don’t know either. As car guys, we can’t deny there is a fashion show element to what we do, and the Cybertruck is a sci-fi train wreck that will get you all the attention you need, good and bad. Would you drive it?
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“40 Cars. 5 Tracks. 1,500 Miles. You’ve Never Seen Anything Like This Before!” promised the cover of the Jan. ‘06 issue of HOT ROD. It was the birth of HOT ROD Drag Week, which hit the 15th anniversary milestone in 2019.

Who has the fastest street car in America? Even local street racers in the earliest days of hot rodding wanted to know. In the modern era, the question attempted to be answered by the original HOT ROD Fastest Street Car in America Shootout in Memphis in conjunction with the NMCA. That race started in 1992, and for the first few years competitors did “a 30-mile drive,” which was just laps around the road course—not exactly stoplight-to-stoplight,” said former HOT ROD editor, Rob Kinnan. “It had a winner every year—but also a lot of whiners saying, ‘That’s not a street car!’ and in some cases, they were right.”

While he was editor, David Freiburger started the HOT ROD Pump Gas Drags, another variation on the theme: Who had the fastest street car in America that ran on pump gas? This, and other events like it, set out to prove “who had a ‘real street car,’ but none required more than about 50 miles of driving,” he said. In 2005, Freiburger—by then, the magazine’s editor-in-chief—was inspired by One Lap of America, and proposed the notion that the way to determine the true, fastest street car was to make them drive on a significant road trip on the street plus five tracks, over five days, to five different states.

“There are a lot of events that have attempted to answer that question, but so far Drag Week has been the most conclusive answer,” said Freiburger. “I think the first year nobody believed that we would get that many cars, because most drag racers don’t drive their cars 1,000 miles on the street.” Kinnan added, “There was no arguing over a car that drove 1,500 miles, ran 8.58 at 157 mph [5s at 250 mph today], wasn’t allowed to change the block, but almost always had to do roadside repairs, all without a support vehicle. I even wrote a few times, ‘If you can make a nitro Funny Car street legal and drive 1,000-plus miles on the street without changing the engine, bring it on!’”

Interesting tidbits: Freiburger didn’t ask corporate for permission to put on a drag racing event. He just made it happen behind the scenes with significant help from Michelle.
the rules with his then-fuchsia '66 Chevy Nova, so he secretly followed him to the hotel, and also stalked him the next morning to watch for a trailer or spare parts to show up. “But damn if that badass little car didn’t drive all the way to the next hotel, over railroad tracks, through small towns with lights, sit in traffic, and everything. He didn’t baby it either. I was seriously impressed.”

“A lot of people compare Drag Week to how drag racing was in the 1950s or how land-speed racing is now, where everybody will help one another,” said Freiburger. “It’s not really that you’re bloodthirsty against your competitor—you’re actually helping out the next guy and helping out guys in other classes, so it’s become a community that’s unlike much else in racing. HOT ROD helped create a culture of people who will do that.” Kinnan reflected, “We all knew, staff and racers alike, that we had just hit on something really big, and everyone—except the cheater—was on the same page about coming back the next year.”

Tori Tellem
20 YEARS AGO
(March 2000, 148 pages, $3.50): It was our Paint & Body-themed issue—but for some reason we opted for a Photoshopped cover. Regardless, inside was packed with info on how to paint, schemes to paint, and 10 of the worst bodywork mistakes you could make. We also went deep when it came to explaining axle tech and intake manifolds, and also while looking at Billy Glidden’s 10-second Windsor race engine.

40 YEARS AGO
(March 1980, 136 pages, $1.50): Putting an exclamation on the cover could only equate to one thing: Pontiac extravaganza! That meant a history lesson, a Funny Car, speed equipment, and two road tests, including one that ended in breakage. The fastest stock-body Corvette? It also made it into the issue, as did a bunch of Chevy small-block performance tips from Smokey Yunick himself (like, use a roller-tappet cam).

60 YEARS AGO
(March 1960, 124 pages, 35¢): Editor Wally Parks pointed out how new vehicles were going through a change that’s polar opposite of 2020: “Days of the big juggernauts of the road seem numbered. Crowded highways and cramped parking spaces dictate the demand for a general shrinking-down.” In keeping with that theme, we found aftermarket companies that were already making performance parts for compact cars, notably Edelbrock and the Ford Falcon. March also featured a Plymouth Sonoramic V8 road test, the tech used by a few dragsters, and why a Gran Prix Ferrari had a Chevy engine. TorTellem
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As one of the greatest rivalries in automotive history, the film *Ford v Ferrari* (in theaters now) tells the story of how automotive legend Carroll Shelby took on the likes of Ferrari at the 1966 24 Hours of Le Mans. This is not some cobbled together Hollywood hash, but instead, a representation of what Mr. Shelby and driver Ken Miles went through as they battled the big red performance juggernaut. HOT ROD Magazine sat down with Aaron Shelby, grandson of Carroll Shelby and copresident of the Carroll Shelby Foundation, to talk about the new film, continuation cars, and what the future holds for Shelby American Inc.

HRM | Your grandfather, Carroll, created one of the most iconic cars in history by way of the Shelby Cobra. Why do you think that car has not only withstood the test of time, but continues to grow in popularity?

AS | For a couple of reasons: it was so successful on the track so quickly, and it took the market by storm. The fact that there were limited numbers produced and they have always been hard to come by has also played into building that legacy. Ultimately, the shape of the design and the visceral feel when you ride in one leaves a lasting impression.

HRM | *Ford v Ferrari* with Christian Bale and Matt Damon is a story 50 years in the making. Do you think it is a proper representation of the racing of that era, and more importantly, do you feel the film depicts your grandfather properly?

AS | For a Hollywood recreation, I think the film does a great job of translating what it was like for the drivers at the time. There were not a lot of safety features back then, and the drivers had to fully trust the car while pushing the limits to the extreme. The film does a good job of depicting my grandfather’s personality and character. Matt Damon does well in presenting the essence of his personality for the audience. As y’all know, Carroll was quite the salesman and that certainly comes across in the movie.

HRM | As a board member of Carroll Shelby International, were you consulted by 20th Century Fox in regard to the story line and overall factual accuracy of the vehicles?

AS | I was born in 1971, so as a young kid it didn’t mean as much. Since Carroll was not in the automotive business in the 1970s I didn’t really know much about it. Once he joined Chrysler in the early 1980s and was splashed across car magazine covers, that’s when his history and the name started to mean something.

HRM | What was it like growing up with the last name Shelby?

AS | I was born in 1971, so as a young kid it didn’t mean as much. Since Carroll was not in the automotive business in the 1970s I didn’t really know much about it. Once he joined Chrysler in the early 1980s and was splashed across car magazine covers, that’s when his history and the name started to mean something.

HRM | Obvious question, but did your grandfather teach you to drive? And what was he like outside of the automotive world?

AS | Actually he did...when I was 12 he was with Chrysler and had just introduced the Dodge Omni GLH (Goes Like Hell). I wanted to tour the facility in Southern California where they made the cars. He took me there and after the tour we went for a ride in the GLH. After a few minutes, he said let’s switch seats and I will teach you how to drive. What a great memory!
We were not directly consulted on the film. The story is public and fairly well known. That said, Superformance supplied most of the Ford/Shelby vehicles for the film and worked on the accuracy quite a bit. In addition, the artistic director went to great lengths to make the cars look as visually close to that time period as possible.

Shelby American builds some amazing continuation vehicles such as the Shelby GT40. In reality, how close is that vehicle in design to the original road-going cars of the 1960s?

The GT40 that we build today is very similar in design, size, and construction to the ones built in the 1960s. Many of the parts would be interchangeable. We should also remember that, even in the '60s, no two GT40s or Cobras were exactly alike.

In the mid-1980s, Shelby dabbled in small-displacement turbocharged engines in the Shelby Charger, Shelby GLH-S, and the Shelby Daytona Turbo Z. Although public reaction was mixed, they turned out to be great performing cars. Would Shelby, as a company, once again entertain going this route?

Shelby is always looking at different propulsion systems, and we still like to push the envelope on performance, so you never know.

We know Shelby embraces forced induction, but what about electrification or hybridization—is that something we might see in a future Shelby product?

My grandfather was all about performance, and as y'all have heard him say, “I'm Carroll Shelby and performance is my business!” Ultimately Carroll looked at, and evaluated, many types of powerplants through the years. What the future holds for Shelby in this regard… you’ll just have to hang on and see.

The 1999 Shelby Series 1 was seen as a triumph by some and a failure by others. Will Shelby ever again design and build its own car, or will the company stick to the business of modifying vehicles produced by other manufacturers?

Carroll always liked to experiment and the company still likes that today. So who knows where the future will take us.

For 2020 we’re seeing an all-new, 760hp Shelby GT500. Name aside, how much input did Shelby American have in the development of the car?

Ford clearly took the lead on this vehicle. Gary Patterson and I took several trips to Dearborn to monitor the development process along the way. The team at Ford Performance has done an outstanding job engineering a vehicle that Carroll would be proud to have his name on!

Knowing your grandfather as you did, what do you think he would’ve done differently in the past, and have you an idea of the projects that he would have liked to accomplish in the future?

Carroll was a risk taker by nature. I don’t know many things he would have done differently, even if some of them did not succeed. He knew success did not come without taking risks. He woke up every morning with new ideas about all kinds of things. At the end, he finally ran out of time to work on them all. Outside of speed performance, he was very interested in fuel-economy performance… going back to the small-displacement turbo engines mentioned earlier. He found a great challenge in providing more horsepower with less fuel. You never know where he might be today, but it is probably a combination those things.

What is the legacy of Shelby 25 years from now?

Carroll always liked to experiment and the company still likes that today. So who knows where the future will take us.

Vintage Shelby, or new Shelby—you can only choose one. What is it, and why?

I love the vintage vehicles, but the 2020 GT500 is the way to go. That car has everything! I can’t wait to get mine!
Hiding in the hills of North Carolina are a bunch of incredible Mopar Honey Holes. This one we’ve been to a handful of times, and yet there is always something new to uncover, like this 1970 Dodge Challenger. We recently visited a gentleman in North Carolina who had let us look at his collection several years ago. On this visit he was going to show us his new shop. On the way to the shop we passed an old shed, and sitting there was a 1970 Dodge Challenger. It was an original small-block car with a flat hood and drum brakes. There was a little rust in the fenders and quarters, but nothing serious. Soon after our visit, the car was moved into the new shop and finished up.
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This modern take on the Tucker design was pulled off by Rob Ida and his crew, and aided by the great-grandson of Preston Tucker himself. The results are both sublime and visually stunning.
reston Tucker was a true hot rodder; there’s no denying that fact,” cites world-class fabricator Rob Ida, while explaining the intricacies of his latest, no-holds-barred Tucker-branded tribute to the once-maligned, now prominently praised marque. “There’s absolutely no rebuffing Tucker’s innovation and the fact that he was a true trailblazer—a visionary of the highest degree. That’s a short list of characteristics of what makes up a great hot-rodding mentality,” continues Rob.
Rob’s got a lot to say about the Tucker legacy, as he should—it’s woven into his family’s history. “My grandfather, Joe Ida, owned a Tucker franchise for about a week in Yonkers, New York, before it was finally shut down,” says Rob. It’s through that history between the Ida and Tucker factions that Rob has befriended both Sean and Mike Tucker, the great-grandsons of the famous automotive futurist.

Because of that, Rob feeds his need to help keep the Tucker name in the spotlight. Both Mike and Sean are pursuing careers in the motor vehicle industry and continue to help spread the Tucker legacy throughout the globe by being modern day ambassadors for the family marque.

Seek and Deploy
To fully appreciate this car you need to see it in person. Built completely from scratch, this rolling piece of automotive art is “homage”, of sorts, to Preston Tucker’s enduring legacy. Outwardly the car stays true to the original, and Rob should know—he’s built several Tuckers (both original and handmade tribute cars) in the recent past.

In person, the Tucker’s beauty spanks you like Mom’s wooden spoon, but in this case it’s all worth it. The project started in 2012 when Rob decided to start putting together a Tucker re-creation for his own. “We basically made the entire car in the shop; we started with my own fiberglass replica body,” says Rob. From there, the...
“A tremendous amount of work went into this car, but the goal was to make it look like almost nothing happened—like it’s an old Tucker with just a mild customization.”

-Rob Ida

sheetmetal hood, bumpers, bellypan, and door frames were all made from scratch by Rob and team members Russ Montelbano, Artie Zygnerski, and Ryan Klimchock.

As if that weren’t enough, they also built the chassis from the ground up. “We had the tooling and jig to build the frame, and it’s all hand fabricated out of rectangle tube,” says Rob. They added an Art Morrison front end to the mix. To really mix things up, Rob took the front suspension from a front-wheel-drive 1995 Cadillac Seville and reworked it into a functional independent rear suspension. RideTech’s Air Ride components are at each corner, making the process of dialing in the height and stance an easy affair.
When planning the build, Rob decided to move the powertrain ahead of the rear axle for better weight balance versus the original rear-engine design. He chose the powertrain from a front-drive 1995 Cadillac, rebuilding the Northstar V8 with head studs and better gaskets.

 wanting more power than the stock Northstar could deliver, Rob designed a twin-turbocharger system with plumbing designed to look like cast pieces, complete with the Tucker name.

When planning the build, Rob decided to move the powertrain ahead of the rear axle for better weight balance versus the original rear-engine design. He chose the powertrain from a front-drive 1995 Cadillac, rebuilding the Northstar V8 with head studs and better gaskets.

[Left: The Tucker was sprayed in Rob Ida's own interpretation of Tucker's Waltz Blue. The original was a personal favorite of Preston's, as it mimicked the hue of one of Mrs. Tucker's beloved dresses.

[Below left: These are steel wheels with Cadillac Sombrero caps. They are shod with Firestone bias-ply whitewalls for that period-correct look.

[Below: This tribute car maintains the same suicide-door arrangement as the original. Ida and his crew used a Henry J seat for the front and custom-built the rear seat. The upholstery is two-tone broadcloth, done in-house by Ken Aucone.
The Cadillac's beefy factory discs now sit out back on the reversed rear suspension, and an electric parking brake from a Tesla was adapted to fit.

Rob decided to use the four-cam Northstar engine from the donor Caddy as the motor-ovation for his new ride. To add a measure of reliability and performance, he rebuilt the engine with custom pistons and rods, had the heads rebuilt, upgraded the head bolts, and installed them with Cometic head gaskets for optimum sealing. All this was done to support the increase in power offered by a pair of Garrett T28 turbos and dual intercoolers in a custom-made induction system. The system runs on a stock Cadillac ECM, but Rob designed a “piggyback” module that modifies the signals. Boost is monitored by a second MAP sensor that controls an additional set of fuel injectors to support the added power. Nick Mannarino from Modern Performance in West Long Branch, New Jersey, handled the handwork on the Cadillac powerplant.

For those familiar with Tuckers, you'll know the engine was located in the rear of the car. That's not quite the case with this build. According to Rob, “One issue the original Tucker 48 had was its overall balance; it just wasn’t right. The rear engine location did not help the ride at all. That's why I decided to locate the transverse-mounted engine and its original Cadillac 4780E four-speed transmission in the back seat area, in front of the rear axle.”

**Family Affair**

As the chassis and body were mocked up, Rob got an infusion of help on the project from a good friend, Sean Tucker. “This was the first project I really started working on with Rob,” states Sean. He had recently relocated to the area after his wife received a job offer at Lehigh University in Bethlehem, Pennsylvania. “We moved from Michigan to Pennsylvania where she could be near work, and I could be closer to Rob’s shop,” Sean says.

Soon Sean was filling in, helping Rob and his crew. “It was still just a side project for Rob, so I was just working on it in my spare time.” says Sean.

All that changed in 2017 when international car collector Jack Kiely got involved. “Jack is one of our best customers. He started checking out the Tucker build. Soon he was asking if he could buy it and then have the car finished for a SEMA show premier,” states Rob. There was plenty left to do,
Rob built the shifter by hand. It was up to his father, Bob, to see it to fruition. The elder Ida first drew it up in CAD and then CNC-machined the final version out of aluminum. "Billet" Bob handled all the custom machining on the Tucker.

Don't let the vintage look fool you. Everything under its skin is modern technology, including Kaiser door handles which activate the power windows. The 3D printed door buttons control the inside door poppers. The steering wheel is from a Lincoln with a re-pop Tucker emblem in the center. Sean Tucker cast it from an original he had stashed away.

Rob designed these "lollipop" switches after similar ones that controlled the original Tucker 48 lights. He made these parts out of metal and painted them to match the overall theme of the cockpit. They control the RideTech Air Ride suspension system. Below are the switches for the wipers, A/C, heat, defrost, and lights.

Preston Tucker sold aftermarket Tucker radios even before the original production run of Tucker 48s was finished. There were quite a few examples sold, including this original one here. Rob installed modern components like satellite radio and a USB smartphone hookup.
though Rob had a seasoned crew and the young Tucker helping.

“The first thing we did when I got there was help Rob finish the drivetrain mock-up and made it a driving chassis,” says Sean. Once the engine and trans were set, Sean designed a dual-mode exhaust system for the car, along with the intercooler and coolant tubes for the turbo set-up. Those unique intercooler tubes are pretty interesting on their own. “Rob got the idea to have them look like old cast pieces, so I drew up a ‘Tucker Twin Turbine’ logo in CAD and then 3D printed it,” says Sean. “You’d never know it was a modern design,” says Rob.

The crew forged on, aided by Russ, Artie and Ryan. They got the bodywork up to snuff and sprayed the car in Rob’s own modern rendition of Tucker’s famous Waltz Blue, which helps keep the Tucker’s period-correct look intact. Rob designed all the intricate trim pieces for the car including the bumpers, surrounds, bezels, and assorted moldings; all handmade in steel by Rob and his team. As the summer of 2017 rolled on, the guys knew they would have to make a big push to stay on schedule. “My crew did a fantastic job putting in the long hours needed to get the job done.

[Above: Initially, Preston Tucker had Stewart Warner make a custom 5-in-1 gauge cluster for the production cars. After the demise of the Tucker Corporation, SW sold the design to Seagrave for their fire trucks. This cluster was pulled from one of those trucks and rebuilt. Rob dismantled the unit and installed modern 12v electronics in the cluster.]
I can’t thank Russ, Ryan, Artie and, of course, Sean enough for their expertise and dedication. Even my dad, Bob chipped in with some of the machining and fabrication,” says Rob. Needless to say, the Twin Turbo Tucker made it to the big event and was stationed at the Axalta Coatings booth, where it received the highest accolades.

The interior gets compliments everywhere it goes. “There’s a lot going on here—all of it is functional—and we wanted to bring in major visual highlights from the original Tucker,” cites Rob. The interior pieces were mostly fabbed by Rob; while Sean handled some of the retro pieces for the interior, drawing them up and 3D printing them. You’d never know these interior pieces weren’t NOS Tucker parts that some picker just stumbled upon.

This particular ride is an eclectic, but understated blend of mid-century design and modern guts; a car that can make both old-time rodders and modern techies grin from ear to ear. Rob says, “This car was scratch built with tons of tech, design, engineering, and fabrication; but in the end, it is a well-balanced and understated car that isn’t trying to grab your attention.”

[Pinstriper and artist, Jennifer “Hot Rod Jenn” Thomas, hand-paints the restored and updated gauge cluster, recreating the Tucker font to perfection.]

[The steel plate front and rear bumpers were hammered into shape by crew member Artie Zygnerski, then were metal finished and chrome-plated.]
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BLAZING A NEW TRAIL

Mark Stielow drives out of his lane with a classic, LT-swapped Blazer built to cruise.
commitment is the ironic flip side of hot rodding.

For all the inspirational creativity and mechanical wizardry that abounds, trends often become clichés that are difficult to shake. So, given his trendsetting legacy with early F-bodies, the logical reaction to Pro Touring pioneer Mark Stielow’s latest build is, “that’s a funny-looking ’69 Camaro.”

But the visionary builder took a big step out of his comfort zone with an LT-swapped, two-wheel-drive 1978 K5 Blazer because, well … just because.

“I’ve always loved the design of these Blazers and I wanted to build something for long-haul drives—something that was comfortable, had room for a week’s worth of gear, and was forget-about-it reliable,” he says. “I didn’t build it to race; I built it to drive.”

In fact, Stielow had just tacked on 2,500 miles to the odometer when we caught up with him after returning from the eastern leg of the Goodguys Road Tour.

“It was 2,500 miles covered in seven days and not a thing went wrong with it,” says Stielow. “The A/C worked; the cruise control worked. It was exactly what I wanted with the build, and even more fun than I expected.”
The project started in earnest more than a year ago, after months of searching online for the perfect candidate vehicle which revealed itself via a Craigslist ad in North Carolina. A deal was struck and Stielow headed down to the Tar Heel state from Michigan to pick it up. He drove it around for about a month while searching for the next piece of the project: the drivetrain.

“I wanted to keep it all very simple and straightforward, with an LT engine and transmission from a late-model truck,” he says. “No supercharger, no big cam or anything like that. Just a modern take-out engine and transmission.”

He found it all through Ohio-based Stricker Auto Parts, which specializes in salvaging vehicles written off in shipping-train derailments. Yes, that’s a thing. A big enough thing, in fact, that Stielow had his pick of project material and settled on the guts from a derailment-damaged 2018 Tahoe. Better still, it was essentially new.

“I was able to get everything for the swap,” he says. “And I mean everything: the engine, transmission, air box, radiator, cooling fans, fuse box, powertrain control module and more—even the emissions equipment, because I wanted to retain all of the catalytic converters.”

Prompt delivery of the swap components kept the project on track (pun intended). Stielow quickly yanked the Blazer’s original smog-choked small-block and started taking measurements of the new powertrain parts and comparing them against the Blazer’s engine compartment dimensions. It would all fit, but the engine needed to be pushed back a few inches to accommodate the radiator and fan assembly.

With his busy job at the General Motors Proving Grounds, however, shop time was something Stielow didn’t have in abundance so he turned to Matt Gurjack’s shop, Sled Alley, to handle the installation and supporting fabrication work. “I wanted the truck done for the spring, and Matt could work on it 40 hours a week, while I might have been able to squeeze in maybe 10 hours a week after-hours,” says Stielow. “Matt has a great eye for detail, and I knew he’d knock it out of the park.” He did.

The engine itself is the L83-code, 355-horsepower, 5.3L backed by GM’s six-speed automatic transmission. It is completely stock and simply cherry-picked from the off-the-rails Tahoe. Holley’s LT-swap engine mounts were used for the installation, but custom brackets were required to attach them to the engine. The stock transmission crossmember was retained, but simply moved back one set of holes. Sled Alley also fabbed all the brackets to mount the radiator, fuse block, air box, and so on—elements that all look innocuous enough under the hood, but nonetheless took hours and hours of time to build.

Fortunately, things were a little easier with the exhaust system. “We even were able to retain the original exhaust manifolds,” says Stielow. “The only real change was a slight modification to accommodate the driver-side converter, Adapte...
was essentially unheard of only a few years ago. Like the engine swap, they look factory installed in the Blazer.

“I was amazed,” says Stielow. “We literally hooked up the few wires from the vehicle side and the two CAN bus wires and it just worked. Just like that. It was the same thing for the cruise control from Dakota—just the CAN wires and a new turn signal stalk. That was it. It couldn’t have been easier.”

The only other significant change or upgrade to the interior, which still wears its original door panels and carpeting, is recovered seats. Stielow turned to SPC Interiors, in suburban Detroit, to stitch together stock-appearing, blue-and-white plaid seat covers that speak to the 1970s like Pablo Cruise concert tickets in the pocket of a brown leather jacket. More than 40 years later, they’re still more stylish, too.

On the outside, the original faded blue-over-white paintwork was retained, but the Blazer was given a more contemporary stance with a Ridetech suspension upgrade and 18-inch wheels. Because Ridetech doesn’t offer a kit specifically for 2WD Blazers, Stielow adapted one of their Square-Body C10 kits. In the front that included the spindles, shocks, stabilizer bar, and springs with a custom half-inch spacer on top.

In the rear, the C10 originally included composite leaf springs, but they were naturally spec’d for a pickup application and gave the Blazer too much of a tail-dragging attitude. “It just sat too low in the rear,” says Stielow. “So, we used the Ridetech shackles and other components, but simply reused the original steel leaf springs to get the ride height and stance just right.”

The wheels are 18x9-inchers all around from Detroit Steel Wheels, wrapped in Michelin 255/45R18 tires in front and 275/45R18 rubber in the rear. That’s about it for exterior alterations. The rest of the truck is stone-cold stock; and with the stock 355-horsepower from the L83 engine, it will never pose a performance threat to Stielow’s Camaro builds. Then again, it was never the goal, he points out. “This was built for fun and easy driving,” he says. “It was a project that didn’t involve the time or investment of an engine builder or a painter. We concentrated on integrating the latest powertrain technology in a great-looking vintage vehicle to make it a cruiser, and that’s exactly what we achieved. I couldn’t be happier with the results.”

That’s not to say Stielow has forsaken his trademark, track-capable F-bodies for slammed SUVs. Not at all. We’ve seen his next project and we can say, with certainty, that the nation’s strategic reserve of Pro Touring ‘69 Camaros is nowhere close to being exhausted.
For Tony Scalici, Building Cars is a Form of Therapy

Stories don’t always begin with the featured vehicle. This one actually began with a 1967 Chevy pickup. I photographed that C10 for sister publication Classic Trucks. It was exceptional beyond the sum of its parts: Tony Scalici transformed it from hardly more than a frame and bits of a rusty cab into a top-shelf Pro Touring rig that made the cover of a national magazine. And he did it in about a year. But that’s not even the impressive part: It was his first shot at building anything. This is a busy dude with a big family and a serious job.
When pressed for the secret to success, he revealed something that most wouldn't associate as any sort of benefit to car building: post-traumatic stress disorder.

Tony is one of the near-countless veterans affected by their service. PTSD manifests in just as many ways. “Specifically, I over-think,” Tony explains. “I can’t turn my brain off. When I don’t have anything to do—meaning I don’t have something to focus on—I get overwhelmed with thoughts that I shouldn’t be having.” Building things trains his mind on something more positive. “I use that therapy to go to the next car.”

This is that next car. In fact, there have been so many next cars that Tony went into business building cars for others at G Rods Garage in Chehalis, Washington. But while building that C10, Tony discovered something that changed his life: autocross. Specifically, the Optima Ultimate Street Car Challenge. As he quickly learned, the truck he built had more of the appearance of a race car than the performance of one. To remedy that, he had to start from scratch.

His inspiration for it was as unlikely as the backbone of his productivity. “My grandmother bought a brand-new Trans Am in 1979,” he reminisces. “At Optima you want to show up with something that’s different from everything else. I’d never seen a Trans Am.”

After some searching, Tony found a derelict project. “The guy blew it into a million pieces and gave up,” he says. The car came together around Speedtech Performance USA’s successful Track Time suspension—a system that uses the company’s interpretation of the torque arm that helped make the third-gen F-body so successful.

For power, Tony had Tory Eaton build an LSA with a raft of parts from Lingenfelter Performance Engineering: a ported 1.9 Eaton supercharger, ported heads, and a Brian Tooley Racing cam. Eric Armstrong, at Armstrong’s Automotive and Performance Center in Enumclaw, WA, coaxed 722 hp and 640 lb-ft of torque from the healthy combination.
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What that engine drives is unexpected: a Tremec TR-6060. It’s basically the venerable T-56 with a host of improvements like triple-synchronized First and Second gears and double-synchronization on all others, including Reverse. A one-piece countershaft also gives the trans a 600 lb-ft torque capacity. However, the gearbox presented a few problems. Because GM intended it for the IRS-equipped Camaro, it has an output coupling that requires a slip-yoke driveshaft. The transmission is also much bigger. “You have to raise the floor to fit the trans,” he says. “It’s bigger back there.”

Tony modified the body in ways that escape detection but that make the car function better. Naturally he tubbed the rear, but to get 335/30ZR18s to tuck, he also had to slice the rear quarter-panels lengthwise over the wheels then fill the gap that emerged. “Everybody thought it was awesome, but it was the easiest thing you can do,” he assures.

To get 315s on the front, he pulled the leading lower edges of the fenders out. That widened the nose at the bottom, so he cut up two bumper fascias on either side of the center and grafted them together with a scarf joint and urethane adhesive. Tony worked with Boze Alloys to create a wheel design that borrows everything from the snowflake … except the weight. They measure 18x9 and 18x10 (f/r) and mount 315/35R18 and 335/30R18 (f/r) BF Goodrich g-Force Rivals.

The feature that makes the car distinctive—the T-tops—also made it a lot harder to build for track use because they compromise the structural integrity of the body. To combat the potential chassis flex, Tony built an eight-point rollcage from .095-inch wall-thickness tube. He used 1 ¼-inch tubing for everything right up to the tops of the A-pillars and sail panels. From there he spanned the top with 1 ½-inch tubing. “I would’ve gone thinner-wall, but I couldn’t find chromoly in the diameters that I wanted,” he says.
What’s especially noteworthy is how Tony routed the tubing. He removed the inner roof panels, tucked the tubes into it, modified the inner panels to fit, then welded everything back together. The only evidence is a bulge in the inner A-pillars.

Though effective, the design has secondary consequences. Because he had to snake the tube across the roof to go through the T-top spine, there’s a lot of material in there. And because he had to run heavier-wall tube to get the sizes he needed, that extra material is kind of heavy. Adding to that weight is the full interior that Tony Miller at Stitches Custom Upholstery created. In total, the car is 400 pounds heavier than the class minimum.
“It was crazy just how much it hurt lap times,” Tony admits. “I really thought horsepower would overcome the weight.”

He cites a buddy who turns faster lap times despite reduced power. “It’s lighter—he was below the 3,200-pound weight minimum whereas I was 3,525.” Furthermore, his friend had the advantage of ballast. “He put the weight where it did the most good.”

Though heavy, the Firebird performed beyond expectations. “I can’t remember how we placed in the first race (in Las Vegas), but in the last race, I finished in the top five.” The race between those two will go down in infamy; at the Fontana meet, an aggressive speed bump bent an exhaust outlet upwards, directing hot gases at the urethane bumper which ultimately caught fire.

“By the time I noticed it, I’d done two laps,” he says, laughing. “I walked away pretty cool about it, but the photos quickly became memes.” He had the car not just track-ready, but repainted, within 14 days.

Tony, once again, found himself in a predicament similar to what he had encountered with his pickup: he had learned a bunch more that he couldn’t address without basically starting from scratch. “If I could have thrown carbon doors at it, I think I could have consistently been in the top three with it,” he speculates. “But at $2,500 to $3,000 per door, it just wasn’t worth it.”

Obviously, the story about this car didn’t start with this car, and it doesn’t end with it, either. Tony recently bought a third-gen Camaro. “It’s crazy how much lighter it is,” he marvels. With LS power—but otherwise stock—it weighs 3,030 pounds with a full interior and half a tank of gas; below the 3,200-pound threshold, leaving him plenty of ballast potential. With a Lingenfelter LS7, a sequential Tremec, Heidt’s front clip and IRS, plus Tony’s imagination, it can’t help but run hard.

“When I built this car I looked at things differently,” Tony says. “I thought, ‘Well this is what the rules say’, but there’s a gray area—a huge gray area. A lot of the guys I run with have been doing this for four or five years. They’re really good at that gray area.”
The critical fasteners in late model engines aren’t designed to handle extra stress —nor can they be re-used. They’re yielded upon assembly. ARP’s engineering team has tested them all and developed high performance replacements that provide you with increased clamping force, an extra margin of safety, and the ability to be re-used. Win, win, win!

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$50M+ Collection of Rare Shelby Vehicles and Ford GTs

At the headquarters of Carroll Shelby International in Gardena, California, sat close to $55 million worth of automobiles. Thanks to the folks at Shelby American and The Original Venice Crew, and as part of the 15th Annual Tony Sousa Car Show, two of the most significant American race cars were present for onlookers to view and enjoy. The first was the Ford GT40 that was driven by Ken Miles in the 1966 24 Hours of Le Mans. The second, and equally iconic, was the Shelby Daytona Coupe driven by Bob Bondurant, that went on to win the 1965 FIA World Manufacturer’s GT Championship. By themselves, these two vehicles hold an estimated value of more than $49 million.

Scattered throughout the Gardena warehouse lay a host of classic Shelby vehicles, 2005–2006 Ford GTs and, of course, a slew of new Ford GTs. The success of the event was not so much due to the vehicles themselves, but instead, the men and women in attendance who graciously cared for them. HOT ROD was on hand to capture these legends, who more than 50 years ago helped make Shelby a household name.
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PISTON POWERED SHOWDOWN

2019 AMSOIL ENGINE MASTERS CHALLENGE
PRESENTED BY JE PISTONS
[Below: Once again Amsoil backed the Engine Masters Challenge, combining both marketing and research as part of the program. The annual competition gives the oil company access to top engine builders and influencers, allowing them to refine and promote their products.

[Right: JE Pistons handles all the testing under strict parameters with consistent atmospheric conditions and exact sampling parameters. The Early Iron competitors had an operation range between 3,000 to 7,200 rpm while the Extreme LS entries were free to pull all the way up to 8,000 rpm. SuperFlow is the official dyno of the competition and they had representatives on-site to ensure each test was consistent.

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**EARLY IRON**

**BLAIR PATRICK**

**SOUTH PITTSBURG, TENNESSEE**

**Class:** Early Iron

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Ford FE Big-Block</td>
<td>402 ci</td>
<td></td>
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<tr>
<td>Peak HP</td>
<td>586.7 at 7,100</td>
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<tr>
<td>Peak Torque</td>
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<td>Average HP</td>
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<tr>
<td>Average Torque</td>
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<tr>
<td>Overall Score</td>
<td>2,511</td>
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**Key Components:**
Scat 4.000-inch crankshaft, Ford C4AE-6090G cylinder heads, ARP fasteners, Trick Flow intake manifold, Wilson Manifolds spacer, and Holley carburetor

**Competition Notes:**
Blair Patrick Enterprises is well-known in the NHRA Sportsman ranks with record-holding engines in Stock and Super Stock. Proprietor Blair Patrick last entered Engine Masters Challenge in 2008 and waited patiently for the rules to work in favor of the Ford FE platform before he returned.
for the 2019 Amsoil Engine Masters Challenge presented by JE Pistons as the season changed from summer to fall. Once again, HOT ROD enlisted the JE Pistons R&D facility as home base for the popular engine competition, which is celebrating its 18th year. The competition takes three days to complete as JE’s engineering staff worked with SAM Tech students to swap as many as six engines a day. Once the engine is ready to fire, the teams are given 35 minutes for start-up, tuning, and official dyno pulls.

This year there were two categories for the cagey veterans and newcomers—Early Iron and Extreme LS. The Engine Masters Challenge uses a unique scoring system that measures average horsepower and torque against engine displacement. The system helps different combinations compete against each other regardless of brand or engine size.

In Early Iron, competitors must select an operating window between 3,000 to 7,200 rpm to form their average results. The Extreme LS competitors had an 8,000-rpm redline because of their extreme nature, no pun intended. Additionally, the late-model LS category didn’t include the displacement in the final score like the Early Iron class, as all LS entries had a maximum engine size of 440 cubic inches.

The most popular category was Early Iron, and this year’s EMC saw an eclectic mix of brands as the engine builders chased the rule book. The boundary was set at 1968-and-older domestic V8 engines, requiring OEM heads and blocks. Limits were also set on compression and camshaft lift.

Early Iron engine builders were allowed up to a .065-inch overbore from stock and crankshafts could deviate as much as .015-inch from stock specs. The cylinder heads could be ported but welding, epoxy, and other radical tricks were strictly prohibited.

The compression ratio was limited to 10.5:1 and Sunoco Race Fuel 260 GT 100-octane gasoline was supplied to each entry on the day of the dyno challenge.

Moving topside, the Early Iron engine builders could design any style camshaft with a limit on max lift only—0.550-inch for small-block and 0.600-inch on big-block entries. The intake manifold was an area with few restrictions as any commercially available, single four-barrel cast intake could be used. A single 4150 carburetor with specific internal dimensions was required to keep all engines on equal footing.

Heading into the busy week of dyno testing all eyes were focused on Jon Kaase, the renowned engine builder and eight-time Engine Masters Challenge champion, and his Early Iron big-block Chevy. But when the dyno stopped screaming and all the scores were tallied, it was Blair Patrick and his team’s Ford FE engine that topped the charts with 2,511 points.

SAM Tech’s Shawn Hooper joined Patrick in the winner’s circle as the trade school team captured the Extreme LS victory over rival Midgette Motor Sports’ LS engine.

Each winner walked away with either a $15,000 or $20,000 cash prize and the Engine Masters Challenge Trophy.


**GEOFF MUMMERT**

// EL CAJON, CALIFORNIA

Class: Early Iron

<table>
<thead>
<tr>
<th>Engine</th>
<th>Displacement</th>
<th>Peak HP</th>
<th>Peak Torque</th>
<th>Average HP</th>
<th>Average Torque</th>
<th>Overall Score</th>
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<tbody>
<tr>
<td>Ford 302 Small-Block</td>
<td>296 ci</td>
<td>446.0 at 7,000</td>
<td>371.8 at 5,700</td>
<td>387.5</td>
<td>358.2</td>
<td>2,504</td>
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</table>

**Key Components:**
- Offset ground 2M crankshaft, ARP fasteners, D10E factory block, and Ford C5AE cylinder heads

**Competition Notes:**
The goal was to push the revs close to the 7,200-rpm threshold thanks to the excellent oiling and valvetrain stability offered by the Ford 302 platform. The team focused on a favorable valve area/cubic-inch ratio along with a vast collection of OEM parts for the well-matured small-block engine. The team reduced the displacement to 296 ci to take advantage of the scoring system.

---

**JON KAASE**

// WINDER, GEORGIA

Class: Early Iron

<table>
<thead>
<tr>
<th>Engine</th>
<th>Displacement</th>
<th>Peak HP</th>
<th>Peak Torque</th>
<th>Average HP</th>
<th>Average Torque</th>
<th>Overall Score</th>
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<tbody>
<tr>
<td>Chevrolet 427 Big-Block</td>
<td>429 ci</td>
<td>607.6 at 6,500</td>
<td>542.4 at 5,000</td>
<td>547.1</td>
<td>508.8</td>
<td>2,448</td>
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</table>

**Key Components:**
- Scat crankshaft and connecting rods, COMP camshaft, Brodix intake manifold, and Chevy 840 cylinder heads

**Competition Notes:**
As usual, Jon Kaase carried a target on his back as an eight-time Engine Masters Challenge winner. He brought a big-block Chevy to the competition despite his steep heritage in the Ford market and he didn’t disappoint his fans with a third place finish. He noted the engine was down on power compared to his pre-event testing, but it still managed to crank over 600 hp while maintaining a stock appearance on the outside.
BUCK HINKLE  
LONDON, KENTUCKY  
Class: Early Iron

Chevrolet 396 Big-Block 403 ci  
Peak HP 584.8 at 6,700  
Peak Torque 508.3 at 5,500  
Average HP 492.5  
Average Torque 481.3  
Overall Score 2,412  

**Key Components:**  
Chevy 702 castings with CNC porting, stock crankshaft with 3.760-inch stroke

**Competition Notes:**  
Hinkle Performance Engines are longtime Engine Masters Challenge competitors and they normally bring a Mopar engine to the shootout. Though Chevy engines are not foreign to their EMC efforts, one year they brought a nasty small-block Chevy that used NASCAR parts and cranked out 763 hp. Buck Hinkle was quick to note that they had a Mopar 383 engine in the shop that might have faired better but their stock-looking 403ci big-block was no slouch as the peak output was a stout 584 hp and produced an overall score of 2,412 points.

ADNEY BROWN  
FERNDALE, MICHIGAN  
Class: Early Iron

Chevrolet 327 Small-Block 331 ci  
Peak HP 464.9 at 6,500  
Peak Torque 416.0 at 5,200  
Average HP 403.5  
Average Torque 394.4  
Overall Score 2,405  

**Key Components:**  
Scat connecting rods, ARP fasteners, Lunati camshaft, COMP Cams valvesprings, Hedman headers

**Competition Notes:**  
The 1967 Chevy 327 was selected due to the rules limiting Early Iron entries to 1968-and-older combinations. Adney Brown and the Performance Crankshaft team tested several camshafts and other parts to extract the most power from the OEM-headed small-block, which produced a max horsepower reading of 464 hp. Brown has competed many times in the Engine Masters Challenge and uses it to push the shop and mingle with the other competitors.
TED EATON  
// LORENA, TEXAS
Class: Early Iron
Ford Y-Block 303 ci
Peak HP 428 at 6,800
Peak Torque 367 at 5,500
Average HP 367.1
Average Torque 346.6
Overall Score 2,358

Key Components:
JE Pistons, Total Seal rings

Competition Notes:
Ted Eaton and his Eaton Balancing team mixed and matched several different Y-block components to come up with the 303ci displacement and create strong average results. The engine block was from a 1962 passenger car while a crank from a 1957 model was dropped in because it featured a 3.314-inch stroke. The cylinder heads, P/N 113, were only available in 1958 and 1959. Despite the engine’s age, it did manage 428 hp and broad power curves.

CHRISTOPHER PELCZAR  
// HOUSTON, TEXAS
Class: Early Iron
Chevrolet 327 Small-Block 330 ci
Peak Hp 464.7 at 6,600
Peak Torque 412.1 at 5,200
Average HP 402.5
Average Torque 386.1
Overall Score 2321

Key Components:
COMP camshaft, Chevy Iron 3782461 cylinder heads, ARP fasteners, Edelbrock Super Victor P/N 2925, JE Pistons, and Total Seal rings

Competition Notes:
Christopher Pelczar and CP Speed Shop brought the second Chevy 327 small-block to the Engine Masters Challenge party, and it faired very well. A major focal point was to match the displacement to the induction system. Pelczar served in the United States Armed Forces, is a graduate of SAM Tech, and this was his third Engine Masters Challenge.
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BARRY ROBOTNICK
// WALLED LAKE, MICHIGAN

Class: Early Iron
Ford 390 FE B-Block 421 ci
Peak HP 536 at 6,000
Peak Torque 520 at 4,400
Average HP 478.4
Average Torque 478.9
Overall Score 2,285

Key Components:
Bullet camshaft, Mercury and Ford FE parts

Competition Notes:
Barry Robotnick and Survival Motorsports used their vast knowledge of FE engines to build their Engine Masters Challenge big-block. They turned to the Mercury-variant of the platform and focused on the 1966-1967 highway cruising engine found in sedans instead of high-performance vehicles. The concept was to capitalize on its average power for the big vehicles, and he used a 390 FE block with a 428 crankshaft to create the 421ci displacement.

DANIEL BOSHEARS
// FLINTSTONE, GEORGIA

Class: Early Iron
Ford 385 Big-Block 409 ci
Peak HP 549.6 at 6,400
Peak Torque 485.3 at 5,100
Average HP 477.6
Average Torque 458.3
Overall Score 2,282

Key Components:
JE Pistons, Molnar connecting rods, Total Seal rings

Competition Notes:
Daniel Boshears had the most dramatic emergency of the week when his engine popped through the carburetor on its first pull. In typical Engine Masters Challenge etiquette, several competitors crammed into the dyno cell to help Boshears diagnosis the issue, which turned out to be a rocker arm that popped off. The quick fix resulted in a max output of 594 hp from the Ford 385-series engine.

[Left: The official fuel of Engine Masters Challenge is Sunoco Racing Fuel with the Early Iron engines running on 260 GT 100-octane and the Extreme LS engines gulping SR18 118-octane gasoline.]
JAMMIE WELLS
// MIDLOTHIAN, TEXAS
Class: Early Iron
Chevrolet 302 Small-Block 306 ci
Peak HP 418.0 at 6,800
Peak Torque 358.2 at 5,200
Average HP 355.5
Average Torque 340.0
Overall Score 2254

Key Components:
Howards camshaft, GM 461 cast-iron cylinder heads, ARP fasteners, Edelbrock Victor intake manifold

Competition Notes:
Jammie Wells and the WCH Engines shop might be known for their prowess on television but they use Engine Masters Challenge to bring attention to their engine-building skills. They brought the only Chevrolet 302 to the competition, which complimented the lone Ford 302 engine entry. They used the same theory, like their Ford counterparts, keeping displacement low and matching the induction system to it in an effort to score as many points as possible.

DAVID MOLNAR
// MISHAWAKA, INDIANA
Class: Early Iron
Studebaker 310 ci
Peak HP 389 at 6,200
Peak Torque 363 at 4,800
Average HP 333.8
Average Torque 338.4
Overall Score 2,182

Key Components:
JE Pistons, COMP camshaft, Edelbrock Performer RPM, FST Carburetor 750cfm

Competition Notes:
The Studebaker R3 is normally a factory supercharged engine, but David Molnar of Studebaker Power brought it to Engine Masters Challenge in naturally-aspirated form. A stable valvetrain, combined with a healthy COMP camshaft that checks in at .545-inches of lift, helped this unique engine combination crank out nearly 400 hp!
ROBERT PETERS  
// HUBER HEIGHTS, OHIO

Class: Early Iron

Chevy 327 Small-Block

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak HP</td>
<td>405.3 at 6,500</td>
</tr>
<tr>
<td>Peak Torque</td>
<td>353.7 at 5,300</td>
</tr>
<tr>
<td>Average HP</td>
<td>353.6</td>
</tr>
<tr>
<td>Average Torque</td>
<td>339.1</td>
</tr>
<tr>
<td>Overall Score</td>
<td>2065</td>
</tr>
</tbody>
</table>

Key Components:
Scat connecting rods, ARP fasteners, COMP camshaft, GM 3890462 cylinder heads, Trick Flow StreetBurner intake manifold, JE Pistons

Competition Notes:
Robert Peters kept a keen eye on his budget and focused on the camshaft technology to help the factory small-block Chevy cylinder heads perform. The engine produced great average torque, and credit goes to camshaft lobes that he worked with COMP to create for this combination.

MICHAEL SEMCHEE  
// AUSTINTOWN, OHIO

Class: Early Iron

Pontiac

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak HP</td>
<td>478 at 6,200</td>
</tr>
<tr>
<td>Peak Torque</td>
<td>468 at 4,500</td>
</tr>
<tr>
<td>Average HP</td>
<td>419.2</td>
</tr>
<tr>
<td>Average Torque</td>
<td>435.4</td>
</tr>
<tr>
<td>Overall Score</td>
<td>2,059</td>
</tr>
</tbody>
</table>

Key Components:
Scat crankshaft and connecting rods, JE Pistons, Pontiac 670 iron cylinder heads

Competition Notes:
The lone Pontiac in the event came from longtime Engine Masters Challenge competitors, Semco Performance. That is no surprise since Michael Semchee and his shop specialize in the Poncho market. The selection of cylinder heads was key to the combination because the smaller port created high-velocity airflow through the head. Peak power was 478 hp, quite an impressive number for just 415 ci through a set of iron cylinder heads.
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### SHAWN HOOPER

**HOUoston, Texas**

**Class:** Extreme LS

- Chevrolet LS Small-Block: 437 ci
- Peak HP: 800.9 at 7,100
- Peak Torque: 623.2 at 6,300
- Average HP: 625.4
- Average Torque: 566.6
- Overall Score: 2,706

**Key Components:**
- Scat connecting rods, COMP camshaft, ARP fasteners, Total Seal rings, CID cylinder heads and intake manifold, Holley EFI, built at SAM Tech

**Competition Notes:**
- Shawn Hooper is an instructor at SAM Tech and used the engine as a project for the students to learn on a real-world race engine. Entering the Extreme LS category is a natural for SAM Tech given their history with the engine platform, including record-setting engines in NHRA Factory Showdown and NMCA Pro Stock.

### JUSTIN MCLENDON

**POPular Branch, NOrth Carolina**

**Class:** Extreme LS

- Chevrolet LS Small-Block: 439 ci
- Peak HP: 697.6 at 6,800
- Peak Torque: 578.8 at 5,600
- Average HP: 567.2
- Average Torque: 520.1
- Overall Score: 2,318

**Key Components:**
- Scat connecting rods, ARP fasteners, Brodix BR7 cylinder heads, CID intake manifold, JE Pistons

**Competition Notes:**
- Justin McLendon of Midgette Motor Sports carried the family shop name into the Engine Masters Challenge after they forged their reputation in the Monster Truck arena. Midway through the build, he was hired as a SAM Tech instructor, thrusting himself in the midst of his competitors on a daily basis. The team had fun with its SAM Tech competitors and brought their own unique twist to the LS7-based entry. The bore and stroke combination was a key focus for McLendon as his engine cranked out nearly 700 hp in the process.
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HOW TO BUILD RELAYS— THE RIGHT WAY

Building relays doesn’t have to be complicated. Using the right tools and terminals, you can build your own to create a clean, reliable underhood look.

Jesse Kiser

> Love it or hate it, wiring is a part of any project car. You may loathe the idea of installing relays, but without them, wiring would be much more difficult. HOT ROD rebuilt a sloppy relay wiring harness the right way by using the right tools and correct terminals.

**WHAT’S A RELAY?**

A relay is used to activate a high-amp accessory with a low-amp switch. An accessory like an electric fan or electric fuel pump requires significant amperage. Sending that amperage through a standard switch would cause it to fail.

**WIRING DIAGRAM**

Terminal 86 = 12V trigger
Terminal 85 = Ground trigger
Terminal 30 = 12V source
Terminal 87 = connects to device
Terminal 87a = connects to a second device (not necessary)

Once you activate the relay with 12V power and ground, the relay will power the accessory. A relay is essentially a heavy-duty switch, connecting the high-amp accessory to a clean 12V source.

01 | That fifth connection on a relay, 87a, often goes unused, but it’s designed to accommodate a second wire for the accessory. For example, a horn where a single 30-amp relay is adequate, but you need two wires traveling to two horns.

02 | The relay activates by completing either the ground or positive on the low-amp side. For example, when a temperature sensor reaches the predetermined temperature, it completes the ground circuit on the low-amp side of a fan relay, thus activating the relay. According to PSI Conversion, a common mistake is installing multiple grounds. A relay only requires one ground on the switch side.
WHICH RELAY?
Avoid low quality relays at all costs and stick with OEM brands. For instance, most late-model GMs use Bosch relays, which PSI Conversion uses exclusively. PSI Conversion recommends snagging them from the local junkyard before using a no-name relay.

PROPER WIRE SIZE
A wire’s required maximum amperage and total length to the power source will determine its size. See the chart below.

**AMERICAN WIRE GAUGE (AWG) CHART**

<table>
<thead>
<tr>
<th>Amps at 13.8V</th>
<th>0-4 ft</th>
<th>4-7 ft</th>
<th>7-10 ft</th>
<th>10-13 ft</th>
<th>13-16 ft</th>
<th>16-19 ft</th>
<th>19-22 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>16-ga</td>
<td>16-ga</td>
<td>14-ga</td>
<td>14-ga</td>
<td>12-ga</td>
<td>10-ga</td>
<td>10-ga</td>
</tr>
<tr>
<td>10-15</td>
<td>14-ga</td>
<td>14-ga</td>
<td>14-ga</td>
<td>12-ga</td>
<td>10-ga</td>
<td>8-ga</td>
<td>8-ga</td>
</tr>
<tr>
<td>15-20</td>
<td>12-ga</td>
<td>12-ga</td>
<td>12-ga</td>
<td>12-ga</td>
<td>10-ga</td>
<td>8-ga</td>
<td>8-ga</td>
</tr>
<tr>
<td>20-35</td>
<td>12-ga</td>
<td>10-ga</td>
<td>10-ga</td>
<td>10-ga</td>
<td>10-ga</td>
<td>8-ga</td>
<td>8-ga</td>
</tr>
<tr>
<td>35-50</td>
<td>10-ga</td>
<td>10-ga</td>
<td>10-ga</td>
<td>8-ga</td>
<td>8-ga</td>
<td>8-ga</td>
<td>6/4-ga</td>
</tr>
<tr>
<td>50-65</td>
<td>10-ga</td>
<td>10-ga</td>
<td>8-ga</td>
<td>8-ga</td>
<td>6/4-ga</td>
<td>6/4-ga</td>
<td>4-ga</td>
</tr>
<tr>
<td>65-85</td>
<td>10-ga</td>
<td>8-ga</td>
<td>8-ga</td>
<td>6/4-ga</td>
<td>6/4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
</tr>
<tr>
<td>85-105</td>
<td>8-ga</td>
<td>8-ga</td>
<td>6/4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
</tr>
<tr>
<td>105-125</td>
<td>8-ga</td>
<td>8-ga</td>
<td>6/4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
<td>2-ga</td>
</tr>
<tr>
<td>125-150</td>
<td>8-ga</td>
<td>6/4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
<td>2-ga</td>
<td>2-ga</td>
<td>2-ga</td>
</tr>
<tr>
<td>150-200</td>
<td>6/4-ga</td>
<td>4-ga</td>
<td>4-ga</td>
<td>2-ga</td>
<td>2-ga</td>
<td>1/0-ga</td>
<td>1/0-ga</td>
</tr>
<tr>
<td>200-250</td>
<td>4-ga</td>
<td>4-ga</td>
<td>2-ga</td>
<td>2-ga</td>
<td>1/0-ga</td>
<td>1/0-ga</td>
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</tr>
<tr>
<td>250-300</td>
<td>4-ga</td>
<td>2-ga</td>
<td>2-ga</td>
<td>1/0-ga</td>
<td>1/0-ga</td>
<td>1/0-ga</td>
<td>2/0-ga</td>
</tr>
</tbody>
</table>
06 The tool, like most, will crimp four gauge sizes, covering the vast majority of fittings. A roll-over crimper costs $50 to $200, meaning you’d need to build multiple relays or plugs to offset the cost. According to PSI Conversion, a 20-14 gauge Metri-Pack crimper will cover most connections on a late-model engine like an LS ($180.56; PN 908485). The Weather-Pack connectors were phased out in the mid-90s, but you can still find the crimper tool (PN 906495; $156.23).

07 The roll-over terminals are simple to install but require the tool to do it right. First, skin the wire.

08 Then place the wire inside the terminal, with the skinned portion in the middle crimp.

09 The skinned wire crimps into the middle spot with one squeeze of the tool.

10 The insulated wire crimps into the bottom crimp. The terminal now has a firm hold of the wire, for an OEM fit. It’s superior to a butt connector but more expensive. Our two relay bases and terminals cost $14, and the tool cost $48.99.
The terminal features a tiny tab shown here. The terminal presses into the relay base from the bottom. The ear will snap into place.

To get the terminal back out, you need to press the tab in with an object. Here, we use a flathead screwdriver for eyeglass repair.

On our project car, we mount the circuit breakers in place. It’s vital to run protection on the high-amperage side. Some companies prefer in-line fuses, while others prefer circuit breakers.

We lay out all of the wires, already run from our previous hack job, cut them to length and crimp the fittings. We mount the relay holders and snap the terminals in place.

The final result isn’t perfect, but miles better than before. A ground switch in the ECU triggers the fan relays.

The method of using roll-over crimpers applies to most all modern OEM sensor plugs. Here’s an OEM electric fan plug taken apart. The terminals crimp onto the wire and snap into the plastic socket. A rubber grommet pushes into place, creating a water-tight seal. With this tool, albeit expensive, you can build an OEM-style harness. It’s a necessary tool for kits like the PSI Conversion Builder’s Harness.

Sources
PAINLESS PERFORMANCE; 800.423.9696; painlessperformance.com
PSI CONVERSION; 732.444-3277; psiconversion.com
Why Cut Back a Spark Plug’s Side Electrode?

Some racing plugs offered by Champion and other leading manufacturers come with their side (ground) electrode tips cut back (not fully extending over the center or positive electrode). In a racing or extreme high-performance engine, this improves the flame kernel efficiency and propagation through the combustion chamber. There are at least three explanations: First, a full-length ground electrode can block a portion of the air/fuel mixture from exposure to the spark, so cutting back the ground electrode exposes more of the spark to the fuel mixture. Second, electricity itself doesn’t directly ignite the mixture; actually, it’s the heat energy generated by electricity that generates the flame. Some of that potential heat energy is lost through reabsorption back into the metal surface of the center and ground electrodes. Therefore, minimizing the surface area should allow more heat to flow into the combustion chamber, and in certain instances requiring less firing voltage for spark generation. Third, a shorter ground electrode may reduce the chances of preignition, especially with power adders.

There’s also a possible mechanical advantage: When installed in older, less efficient, larger-volume, combustion chambers coupled with domed pistons, a cut back ground electrode may offer additional dome clearance at TDC.

The amount of side cut-back varies by manufacturer and intended application. They can be fully cut back, so no part of the tip extends over the center electrode or (for milder apps) only laid back about halfway over the center electrode. Most of the cut back race plugs come precision gapped by the manufacturer, and they’re really intended to run as-gapped. Champion’s line of race plugs is traditionally pre-gapped at 0.025- to 0.030-inch, although some of the NASCAR stuff may get up to 0.035- or 0.040-inch. Hot rodders may make their own cut back plugs by modding readily available (and more affordable) standard street plugs. The angle between the two electrodes can end up pretty severe on a fully cut back plug, making it nearly impossible to gap them with a common round disk-style gapper. Better, would be an old-school round wire gapping tool, carefully inserted at about a 45-degree angle. As any changes in gap would be a trial experiment intended to see what (if any) performance benefits might ensure over the as-delivered gap, the exact gauging point would not be as important as long as the same reference point or measurement technique was used, and records were kept of the changes, versus the original as-delivered baseline.

There’s a downside to cut back on regularly driven street cars. A “stock” side electrode slowly erodes during use on its own, which opens up the original gap. Therefore, in a regularly driven car, an already-shortened side electrode would have a shorter service life.
Digital subscriptions to your favorite magazines are now available for your computer, tablet, and smartphone. The digital version includes everything that appears in the print version, so if you prefer to read on an electronic device, you won’t be missing out anytime, anywhere, on any device!
In our January issue, we chronicled the installation of a real limited-slip differential in the 12-bolt of our 1967 C10. Eaton's Detroit Truetrac is a major step up from the inexpensive locker we installed in the original open differential. Now, we are really ramping up the performance of our project, Truck Norris, with a complete suspension overhaul thanks to Total Cost Involved. We’ve got a lot of pictures here, so let’s get to it.

1. Knowing we’d appreciate a ton of access doing this job, we removed the front end sheetmetal, then got to work disassembling the stock suspension.

2. We also removed the drivetrain, not only to give us room to work, but mainly because TCI’s front coilover kit calls for removal of the stock engine crossmember. We took the extra effort to clean the grime and rust off the frame.

3. With everything removed, we did some repair to the firewall, welding closed some unused holes and patching this area where the mechanical clutch linkage passed through the firewall.
TCI’s kit includes a square-tube engine crossmember and tubular upper and lower A-arms and motor mount stands. The components sandwich the frame and align with several holes already drilled in the frame. Additional holes will need to be drilled, and all the necessary fasteners are included.

The kit is designed to convert to a rack-and-pinion steering system. The Mustang-style rack bolts to the engine crossmember and we centered the steering gear before installing the tie-rod ends.

With the components installed and torqued to spec, we reinstalled our CPP disc brakes and set the front end back on the ground.

With the new motor mounts, the engine sits slightly lower in the frame. Test fitting the big-block, none of our headers would fit without some surgery. Our mock-up small-block fits nicely with Hooker’s long-tube C10 headers, though.

HOT Rod Garage co-host Lucky Costa made a guest appearance at our warehome, helping us install the new spindles, A-arms, and springs.

Next time, we’ll show you how we installed the rear suspension. Stay tuned.

Sources
CLASSIC PERFORMANCE PRODUCTS; 714.322.2000; ClassicPerform.com
TOTAL COST INVOLVED ENGINEERING; 800.984.6259; TotalCostInvolved.com
REAL-WORLD REPAIR

The 393ci Cleveland in Don Hicks’ 1973 Mustang Lost a Cam Lobe. We’re Gonna Fix It.

THE COMBO

“I’ve always been a car guy,” Don Hicks recalls. “I’ve owned a lot of Fords, going back to a 1969 Boss 302 Mustang in college. I love working on cars and going to shows. About nine years ago, I found this 1973 convertible sitting in a local farmer’s barn. The price was right, and my wife and I think convertibles are really cool. Later I found out the car was originally sold in Honolulu, Hawaii, and—from what I am told—was at least a ‘drive-around’ car for the cast on the original Hawaii 5-O [TV show] back in the 1970s.

“When I retired, I finally had time to add a complete Global West front suspension and SSBC front disc brakes. I put a new top on it, then a fiberglass front bumper which took 70 pounds off the front-end. I swapped the FMX automatic trans for a T5 five-speed manual, clutch, pressure plate, and cable-clutch bellhousing I found for sale on Craigslist, then installed it using a Modern Driveline kit. I exchanged the 2.75:1 rear gears and open diff in the 28-spline 9-inch Ford rear end for a 3.25:1 ratio with a Locker. At first, I was just going to rebuild the existing 351C-2V engine but found out a stroker kit was almost the same price.”

A local shop bored the block 0.030-inch over, and with the now 4.030-inch bore plus the 3.85-inch stroke crank, Hicks had the makings of a potent 393ci mill. “Another guy on Craigslist was selling a rare set of Australian 351C-2V closed chamber heads, fully machined and converted to an adjustable valvetrain,” Hicks continues. “I thought they’d be a step up from the open-chamber 351C-2V heads that my engine came with.” Installed only on Australian-market Fords, the Aussie heads feature moderately sized 2V oval intake ports, but with the superior 4V-style quench-chamber design that both raises compression and better resists detonation, compared to North American-market 2V Cleveland heads with their smog-era, open chambers that slow the burn and lower compression. Why not just go with 4V heads? Years of real-world experience shows 4V intake ports are too huge for most street use and even many racing applications. The Australian heads and closed combustion chamber are a very good combination compared to other contemporary stock heads from the 1970s, flowing well on the top-end with about a 68-percent exhaust/intake flow-ratio at 0.500-inch valve-lift.

For a cam, Hicks put in a relatively mild Comp Cams XE262H hydraulic flat-tappet grind. Summit had one of its 600-cfm, four-barrel vacuum secondary carbs and Edelbrock...
As received, Hicks’ ailing 393ci Cleveland-based stroker engine was equipped with a Comp Cams’ flat-tappet hydraulic cam and rare Ford of Australia 351C-2V heads with closed combustion chambers.

“Lobe-otomized: Bye-bye No. 1 intake cam lobe. Lifter trouble is afoot when it’s lost its crown. The lifter bottom is ground down so far, it’s breaking into the hydraulic mechanism’s center cavity. (Do these jests fall flat, or are bad puns too wearing?)”

The adjustable valvetrain conversion had already been done when I bought the heads. I don’t know which machine shop, but obviously a lousy one.”

—Don Hicks, Car Owner

Advanced Engineering’s Mark Sanchez quickly found the distributor was 180 degrees out of phase. “After I straightened out the distributor,” Sanchez says, “The engine would run, but very rough, like it was firing on only seven cylinders. It didn’t sound all that bad for what, at the time, I thought was a pretty big cam, and the idle system on entry-level carbs can’t always play happy with a raggedy cam. Maybe I could make things better with careful adjustments, so I looked at the spark plugs. The No. 1 plug was wet and smelled of fuel; it wasn’t burning. The other plugs looked OK.

“So, No. 1 cylinder wasn’t firing. The plug wire to No. 1 checked OK. I pulled the valve cover and cranking the engine over with a bump-start switch, I saw the No. 1 intake valve was barely moving. Turning the lash adjuster nut made no difference. The pushrod wasn’t bent, so the next thing was to look at the cam and lifters. No. 1 lifter was not slack in the bore, indicating to me there wasn’t excessive lifter-bore wear. But pulling that No. 1 lifter I saw a ground-off foot. The corresponding No. 1 intake lobe on the cam was worn nearly round!”

“The cam lobe and lifter for No. 1 [cylinder] had worn away to almost nothing.”

—Mark Sanchez, AEW

everything downstream—including all the other cam lobes, as well as main and rod bearings—should have had even worse problems.

“Valvetrain assembly error”? Now you’re getting warm. Before disassembling the cam and upper valvetrain, Sanchez noticed uneven valve stem tip wear across several valves. The worst misalignment was over...
In sum, durability, not performance, was the initial impetus for the OEs’ switch to roller tappets. Later, as carmakers got a handle on emissions and mileage, they developed a new generation of detonation-resistant, fast-burn heads that worked with higher compression ratios and new high-lift roller cam profiles that can’t be duplicated using flat-tappet technology. Bottom line: Go with a hydraulic roller cam if you can afford it, both for performance as well as reliability.

Any time you have a cam failure, a bottom-end inspection is also in order because all the debris from the failed lifter and cam lobe must go somewhere. The gunk in Hicks’ oil pan didn’t look good, so Sanchez prepared for the worst. Showing only minor normal wear, the main and rod bearings were fortunately reusable. The oil pump was another story, with scored internal gears. Sanchez replaced it with a Melling high-volume pump, transferring over the old screen after a thorough cleanup.

To be honest, we’re kind of jaded on flat-tappet hydraulic cams, generally. Although the lifter quality problem that reared up 10 to 15 years ago is no longer an issue if you buy a brand-new, complete lifter set from a quality vendor like Comp (as opposed to a sketchy bargain-basement source), today’s retail consumer “starburst” motor oils lack the critical ZDDP zinc compound necessary for keeping flat-tappet lifters alive with modern cam profiles.

Not that flat-tappet cam failures were unknown 40 years ago. Even back in the 1980s, when lifters and oil were still “good,” Comp Cams’ Valvetrain Engineering Group Leader Billy Godbold maintains, “U.S. automakers were seeing too many unexplained cam failures that cost them more to fix than the upgrade to a roller tappet would cost.” And that’s with mild OE smog-era cams. Some sources attribute this to lower cruise rpm (and hence lower sustained oil pressure) from mild rear axle ratios and overdrive transmissions used to meet tightening mileage and emissions standards.

Regardless of the cause, Godbold claims, “Over hundreds of thousands of cars, flat-tappet cam and lifter failures were costing GM, Ford, and Chrysler on the order of over $100 per car on warranty and repair claims.”

“You can do everything right to reduce the number of flat-tappet cam failures, but you cannot bring that number to zero.”

—Billy Godbold, Comp Cams
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Sanchez’s original plan was to correct the guideplate misalignment and replace the entire valvetrain with one compatible with a modern roller cam profile that matched the Cleveland heads’ top-end flow characteristics. To do justice to the Aussie Cleveland heads and 42 more cubic inches than a standard 351, Hicks really needed to step-up from the original cam’s 218/224-degrees duration (at 0.050-inch tappet lift; see cam table).

Godbold gave us several cam options, including a racy-sounding Thumpr. “Power-wise, nothing should beat the Thumpr on top with a Cleveland’s 1.70:1 stock rocker ratio,” elaborates Godbold. “Its 107-degree LSA (lobe separation angle) is a little difficult with vacuum and idle characteristics than what you would have with a wider, 109-to 113-degree LSA. For those who want a smoother-idling grind, our brand-new HLO profiles, originally developed for LS engines, would be perfect—but that would be a custom grind for a Cleveland. In an HLO, something about 227/239-degrees at 0.050 ground on about a 111-degree LSA would be very good.” Owner Hicks had to have a racy idle, so Thumpr it was.

Along with the cam, Godbold sent us a complete upper valvetrain, including: springs, retainers, valve seals, and high-tech Pro Magnum roller rocker arms. New parts in hand, Sanchez started to mock-up the cam in the block, putting a guided lifter pair on the No. 1 intake and exhaust lobes, and then began installing the timing chain. Here’s where unanticipated problems started to rear up: Cloyes offers a bulletproof 9-keyway billet-steel True Roller timing set, but it requires a steel thrust plate. “You can’t put a steel sprocket on a stock Ford cast-iron thrust plate without excessively wearing the plate,” Sanchez explains. Cleveland’s are a dying breed here, but they remain popular down under, where Australia’s Aeroflow makes a steel plate. OK, problem solved.

But: It turns out that the front face of Cloyes’ billet chain isn’t machined for a two-piece mechanical fuel pump eccentric. Both one- and two-piece eccentrics are available for Windsor small-blocks, but...
neither works on a Cleveland that uses its own unique two-piece configuration. Short of custom-machining the upper sprocket for clearance, the obvious solution is an electric fuel pump. Hicks wanted a mechanical pump to maintain a stock appearance, so we put in Comp Cam’s Cleveland, 3-keyway, eccentric-compatible, Hi-Tech roller race timing set.

We also needed to make sure any mechanical fuel pump could keep up with the engine’s 450hp-plus projected power output, with ample overhead for the usual “mission creep.” The problem is the big names don’t make (at least not anymore) a truly high-volume Cleveland mechanical fuel pump. Clevelands used to be popular in carbureted oval-track racing back before the SVO hybrid blocks, but that’s why niche specialists like RobbMc exist. It has an interesting line of unique problem-solvers, including the only currently available true high-output Cleveland mechanical fuel pumps.

Are we happy yet? Well, in researching timing sets, eccentrics, thrust plates, and high-output mechanical fuel pumps, we came across some reports that Ford-factory (or equivalent replacement) eccentrics—whether one- or two-piece—can’t reliably do the job on high-output engines with high-volume mechanical fuel pumps. Metal-on-metal contact between the eccentric and the pump’s lever-arm causes horsepower-robbing friction and accelerates pump-arm wear, a problem compounded by the stiffer lever-arm spring used in high-volume pumps. Under sustained high-rpm use, the lever may go into bounce. The solution is HiPo Parts rollerized eccentric. We had to have one.

Goodbye shrimpy (left); hello huge RobbMc mechanical pump (right); which—assuming properly sized fuel lines—supports up to 550 hp at 7 psi without a regulator. It features big ⅜-NPT side inlet and bottom outlets, a small NPT bottom port for a vapor return or fuel pressure-gauge line, and a 180-degree-rotatable valve body. This is plenty for Hicks’ engine, but an 1,100hp version is also available (that one does need a regulator). There’s even a $100 upgrade kit for existing 550hp models, so there’s no need to spring for a whole new 1,100hp pump if your power needs keep climbing.

[Cloyes makes this fine 9-keyway billet-steel Cleveland True Roller timing set but it needs a steel thrust plate made by Australia’s AeroFlow (TMeyer is one U.S. distributor). Upon installation, we found the Cloyes cam sprocket’s flat front face won’t clear a Cleveland mechanical fuel pump eccentric. Owner Hicks didn’t want to run an electric pump, so we put in Comp Cam’s Cleveland, 3-keyway, eccentric-compatible, Hi-Tech roller race timing set.

[Every engine has a different tolerance stack up, so it’s always good practice to dial-in the cam in a high-performance build. Comp’s billet steel crank gear may have “only” three keyways, but that was enough to degree the cam within ½-degree of the timing card’s 0.050-inch tappet-lift intake/exhaust timing events by installing the bottom gear in the 4-degrees advanced position (4-degrees advanced at the crank equals 2-degrees advanced at the cam).]
THE FINAL DIAGNOSIS

Everything seemed back on track, with Sanchez proceeding to mock up the new valvetrain to check the valvetrain geometry, order the right length custom pushrods, and figure out the exact guideplate modifications. That’s when we discovered the biggest problem of all, way beyond guideplate misalignment or finding the right timing chain. Sanchez explains: “The canted-valve Cleveland engines are tough because you are not machining perpendicular to the deck, or even the existing pedestal seat. You have multiple valve angles; even the intake and exhaust valve angles are different from each other. A conversion of this complexity must be done in a mill (not by a drill press). Whoever converted the nonadjustable pedestal-type valvetrain to an adjustable stud-mount configuration missed on all three axes: the front of the head to the rear of the head, the intake to exhaust tilt, and the rocker stud relationship to the cylinder head deck and valve seat. The valve guides were too short due to excessive thrust loads, and the valve seats also needed re-machining.

“Fixing this requires boring the rocker-stud holes oversize on the correct angles, then installing a Keensert with locking keys that’s designed for oversize holes. Again, this is expert millwork to make everything come out right. Only after straightening out the angles can you install bronze wall valvenguides, then properly do a concentric valve job. We’re talking $1,800 or more to repair the heads. And then what do you have? A heavy, 45-year-old head. It’s not as if you have a numbers-matching Boss 351 or a legal Stock Eliminator car. I call a part like this ‘beyond economical repair’.”

At this point, we decided it install a set of modern aftermarket aluminum heads that really do this engine justice. Stay tuned, we’ll be back soon when we go to the class of the heads.

Contacts

AEROFLOW PERFORMANCE, A ROCKET INDUSTRIES PTY, LTD. BRAND; Huntingwood, NSW Australia; +61 2 9925 1999 (from U.S.); AeroflowPerformance.com

AUTOMOTIVE RACING PRODUCTS (ARP); Ventura, CA; 800.826.3045 or 805.339.2200; ARP-Racing.com

CLOYES GEAR & PRODUCTS INC.; Ft Smith, AR; 479.646.1662, ext. 228 (tech) or ext. 297 (customer service); Cloyes.com

COMP CAMS; Memphis, TN; 800.999.0853 or 901.795.2400; CompCams.com

FEL-PRO (FEDERAL-MOGUL MOTORPARTS LLC); Southfield, MI; 800.325.8886; FelPro.com or FME-Cat.com/catalogs.aspx

HIPO PARTS GARAGE LLC; Gaylord, MI; 888.533.HiPo or 989.448.6440; HipoParts.com

LUCAS OIL PRODUCTS INC.; Carson City, NV; 888.533.HiPo or 989.448.6440; LucasOil.com

MELLING (POLYVERSE PRODUCTS LLC); Jackson, MI; 800.325.8886; Melling.com

ROBBMC PERFORMANCE PRODUCTS; Carson City, NV; 775.885.7411; RobbMcPerformance.com

SUMMIT RACING EQUIPMENT; Akron, OH; 800.342.2512 or 951.270.0154; SummitRacing.com

SUMMIT RACING EQUIPMENT; Fairmont, MN; 507.238.4141; SummitRacing.com

1973 MUSTANG MAJOR PARTS & PRICES

Includes the major parts as described in the story or necessary to perform the repairs. In addition to the specifically listed parts, ARP generously supplied all necessary dress-up hardware. Does not include shipping, miscellaneous small hardware, labor, or sales tax. Unit quantity for all listed parts is “1 unit.” Priced 11/03/2019 and subject to change. All dimensions in linear inches, except as noted.

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<td>ARM KIT, engine valve rocker, Ultra Pro Magnum full roller, Boss 302/351/C/429/460, 1.7:1 ratio, fits /° stud</td>
<td>1610-16</td>
<td>Summit</td>
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<td>CAMSHAFT, engine, hydraulic roller, Mutha’ Trump 2911HST, 0.567/0.552 lift, 291°/310° advertised duration</td>
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<td>CHAIN &amp; SPROCKET SET, engine timing, Hi-Tech roller race, 3-keyway,Ford 351C-351M-400</td>
<td>3121</td>
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<td>LIFTER KIT, engine valve, retrofit paired link hydraulic-roller, small-block Ford, 0.675, 144g, 2.60 seat height</td>
<td>8931-16</td>
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<td>FEL-PRO</td>
<td>GASKET KIT, engine, 351C-351M-400, (A/C.; inc. mas. radiator, water pump, timing cover, timing cover seal, water neck, fuel pump)</td>
<td>2710</td>
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<td>GASKET KIT, oil pan, 351-C, rubber-coated fiber, 0.094 thick</td>
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<td>HIPO PARTS</td>
<td>ECCENTRIC, fuel pump, roller-bearing design (inc. 1-point ARP bolt)</td>
<td>HPE-6287-CLV</td>
<td>HiPo</td>
<td>$499.95</td>
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<td>MELLING</td>
<td>PUMP, engine oil, high-volume (25% more oil volume; transfer screen from old pump)</td>
<td>M-BLAHY</td>
<td>Summit</td>
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<td>LUCAS OIL</td>
<td>LUBRICANT, engine assembly, semisynthetic, 4oz bottle</td>
<td>10152-1</td>
<td>Summit</td>
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<td>ROBBMC</td>
<td>PUMP, engine fuel, mechanical, 550 hp/179 gph, Ford 351C-351M-400 (inc. gasket &amp; mounting hardware)</td>
<td>1102</td>
<td>RobbMc</td>
<td>$214.00</td>
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TOTAL SECTION A $1,725.24

B. OPTIONAL UPGRADE

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<td>AEROFLOW</td>
<td>PLATE, engine, camshaft thrust, 1045 carbon steel (use with Cloyes billet timing set)</td>
<td>AF461-00</td>
<td>TMeyer</td>
<td>$32.00</td>
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TOTAL SECTION B $717.99

LESS UNNEEDED “A” PARTS $224.94

TOTAL WITH OPTIONS $1,704.43

Notes: [1] Upper cam sprocket not machined for Cleveland two-piece mechanical fuel pump eccentric. Install electric pump or custom machine cam sprocket to clear eccentric. Cost of electric fuel pump or potential machining not included in this list. [2] Subtotal 1-2 Comp chain and sprocket set and HiPo Parts semisynthetic mechanical fuel pump eccentric.
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Jim Hunt Asks…
Can an **External Pump** Be Used to Pre-prime an LS7 Corvette with the Factory Dry-Sump Oil System?

Q:
I’m in the final stages of finishing a rebodied, mid-engine C6 Corvette titled “Caccia Drago.” The car has been under construction for a number of years, and its LS7 has not run for quite a while. I have turned the engine over by hand, but I am very concerned that since there has not been any oil running through the engine, the bearings may be damaged if I try to start it before pumping oil through the system.

Am I being overly cautious? Is there some way to use an external pump to run oil through the system before I hit the “start” button?

You can never be too cautious on a high-end (and expensive) engine. Most engine wear occurs at start-up, so you need to, at a minimum, get fresh oil on the bearings. Ideally, it’s good to ensure oil is getting everywhere, all the way upstairs to the pushrods. That said, it’s obviously more difficult to pressure-lube new or long-dormant modern, distributorless engines because they no longer have a removable distributor and oil-pump driveshaft. Most current late-model engines—including GM’s Gen III/IV/V (LS/LT-series) small-block, the modern Chrysler Hemi, and Ford’s modular and Coyote families—drive the oil pump directly off the crank. Unlike the old classics, they can’t be prelubed by using an impact wrench or electric drill and dummy distributor shaft.

Instead, prelubing requires some sort of externally driven setup. The prelubing schemes we’ll be discussing here are generally applicable to any make of distributorless engine, whether they still have a...
wet-sump oil system or—like an LS7, LS9, and certain other Corvette engines—incorporate a factory dry-sump lubrication system. There are a couple of things you need to be aware of on the Corvette dry-sump, and we'll address them as well.

We'll start with the official GM method. The dealer's factory special service tool (Bosch, formerly SPX, formerly Kent-Moore, PN J-45299) is a human-powered setup. I'm not too enamored with it. First, it costs an astounding $281; second, it isn't an engine pressurizer as we hot rodders understand the term because it doesn't develop enough pressure to get oil all the way upstream to the pushrods and rocker arms. Goodson (PN PL-40) and Sealed Power (PN T40) offer an air-pressurized prelube tank that looks kind of like the portable air tanks some of us use for installing our slicks at the drags. I haven't tried them personally, but they're popular in the engine-rebuilder market.

The best tool from a home mechanic's standpoint, that I've seen, is one that can pressurize the entire oil system up to the rocker arms—yet only costs around $70 to $100, depending on what parts you may already have lying around. It's a homebuilt, remotely-powered, recirculating oil reservoir system designed by my buddy Jeff Smith, that he says takes less than four hours to build. Although Smith built it for everyday wet-sump LS engines, former GM engineer and current owner of Diversified Creations, Michael Copeland confirms Smith's system should work fine on the dry-sump Corvette engines as well. The same basic setup also works on just about any distributorless engine, although the specific adapter fittings may differ.

For the remote reservoir Smith uses a sealed, hardware-store 5-gallon plastic bucket filled with 4 to 6 quarts of engine oil. The bucket has been modified to house an old-school Chevy V8 oil pump spun by a ½-inch electric drill motor. Any similar old-school oil pump—big-block Chevy, other GM, Ford, or even Chrysler—would work as well. Thin aluminum plates reinforce the bucket's plastic lid on each side so it can bear the weight of the oil pump, hoses, and AN-6 fittings that mount to the lid.

Smith modifies the pump by drilling and tapping its outlet for a pipe-to-AN fitting that feeds oil into the engine via a high-pressure AN line connected to a metric engine-block adapter-fitting screwed into the main oil gallery located above the oil filter mount. Oil returns to the bucket through an oil line connected to a custom fitting screwed into the oil pan's drain-plug hole. To mount a handy external oil pressure gauge to monitor the procedure, drill the blank boss on the little two-bolt oil pan cover plate located above the filter mount.

If possible, after the pressure starts to come up, have a partner rotate the engine with a breaker bar on the front balancer bolt for several minutes while you continue operating the preluber to ensure oil gets fully distributed throughout the engine. It's also a good idea to squirt oil into the cylinders through the spark plug holes before attempting rotation if the engine has lain dormant. If the engine won't rotate freely

1 Use an M16x1.5-to-AN6 adapter fitting (Earl's PN 9919DFERL or equivalent) at the pressure-in location. The Earl's fitting comes with a Stat-O-Seal gasket; otherwise procure the seal individually under Earl's PN 178006ERL. The same fitting and seal work for the oil pressure gauge tap if you have the OE predrilled two-bolt cover. Ford's modular and Coyote engines need an M12x1.50 adapter for the pressure-in hookup, while late-model Hemi engines intelligently stayed with typical NPT ¾-27 pipe thread.

2 The pressure-in location is the nearly vertical boss in the block near the bellhousing flange above the oil filter mount and two-bolt oil pan cover. Connect the referenced adapter to a 90-degree hose fitting. Carefully grind the oil pan's cover mount surface mounting lip corner as needed for clearance. Reinstall the factory plug after prelubing is complete.

3 To return oil back to the external priming pump and bail, connect a hose to the oil pan's threaded drain-plug hole. No commercially available adapter is available; fab your own by carefully drilling and tapping a course-thread M12x1.75 ISO hardware-store bolt to accept a ¼-NPT-to-AN6 adapter (Earl's PN 1662ERL or equivalent).

4 GM dry-sump Corvette oil pans have two drain plugs. For the pre-prime's return (outlet) line, hook up to the side drain-hole in the vestigial small oil pump sump just ahead of the oil filter (A), not the one located at the front of the sump (B), which would drain the entire 10-quart remote dry-sump tank (in fact, you probably don't want or need any oil in the tank at this point).

5 Use any oil pump that you can bolt to the container's lid—like this old-school Chevy small-block pump. Smith tapped the pump's discharge hole for ¼-NPT to accept a ¼-NPT-to-AN6 male fitting (such as Earl's PN 9B1606ERL) in the outlet. Sizes may differ for pumps from other engine models. Don't forget to thoroughly clean the pump after you're done.
6 | The plastic lid requires reinforcement to support the weight of the pump and hose fittings. Use a metal hole saw to drill two 1-inch holes in the lid for the pressure out and the return lines. Drill a $\frac{1}{4}$-inch mounting hole to secure the oil pump to the lid, a second hole for the pump’s drive tang and driveshaft, and three equally spaced $\frac{1}{4}$-inch holes around the lid’s circumference for attaching the aluminum plates to the lid.

7 | Section the existing pump pickup tube, then lengthen it using $\frac{1}{4}$-inch hose to place the screen at the bucket’s bottom. The return line inside the metal pail is fabbed from a short length of suitable $\frac{3}{4}$-inch (≈6) metal tubing, attaching to the lid via a bulkhead fitting.

8 | This is the complete prelube rig “in action.” The oil pump pressure can exceed 60 psi so, at least on the pressure-side, use high-pressure hose with real hose-ends. The small-block Chevy pump used here is spun by a $\frac{1}{2}$-inch electric drill motor driving a standard Chevy oil pump driveshaft mated to the oil pump’s drive tang and plastic sleeve. An old-school aftermarket Chevy oil pump priming tool is another option.

9 | Engine oil pressure should come up almost immediately with this rig, but it may take as long as 15 minutes before oil exits all 16 pushrods at the rocker arms. Oil coming out of every pushrod is proof positive that the engine has been completely primed.

10 | [Beginning on the 2009 LS7 and LS9, GM added a secondary auxiliary remote tank to increase total oil system capacity. This photo shows the dual tank’s appearance as of 2015 on the Corvette Z06 LT4. On any of the GM dry-sumps, be sure to follow the factory-specified oil-level checking method. This isn’t your granddad’s Chevy!

The unique AC filter is easy to identify because it is black, rather than AC’s standard blue. If desired, the special filter also works for those “lesser” LS applications where GM officially specs the standard PF48.

Checking the oil fill level also differs from wet-sump engines. According to official GM engine oil change service instructions, “The [dry-sump-equipped] engine must be warmed up to 175-degrees F and turned off before checking the oil level. It is important to check the oil level at least 5 minutes after engine shutdown, but no longer than 15 minutes. This allows oil to return from the top of the engine and prevents oil from draining back into the oil pan.”

Contacts

ACDelco; Detroit, MI; 800.ACDelco; ACDelco.com

GM SPECIAL SERVICE TOOLS (BOSCH AUTOMOTIVE SERVICE SOLUTIONS INC.); Warren, MI; 800.GM.Tools; GMToolsAndEquipment.com

DIVERSIFIED CREATIONS; Brighton, MI; 810.227.4777; DiversifiedCreations.com

EARL’S PERFORMANCE PLUMBING, A HOLLEY BRAND; Bowling Green, KY; 866.464.6553; Holley.com/brands/earls/

JOHN ELWAY CHEVROLET ON SOUTH BROADWAY; Englewood, CO; 866.273.6757 or 303.761.5161; JohnElwayChevrolet.com/Order-Parts-Online

GM CUSTOMER CARE AND AFTERSALES; Grand Blanc, MI; 810.606.2001; GenuineGMParts.com

GOODSON TOOLS & SUPPLIES; Winona, MN; 800.333.8070 or 507.452.8330; Goodson.com

SEALED POWER (FEDERAL-MOGUL MOTORPARTS LLC); Southfield, MI; 800.334.3210 (customer service) or 800.325.8886 (tech); FMmotorparts.com/brands/sealed-power/ or FMEngine.com

SUMMIT RACING EQUIPMENT; Akron, OH; 800.230.3030 (U.S.) or 330.630.3030 (outside U.S.); SummitRacing.com
Rear Suspension Kits for C10s

Detroit Speed // 704.662.3272
detroitspeed.com

This one is for you, owners of ‘73-’87 GM square-body trucks. Detroit Speed has debuted Quadralink rear suspension kits, in your choice of weld-on or bolt-on. C10s gain a four-link rear with track bar, adjustable Detroit Speed Swivel-Links, colover shocks and springs, and C-notch cut template. A C-notch plate allows for additional axle clearance at lower ride heights. Also, the adjustable upper shock mount relocates, one inch up or down from nominal, so a change in ride height won’t affect shock travel. The kits include laser-cut brackets that are compatible with the original axle, wiring, brake lines and installation hardware.

Price: Starts at $3,095 for the weld-on kit, $3,295 for the bolt-on kit

Coilovers for GM A-Bodies

Hotchkis // 877.466.7655 // hotchkis.net

A new line of coilovers is available from Hotchkis, and first out of the box is a complete system for the ‘64-’72 GM A-body cars. Want to know how futuristic life is now? The coilovers have Bluetooth tech, making it possible for you to adjust cornering, braking, and acceleration damping from your phone (but you can still go old-school and get them with manual adjustment). The lightweight monotube shocks have a CNC-machined piston and use a high-tensile coil-spring wire for endurance and anti-sag capabilities. There are laser-cut mounting brackets with Grade 8 hardware. More applications are forthcoming.

Price: Starts around $2,200
Bowlr Performance has a new line of transmissions for the budget-minded and DIYers. The Tru-Street series is comprised of overdrive-equipped automatic transmissions for those using a stock, to slightly modified engine—as in, you’re someone who doesn’t need a high-end, highly-modified trans. These are remanufactured, not rebuilt, transmissions; each one fully dyno’d. The company also tried something new: They decided to do this series “a la carte” so you purchase only the parts and components you need. For example, you first decide on the best trans and torque converter, then from there build a package for your needs.

Price: Starts at $2,480

Bolt-In G-Machine Chassis for Monte Carlo

Schwartz Performance // 815.206.2230 // schwartzperformance.com

Attention first-gen Chevy Monte Carlo owners: Schwartz Performance has made the G-Machine chassis available for your ’70–’72 cars. It’s all about the heavy-duty, mandrel-bent, rectangular steel main framerails that roll in to replace the stock Monte frame—fitting right into the factory body-mount locations. Without floor or body mods? Correct. And bind-free is a theme: The updated front suspension includes needle-bearing supported A-arms, extra-long colovers, and a power steering rack and splined sway bars with billet arms. Out back is a triangulated four-bar system, plus Teflon-lined spherical rod ends with a full-floating Moser 9-inch. The rear rails were narrowed to accommodate mini-tubs and a 355-wide tire.

Price: Starts around $9,812

Tru-Street Budget and DIY Transmission Series

Bowlr Performance Transmissions // 618.943.4856
bowlrtransmissions.com

Bowlr Performance has a new line of transmissions for the budget-minded and DIYers. The Tru-Street series is comprised of overdrive-equipped automatic transmissions for those using a stock, to slightly modified engine—as in, you’re someone who doesn’t need a high-end, highly-modified trans. These are remanufactured, not rebuilt, transmissions; each one fully dyno’d. The company also tried something new: They decided to do this series “a la carte” so you purchase only the parts and components you need. For example, you first decide on the best trans and torque converter, then from there, build a package for your needs.

Price: Starts at $2,480
Chevy D.U.I. Distributors
The Chevy D.U.I. Distributor was the first, and still is the best performance H.E.I. Distributor. Inferior copy cats have come and gone, but the D.U.I. remains the most popular choice for hot rodders around the globe. A super smooth advance curve is machine calibrated, providing you with instant throttle response, while eliminating engine damaging detonation. The 50,000 Volt D.U.I. Coil teams up with our high dwell Dyna-Module, allowing you to run a massive .055” plug gap. 8, 6, & 4 cyl. applications are available.

ZZ Crate Engine D.U.I.’s
Our Street/Strip Chevrolet D.U.I. Distributor is now available for the popular ZZ series crate engines! This new D.U.I. (Davis Unified Ignition) is designed for the ZZ-4, ZZ-454 and ZZ-502. A special timing curve and a melonized gear set this distributor apart from our standard D.U.I. The advance weights and springs are tuned specifically for these crate engines. The optimized curve provides instant throttle response and maximum performance all through the RPM range without any pre-detonation. The melonized gear is installed for proper meshing with the roller cam.

Ford D.U.I. Distributors
Hot Rodding demands faultless reliability and “right now” performance. Which is why the D.U.I. Ford distributor is the perfect choice for your hot rod engine. The Ford D.U.I. eliminates the maze of wiring found on stock Ford electronic ignition systems. Built for durability, as well as performance, the Ford D.U.I. has an upper and lower bushing, unlike the stock Ford distributors with only one bushing. For those of you who don’t like the H.E.I. style distributor, we also offer a full line of stock appearing Ford Duraspark Distributors.

Mopar owners can also benefit from D.U.I. technology, with our one-piece ignition systems for Dodge and Chrysler small and big block powerplants. Also available for the 426 HEMI!! Our Dodge D.U.I. distributors feature the same battle tested components as our other proven counterparts. With its one-wire hook-up, dual bushing design, resistance to heat, dirt, and vibration, this unit is both simple and bullet proof...and its performance is unmatched.
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10 Things You Don’t Know About NHRA Drags

By David Freiburger

If you follow me on social media, it’s clear to you that I’ve become a huge fan of NHRA drag racing—a switch from years ago when I had the obligatory auto-journalist opinion that the whole thing had jumped the shark. Instead, these days, it’s my opinion that the more closely you follow drag racing, the more invested you become. Know the drivers, the crew member drama, the points-chase info, the intricacies of the rules—and all of a sudden it’s a much greater story.

Things have changed quite a bit since that very first organized drag event in Goleta, California, in 1949. Here, in no particular order, are some details you may not be aware of if you don’t follow obsessively.

1. The 1,000-foot thing. The nitro classes of NHRA drag racing changed from a 1,320-foot racetrack to 1,000 feet after the Las Vegas accident in which Scott Kalitta perished. Next season it’ll be nearly 12 years at 1,000 feet. Get over it. If you didn’t know how long the track was, I guarantee you’d never know the difference.

2. They’re the fastest ever. At the second Las Vegas race in 2019, Brittany Force set the Top Fuel record at 338.17 mph, which is the fastest record ever, regardless of 1,000 or 1,320 feet. Force also holds the c.t. record at 3.623. Funny Cars are faster due to aero (and old rev-limiter rules), with Robert Hight’s 339.87.

3. The diversity. Drag racing is the only professional sport where women and men compete side-by-side with no handicap or special division—and they win.

4. The Christmas Tree. The flag man was first replaced by the Christmas Tree starting mechanism at the 1963 Nationals (where Don Garlits lost the final due to a red light). Did you know the Tree had fiveamura until 1986, when it was shortened to three? The Pro start, with just an amber flash before the green and no amber countdown, used only the bottom amber bulb when it was introduced for the 1970 Super Season; today, all three flash. Pre-stage and stage lights didn’t appear until 1964, when they were at track level instead of atop the Tree. In 2003, LED bulbs were introduced.

5. Reaction times. Before 2003, a perfect reaction time was .400 or .500 (the difference in time between when the green light came on and when the car left the starting line). Since then, .000 has been considered a perfect light.

6. Speed traps. Before 1989, speed was based upon a trap that started 66 feet before the finish line and ended 66 feet after the finish line for a total of 132 feet, or 10 percent of a quarter-mile. After then, the trap was shortened to 66 feet, eliminating the back half to keep drivers from throttling past the finish line.

7. Points and the countdown. The NHRA has been using a points system to determine champions since 1974. Prior to that, the winner of the World Finals was considered the season champ. In 2007, the Countdown was added, wherein points reset after the NHRA Nationals in Indy, followed by a 10-race chase for the championships. Racers potentially gain points in each qualifying round, but can lose them for violations such as crossing the centerline or hitting a timing block.

8. The crowds. Old-timers like to say that “the grandstands just aren’t packed like when I was a kid.” This is often true—but today’s grandstands can seat 4 to 8 times more people than in the old days. With 24 events and huge facilities, far more people witness NHRA drag racing today than they did in the early ’70s. Heard that no-prep racing is bigger? False.

9. The drama is still there. People “wish there were rivalries like the old days.” Pay close attention and you’ll find plenty, especially in the world of crew-chief swapping. In the 2019 season, Funny Car racers Shawn Langdon and Cruz Pedregon got into a hilarious, multi-race tiff, and eventual Top Fuel champ Steve Torrence shoved competitor Cameron Ferre in the face after some fantastic staging games.

10. John Force. The biggest name in pro drag racing is still at it in a Funny Car, having won his 150th lifetime event in 2019. He’ll turn 71 years old in 2020 as he chases his 17th championship.

If you haven’t been to an NHRA race in person, in a while, get out in 2020 and try it. If not, just go to any drag event and support your local tracks. It’s worth it.