70TH ANNIVERSARY ISSUE

MOTORTREND

IT'S HERE! INSIDE THE ALL-NEW

Mid-Engine Corvette

2020 STINGRAY

\+ The Ultimate Car of the Year

TEN: PUBLISHING

The mid-engine Corvette is here ... and we're in it

FIRST RIDE

2020 CHEVROLET CORVETTE C8

WORDS FRANK MARKUS

"We're none too pleased to have you here."

Soul-crushing words from Corvette chief engineer Tadge Juechter. Chevy's PR department, relenting to *MotorTrend*'s barrage of begging for early C8 Corvette access, has twisted Juechter's arm into letting me ride shotgun for three rotations of a development drive in the latest C8 prototypes.

His team is loath to expose the press to anything less than a fully baked, buffed, and polished, production-ready, no-excuses Corvette—and this drive is a crucial step in that process. Upon solemnly swearing not to report on any quality lapses I may detect, I strap into the right seat of a 2020 Chevrolet Corvette Stingray Z51 with FE4 suspension.

"Cars are complicated," Juechter deadpans, noting that writing, developing, and perfecting the software that controls the myriad microchips, solenoids, motors, features, and functions on a modern car takes vastly longer than any other aspect of bringing a car to market.

The process starts at vehicle inception, and final calibration tweaks are made right up to and sometimes past launch. On today's drive, Juechter's team is scrutinizing powertrain calibrations—especially concerning launch feel and the ability of the clutches in the Tremec eight-speed twin-clutch transmission to mask the 6.2-liter V-8's transitions into and out of four-cylinder mode at various cruising speeds.

Developing a suitable transaxle has been a limiting factor to the concept of a mid-engine Corvette since the 1960s, when transaxles from the front-drive Oldsmobile Toronado and rear-drive Pontiac Tempest proved inadequate. My ride, precisely six weeks in advance of the press launch, reveals a pretty impressive state of tune.

Shifts in automatic mode sound and feel incredibly swift and smooth, and I'm unable to detect any four-cylinder mode vibrations. Juechter notes that the very first prototype transaxles performed almost perfectly at 70 percent or greater throttle. The challenge has been tuning for every other condition. Later on, vehicle performance manager Alex MacDonald will call my attention to an abrupt transmission engagement issue he's tagged for follow-up. I hadn't noticed it. These cars are nearly ready for prime time.

But back to this FE4 Z51 with magnetorheological dampers. We are traversing scabrous pavement and railroad crossings in Tour mode, and the ride quality delivered by the car's run-flat 35-series 19-inch front and 30-series 20-inch rear tires is impressively plush. Juechter then dials up Sport

The squircle steering wheel and "unique" ergonomic features like the push-button shifter and long line of buttons at right are going to take some getting used to.

We are promised that roughly 10 cubic feet of luggage fit behind the engine and above the muffler that goes where a useful rear diffuser would be. Note the Shelby-like spoiler/wing S'wing.

and Track modes, each of which noticeably ratchet up the road feel.

I am pleased to hear that the car will "remember" either Tour or Sport mode after cycling the ignition, which required EPA certification to be done in both modes with results being averaged for CAFE and window-sticker reporting.

We ride along, discussing the many challenges presented by transitioning the Corvette from front-mid to mid-rear engine positioning. (There were no in-house experts to consult, no similar GM cars to build mules from, and lots of unknown unknowns.)

I'm struck by how conversational the cockpit is. The engine note is textbook small-block background music, which comes to the foreground when an exhaust valve in the muffler opens in Sport or Track mode. Most of what I'm hearing is organic, but the active noise-cancellation system does a bit of frequency augmentation—primarily of exhaust sound, because the pipes are muffled by a luggage area and the engine. They're also positioned way behind our ears, and sound pressure drops with the square of distance.

Getting the chassis balance right with a 40/60 weight balance was another big challenge. Mid-rear-engine cars have a natural tendency toward midcorner understeer, but tuning the springs and bars to neutralize that part of the corner can mess up the car's entry and exit behavior. So the team optimized the electronic limited-slip differential tuning to make the car more neutral midcorner while tuning the bars and springs for entry and exit. (That multiplate-clutch type e-LSD works like the old one, except it's now powered by the transaxle pump.)

During my stint with lead development engineer Mike Petrucci in an FE3 Z51 Stingray, our route affords a few

Three challenges the mid-engine presented

Everything about building a mid-engine car was new to the C8 development engineers. There's virtually nobody left from the earlier mid-engine Corvette programs (or even the Pontiac Fiero team) to consult with, so the C8 team pretty much had to benchmark state-of-the-art competitors. And because most competitors have been developing mid-engine sports cars for several generations, the pressure on the Corvette squad has been high to nail the benchmarks right from the start. Plenty of computer-aided engineering and rough mule prototype vehicles were involved. Below are a few of the diciest challenges the team faced.

Engine Note Tuning: Some of the nastiest (in a bad way) sounds an engine makes are now 12 inches from the driver's ear: the accessory drive. Hence the firewall is well insulated, and the bulkhead window is 9mm thick (most windshields are 5mm thick).

Everyone loves exhaust noise, but that's really far away, and the pipes are short, presenting no opportunity for X-pipes and other plumbing elements to improve the sound. Even the intake is located pretty far back, but airflow is directed through some body cavities with openings near the driver door in an effort to naturally direct some of that noise forward.

The car's audio system is primarily programmed to cancel objectionable frequencies, but a bit of constructive enhancement of the trademark small-block burble is also dialed in. The Z51's low-restriction exhaust valve makes the car as loud as it legally can be. A mid-motor NVH windfall: Road noise is inherently reduced by moving the big rear tires aft and insulating them behind an engine.

Matching Corvette's Legendary Trunk Space: Few sports cars can touch the Corvette hatchback's 15-cubic-foot luggage capacity. The ability for the C8 to continue the legacy as a weekend getaway car was deemed crucial. So despite an engine sitting where all that luggage used to go, the team has roughly matched that space, with a 5-cubic-foot "frunk" and room for 10 more cubes in the back.

The front accommodates a standard airline-regulation roll-aboard laid on its narrow, tall side. The rear can fit two golf bags. And although a new four-piece set of fitted semi-rigid leather duffels will be offered for the C8, the C7's five-piece set fits in the C8. The removable targa roof panel also fits in the back (though not necessarily along with the golf bags or fitted luggage).

Torsional Stiffness/Crash Energy Management: The long-hood/short-deck front-mid-engine layout was a breeze for energy management. There used to be plenty of room to gently steer crash energy down around the front wheel to the side frame member. Swap the powertrain and cabin positions, and the tire is right behind the dead pedal, leaving no room for a crash energy load path. Those forces must now be directed into the center tunnel structure.

The comparatively narrow box the engine used to fit in is smaller and more inherently rigid than the larger opening required to accommodate the C8's entire powertrain. But the team reports that the torsional stiffness is better than that of the C7 and several key competitors. There are also several local stiffness wins, one of which is the steering column. Because it's shorter and more direct, it was easier to stiffen it up. **FM**

The new Corvette Z51's low-restriction exhaust valve makes the car as loud as it legally can be.

opportunities for hard acceleration out of some corners, which the new chassis dispatches without a hint of wheelspin. I'm pinned to the seat with no oversteer. Clearly it's going to take a lot more concentration to drift this generation of Stingray than it has most previous gens. (Future Z06s and ZR1s might be a different story.)

This car's ride feels enough stiffer than the MR car's Sport setting that if I were buying a car for Michigan roads, I'd prioritize the FE4 suspension over any other options when speccing out a Z51.

Petrucci takes me through the Stingray Z51's aerodynamic upgrades, which include a subtle chin spoiler balanced by

Those vents flanking the engine window provide for convection cooling. This engine/luggage cover is the largest composite structure GM has ever made.

GPS Nose Lift: The C8 Corvette's front suspension includes screw jacks that can raise the car by 2 inches to help the chin spoiler clear aggressive speed bumps, driveway approaches, and the like. The fresh thinking Chevy brings to this staple of mid-engine wedge-mobiles is the option to geotag and store each such obstacle in a memory bank, so you need not fuss with manually lifting the nose for every bump, dip, or apron on your daily commute.

The car can even start jacking itself up early if you're approaching a bump with a bit of speed. Heck, with a memory for 1,000 such places, you can program in every permanent bump or hump you encounter.

Programmable Turn Circle: With no powertrain in the way and no drive to the front axle dictating constant-velocity-joint angles, it's possible to really crank the front wheels of the C8 Corvette when maneuvering in tight quarters—but only at low speeds and when neither front wheel is articulating over some bump. The electric power steering, informed by myriad speed and wheel-position sensors, imposes "virtual stops" that limit steering angle based on speed and conditions. At its most extreme limits, the Corvette's turn circle is just 36.0 feet curb to curb, down from the C7's 37.7 feet. This is especially impressive given that the C8's wheelbase is a half-inch longer (at 107.2 inches).

Four Tech Triumphs: Industry-trumping firsts and fun features

Flagships always get the coolest tech first, and the Corvette C8 is most definitely Chevrolet's flagship and a standard-bearer for the entire General Motors Corporation. Here are four technologies that piqued the interest of your humble *MotorTrend* technical director.

Cylinder Deactivation + Twin-Clutch: Neither is a new technology, but GM is the first to combine them in this market and this segment. This is a big deal because the vibration that comes with shutting off half the cylinders is harder to absorb or mask without a torque converter in the driveline.

Torque converters are basically fluid couplings, and fluid is great at absorbing vibes. And even when they're locked for fuel savings, their housings can incorporate nifty pendulum mass dampers tuned to absorb torsional wiggles.

All a multiplate clutch pack can do in a twin-clutch system is loosen its grip enough to allow a few 10s of rpm slippage, so that's what happens during the transition between modes. The team still wasn't quite satisfied with the quality of these transitions as of our development drive ride-along, though I couldn't detect four-cylinder operation from the passenger seat.

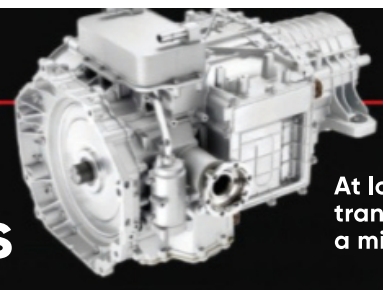
Sequential-Decay Turn Signals: Our killjoy government just doesn't want us to have fun things like sequential turn signals. There's a minimum amount of light that must be displayed when the signal first illuminates. The first of three elements in a Mustang taillamp are big enough, but cars that attempt to successively illuminate LEDs in the direction of a turn can't meet the standard, so they typically flash a full-size element at the same time (see Audi). The Corvette's LEDs flash on fully, and then switch off successively from the inside out, indicating the direction of the turn. A clever workaround. **FM**

The Corvette C8 is Chevy's flagship and a standard-bearer for General Motors.

a hybrid spoiler/wing in back that works like the one that's about to make its debut on the Ford Mustang Shelby GT500. A duckbill spoiler in the center generates big downforce from the air coming down off the rear hatch window, and the outer wing sections develop some additional downforce while allowing most of the air coming around the cockpit to flow under with reduced drag.

The body sculpting also optimizes cooling airflow through the side-mounted radiators; a smooth underbelly pan further reduces drag. The rear diffuser generates little or no downforce because the muffler lives right where a venturi tunnel would need to be in order to generate downforce. Petrucci claims that at speed the Z51's aero package produces measurable downforce, not just reduced lift.

Asked what mid-engine competitors his team benchmarked, Petrucci mentions the usual suspects—Porsche 718 Cayman, Ferrari 458 and 488, McLaren 570S, and



At long last, a transaxle worthy of a mid-engine 'Vette.

Fast 4-1-1: Mid-engine 'Vette basics

Prepare to be bombarded with facts, trivia, and minutiae covering every aspect of the long-awaited mid-engine Corvette in the weeks leading up to its on-sale date. For now, here's a concise distillation of the most basic information you need to get the conversation going at your local cars 'n' caffeine gathering.

Engine: The base Stingray's 6.2-liter V-8 engine is the least interesting part of the new C8, yet it has been significantly revised in morphing from LT1 to LT2 nomenclature.

Myriad little refinements contribute to the roughly 45-hp jump in output to what is still an estimated 500. A big one is the camshaft. Another biggie: All variants now get dry-sump lubrication, featuring three suction pumps and a more compact remote reservoir. The system is said to be capable of providing full-pressure lubrication under sustained lateral cornering loads of greater than 1 g.

The cylinder deactivation system is still of the Active Fuel Management V-8-4 style, not the Dynamic Skip Fire system that deactivates any cylinder at will on GM trucks.

As yet there is no confirmation of the pressurized DOHC engine options that have been predicted for higher-powered future variants.

Transmission: Everyone predicted the C8 would get a Tremec TR-9070 seven-speed dual-clutch, but it will get a completely bespoke eight-speed twin-clutch developed in conjunction with Tremec.

No three-pedal manual or torque-converter transmission is planned. Full details of this M1L transmission haven't been disclosed, but we know the top three gear ratios are overdrive, and first gear is primarily for launch. It is capable of shifting directly between any two gears as necessary. The transmission is tuned to provide a creep mode when lifting off the brake from a stop.

Suspension: Three suspension options will again be offered on the Stingray: the base FE1, FE3, and FE4 for Z51 models (the latter with magnetorheological damping). These fourth-gen MR shocks offer greater bandwidth and react much faster.

In order to take full advantage of this quickness, wheel-position accelerometers are located on the knuckles where there's little or no lost motion; as such, they're four times faster than previous setups at reporting wheel motion.

FE1 tuning is slightly more aggressive than the base C7 Stingray setup. It's close to the FE4 Tour setting, though spring rates are higher on the Z51. FE3 tuning is sportier than the FE4 Sport setting—close to the factory Z mode setting.

Brakes: Brembo brakes use six-piston front and four-piston rear calipers and eliminate the drum-in-hat parking brake in favor of lighter secondary rear calipers. Base JL9 front brake rotors are similar in size to today's (12.6-inch) rotors, while the rears are slightly larger. The Z51's J55 brake setup gets larger rotors all around. Carbon-ceramic brakes are not offered on the Stingray.

A big braking challenge that was not related to the amidships powertrain placement: regulation to remove copper from the brake pads, which had accounted for 20 percent of the material.

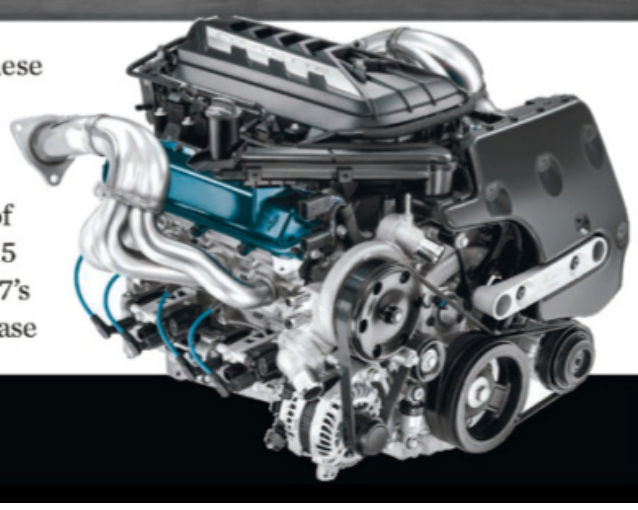
Wheels and Tires: All Stingrays will ride on Michelin run-flat tires sized 245/35ZR19 front and 305/30ZR20 rear. They'll be wrapped around spun-cast aluminum wheels that are strengthened to cope with America's worsening roads. Base cars get Pilot Sport All Seasons; Z51s get Pilot Sport 4S tires that we're told function quite well in the wet. Winter tire fitments will be available. Pilot Sport Cup tires are available now in these sizes, but the development team cautions track rats that the extensive chassis-control electronics are optimized for the stock tires, so caveat emptor.

Launch Control: There's no special button, and none is really needed because the mid-engine Corvette is an inherently strong launcher. All you have to do is engage Track mode, turn traction control off, step on the brake, floor the accelerator, and lift off the brake. And an improved Performance Data Recorder will now record all such launch and lap data (and presumably Russian dashcam-style wreck footage) automatically and continuously. It saves the video and time/speed/distance info to a 128-GB card that writes over itself after 1,000 minutes. **FM**

The FE1 suspension tuning is slightly more aggressive than the base C7 Stingray setup.

Ford GT—but he notes that owners of these cars don't typically expect them to be as everyday-usable as a Corvette. His baby therefore needs to be easier to get into and out of, less punishing, and capable of hauling luggage. I'm promised that the 15 cubic feet of luggage that fit under the C7's hatch—one regulation roll-aboard suitcase and two modest golf bags—will fit in the C8, split between front and rear trunks.

All too soon my sessions are over, and I'm left watching the three camoed Corvettes roar back toward their home base at GM's Milford Proving Ground, my appetite well and truly whetted for my first chance at the left seat. ■



The Big Picture

Angus MacKenzie

My Corvette Moment

Celebrating 70 years of history together

It's fitting the C8 Corvette graces the cover of this, the 70th anniversary issue of *MotorTrend* magazine. We've grown up together, you see.

"We wanted a magazine that would interest the foreign car exponent, the sports car enthusiast, the custom car fan, and also be equally interesting to the stock car owner," original *MotorTrend* editor-in-chief Walt Woron wrote as he put the finishing touches on the September 1949 issue. "A magazine that brings you the trends of the automotive field: designs of the future, what's new in motoring, news from the Continent, trends in design."

MotorTrend founder Robert Petersen's personal connection with Southern California race car builder Frank Kurtis perhaps explains why he chose the Kurtis Sport Car as the first cover car for his new magazine—rather than, say, a Chevrolet sedan, America's top-selling car that year. But the choice was also an eerily prescient confirmation of *MotorTrend*'s mission statement.

Within two years of the Kurtis appearing on our cover, a senior GM executive in Detroit had instigated a secret backroom program code-named Project Opel, a proposal for a fiberglass-bodied sports car that, like the Kurtis, used many regular production car components under its shapely skin. The GM exec's name? Harley Earl. And the car? Well, it first came to the public's attention as the EX-122, one of the stars of GM's 1953 Motorama Show at New York's Waldorf Astoria hotel. But you know it better as the original Chevrolet Corvette.

Frank Kurtis had the idea. GM had the money.

Today *MotorTrend* is more than just a magazine. It's a video on demand service, linear TV channels, a website, and a social media phenomenon—an automotive content creator and curator with an audience that now spans the globe. *MotorTrend* has grown up. So, too, has the Chevrolet Corvette. The C8 is still America's Own Sports Car, but with its state-of-the-supercar-art chassis and mid-engine layout, it's built to take on all comers, from Italy's Ferrari to Britain's McLaren and Germany's Porsche.

I can't wait to drive it.

Although I'd had brief stints in C3s, C4s, and C5s over the years, I arrived in the U.S. to become editor-in-chief of *MotorTrend* just after the C6 launched in 2004. Since then, I've done a lot of miles in Corvettes. Like all great sports cars, the very best Corvettes bring even the most mundane drives to life. And the special drives ... well, they're something else again.

July 2011. The afternoon traffic on the A9 autobahn in southern Germany is unusually light. Le Mans champ and *MotorTrend* presenter Justin Bell is lounging in the passenger seat as I let the Corvette ZR1 off the leash. For 25 glorious minutes we own the fast lane, the speedo needle never falling below 120 mph and occasionally flickering past 180 mph when I can read the traffic in the far distance.

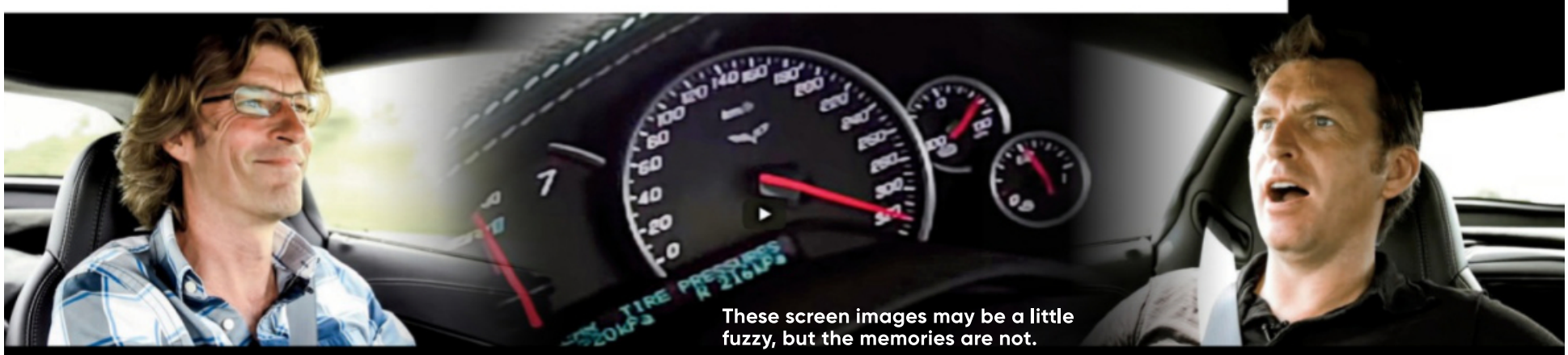
We cover 55 miles in those 25 minutes, an average speed of 132 mph, the 638-hp V-8 leaving a thundering sonic boom in its wake, scattering slower Benzes and BMWs and Audis like autumn leaves. We roll into the Munich evening traffic grinning from ear to ear at the sheer audacity of it all, at the idea that even in this era of speed cameras, fuel-sipping hybrids, and computer-controlled cars that do most of the driving themselves, you can still drive a supercar at supercar speeds on a public road.

With Justin counting off the increments, I took the mighty ZR1 all the way to 200 mph.

It got even better the next day, filming an episode of "Epic Drives" for the MotorTrend Channel on YouTube.

I punched the gas as the traffic cleared, shifting into fifth at 160 mph and sixth at somewhere north of 180 mph. And then, with Justin watching the speedo and counting off the increments, almost shouting to be heard over the shrieking wall-of-sound snarl from the supercharged small-block, I took the mighty ZR1 all the way to 200 mph.

That is my all-time best Corvette Moment, for now. I suspect the stunning C8 is going to provide some better ones in the coming years. And just as we have for the past 70 years, *MotorTrend* will take you along for the ride. ■



These screen images may be a little fuzzy, but the memories are not.

MOTORTREND

September 2019

COVER STORY

70TH ANNIVERSARY 1949 - 2019

After decades of false hope and false starts, the mid-engine Corvette is here. Really.

ON THE COVER
2020 Chevrolet Corvette C8

Tests & Drives

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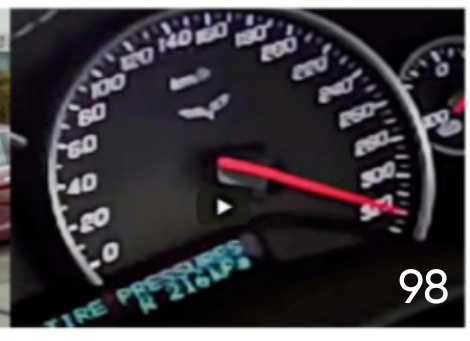
The mid-engine Corvette wait is finally over: We take a ride in one of the most anticipated new vehicles in decades.

Departments



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Edward Loh

Finally After 70 years, we reveal our love of Corvette

What do you call a myth that finally comes true? Well, you can call it the cover story of this special 70th anniversary issue. After decades of our theorizing and Chevrolet's teasing, the Corvette quits banging on the limiters of a grand touring platform and upshifts into the realm of mid-engine supercar.

Seventy years of *MotorTrend* means, at minimum, 840 covers, not counting special editions or different versions of issues for newsstands and subscribers. We have a feature this month on the staff's favorite covers over the years, and this exercise led me to count up the number of times we've prominently featured a Corvette on our most prized page, with either an image, headline, or other callout.

The love we've given the Chevrolet Corvette is astonishing and frankly a bit embarrassing; in 70 years, *MotorTrend* has featured Corvette on the cover 177 times, including this one. Put another way, we've devoted greater than 20 percent of our most precious real estate to one single car.

Two issues out of every 10 means longtime readers reliably see a Corvette cover on average twice a year, but the frequency in more recent years has been much greater.

The first issue of *MotorTrend* was September 1949. Corvette made its debut in 1953, but our first cover mention of Corvette was in June 1954, in a photo alongside a Ford Thunderbird. How *MotorTrend* survived those first 58 issues without Corvette remains a mystery to this day, because after its debut, we never looked back. In the '60s and '70s, there were a couple of years here and there with covers sans Corvette, but not by the '80s. The banner year was 1985, the first time that fully half of the year's covers made some mention of Corvette. We never published more than six 'Vette covers in a calendar year, but we managed half a dozen in 1992 and 2005, and we had many years in between when the Bowling Green boulevardier made the cover four or five times.

Our (and apparently your) fascination with Corvettes was both real and imagined. The bulk of our reporting included discussions of style, first driving impressions, and lots of comparison tests. In the early days, Ford T-Birds and high-test Mustangs made up the bulk of our shootouts.

Later on, our focus would shift to Shelby Cobra and the odd foreigner, until the rise of Corvette's archnemesis, the Porsche 911 Turbo. Countless artful pairings and terrible puns positioned Turbo vs. ZR-1. Then the Dodge Viper entered the fray. We spilled gallons of ink on it, as well as Corvette tuners from Hennessey to Lingenfelter, and pulled off top-speed tests and cross-continent road trips. As Corvette (and Porsche) engineers began to push the performance envelope into the supercar space, so did we with comparisons involving Lamborghini, Ferrari, and some newcomer called GT-R.

In the imagined space, we devoted pages to what stunning new tech would push Corvette performance past the jet age. Gas turbine engines? Four-rotor Wankels? Hybrid-electric? And then, of course, were the 10 cover stories focused on the imminent arrival of the mid-engine Corvette.

I chuckled to myself while tabbing through the folder of 800-plus covers and jotting down instances of C1–C7. What on earth were my forebears thinking with all of this Corvette lust and mid-engine lunacy, especially in the late '80s through the '90s? Had everyone lost their minds? Then I got to 2014, my third year as editor-in-chief, and discovered that I, too, was guilty: Six issues with Corvette on the cover, including one all-caps skyline blurb atop the Nov 2014 issue: MID-ENGINE CORVETTE PG 20.

Now that the mid-engine Corvette is finally here and we've blown out the candles on our 70th anniversary cake and tipped over the last bottles of champagne, I'm feeling a bit empty. What will we splash across our covers in the decades yet to come?

All-electric, 250-mph, AWD Corvette, anyone? You read it here first.

Editor's Note: At the first planning meeting for this issue, more than a year before we went to press, I opened with the statement, "I hate anniversaries," and then tasked Miguel Cortina, Scott Evans, and Christian Seabaugh to come up with a plan to create retrospective stories you would all want to read and enjoy. Huge thanks to that trio, along with Alisa Priddle and Frank Markus in Detroit, and our entire family of photo, copy, production, and online pros. We went out of our way to revisit the stories MotorTrend *used to tell, and we wrangled vehicles from across seven decades, all to give you a taste of state-of-the-art, way back when. I hope you enjoy the issue.* ■

Ten covers heralding the imminent arrival of the mid-engine Corvette, and finally, it arrives in time for our 70th birthday. We weren't wrong, just early.