

# United We Drive

*A brilliant new Corvette will bridge the sports car divide*

by Kevin A. Wilson

**A**merican sports car enthusiasts have divided into two groups since 1953: those who thought Corvette was the epitome of the sports car ideal and those who thought, well, those who thought it most certainly was not.

Who would have predicted, then, that the car that has divided these people for all these years, the car that fueled so much earnest bench-racer debate, could be the one that unites them?

No one until now.

This month the 1997 Corvette debuts, and it is brilliant. It retains and improves upon everything that Corvette lovers hold dear, while addressing the problems the car's critics have gloated over. This fifth-generation sports car (known at Chevy as C5) will unite the camps in ways that no Corvette has ever done; the only one to come even close was the 1963-67 Sting Ray.

In developing the 1997 model, the first all-new Corvette since 1984, chief engineer Dave Hill and company sought to do two things: address all the problems and concerns that Corvette owners and

loyalists had with the previous-generation car, and reach out to those who preferred cars like the Nissan 300ZX, Acura NSX, Mitsubishi 3000GT and Mazda RX-7.

The wonder is that it appears as if Chevrolet has accomplished what it set out to do, and perhaps a bit more, in a project that dragged itself out for more than seven years within a corporate environment that was more often in turmoil than stable.

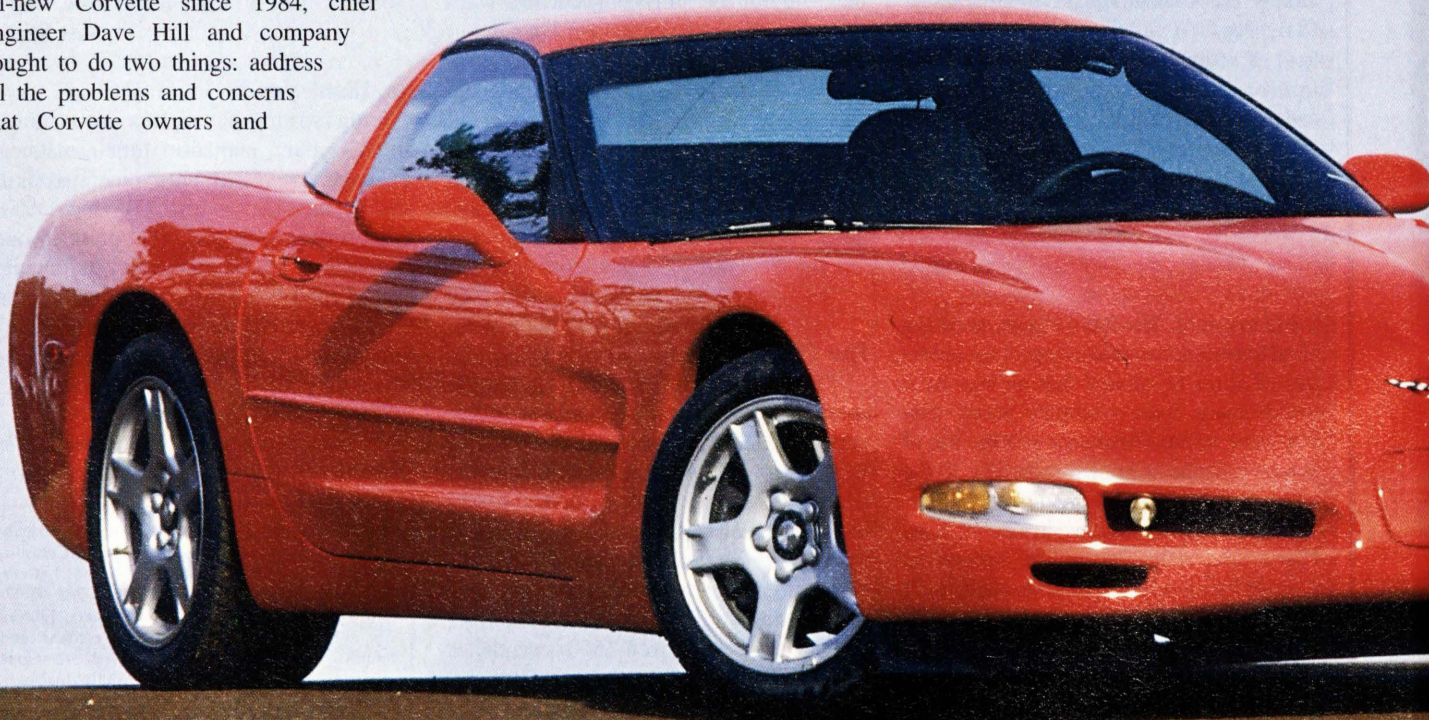
Chevy introduces at the North American International Auto Show a car that goes faster than its predecessor, while being more comfortable and much easier to drive, both at high speed and cruising the interstate. It also is better-built; the Corvette is assembled more efficiently in terms of corporate resources, and it operates more efficiently using fewer of the world's resources.

Its success may not be evident right away, especially to Corvette skeptics. What people will see first is a car styled in such a way that it is unmistakably a Corvette. On

the road it's also impossible to mistake for its predecessor. It has a much lower nose, a wheelbase 8.3 inches longer in a car whose length has increased only 1.2 inches, and a slicker, sleeker look from stem to stern.

"There's a lot of family pride in it," Hill says, "but it's not at all retro."

Like the rest of the C5, the design is all-Corvette, but it is also all-new. Those with an eye for what works in a wind tunnel may recognize that the 1997 Corvette has one of the most slippery shapes around. Pointing out details that make this so, aerodynamicist Kurt Romberg notes the tapered canopy, and the crisp, hard edge that frames the rear end, forcing air to separate from the body cleanly to reduce drag from the wake behind the car. This flat-bottomed design measures a 0.29 Cd, the lowest of any car offered on the American market besides GM's own EV1, and it is superior by a wide margin to any other high-power sports car in the world today. Next best: NSX, at 0.332 Cd.



Underneath that slick surface, though, is the real secret to the new Corvette: the stiffest, most sophisticated chassis design ever to wear the name. What you see is that there is a lot more room in the new cabin, and that the door sills have been lowered four inches, and no longer present an obstacle to entry. There is even a real hatch with 25 cubic feet of cargo room. The reasons for these evident improvements are hidden, though. The sills are lower because of a new perimeter frame built with hydro-



**The Corvette's long wheelbase enhances both ride and interior volume, while the car's shape delivers a slick 0.29 Cd. The door-guard molding seen in these photos is optional. The Sting Ray-inspired cabin includes round, analog gauges (left).**



formed seamless steel tubing. The long, single-piece side rails are much stiffer than the 14-piece rails of old, and they are tied together at each end by hefty bumper beams that are welded, rather than bolted, together.

And that's only part of the story: The center tunnel is structural and sealed at the bottom, and there is a race car-like welded cage of aluminum castings and extrusions that frames the cockpit and windscreen. Finally, the floorpan is a lightweight composite sandwich (with balsa wood at its center) that aids both chassis rigidity and noise-isolation.

These elements together form a structure 4.5 times stiffer than that on the fourth-generation Corvette. With its removable hardtop in place, the chassis is rated at 23

hertz. Take that roof panel out (open three conventional, convertible-type latches in an easy, one-person operation best appreciated by anyone who has wrestled with the C4's roof and its special tools) and the structure still measures at 21.5 hertz vs. the old car's 17 or less with its roof installed.

The entire assembly process has been simplified enormously. There are 34 percent fewer parts in the car, or about 1500 parts that no longer have to be fastened, glued, or hung in place. That is 1500 fewer things to go wrong. In practice, this all means that the 1997 model is the first Corvette body/chassis unit that doesn't rattle, creak or groan when brand-new.

Interior volume is also up because of the longer wheelbase and the relocation of the transmission to the rear of the car. This allowed for a smaller and stiffer central tunnel structure, and it balanced the front-rear weight distribution at 51.4 percent front, 48.6 rear with the automatic.

Chevrolet pr people carefully avoid calling this a rear-transaxle design—although the engineers sometimes use the term—because a transaxle is a single unit that includes both a transmission and differential in a single housing. Corvette simply mounts its transmission behind the driver's right elbow and ahead of the new Getrag-built limited-slip rear axle. The latter is offered with one of three ratios, one each for the manual transmission (3.42:1) and the automatic (2.73:1), and another, optional performance gear for the automatic (3.15:1). The choice is between a con-

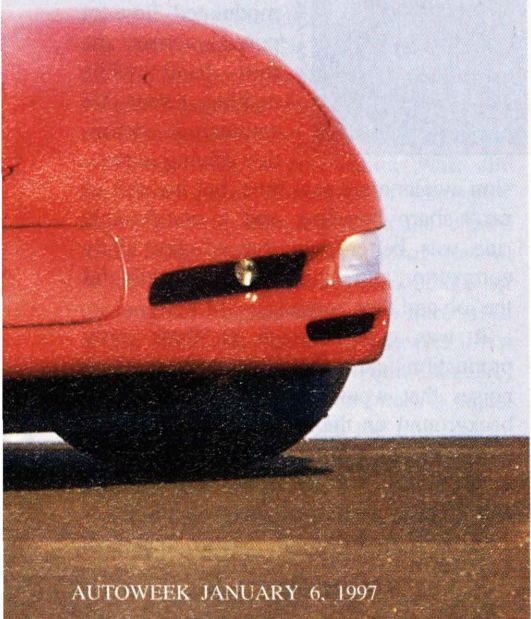
ventional six-speed manual (the Borg-Warner unit used in F-body cars, not the ZF found in the C4) and a four-speed automatic (basically the same Hydra-matic but with a modified housing, beefed-up torque converter and oil pump, and amended electronics). Chevy lists the automatic as the standard transmission and the six-speed as optional, but there is no price difference.

With the six-speed, there is a self-adjusting clutch (mounted at the engine end of the driveshaft) for lower wear and longer intervals between servicing. The B-W unit employs the skip-shift design that forces a first-fourth gear shift under certain conditions in order to meet federal fuel economy requirements, but the car is more fuel efficient, so compared with the old version, you can use a lighter throttle and still get second gear.

Another measure of the engineers' achievement is that the whole car weighs 69 pounds less than the 1996 model similarly equipped. This is due in part to thinner, plastic—not fiberglass—body panels. The last model used FRP, fiberglass-reinforced plastic, while the new car uses SMC (sheet-molded compound) and RIM (reaction injection molded) plastics.

Because the fenders are bolted on, not bonded, these new plastic panels are easily replaced, which should reduce repair costs and therefore, eventually, insurance costs. Hill says that Chevy consulted insurers with an eye toward making sure Corvette remains an affordable dream car. One result was the decision to use a conventional, forward-tilting hood rather than the old clamshell design.

Which brings us to the engine: Some expected a modern Corvette to employ an overhead-cam engine, especially after the ZR-1 version of the C4 appeared, but pushrods prevailed. The advantage of overhead cams is in engine breathing at high rpm, but Chevy's engineers determined that low-rpm performance was more important to buyers, and that the penalties of overhead cams—both in added mass and in a wider engine that poses packaging problems—were not justified by the resultant performance.



Critics may quibble with that, but they should note that the engineers were not content to settle for the Chevy V8 that dates to the 1950s, either. The only engine choice this year is the LS1, a completely redesigned ohv V8 engine that employs the old small block's 4.4-inch spacing between cylinder bore centers, but is otherwise all-new. We reported details in a spy shot/preview story (AW, Oct. 28), but here are the highlights: The LS1 has an all-aluminum block with cast-in-place iron cylinder liners. The alloy heads no longer have siamesed intake ports; instead, all the ports are shaped identically. The Corvette uses direct ignition that provides each spark plug with its own coil, and a multi-functional powertrain control module. The part of this latter feature that gets people's attention is the "drive by wire" throttle control. Electronics read the pedal position and operate the throttle accordingly.

A single controller also incorporates traction control and cruise control, and communicates with the electronic automatic transmission. Unlike the C4, there is no longer any feedback through the pedal when the traction control engages, but it remains possible for the driver to induce some rear wheel slip without turning off the traction control.

The engine generates 345 horsepower at 5600 rpm vs. 330 at 5800 for last year's top engine, the LT4. Perhaps more significantly, the LS1 pours out 350 lb ft of torque at 4400 rpm vs. 340 at 4500 for the LT4. The LT4 was rated at 16 mpg city/27 highway, but preliminary figures for the 1997 Corvette are 18/29.

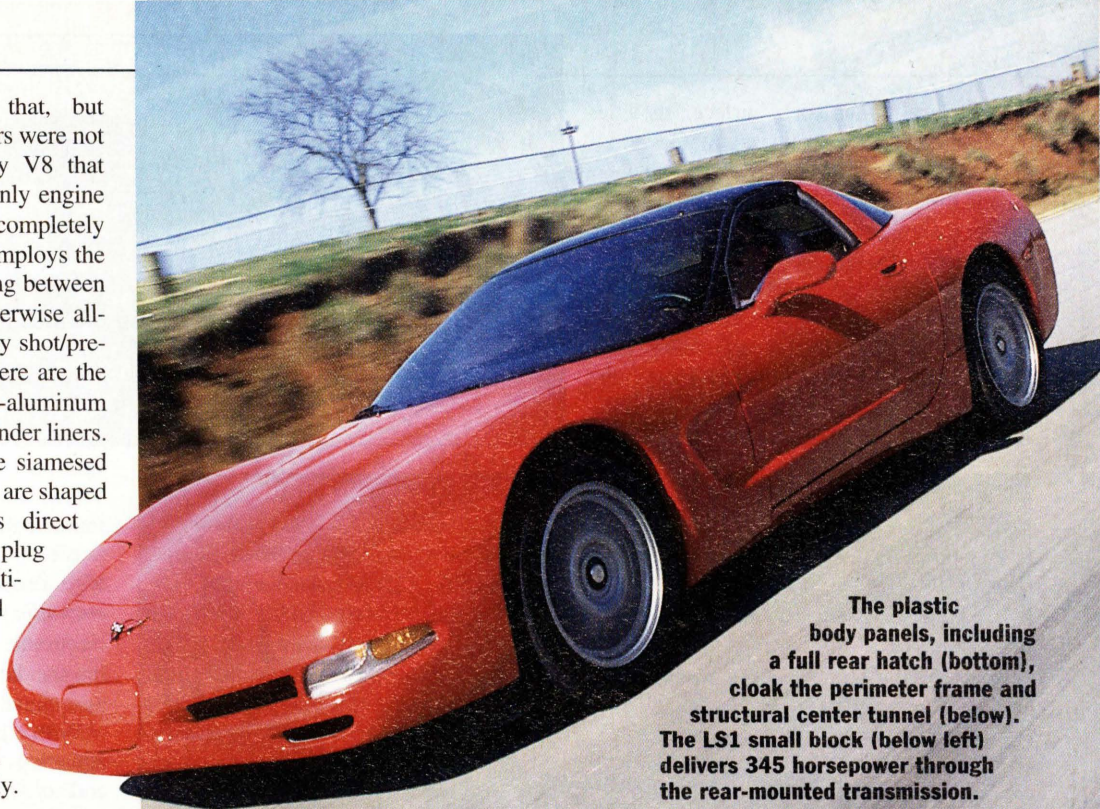
But that's not the performance increase you care about most. Remember that weight is down, too, so the power-to-weight ratio is 1 horsepower per 9.3 pounds with the manual gearbox, 9.4 with the automatic. Chevy claims 0-60 mph in 4.72 seconds with the manual, 5.05 with the automatic, and 13.3 at 109 mph for the quarter-mile, with a top speed of 172 mph, and lateral acceleration at 0.93 g, the latter despite a switch to narrower tires.

In a day's drive over public roads, and another morning on the Road Atlanta racing

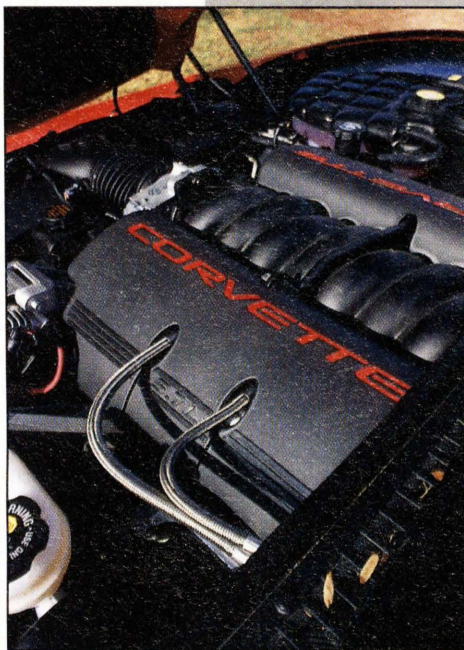
circuit and through a slalom course, we found the performance more than adequate. No, wait! Forget understatement: This car is a blast to drive! That is a judgment rendered by both acknowledged Corvette-o-philos and avowed harsh critics alike on the preview. Whether you like to drive a little brutally, hammering on the car the way that many Corvette believers like to do, or you prefer to finesse it with a light touch that the old Corvette shrugged off, it responds capably, predictably and rewardingly. Handling at the limit is improved a lot, but so is everyday handling, so the rewards are accessible to any driver, not just to the skilled or

talented few. The LS1 is not a brute-force engine, but it delivers a smooth, easily modulated flow of power across the rpm band while making sweet V8 sounds. A definitive driving impression awaits more seat time, but the mix of razor-sharp handling and a comfortable ride was better than that of any likely competitor, and the drivetrain certainly did the job and then some.

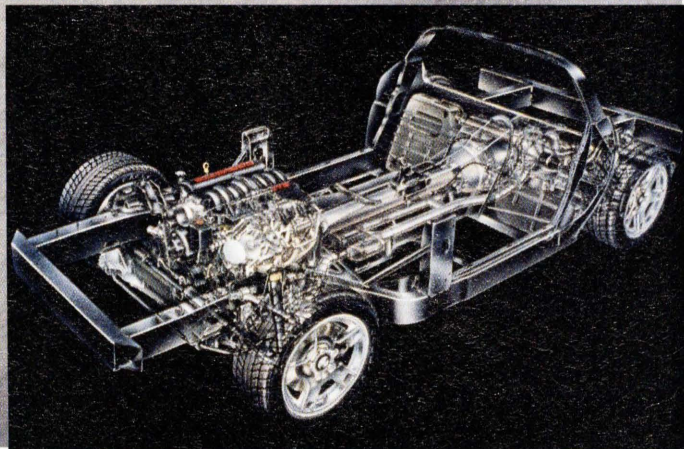
It was quiet enough in these early production cars that we noticed three noises that would have blended into the background on the C4: The door window seal sometimes allowed some wind noise at speed, the manual shifter rattled a bit, and there is an exhaust boom or drone at 2500 rpm in top gear. Chevy engineers



The plastic body panels, including a full rear hatch (bottom), cloak the perimeter frame and structural center tunnel (below). The LS1 small block (below left) delivers 345 horsepower through the rear-mounted transmission.



DAVID NEWHARDT



DAVID NEWHARDT

were working on fixes to these concerns before sending the cars to market.

In our driving experience, the car's structural stiffness and its suspension compliance reminded us of the late, lamented Nissan 300ZX—nimble, yet solid.

On a wet skidpad that was part of the slalom run at Road Atlanta, we really enjoyed cornering in a tail-out, throttle-induced oversteer with the gas pedal floored and the traction control keeping the wheel slip in check. This is a trick that you can't do in most cars with traction control, because they are engineered to cancel all possibility of slip, regardless of the driver's intent.

Then we turned the traction control off, and found it even more fun to modulate the degree of oversteer with the gas pedal. There was more of a risk of spinning out, but the car was so predictable and responsive that we had more fun. But our lap times became less consistent.

The new rear suspension has lower and upper control arms (the previous-generation car made its half-shafts do double duty, not only carrying power to the wheels, but also serving as suspension arms) for better control of wheel location in all circumstances. The suspension attaches to the chassis with bushings designed to be soft in response to fore-aft forces for better ride, but stiff in resisting lateral and vertical motion, to keep the handling under control.

A redesigned composite transverse leaf spring mounts to the lower suspension arms (one spring for each end of the car). These springs are softer (lower rate), thanks to the stiffer chassis, which allows more compliance with road irregularities and better ride.

There are three available suspension tunings: base, electronically adjustable F45, and autocross-tuned Z51 with stiffer springs, bigger antiroll bars and firmer monotube shocks. We found all three suitable for road use (remember the harsh 1984? No problem this time), and on the slalom, learned that the F45 in "performance mode" adjusts its shocks to be stiffer than the Z51's to make up for its softer springs.

If we have a reservation with the suspension and handling of the new Corvette, it is with regard to the choice of the Magnasteer II power steering system. A performance-oriented development of the original Magnasteer system introduced on the 1995 Olds Aurora, Magnasteer II is a variable-effort power-assist unit that uses electronics to vary magnetic forces to adjust the steering effort through the fluid pump. This imposes another layer of separation between the driver and the tires at road level. In theory, that communication should be maximized, not isolated. Yet we couldn't

really argue with the program's "total vehicle integration manager," or with Corvette racer John Heinricy when he said that the new car's steering is much more predictable than the previous model's. "You can't really feel the road with any power steering," Heinricy said. "One thing you have to get used to with the C4 is the steering, because you're not getting a lot of information about what the car's going to do."

In fact, there was more monkey-motion

## **Forget understatement.**

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and compliance in the old car than anyone would like—steering is one thing that Corvette-bashers loved to harp on with the C4. The new car ties the steering column to a rigid magnesium bracket attached to a stiff instrument-panel crossmember, and the rack-and-pinion is mounted properly, so steering input turns into steering at the ground, and the C5's steering responds more consistently and predictably. It may be more a measure of the C4's deficiency than of any inherent benefit to Magnasteer, but the improvement from last year's car to this year's is undeniable.

And at least you can see forward well enough to know what you're steering toward. From the supportive bucket seat, which comes standard in glove-soft leather trim, you can see the road as no Corvette driver has since 1968, at least. The low hoodline lets you see ground a full 18 feet closer to the bumper than what last year's car allowed. That's a long luxury car-length.

It's just one measure of the vast improvement in cabin comfort and usefulness. The steering wheel, for instance, doesn't suffer the incredible inertia that

accompanies most airbag-equipped wheels because it uses a lightweight magnesium core (a trick it shares with EV1). The shifter isn't hooked as directly to the transmission as it was before, but it feels right—lighter and quicker in use than the old one, and also better located, so that you no longer have to reach up to grab the knob. The handbrake has also been relocated, from the driver's door sill to the console.

And the driver-side footwell is 2.8 inches wider, so there is room for a real dead pedal, while the passenger-side footwell is six full inches wider. It's simply enormous compared with the old car.

The dashboard design is clearly inspired by that of the 1963-67 Sting Ray, even though instrument-panel operation is entirely electronic. But don't fear: The gauges are round analog ones, a preference stated by Corvette lovers and revilers alike. The dashboard has a dual-pod design with a grab handle in front of the passenger, mimicking the shape of the top of the driver's instrument pod (it also helps direct the airbag inflation appropriately).

The instruments themselves are arrayed in a 3-D, layered effect that draws inspiration from Sting Ray's separate round instruments. Flick the switch to move from metric to English and back, and the speedometer reads out in either mph or km/h up to 200 (cars for metric markets have different speedometers appropriate to the near-300 km/h top speed). When the lights are on, the panel glows under ultraviolet light, giving it a unique purplish hue.

There's a driver information center below the instruments that offers readouts in four languages—English, French, Spanish or German. One of the 12 readouts available is the air pressure in each of the four Goodyear Extended Mobility Tires (EMTs, or run-flats). The EMTs are standard, because there is no spare. The new tires have better ride and less noise than previous EMTs, and the new sending units are far more precise. You can go 200 miles on an empty tire, if you're careful.

The driver information center also lets you adjust settings for the alarms, seat memory and other features. And it has one sort of corny, all-American feature: When you first turn the key, if you pause long enough before turning the ignition switch to the "start" position, you'll see a scrolling message that proclaims "Corvette. By Chevrolet." As if you had any doubts.

Since 1953, anyone seeking to sell sports cars to Americans has had to deal first with the Corvette. With the C5, Chevy has raised that bar. By a bunch. And that is something Corvette lovers and Corvette critics can applaud together. ■