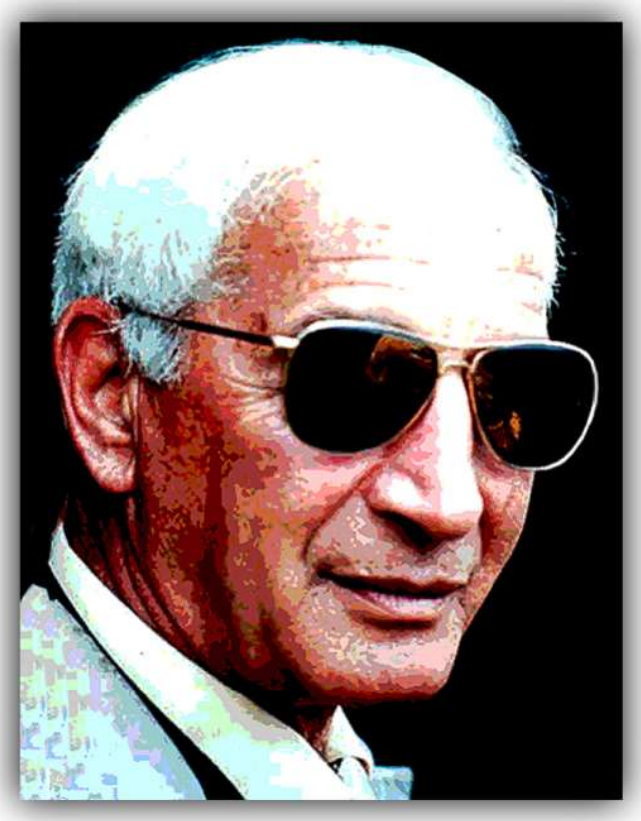
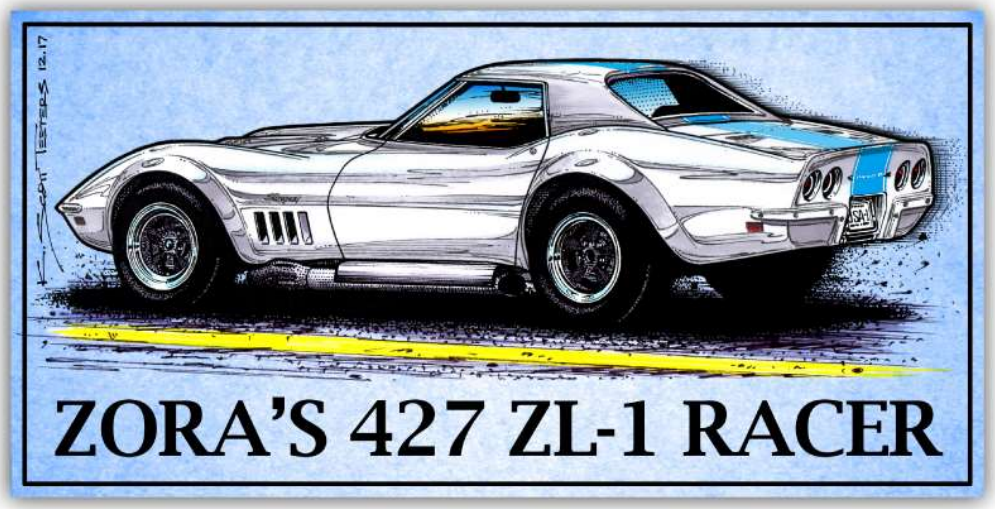
The Duntov Files

Pt 1





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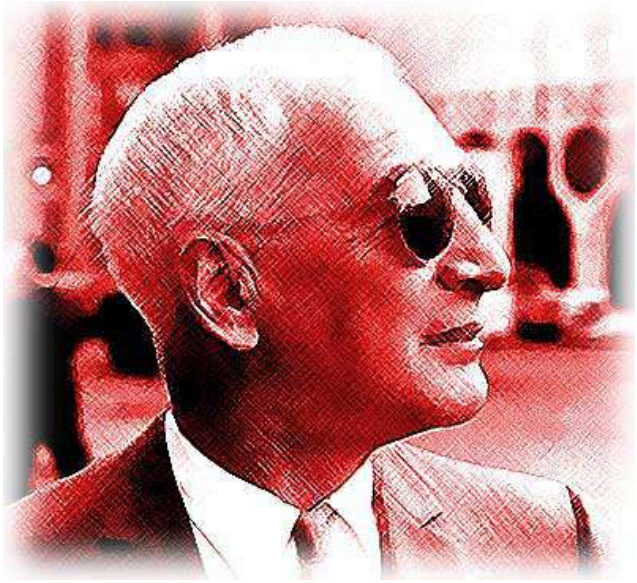


This PDF collection of car magazine articles about Zora's unique, R&D 1968-1969 ZL-1 Corvette was originally published in 2018, around the time the C7 ZR1 surfaced. Fast forward to 2025, the C8 ZR1 is the new General Motors engineering and technology crown jewel.

Enjoy this “blast from the past” when stories of secret, experimental, 600 horsepower Corvettes were blowing minds in the automotive press.

Enjoy and pass around to your Corvette friends. - Scott
March 4, 2025

PS – The below stories are from Road & Track, Popular Hot Rodding, and Car Life, circa 1969.

& ...VARIOUS ITEMS, TECHNICAL & OTHERWISE

The Hottest Corvette

CHEVROLET INVITED us over to Phoenix to see and drive it. It's the ZL-1, powered by a new aluminum-block version of the already well known L-88, which is in turn the racing version of the so-called 435-bhp 427. So-called, we say, because it's common knowledge that in racing trim this engine develops 435 bhp at some point well below the top of its power curve. A more realistic estimate of its peak output is, say, 500 bhp @ 6500 rpm.

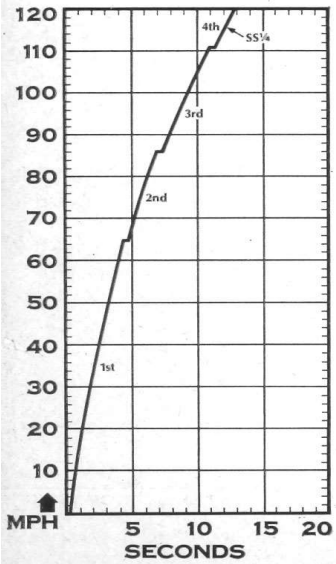
The aluminum block, produced as are the L-88's aluminum heads by an outside supplier, saves an additional 100 lb over the 75 lb the heads take off the all-iron weight. With various other bits of minor lightening—removal of carpets, insulation and headlights—to get the weight down to somewhere halfway between FIA and SCCA homologated weights, the test car weighed 2908 lb dry, or with a half-tank of fuel, about 2965 lb as tested. The test car also had all legal racing items, including 9½-in. rims on magnesium wheels and Firestone racing tires, 10.50-15 front and 12.50-15 rear.

We drove a few laps around the tight little road circuit Chevrolet had chosen for the ZL-1 introduction and were just beginning to enjoy ourselves when it was time to turn it over to somebody else. What surprised us is that the car felt so much like the Group 7 car we'd driven last month; though it weighed 1100 lb more and had a milder engine, its performance, cornering power and sound were—at least subjectively—much closer to the Group 7 than to the 435-bhp test car of our March issue (which, incidentally, should have gone faster than it did but failed to yield to diagnosis before press time). The cornering power of those racing tires is phenomenal, and we wish we could have put the car on a skid pad to measure just how phenomenal.

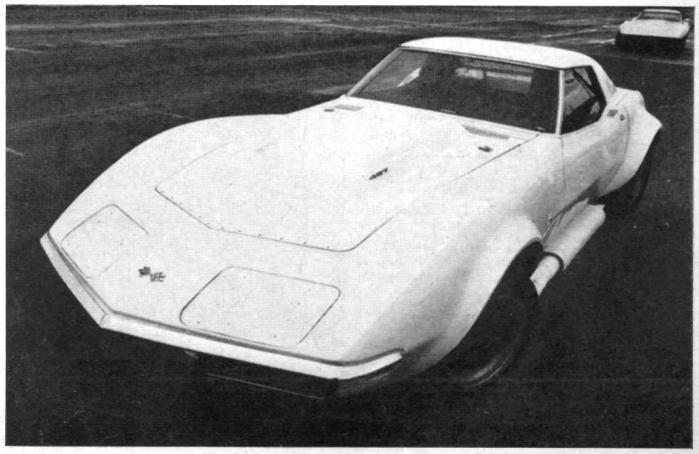
We were also surprised at how forgiving the ZL-1's handling turned out to be. With all that torque on tap, it's no trouble to break even those 12.50 rear tires loose, but if you do it and do it a little too much, there's no skittishness in getting the car back on your intended line. Nice racing car.

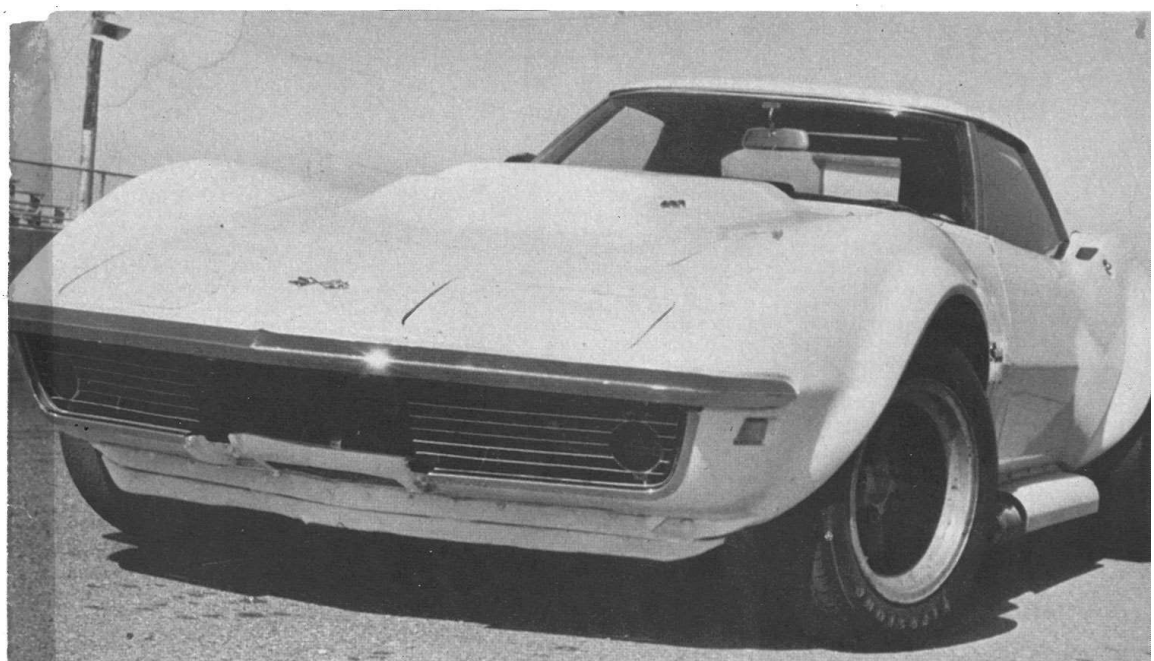
Zora Arkus-Duntov was on hand to tell us anything we wanted to know about ZL-1 and just to generally shoot the bull, as he loves to do. We talked him into driving the ZL-1 through a standing-start quarter mile so we'd have an idea of the car's performance level. Zora wasn't enthusiastic about subjecting this road-racing machine to drag-racing starts but he consented to do it. Lighting up the tires nicely off the line but not shifting like a drag racer, he got a highly respectable quarter time of 12.1 sec and was going 116 mph at the end. Zero to 60 mph came up in 4.0 sec, 0-100 in 9.4; the 6500-rpm redline gave speeds of 65, 86, 111 and 141 mph in the gears. This is with a 3.70:1 final drive and the close-ratio gearbox (2.20:1 1st).

The ZL-1's main purpose is to tweak things a little for



Acceleration curve for Corvette ZL-1, left, is one of the steepest ones we've ever plotted. The test car, below, shows evidence of its hairy nature in the rivets, the big fender flares, the outboard exhaust system and the huge hood bulge, which houses a plenum chamber for the engine's cool air supply. Price of this racing package, not yet determined, will be about $4000 over the basic Corvette.





Flared fenderwells on the ZL-1 'Vette give it the appearance of an All-American road racer, which is just what it is.

ZL-1 'VETTE
ZL-1 CAMARO

factor in the ZL-1's performance. The exhaust ports have been enlarged and rounded at the outlet for an air flow increase of some 10 per cent. The exhaust valves are 1.88-inch diameter as opposed to 1.84 in the steel heads. The intake valves are 2.19 inches across and the intake port contour is radically new. The ports, measuring 3.84 square inches, were smoothed and the pocket that existed behind the valve guide has been nearly elimated. This pocket was found to cause a stagnant pool, creating turbulence and blocking the flow through the port. Therefore, there is actually less port area but a greatly improved flow of fuel. Engineers have found that, with a venturi shape and less port area, the torque range is broader.

Some very effective cam changes were also incorporated into the ZL-1 package. This is obvious as soon as you fire the engine and feel it idling like a fuel burner, seemingly wanting to escape from the confines of its sheet metal cage. The valve lift has been increased from the L-88's .560-inch, to a high .600-inch. With the automatic transmission the car's rough idle, together with the pressure created by the transmission, makes you think it's about to stall. This is not the case, however, and the response to throttle is very quick, smooth and exciting.

Another important head configuration change was in the combustion chamber, and it brought Chevy's "semi-hemi" much closer to being an actual hemi. The quench area below the plug has been opened up, enlarging the combustion chamber but giving a freer flow of fuel vapors into the chamber. This change dropped the compression from 12.5-to 1 to 12.0-to-1, but the greatly increased breathing more than compensates for the loss.

Together with Dick Harrell, we took over Kansas City International Raceway for some test runs on the ZL-1. The results were pretty amazing. Our combination included 8.00 x 14 M & H Racemaster tires and began with a Holley 850cfm carburetor with manually operated secondaries. The rear end gears were 4.10-to-1. With the headers closed, we managed a best of 12.14 at 117.80. Opening the headers (made by S & S) and installing a set of N3 Champion plugs produced a 12.11 ET and a 119.34 mph speed.

A quick switch to vacuum operated secondaries with the same model carb produced interesting results. The tires, which to this time had been smoking all the way, bogged off the line, resulting in an 11.92 ET at 120.11 mph. A few minutes spent resetting valves, a timing boost to 42 degrees and richer secondary carburetor jets produced readings of 11.78-122.50.

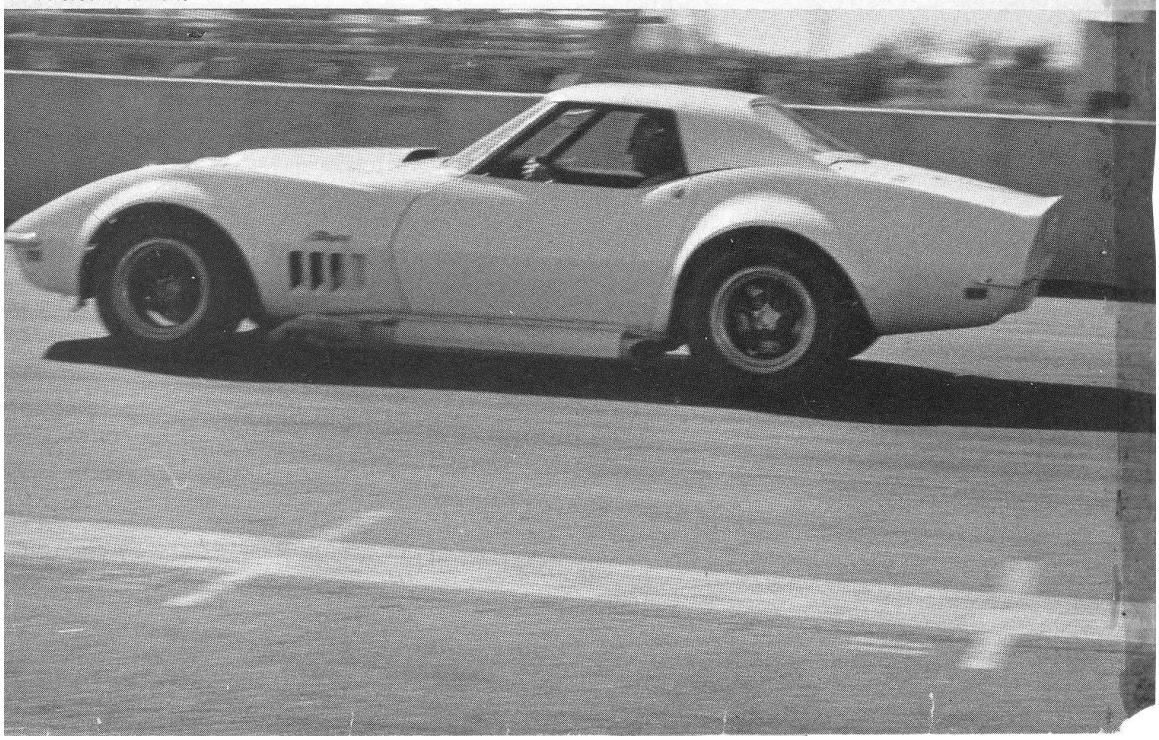
For the super stock enthusiast, a few runs were later made using a Turbo clutch transmission, with one of Hays' Clutches racing units. Additionally, a tall Weiand manifold with a pair of Holley 660 cfm's was installed. The top end was greatly improved, and with eight pounds of air in the tires the clocks showed a best run of 10.28-133.05. Lowering the tire pressure to six pounds and sprinkling a little powdered rosin produced our best run, a 10.21 ET at 133.80 mph.

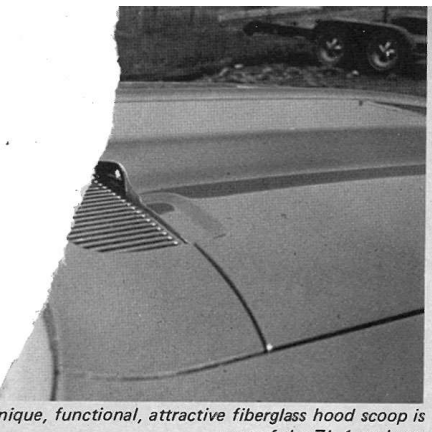
What you have with the ZL-1, is something wild for the street, great for stock racing and adaptable, with available bolt-ons, to highly competitive super stock racing.

Besides a thrilling performance improvement in the ZL-1 over a stock 427 Camaro, the ride is noticeably different. The 160-pound front end weight saving makes handling somewhat easier, and despite a firm suspension the ride is easy. The comparison of rides would be very similar to driving the same Camaro with a 427, then with a 327 until you step on it and lose rear vision to tire smoke.

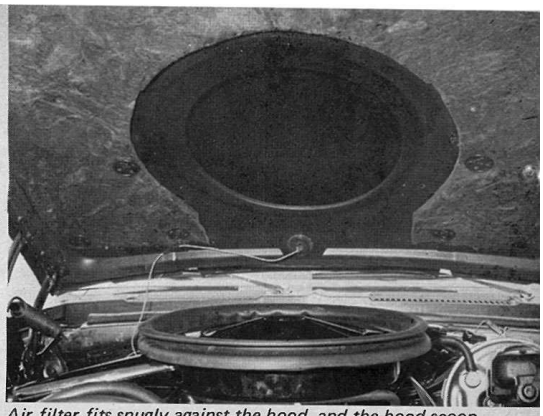
The price? With some $4100 being added for the ZL-1 package, it's a mere $7387! If you're sporting enough to put up the money, don't count on the hefty price to hold a car until you're ready; the demand already exceeds the availability!

At speed with the man himself, Zora Arkus-Duntov, the ZL-1 'Vette is a thing of beauty, and a machine you'd better not challenge unless you're driving an 11-second vehicle.

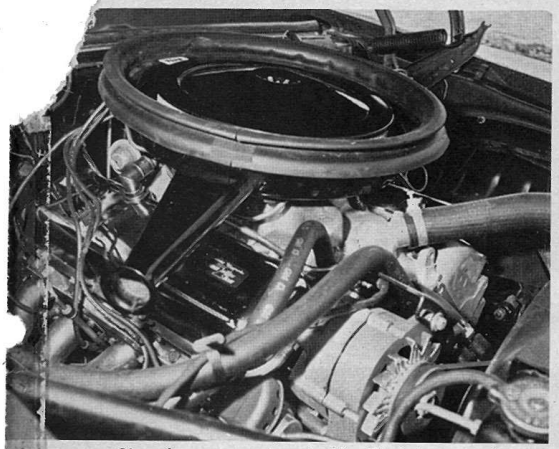




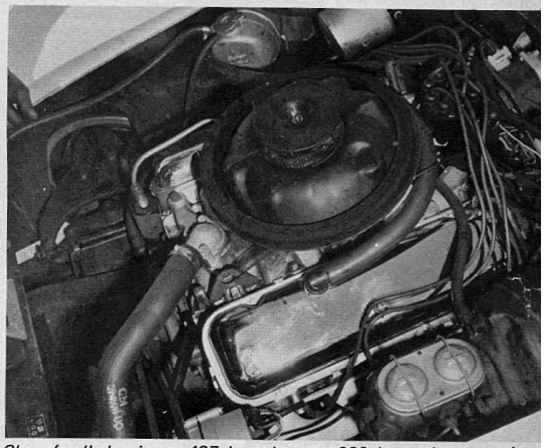
nique, functional, attractive fiberglass hood scoop is part of the ZL-1 package.



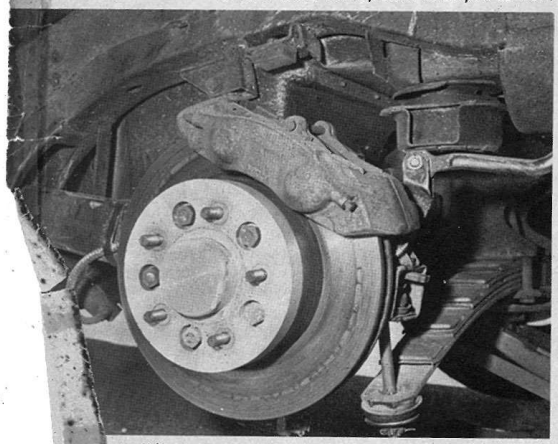
Air filter fits snugly against the hood, and the hood scoop is vacuum operated to open under hard acceleration.



Chevy's greatest triumph: the ZL-1. It not only saves about 160 pounds over its steel counterpart, it puts out several more horsepower and rpm as well.



Chevy's all-aluminum 427 has close to 600 hp as it comes in ZL-1 'Vette. A wild combination, the slick 'Vette body and one of the most powerful production engines in the industry!



rge 5/8-inch rear stabilizer bar, heavier spring rates and heavy-duty disc brakes are part of the ZL-1 package. Cornering ability is unbelievable.

ZL-1 'Vette's fiberglass hood scoop pulls fresh air from area near base of windshield. Fresh air is good for up to 20 extra horses.

CORVETTE:
WHY IT IS THE WAY IT IS

. . . Because of Zora Arkus-Duntov, not only the builder, but No. 1 Corvette fan. He's quick to praise it, quick to fault it, and ready to improve it.

HIS LABORATORY looked like just another race-ready Corvette until Zora Arkus-Duntov wedged himself into the seat, buckled helmet and harness and started the engine. Some 500 horses thundered out the open exhaust pipes. When the needles moved off their pegs, Duntov nodded to his passenger: "We'll take it easy."

Then he rapped off a standing quarter-mile in 12.1 sec. and took a quick lap around the road course, cornering and braking at one G while the delighted passenger rocked back and forth in his harness like a tether ball on a short rope.

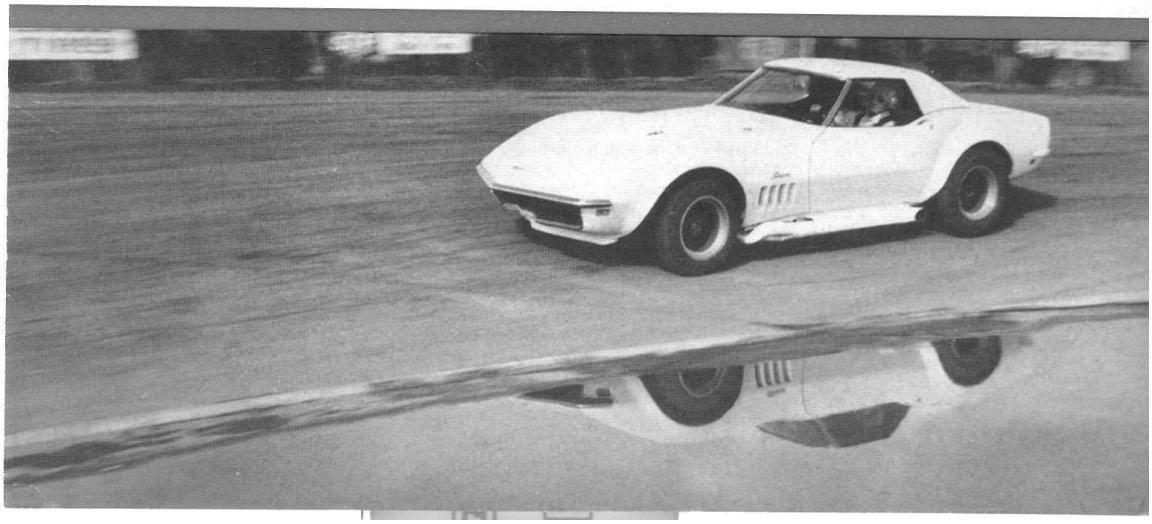
Duntov directs Chevrolet's high-performance vehicle program. His laboratory is the ZL-1, an aluminum-block version of the 427-cid racing V-8. Duntov came to the track to talk about the ZL-1 and to show that one lap is worth one thousand words. It was a convincing demonstration, but Duntov's words are worth more than ordinary words. He has the rare gift of understanding what others can't explain, and explaining it so anyone can understand.

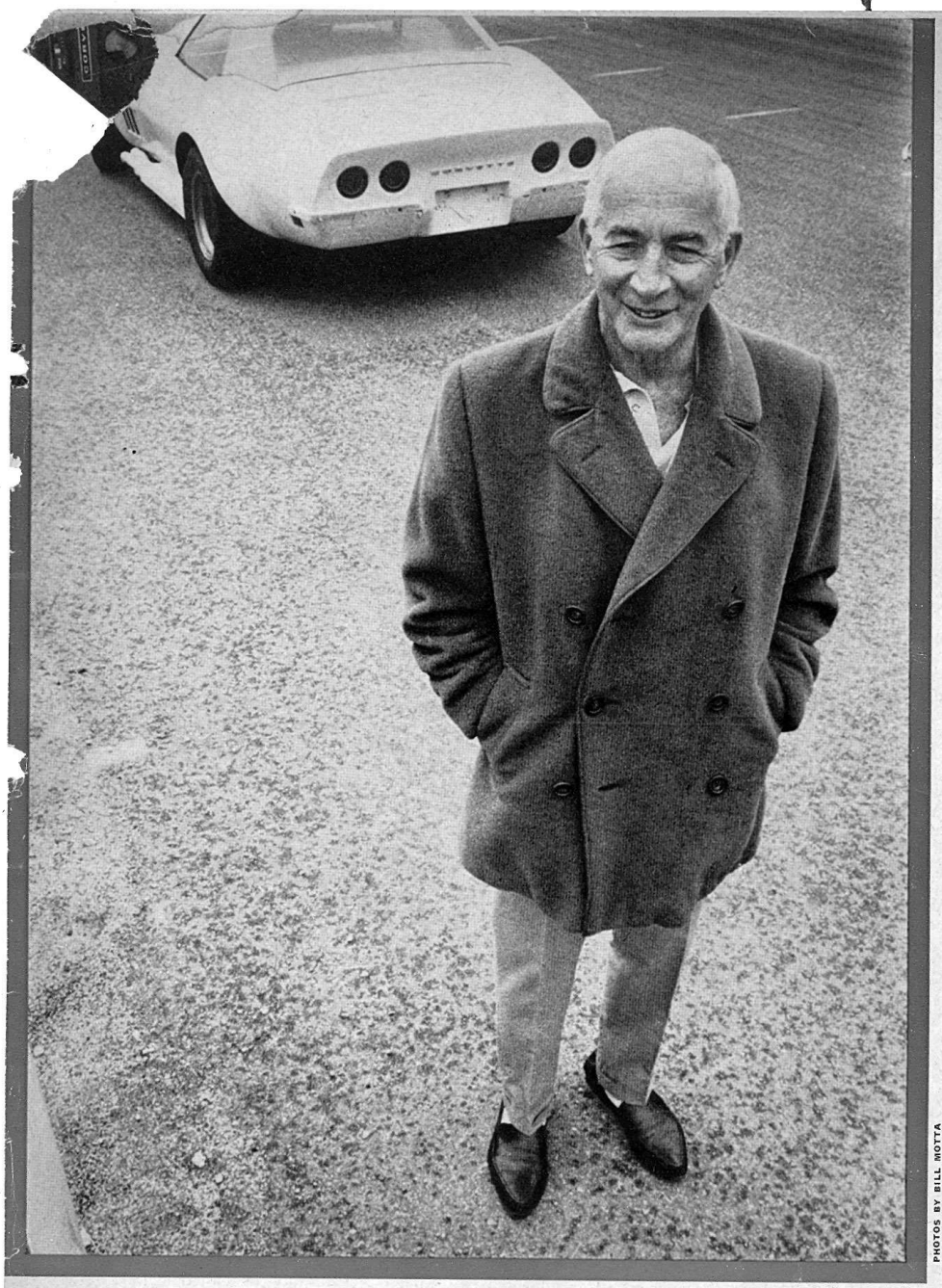
Duntov discussed power-assisted steering for racing cars. Street Corvettes do have optional power steering, and Duntov approves. "It's not integral. We do have road feel. It has a built-in feedback, and you have resistance in proportion to tire adhesion."

The problem is tires. The current racing tire contact patch is wider than it is long. A street tire has a long, thin footprint. When the car pushes one direction and the pavement resists, the street tire is twisted. The twisting force is transmitted by the steering to th driver. The short, wide racing tire i pushed. It has less self-aligning torque Road feel comes from self-aligning torque. Power steering, even on Corvettes, has less feel than manual steering. Racing tires don't transmit a much feel as street tires do. Result "We couldn't get enough feedback We've shelved that, temporarily."

Automatic transmissions for racing are also being investigated. Duntov said the controls are no problem Chevrolet's transmission engineers could design a driver-controlled automatic as a routine chore. Efficiency is so good now, and power so available that the racing car with automatic would be just as fast.

But there is a hang-up. Automatics now used in passenger cars, the basic designs Duntov and Chevrolet's high-

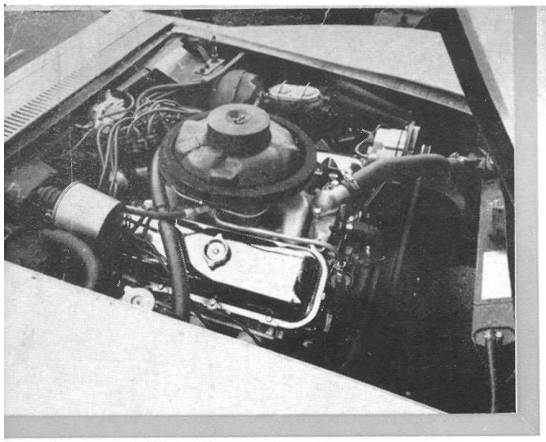




PHOTOS BY BILL MOTTA

performance engineers would have to use, have planetary gears. Because of the sizes of the parts, planetary gears are all wide ratio. The closest they can be is about 1.3:1. A racing engine develops power in a narrow band of rpm. It needs close-ratio gears. Racing transmissions have gear spreads of 1.2:1. Until there's a way to build close-ratio automatics, Duntov said, the manual transmission will be the best choice.

Duntov talked about his battles, won and lost, inside the company and out. Heard about the executive's wife, the one who burned her leg on the side-mount exhaust and caused the option to be dropped? Don't believe it. The current Corvette body has a Coke-bottle shape, with the lower part of the body sculptured between the front and rear wheel wells. It makes the stylists proud. Last year, they wanted to show it off, and they won: ▶



THE ZL-1, aluminum-block version of racing 427, develops 500 bhp, "eased through" 12.1 quarter-mile.

THE SURE, quick hands of Zora Arkus-Duntov, put ZL-1 to work on tight, flat Phoenix course, cornering and braking at 1 G.

DUNTOV

continued

No side exhausts. But Duntov has an unlikely ally. The sales department heard the voice of the customer, who wanted the side pipes and didn't care about the styling. The side mounts are back on the option list.

The LT-1, announced as the top small-block performance engine for 1969, then quietly dropped, was one of Duntov's losses. He believes in the small, wild engine, thinks that's what Corvette is all about. The LT-1 is a 350-cid Z/28. Same camshaft, same intake manifold and carburetor, but with more inches. It was to be the club racer's car, the scourge of the Sports Car Club of America's B-Production class, just as the L-88 is the car for the semi-pro competing in A-Production.

But Duntov and the LT-1 lost, to the customer and the production line. The customers keep surprising the factory by buying more and more Z/28s. The production men said they couldn't get enough parts for the LT-1 and that the logistics of delivering the parts to the Corvette assembly plant and keeping track of one more engine was more than they could bear. Next year, Duntov said, there will be an LT-1. (There is a way this year. Keep reading and you'll find out how one Corvette fan did it.)

On that subject, any chance of a Z/28 Corvette? No. The 302-cid V-8 is an "artificial" engine, built to put Camaro into the Trans-Am series. The 302- and 350-cid engines are built from the same block. They weigh the same. The larger the displacement, the higher the tolerance for wild camshaft timing. In equal stages of tune, the 350 will have more horsepower and more torque with less fuss and the same weight. It won't wind quite as high. Trading 90 ft./lb. of torque for a handful of revs strikes Duntov as a bad bargain, and there are no plans for a Z/28 Corvette.

Duntov hoped the SCCA would help the LT-1, but it didn't happen. The SCCA won't allow production cars to use parts that aren't sold by the factory on the car, so the LT-1 isn't listed as accepted for racing. If it had been, maybe Duntov would have better luck with the production men.

He concedes that point, and is still fighting for the L-88's fender flares. The rules say the tire must be under the fender. The wider the fender, the bigger the tire. On the assembly line, the Corvette body fits into a jig. There's no room for the flares, and Duntov can't justify changing the jigs "for a few hundred racing cars." A set of fender flares is in the trunk of every L-88 when it's delivered. The customer must deal with the technical inspectors as best he can.

In his role of proud parent, Duntov freely admits the Corvette has a few minor faults. What about the gyrations needed to load and unload the trunk? "It keeps your back muscles in shape, bending down like that."

Isn't the ride harsh at low speeds? Yes. The suspension is tuned for 80 to 120 mph. Change it and, "you'd penalize the man who's going to drive it fast."

Why not a four-place Corvette? He'd like to build one, so the Corvette owner won't have to sacrifice his family. "Corvette owners are the cream of the population. We want them to reproduce."

He tried. When the present Corvette was being designed, the engineers built a stretched version, with four seats. It "was neither fish nor fowl," and another project went on the shelf.

There won't be two Corvettes, sporting and luxury. When the Corvette and the Thunderbird began, both were boulevard sports cars. The Thunderbird grew into a luxury car, and the Corvette was refined into a raceable sports car. Duntov thinks Ford walked away from the best market, and he's not going to follow the example.

Asking about the next Corvette is the only way to lead Duntov into a vague answer. He knows what's coming, but he can't say.

Still, there are some interesting inferences editors can draw. Can the Corvette be lowered? Not in its present form. The engine is only five inches from the ground. It can't be lowered without an expensive and complicated dry-sump oil system. The driver can't be lowered. He can barely see over the engine as it is. "To get it lower, you'll have to move the engine from where it is."

Aha, the rear-engine Corvette! (Rear engine is Duntov's term. He doesn't use "mid-engine." Says it's an evasion by advertising men who don't want to scare customers weaned on the notion that rear engines are dangerous.)

But that puts weight in the back, right? Yes, Duntov said, and that's where it belongs. With 40/60 weight distribution, the car is balanced under braking, a plus. It has more weight on the driving wheels when accelerating, another plus. Suspension can compensate for the heavy tail, just as it does for cars with heavy fronts. It's the way to go, Duntov said. He's just as willing to admit that he's felt this way for 10 years, but the factory hasn't yet agreed.

But most of the talking (and riding, driving and all-'round bench racing) involved the ZL-1. The car and its production status say just how serious Chevrolet is about building and selling racing cars.

There's a Duntov message here, too. The amateur racer does his best to build a replica of the factory cars. Duntov identifies with the amateur. His ZL-1 is a replica of the amateur

DUNTOV TO EDITORS and bystanders during rain break: **"We did what a man would do on his own" by removing everything from a Corvette that doesn't look like a racing car. (Lip on leading edge of hood is to hold hood on above 180 mph.)**

racer's car, sort of join-'em-so-they-can-beat-everybody-else.

The engine is an exception in that Duntov's arrived while the club racers were getting in line at the nearest Chevrolet agency. The ZL-1 block is, as mentioned, aluminum. The cylinder bores have cast iron sleeves. In dimension and shape, the ZL-1 is identical to the other 427s, right down to its four-bolt main bearing caps. But it is *100 lb. lighter* than last year's secret weapon, the L-88.

The two benefit each other. The alloy-block engine uses the aluminum cylinder heads and intake manifold developed for the L-88. Development work done for the L-88 shows up on both. The 1969 engines, in iron or aluminum, use stronger connecting rods with bigger bolts. Same for the pistons, which get heads reshaped for a different combustion chamber shape and stronger skirts. The cylinder heads are modified with larger, round exhaust ports and intake ports streamlined for improved flow. The components in Duntov's engine, and in all ZL-1 and L-88 engines, are balanced and inspected to a degree achieved on no assembly line. The engines are "surgically clean," Duntov said. Then he added that if he were buying one, he'd take it all apart, clean it, check it and put it back together himself. No criticism of the builders implied: Any serious racer or engine builder would do the same thing.

The engine is special, but the car looks like loving hands at home. It is. Duntov's test car started life as a stock L-88. He and his crew did "what a man would do on his own"—they removed everything that didn't look like a racing car. With steel headers replacing iron exhaust manifolds and mufflers, minus headlights, bumpers, upholstery, spare tire mount, heater, etc., the car sheds close to 400 lb. The aluminum components subtract another 175. Without driver or fuel, the car weighs 2908 lb. Body modifications were limited to the quasi-legal flares, rivets over the headlight doors and an aluminum lip along the front edge of the hood.

Another Duntov story there. He was conducting some high-speed tests, at 180 or so, when air trapped underneath the car escaped, taking the hood with it. It happened so fast Duntov never saw the hood sail over his head. The postmortem showed it pulled the hinges out, so the lip is there to prevent that from happening again.

There's a hood scoop option (code named ZL-2), the rear-intake cold air system that's also an option on Camaros, and an air cleaner/director Duntov calls the Tranquilizer. With the scoop open, the incoming air buffets around unless the cleaner is there to calm and point it. Once, in Duntov's absence, some non-believers decided they had a speed secret, so they took off the air cleaner, just like the good old days. The engine refused to run properly, and Duntov has had a soft spot for the Tranquilizer since.

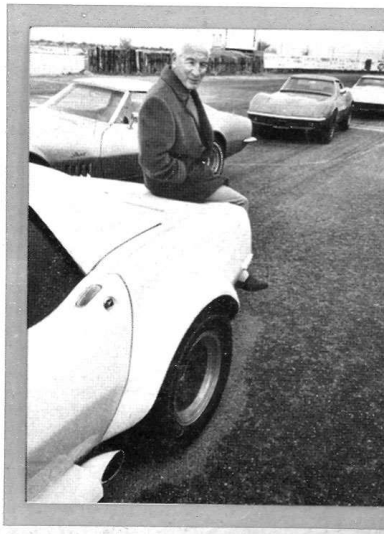
As it appeared in Phoenix, the ZL-1 was prepared for road racing, with 10-in. tires on 9.5-in. rims, a clutch that wouldn't tolerate being slipped, and 3.70:1 gears. Duntov drove the car for a timed quarter-mile carefully, more as a favor than for his own benefit. With an easy start and deliberate shifts, the standing quarter in 12.1 sec., at 116 mph is merely terrifying. A stout clutch, heavy hand and the right gears would put the car into the elevens.

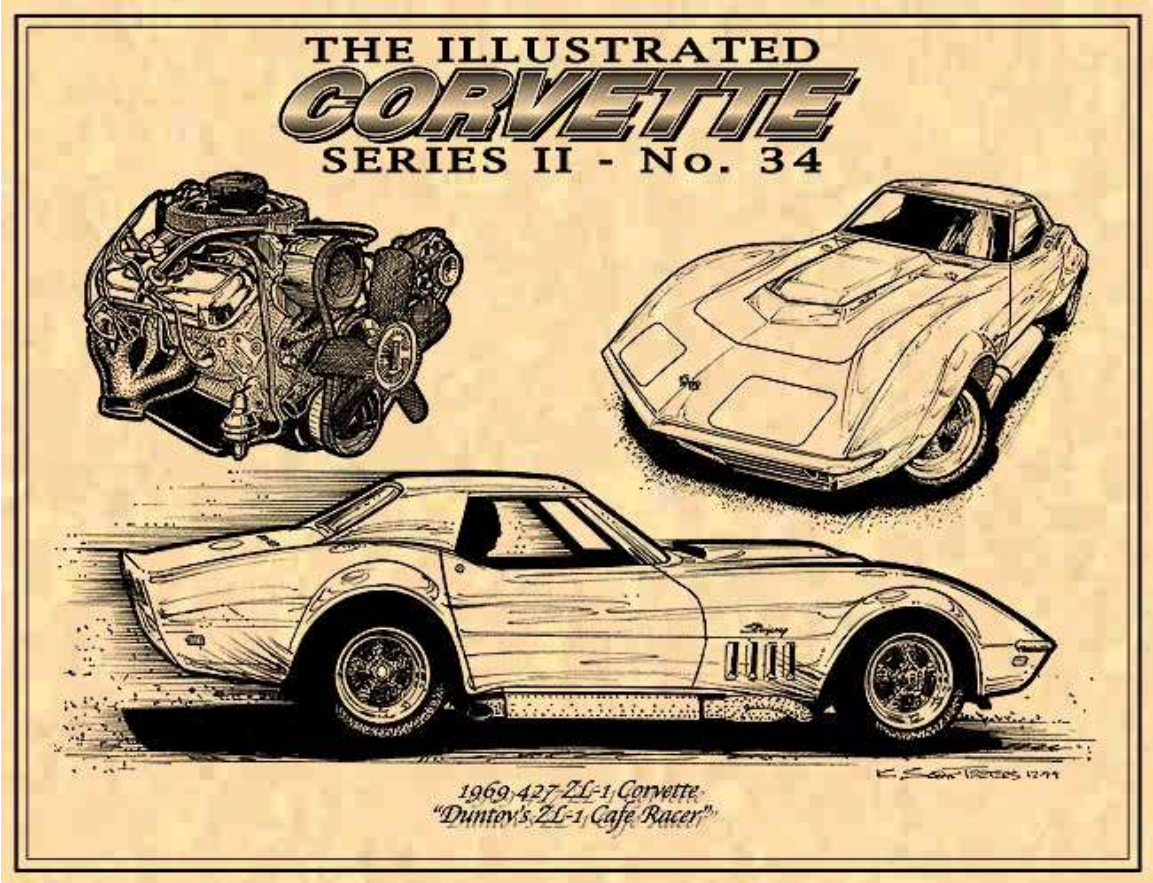
The suspension is stock L-88: stiff. Suspension settings—one degree positive camber in front, one-half degree negative at the rear, 0.125-in. toe in at both ends, are chosen to produce slight understeer. "If you over-drive, you will let up instinctively," Duntov said. "That's enough to save the car. Just wait a moment and let the velocity dispel itself."

On the tight turns, the front plowed a bit, but Duntov's advice worked. Back off and the ZL-1 puts itself on the correct line. On the track's only really fast turn, a 100-mph lefthand sweeper, the car could be driven through in a balanced drift, controlled by flicks of the wheel and throttle.

This is not a road test. The tires on Duntov's ZL-1 have never touched public pavement. The production versions will meet all the standards, and will be sold with street equipment, but using the car as transportation would be wasteful.

And expensive. There is no low-price Corvette, either. The L-88 package is roughly $1000 more than the standard car, and the ZL-1 adds $3000 to that. What sort of man will buy it? Duntov smiled. "First, he'll have a lot of money." ■ ▶





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