

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."

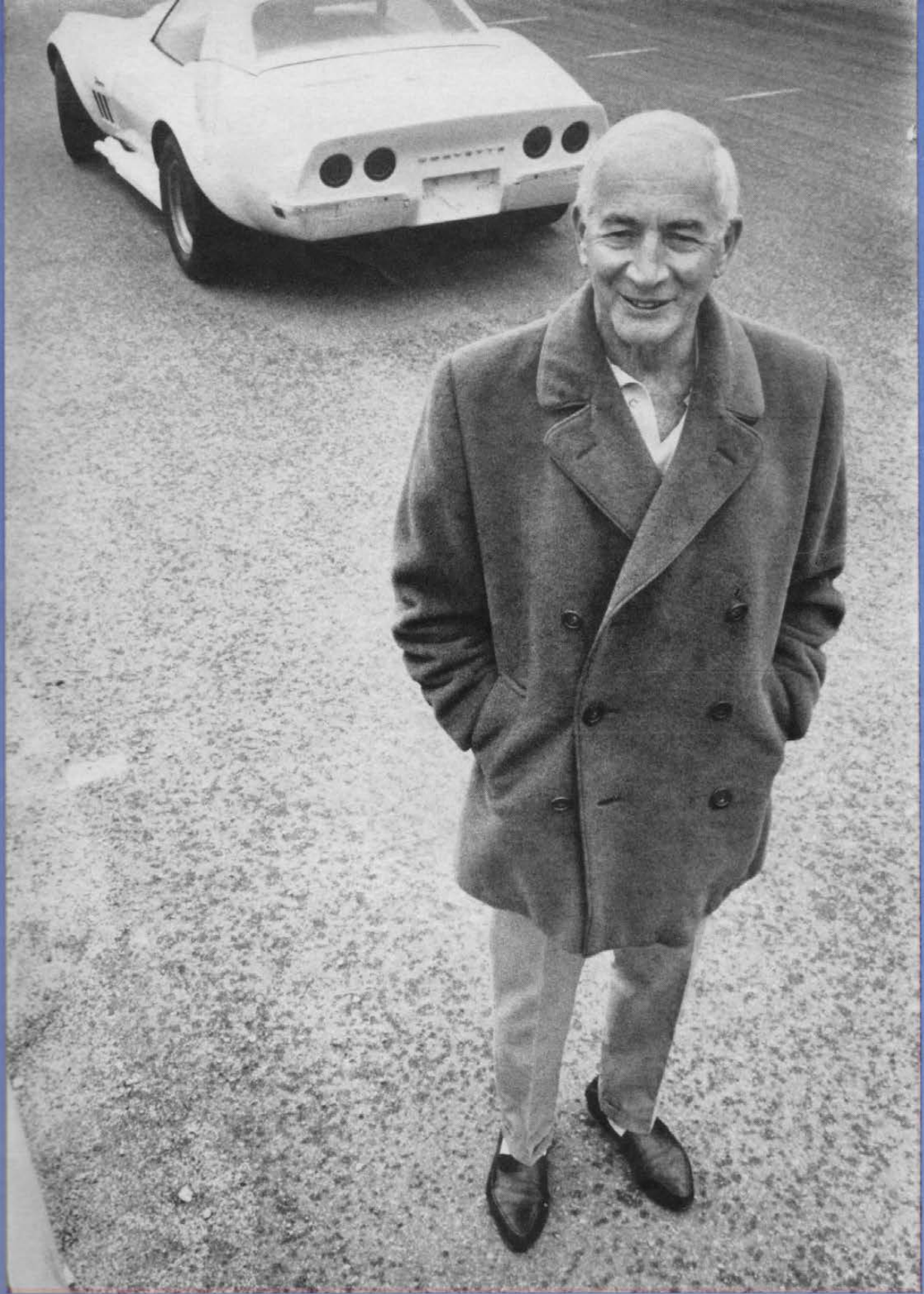
The problem is tires. The current racing tire contact patch is wider than it is long. A street tire has a long, thin footprint. When the car pushes one direction and the pavement resists, the street tire is twisted. The twisting force

is transmitted by the steering to the driver. The short, wide racing tire is 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 as 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-





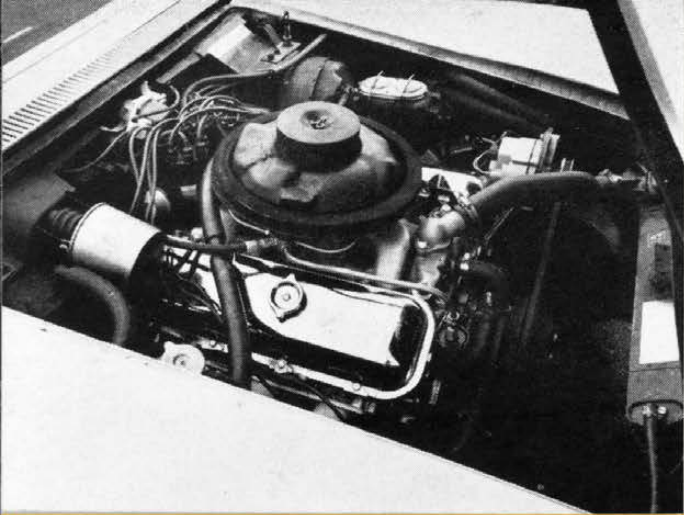
PHOTOS BY BILL MOTTA

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 Thunder-

bird 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.

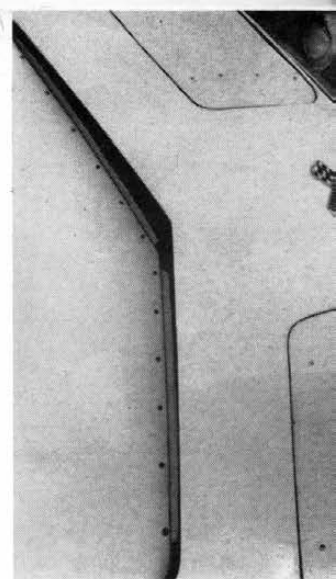
Still, there are some interesting inferences editors can draw. Can the Corvette be lowered? Not in its present form. The engine is only five inches from the ground. It can't be lowered without an expensive and complicated dry-sump oil system. The driver can't be lowered. He can barely see over the engine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

