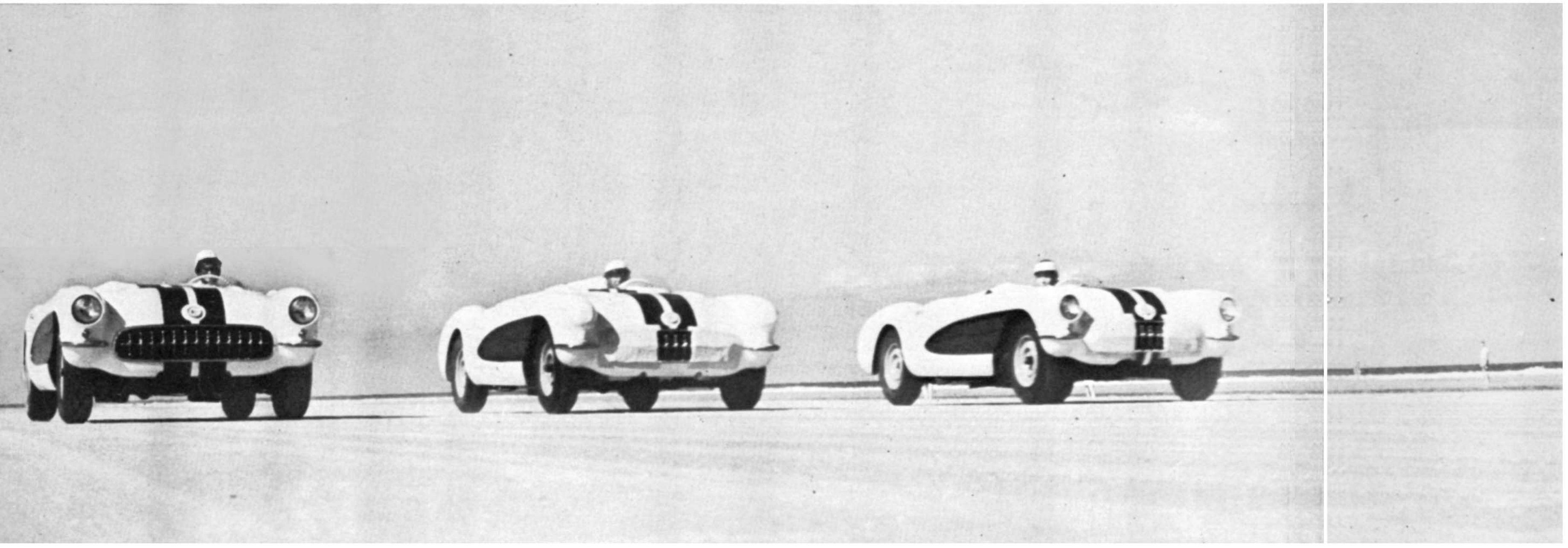
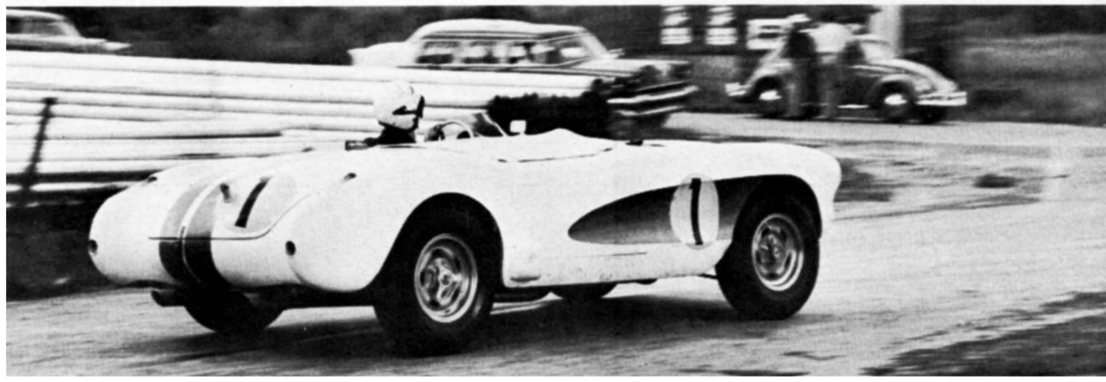
How fast is the Corvette?

Firestone "Bonneville" tire used by Corvette at Daytona. Note thin tread layer and smooth side casing.



LEFT: Corvette team at Daytona. NASCAR allowed use of the Duntov competition cam. BELOW: At Sebring, Corvette's high torque placed it first at start, but couldn't keep apace.



By ROGER HUNTINGTON

WHAT is this *stock* Corvette? After all, 150 mph and a standing mile in 39.6 seconds *on sand* . . . that's Ferrari or Jaguar performance, not the kind of go you expect from penny-pinching American production-line stuff. One can picture everything from fuel injection to a stroker kit under the hood. At first blush, the term "stock" seems just a shade far-fetched. But only at first.

I've done a little nosing around and dug up a few facts (and probably a little fancy!) on the question of Corvette performance. I'm still not prepared to *guarantee* anything in regard to the stock status of the 150-mph factory Corvettes, but here's the story for what it's worth . . .

In the first place, nobody who knows hot road machinery today will argue the fact that the new Chevrolet V-8 engine produces more horsepower and torque *per cubic inch* than any American production engine in history. At 265 cubic inches, it will actually out-perform many OHV V-8's with well over 300 inches. We don't need to take the word of a factory dynamometer operator for this. An afternoon at any drag strip, or a few runs against a stop-watch, will show quickly that here is one of the hottest production engines in the world — *regardless of piston displacement.*

I have even cross-checked by road-testing with an accelerometer. Here we use the mass of the car itself as our dynamometer, read the actual rate of acceleration at various speeds on this instrument, and with these figures the horsepower curve of the engine as installed in the car can be calculated with fair accuracy. Here are some eye-opening comparisons, both calculated from personal accelerometer tests on strictly stock, un-reworked cars with no special tuning:

'56 Packard V-8 in Studebaker Golden Hawk (rated 275 hp):
Maximum hp: 215 @ 4400 rpm
Maximum torque: 320 lb.-ft. @ 2500 rpm

'56 Chevrolet Corvette (rated 225 hp):
Maximum hp: 220 @ 5400 rpm
Maximum torque: 225 lb.-ft. @ 3400 rpm

(Admittedly, this was an exceptionally hot Corvette engine — but it was definitely stock. The average peak hp would probably be nearer 200.)

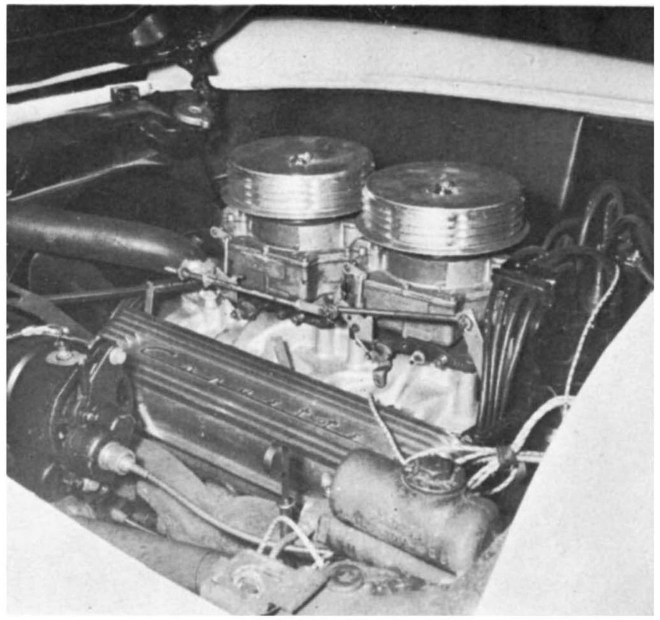
Now I don't know why the Chevrolet engine performs this way . . . and I don't know anyone who does. I've talked to engineers, hop-up experts, and competition men; no one has any half-way reasonable explanation for the unusual performance. It's as much a surprise to the Chevrolet engineers who *designed* the thing as it is to the people who are out beating the big-inch devotees with it. The engine was designed primarily to be mass-produced for a few dollars. By some crazy trick of fate it *goes.*

So let it be firmly established at this point that we do definitely have brute horsepower available in the '56 Corvetté — not just advertised horsepower.

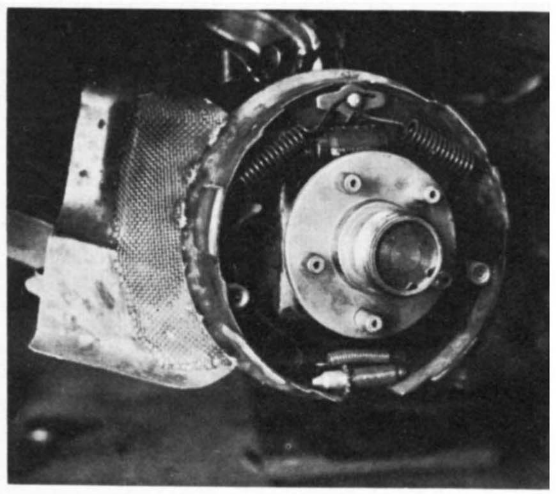
And there's another angle to this horsepower problem: Several weeks before Daytona Chevrolet's engineer, Zora Arkus-Duntov (of Le Mans, Allard, and Ardun head fame), designed a special "competition" camshaft for the Corvette engine. It has approximately the same timing and lift as the standard cam, but much faster opening and closing rates. Official dynomometer figures on the combination have not been released; but Duntov says the peak of the curve on it will average about 240 hp at 5800 rpm. Maximum torque is slightly below the standard 270 lb. ft., but comes in at 4400 rpm instead of 3600. Approximate power curves for the two cams are shown in the accompanying graph. The new cam is characterized by a very flat peak in the 5000-6000 rpm range, without a radical drop-off in power at low speed.

This competition cam was in all the factory Chevrolets at Daytona — and the deal apparently satisfied NASCAR stock class rules requiring 100 cars to be consigned to dealers prior to February 1st. It is optional on all Corvette engines now, including those installed in sedans. Ask for the Duntov cam — (but don't try to balance a coin on the hood when it's idling!).

Then there was the well-known modified Corvette at Daytona. There were all kinds of wild rumors about what this had in it. Actually, Duntov tells me this move was merely to let Corvettes compete in one additional class in the Speed Week festivities, or the class for modified production sports cars. The only change was a set of experimental cylinder heads with 10.3:1 compression ratio. They added about 15 hp to the peak, or something around 255

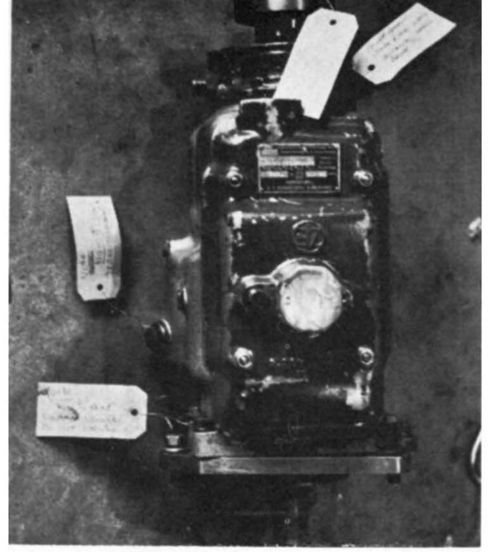


Three of the four Corvettes entered in Sebring had standard 240 hp engines shown here.

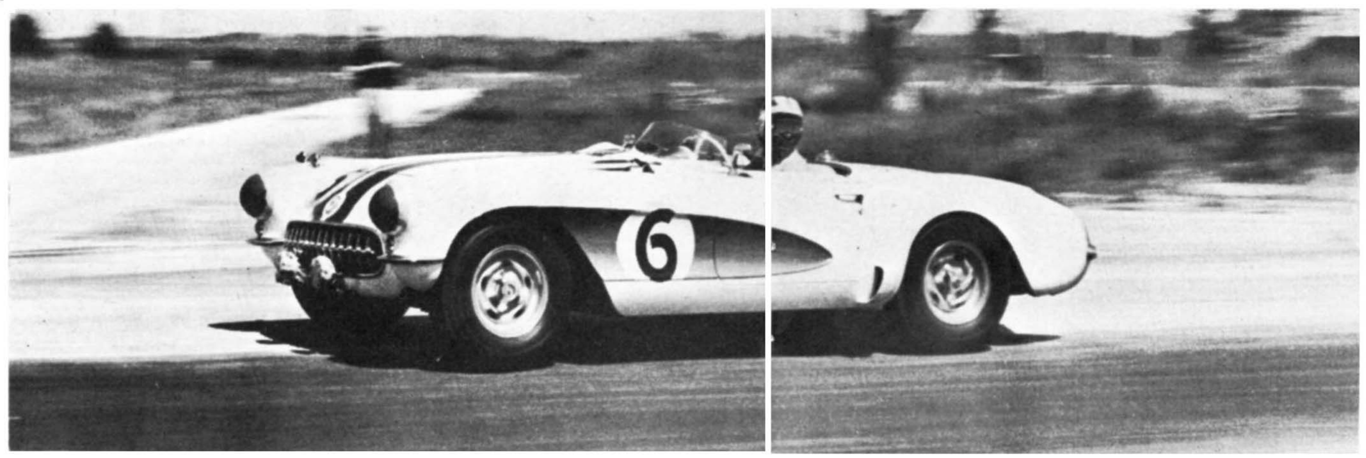


Corvette's brakes were over-sized cera-metallic Bendix units. Primary shoe has two bonded surfaces, second shoe four.

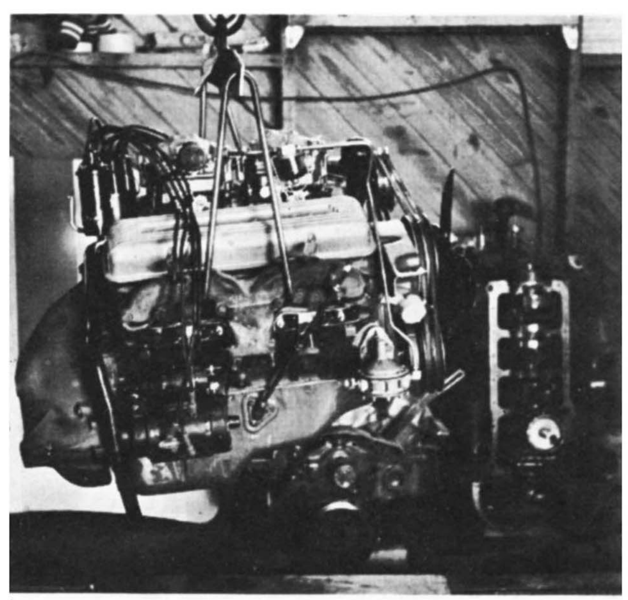
Three-quarter rear view of the Corvette at Daytona. Faired headrest fin increased top speed by 1½ miles an hour.



German ZF four-speed gearbox was used in the modified Sebring machine. Extra gearing helped place car in first 10.



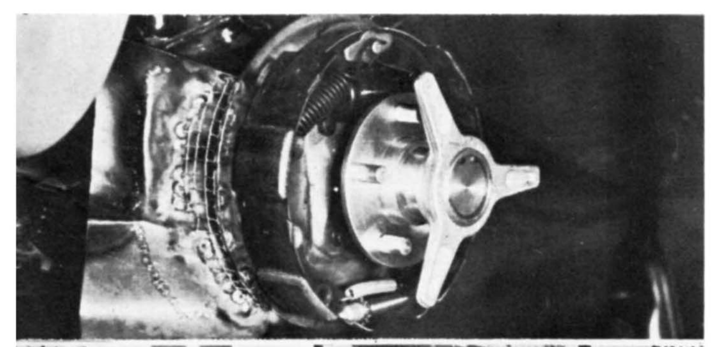
Of the four Corvettes entered in Sebring two finished: number 1 driven by Fitch and Hansgen, and number 6 above.



Stock Corvette power plant produces more horsepower per cu. in than any American production engine in history.

"... here is one of the hottest production engines in the world - regardless of piston displacement."

BELOW: Among other changes the Sebring race Corvette was equipped with Halibrand magnesium knock-off wheels.



Last minute details are checked just before Sebring race. Number 1 car had 316 cubic inch engine for class B.

hp. I have no reason to doubt that this was the only modification, as there was very little difference in times between this modified and the standard Corvettes at Daytona.

Of the four factory Corvettes sent on to the Sebring 12-hour race, three had the standard 240-hp engine described above. Other changes included Halibrand magnesium knock-off wheels, special shocks, and special oversize brakes (wider, same diameter) with Bendix cera-metallic aircraft linings. (All this is to be optional equipment). The fourth Sebring car had all the above, plus a 4-speed gearbox and special 316 cu. in. engine to put it in Class B. Very little information is available on this car. Duntov laughingly refers to the engine modification as a "California tune-up," but wouldn't give any details. The implication, of course, is a big bore and stroke job, additional cam, complete cylinder head reworking (oversize valves, higher compression, porting, polishing), and special ignition. In view of all the evidence, a conservative output estimate would have to be near 300 hp at 6000 rpm.

The two other key factors in straight-line performance are weight and drag. Weight-wise, the '56 body modifications didn't help matters. The curb weight of last year's V-8 Corvette ran around 2800 lbs. with soft top. Current showroom models are up about 150 lbs., due mostly to the wind-up windows and power top-raising mechanism. The stripped competition Corvettes will curb down around 2700.

Drag is a more important factor than weight when we're after top speed. Open sports cars have a serious wind resistance problem because of the larger suction area behind the upright windshield. Such a car will almost invariably go three to 12 mph faster with the top up than with it down — and frequently a small sports car with the top down will prove to have as much total air drag as a medium-size sedan. (Accelerometer tests substantiate this.) The best solution, of course, is to whip the windshield off altogether, give the driver just a narrow, low screen for wind protection, and cover over the passenger side of the cockpit. This not only reduces the drag coefficient by eliminating the big suction area, but frontal area is also substantially reduced.

This is exactly what they did for the competition Corvettes. No wind tunnel tests were run to determine the improvement, but I would estimate that total air drag at any speed is reduced 40-45% with this layout, compared with a standard Corvette with top down. This streamlining kit is

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fold and is driven off the crankshaft by twin belts. Like the Judson, it utilizes the stock carb, but its claimed boost comes as a distinct shock: 10 lbs. After a little reflection this pressure doesn't seem excessive. Remember, we're still dealing with mixture weight delivered and burned. Ten lbs. maintained against the recalcitrant VW manifolding will result in considerably less weight delivered to the cylinders in a given time than would be the case with a free-flowing induction system.

The Pepco Roots blower suffers slightly from mechanical inefficiency at low rotor speeds. This is due to the slip-loss or leakage past the necessary clearances between the rotors and the casing. However, this forms a diminishing fraction of the total volume of air pumped as speeds go up. Overall efficiency with this blower is very high. The results are profoundly, overwhelmingly apparent. In fact, they're shatteringly convincing.

Pepco superchargers are made in Dayton, Ohio. They and the Judson units are available on the West Coast through Bill Corey's Empire Motors, Pasadena, Calif. The persuasive Pepco supercharger, with all necessary components, sells for $199.50.

I remember the days when superchargers on American race cars were accurately referred to as vacuum cleaners. This was because they sucked up everything in their path that wasn't nailed down. When you buy a blower you want it to last as long as your engine. The suppliers have skimped in the air-cleaner department. But that's something you can correct yourself for a buck or two. What counts the most is that means actually have been found to confound even the most careful plans of the VW factory. #

Corvette

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supposed to be available as optional equipment.

Tire rolling resistance was another vital factor in the top speeds made by the Daytona Corvettes. They would have been lucky to reach 135 mph with the factory-equipped tires. Few of us realize that it requires about 160 hp to roll these tires at 150 mph — under the weight of the Corvette and inflated to 28 lbs./sq. in. Rolling resistance is caused by the violent flexing and stretching of the tire casing and tread layer under rolling and centrifugal forces. We can reduce it by increasing inflation pressure, using stiffer 6-ply casings with a steep cord weave angle, and with a lighter, thinner tread layer. The special Firestone Bonneville tires have the lowest rolling resistance factor of anything available in this country, and they compare favorably with the European super-speed types for record cars (Dunlop, etc.). They have only a fraction of the drag of regular passenger tires, and seem to be substantially below the conventional full-tread racing tires like the Firestone Super Sports 170 and Goodyear models. Most of the really fast cars at Daytona, including the Corvettes, were on Bonneville rubber for their top-end runs, running inflation pressures anywhere from 40 to 65 lbs.

Add up all these drag-reducing gimmicks — stripped windshield and competition screen, cockpit cover, partially masked grille opening, headrest fin, Bonneville tires at 50 lbs. pressure — and it would take roughly 190 hp at the clutch to move the competition Corvette 150 mph in still air on pavement. So you see, things begin to fall into place. The absolute top speed potential of this combination on pavement, using the 3.27:1 rear-end ratio, is definitely *over 160 mph*. Duntov clocked 163 mph at 6300 rpm on the Arizona test track. An honest 245 hp should account for this — which appears to be well within the capabilities of the engine in stock form, with options.

The best two-way average on the beach was 150.53 mph. Duntov feels the true potential here is over 155, given excellent beach and wind conditions. Rolling resistance on the sand is definitely higher than on hard pavement — and, as beach conditions deteriorate, resistance goes up and traction comes down. Also, wind is a problem at Daytona. *Any* kind of wind component parallel to the course acts to chop down the two-way average; the wind holds you back more on the upwind run than it boosts you downwind. Coast-wise winds of 35 mph are not unusual at Daytona.

Conditions weren't perfect on any of the runs. On his 150 mph runs prior to Speed Week Duntov had little wind, but only a fair beach; he was getting five percent wheel-spin. On Fitch's official two-way runs with the production Corvette during Speed Week the beach was good, but there was a 20 mph coast-wise wind. He turned 155 mph downwind, but the two-way average came out to 145.54. Duntov averaged 147.3 mph in the modified class that day. He figures if he could have switched to a 3.08:1 axle ratio for the downwind run he could have increased his speed from 156 mph to more than 160. At any rate, it appears that the true top speed *potential* of the competition Corvette on Daytona Beach is a good five or 6 percent below the speed on hard, smooth pavement. That should answer some burning questions!

I have listed a set of road test figures which I obtained personally on a friend's strictly "showroom" '56 Corvette . . . then for comparison I've *calculated* the corresponding figures for the Sebring Corvette, using slide rule, graph paper, and a planimeter (area measuring instrument for graphical analysis). I think I hit the true performance of the Sebring cars pretty close with this method, by using all available technical data on the cars and carefully estimating the "unknowns."

Incidentally, the calculations on this car are based on a gross weight of 2900 lbs., 3.55:1 axle ratio, and a shift point of 6500 rpm in the gears. (This was used by Duntov on his standing mile runs, but might be a little high for a long race.) The showroom Corvette had stick shift, 3.55:1 axle, but not the Duntov cam. It seemed to run well in all rpm ranges, but there was no special tune-up for the test. It had about 700 miles on the odometer.

Here are the figures on the two cars for comparison:

	Sebring	*Huntington*	*SCI Test*
0-30 mph. . . .	3.2 secs.	3.2 secs.	3.4 secs.
0-60 . . .	6.3 secs.	7.5 secs.	7.5 secs.
0-80 . . .	9.6 secs.	12.4 secs.	12.5 secs.
0-100 . . .	15.1 secs.	21.2 secs.	19.3 secs.
Standing ¼-mile . . .	14.9 secs.	16.0 secs.	15.9 secs.
Speed at ¼ . . .	99 mph	89 mph	91.0 mph
Top speed . . .	Approx. 148 mph	(top speed) 121 mph	120.0 mph

And there you are. There's a pretty big difference between the performance of our production-line Corvette and the Sebring job, but obviously both of them can hold their own in pretty quick company. The showroom job would have strictly no trouble with its arch-rival, the showroom T'bird — and the Sebring cars, I think, might even raise a few eyebrows on the California drag strips.

No doubt about it . . . the new Chevrolet Corvette is America's fastest stock car. #