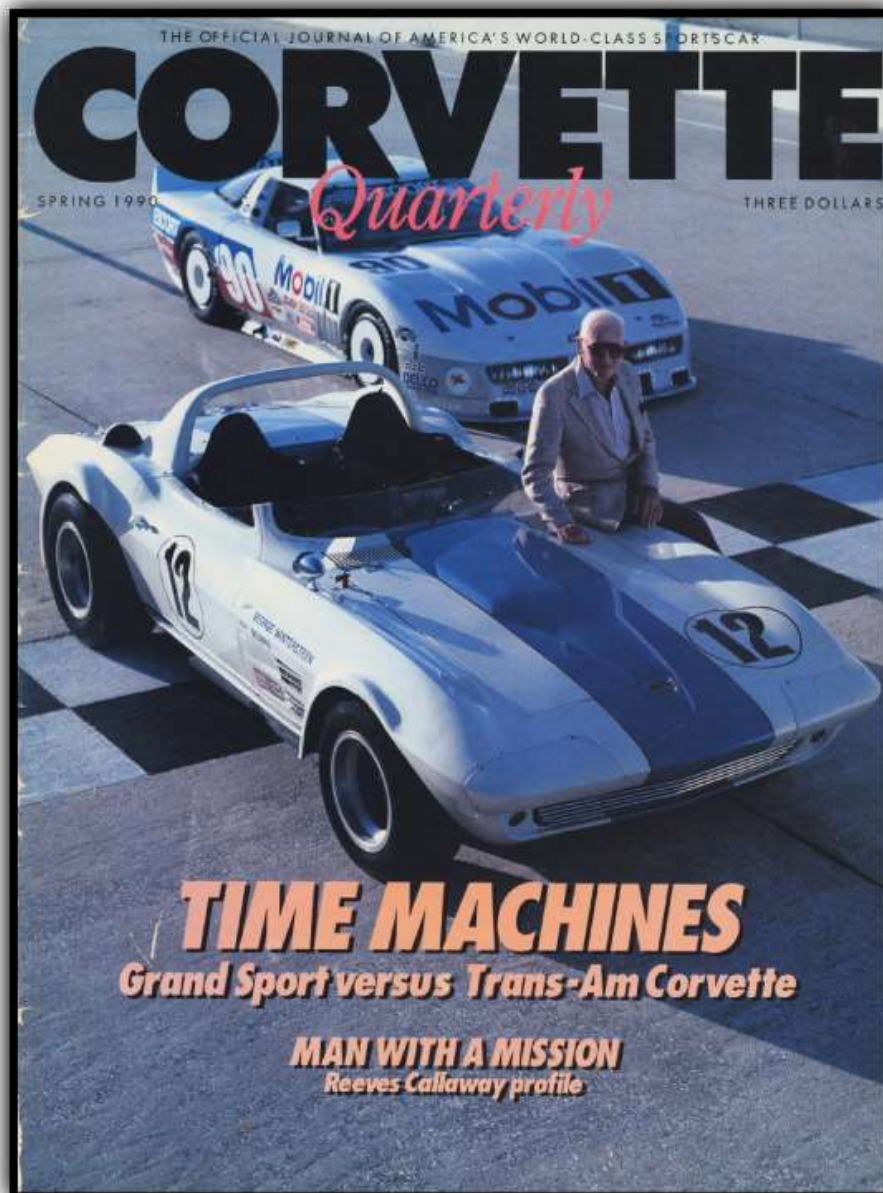


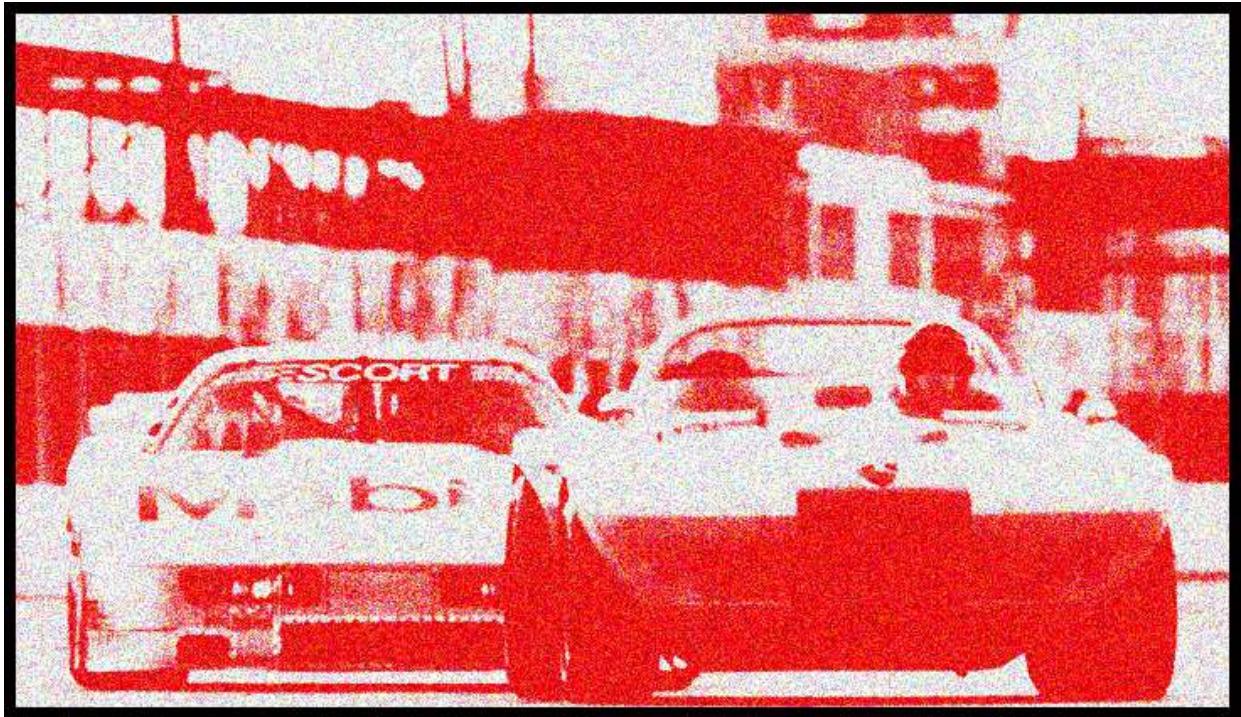
The Duntov Files

Pt. 4



The Duntov Files

PL4



Of all of the five original 1963 Grand Sport Corvettes, GS #002, known today as the “Wintersteen Grand Sport” is the only Grand Sport to have big-block, 427 L88 power. Sports car racing was evolving so fast that by 1965/1966 the Grand Sport was obsolete, despite copious amounts of horsepower and torque. Like all of the Grand Sport Corvettes, after George Wintersteen was done racing the car, it was bought and sold many times.

Today, the car resides at The Simeone Museum, in Philadelphia, Pennsylvania. Occasionally the car is brought out into Simeone's two-acre courtyard for their monthly Saturday “Demonstration Days”. If you are in the Philly area, check Simeone's schedule to see when you can see, hear, and smell a classic American beast race car.

Late in 1989 Corvette Quarterly (formerly “Corvette News”) arranged a special event. Grand Sport #002 was brought together at Sebring International Raceway for a side-by-side comparison test with the then “state-of-the-art” tube chassis Trans-Am C4 Corvette. Twenty-six-years separate the two cars, they are both tube-frame cars with replica bodies, and powered by Chevrolet engines. But that's where the similarity ends, and the difference is startling.

The Grand Sport's lap time was 1.34.22 and the Trans-Am Corvette's lap time was 1.22.45. Technologies across the board all added up to a much-improved race car. Enjoy the comparison.

K. Scott Teeters
February 16, 2021

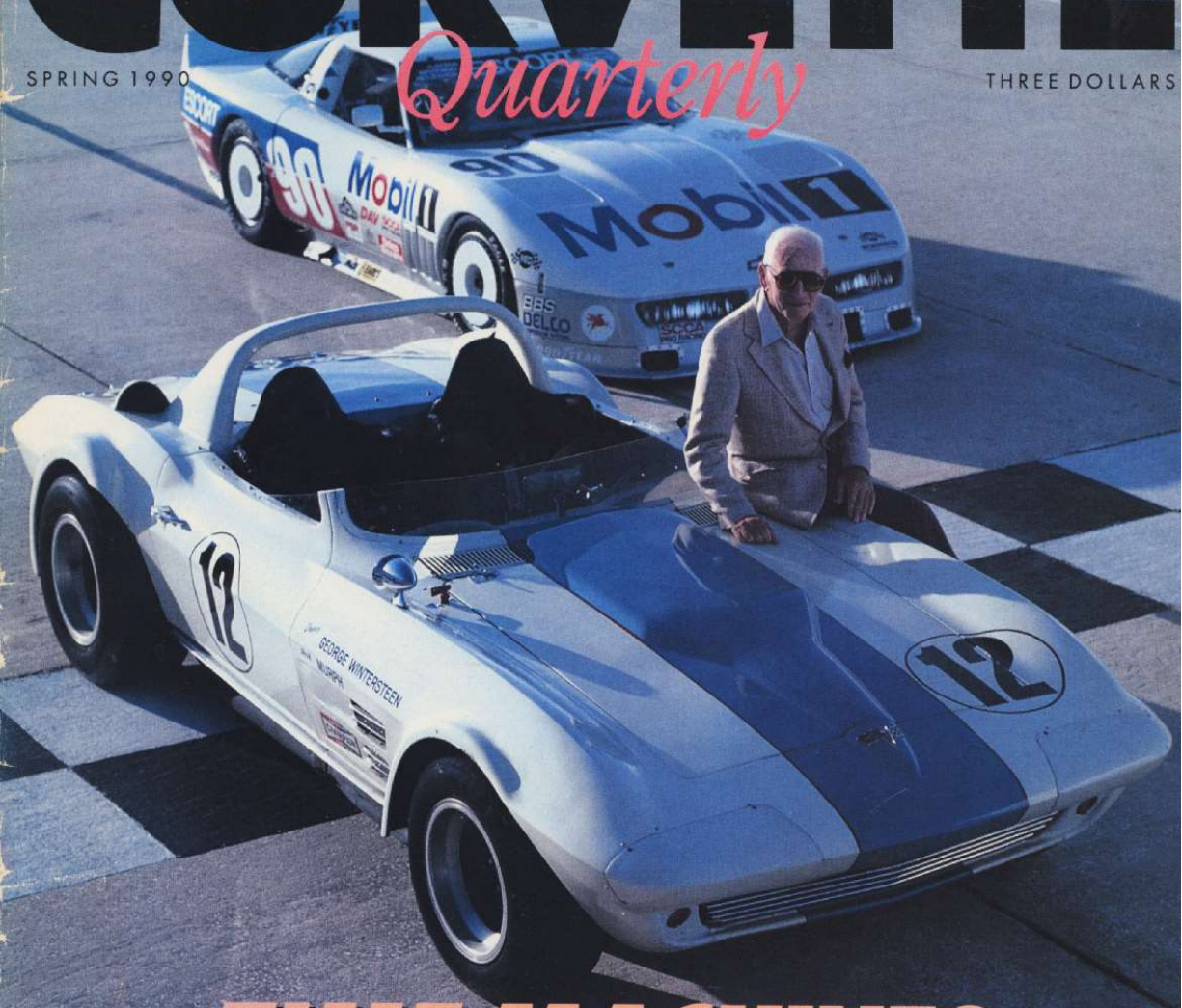
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CORVETTE

SPRING 1990

Quarterly

THREE DOLLARS



TIME MACHINES *Grand Sport versus Trans-Am Corvette*

MAN WITH A MISSION
Reeves Callaway profile

1963 Grand Sport vs 1989 Morrison Engineering Trans-Am Corvette

Story by Paul Van Valkenburgh

A look at the difference 27 years have made in race car technology.

GENERATION GAP

*By Paul Van Valkenburgh
Photography by Mark Harmer*

They both have four wheels, front-engine V8s and the same surname: Corvette. But what a difference a few decades make. What you see here is the state-of-the-art competition Corvette from 1963, Ed Mueller's vintage Grand Sport, and its counterpart from 1989-90 — the Morrison Engineering and Development Trans-Am Corvette.

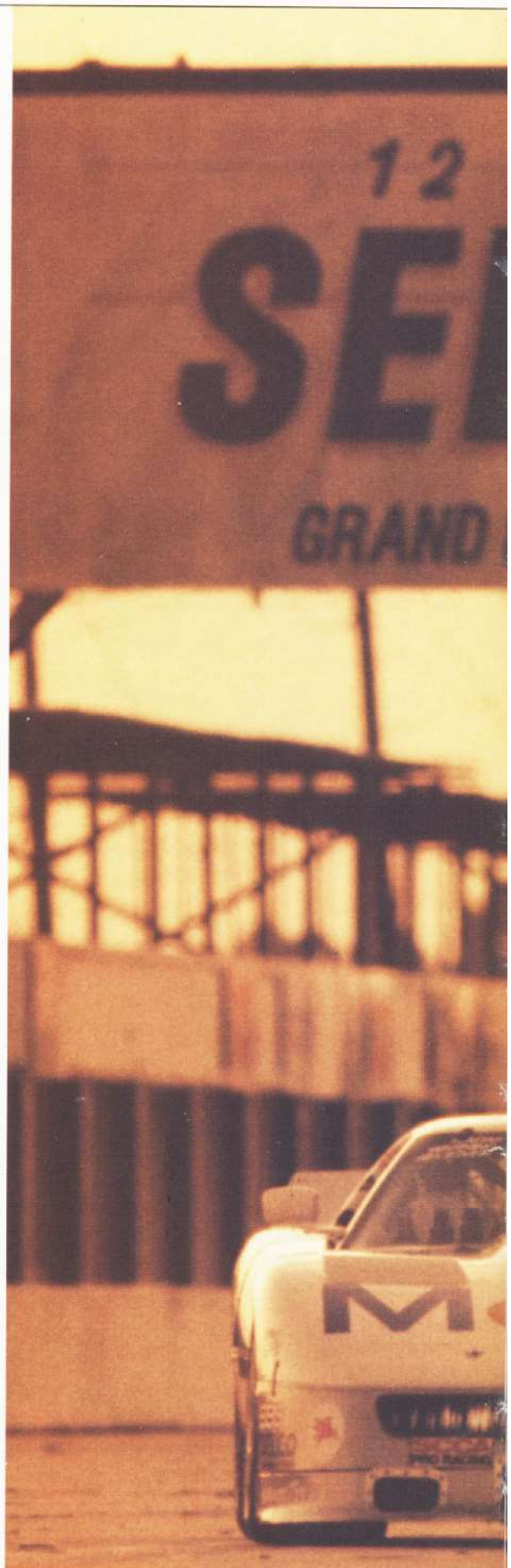
We're here at one of the shrines of American road racing, the Sebring airport circuit in Sebring, Fla. — home of the 12-hour endurance classic. Our purpose here is to see just how far we've really come in 27 years of racing Corvettes.

These cars represent two totally different approaches to racing. The earlier of the two was an attempt to modify a production-based sports car, and the latter is a single-purpose vehicle constrained only by racing regulations. Comparing them is to



A battle between two eras: In the twilight at Sebring, the 002 Grand Sport roadster owned by Ed Mueller goes up against its modern counterpart — the Mobil 1/Escort Trans-Am Corvette.

Paul Van Valkenburgh is a California-based engineering writer and a former Chevrolet engineer. He is the author of *Race Car Engineering and Mechanics* (1976) and *Chevrolet - Racing* (1972). Van Valkenburgh competed in the SCCA Trans-Am series in the early '70s and currently owns a '63 split-window coupe.







Side profiles of the two cars reveal the major strides made in aerodynamics. Note that the Grand Sport has a street legal ride height, versus the Mobil 1/Escort car whose body panels almost skim the ground. The instrument panel of the Trans-Am car (top) bears no resemblance to a stock Corvette, with its many switches, ducting and plumbing. The engine of the Trans-Am car (above) is a small-block equipped with a Holley carburetor, much like the Grand Sport.

revert to the classic “apples and oranges” problem. No...in this case, it’s more like comparing a diamond with a pearl.

HISTORY IN PERSPECTIVE

The 1963 Grand Sport, dubbed “the lightweight,” needs little introduction to Corvette enthusiasts. The five that were built by Chevrolet to compete with the original Shelby Cobras have become perhaps the rarest, most valuable, and most famous of all Corvettes. The complete history of each has been documented in Karl Ludvigsen’s *Corvette: America’s Star-Spangled Sports Car* (Automobile Quarterly), my own *Chevrolet = Racing* (out of print) and *Grand Sport*, a new book written by Dave Friedman and Lowell Paddock. This is not to mention dozens of magazine articles about the car.

In designing and engineering the Grand Sport, the primary goal of Corvette Chief Engineer Zora Arkus-Duntov was to carve some 1,000 pounds off the production Sting Ray.

The resulting effort combined standard-looking bodies with some very non-standard pieces bolted together underneath their thin-walled fiberglass skins. The bodies themselves were hand-laid up over an aluminum substructure and had a thickness of 0.040 of an inch.

The most dramatic change was the frame. Instead of the production version, Duntov and his engineers created a ladder-type tubular unit. Because of time constraints, the same basic suspension geometry and wheelbase were carried over from the 1963 production Sting Ray. Most of the individual suspension pieces, however, were lightened by hand-fabrication instead of being forged like the production pieces.

While the 4-speed “rock crusher” Muncie transmission was basically unmodified, the rear differential acquired an aluminum housing to save weight.

It was in the engine compartment, though, that Duntov and his engineers had planned the biggest changes.



Instead of the normal 327-cu.-in. fuel-injected, pushrod V8, there was to be a 377-cu.-in. all-aluminum, overhead cam, twin-ignition engine that put out 500 hp and 500 lbs./ft. of torque. Unfortunately, no Grand Sport ever raced with one of these potent units (Duntov even considered a de-stroked version for Indianapolis).

In writing about the Grand Sport over the years, some pundits have been less than kind, pointing out that these five cars had little success: no championships and few wins, especially compared to the Cobras.

But without apologies, the fact is that these cars were the victims of politics, racing rules, and a sudden shift in racing technology. Because GM refused to allow 100 copies to be built for homologation, they could not even race in the same class with the Cobras in SCCA events. Instead, they were forced to run against the mid-engined Coopers, Scarabs, Chaparrals, McLarens and Lola sports racing prototypes.

Although the basic drivetrain configurations of the Grand Sport and the

Trans-Am Corvette are identical, these lightweights still represent the end of an era. Not only was there a change from front- to mid-engined configuration in the prototype and open-wheel formula car arena, but at the same time, tire technology and aerodynamics underwent their own revolutions as well. When the Grand Sport first came on the scene, these changes were just beginning. By the time it was reduced to relic status a few years later, this new technology was firmly entrenched.

The aerodynamics revolution was to be even more dramatic. It was rapidly recognized that the Grand Sports had severe problems with aerodynamic lift, as did Jim Hall's early Chaparrals. While little effort was put into fixing the Corvettes, research on the Chaparrals produced plows and ducktails that neutralized the lift. Suddenly, everyone seemed to wake up and discover that aerodynamic downforce was tremendously important, at any cost in air drag.

In Chevrolet R&D, my own experi-



Top: The instrument panel of the Grand Sport is stock Corvette, with the exception of the 200-mph speedometer and the absence of heater controls and a radio. Carpeting, however, has been retained. **Above:** The 002 Grand Sport is currently equipped with a cast-iron 454-cu.-in. engine built by Traco. It, too, has a Holley carburetor.



Above left: The Grand Sport at speed on the Sebring short course. Inset: Author Paul Van Valkenburgh sets up a fifth wheel on the Grand Sport for the quarter mile runs. Above right: The Mobil 1/Escort Trans-Am car makes its run with John Heinrich behind the wheel. Inset: The Morrison crew makes final engine adjustments.

ments with computer simulations and track tests demonstrated that a pound more downforce was better than a 10-pound reduction in drag. From then on, no serious race car would be built with such disregard for underside airflow as the Grand Sports. They were immediately outmoded, just as we continue to see many race cars being aerodynamically outmoded annually.

Today's Trans-Am Corvette is a perfect example of the rules-driven race car. This particular car is the one

that won the '89 Detroit Trans-Am race driven by Greg Pickett.

Designed from the ground up by Bob Riley of Protofab Engineering in Wixom, Mich., for both IMSA GTO and SCCA Trans-Am competition, this Corvette makes very few concessions to the production line. While there is some beautiful engineering in the car, the rule books also weighed heavily on its configuration. In today's world, where "the show is the thing," these organizations are far more concerned with equalization than ultimate performance.

TECH

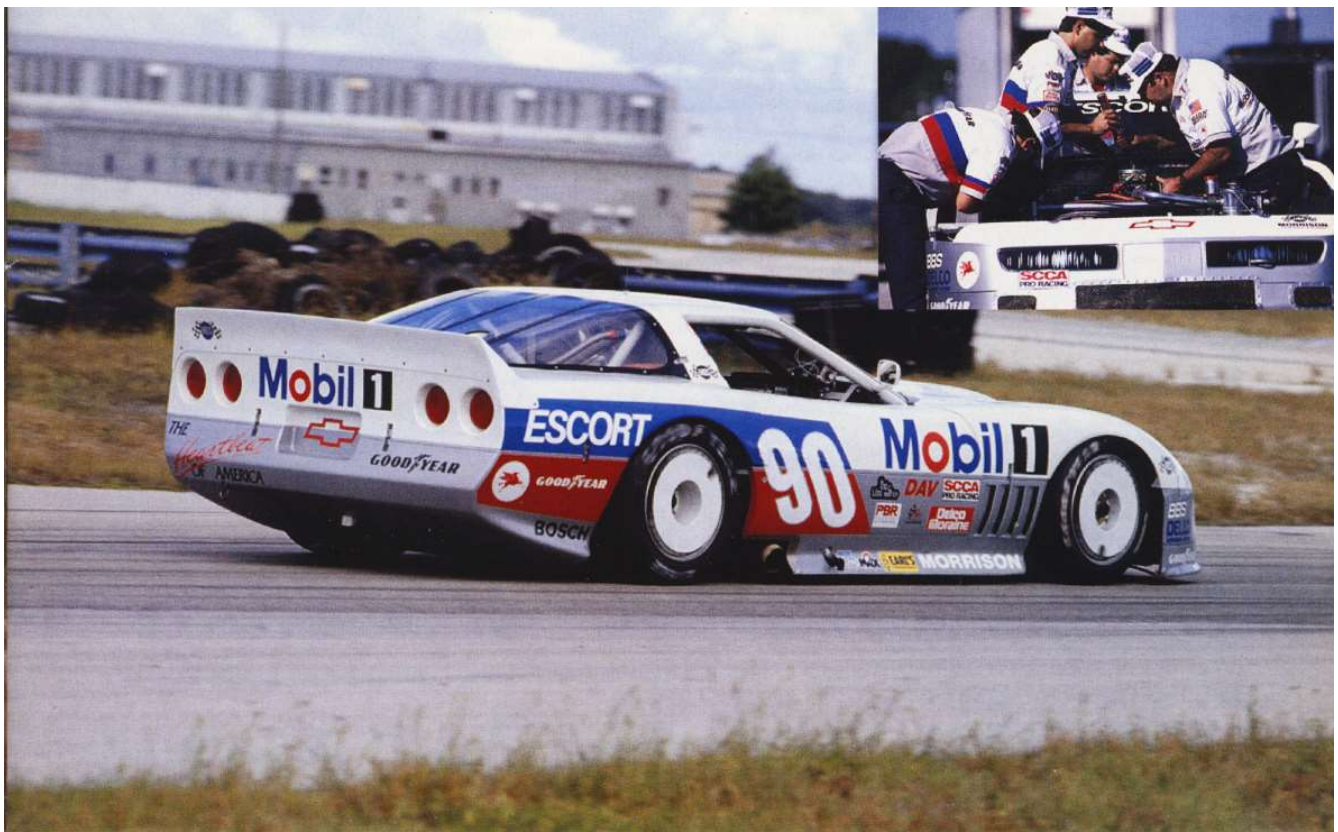
To compound the problem of comparing these two eras, we have to recognize that over the few years that the Grand Sports were raced, they went through a number of configurations: they had stock Corvette engines, all-aluminum small-blocks and big-

blocks, with all sorts of carburetion and injection.

Originally, all the Grand Sports were identical coupes; over time they grew flares, scoops, ducts, and two were cut down into roadsters. All this creates the problem of what *date* to restore each car to.

*Today's Trans-Am Corvette
is a perfect example
of the rules-driven
race car.*

In addition, the cars that are being vintage-raced today require certain mandatory changes for the safety of the driver and the survival of irreplaceable parts. Ed Mueller's car, for example, temporarily has a replacement 454, and an additional safety



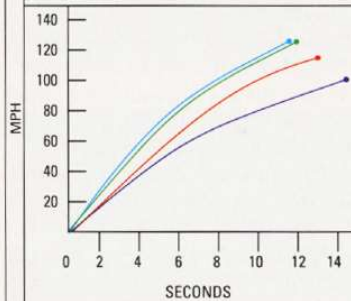
fuel cell, which help bring the car's weight up to about 2,400 pounds from its original 2,200.

A new Grand Sport owner who wants to restore his car also faces the dilemma of whether to put up with the deficiencies in the original design or to tune and tweak the engine and handling using the technological benefits of the 27 intervening years.

So with this in mind, let's now take a technical look at old and new as they sit on Sebring's runways.

An engine comparison might not seem fair, between the 454-cu.-in. big-block in the Grand Sport and the 335-cu.-in. small-block in the Trans-Am Corvette. And yet today's small-block has 35 years of development. As installed in the Grand Sport, the big-block had essentially none. On top of that, the iron big-block must weigh 150 pounds more than today's small-block with its aluminum heads, and 250 pounds more than the original all-aluminum prototype small-blocks (which Duntov had intended for his factory program).

ACCELERATION CURVES ON FOUR CORVETTES



1/4 Mile: ■ Trans-Am Vette ■ #3 Grand Sport ■ Mueller's #2 Grand Sport ■ Challenge Car

Car	Lap Time
Trans-Am	1.22.45
Grand Sport	1.34.22
Special L98	1.32.33
ZR-1	1.35.11
Corvette Challenge (White Car)	1.36.12
Corvette Challenge (Black Car)	1.36.66

Ignition in the '60s was by common mechanical distributors and coils, whereas today, digital electronics are used to tailor the entire spark curve. Oiling systems have progressed from boosted internal pumps to dry-sump systems with external pumps, filters and coolers. The induction systems in both cars, surprisingly enough, are similar Holley four-barrel units. Mechanical fuel injection was also available back in the '60s. Conversely, electronic port fuel injection is used on the current Trans-Am Berettas.

The chassis are both "tube frames," but similar in name only. As noted earlier, the 1963 version was "ladder style," while every legitimate race car today has a complex triangulated tubular space frame structure which doubles as a roll cage. This came about because sanctioning bodies demanded such huge roll cages for safety that it was redundant to have both a roll cage and a frame. Besides, a typical roll cage now provides so much torsional stiffness that a traditional frame is virtually unnecessary.



Van Valkenburgh confers with driver Jim Minneker before one of the quarter mile runs. Its best time was 11.5 seconds.

Today's frames probably have two to four times the strength and stiffness per pound than the Grand Sports. Chassis' centers of gravity have changed, too, going as low and rearward as the components rules will allow. Although the Grand Sport designers were pleased with a 50/50 distribution, today a typical race car designer desires more than 60 percent on the rear.

Aerodynamics is perhaps the biggest difference between the two ages. The emphasis has shifted from low drag in the early '60s, through a short, aborted affair with movable aerodynamic wings and things, to today's front-and-side-sealed inverted box. The '63 design looks like it could clear a curbstone, while you can't even see daylight beneath a running race car today, as it is pushed down on the pavement by the unseen force of air pressure.

Looking down on the Trans-Am Corvette, one notices its "Coke®-bottle" shape, the body being slimmer at the waist (around the doors) and flared out around the tires. This shape is a consequence of the stock door configuration required by the rules.

Moreover, because downforce is so important, rulemakers limit performance by the dimensions of the more critical rear spoiler — which had been hardly discovered in 1963.

Of course, transmissions, brakes, wheels, and tires have improved considerably in the intervening years, although primarily in performance. Here it has been less a matter of dramatic breakthroughs than of contin-

ual minor improvements.

Race car cockpits have also changed substantially over the years. The Grand Sport has a stock Corvette instrument panel with full gauges, including a 200 mph speedometer. It even has carpeting. In contrast, the Trans-Am Corvette cockpit has been completely gutted and replaced with a full roll cage and enough plumbing, wires and tubes to stock a good hardware store.

In a nutshell, the technological layman could look at these two cars and realize the greatest difference. Most race cars from the '60s were comparatively basic, even fundamental, and could be labeled either elegant or primitive in their simplicity. Today's race car is obviously more technologically sophisticated — either the ultimate engineering evolution within a given set of rules or unbelievably and intolerably complex.

You look at the Grand Sport and say, "Something must be missing. But what is it? Maybe more safety equipment." And yet it's still eminently raceable, given a suitable class. At least one Grand Sport still regularly blows the doors off of restored Cobras.

You look at the Trans-Am Corvette and say, "Why does it have so much stuff? Isn't there something that could be left out?" Not the quick-change Weismann transmission. Not the electronic ignitions. Not the adjustable balance bars and brakes. Not the dry sump and oil cooler plumbing. Not the replaceable body panels. Not the Halon Firex nozzles. Not the sophisticated fuel pickup plumbing, or the fuel cell, or the driver's cool suit, or radio, for that matter.

And even the technological layman's child could tell their respective eras from a hundred yards away. Until you see the '63, it's hard to remember that once upon a time, racing — all auto racing — was a gentleman's amateur sport. The SCCA once limited sponsor decals to something like one square foot, and it was common to see race cars, even in Formula One, that carried no sponsors at all.

Now we have high-speed billboards, if not cars painted like the advertiser's containers. Not that many racers complain about the billions that advertisers inject into the game each year. But remember, people don't go racing because advertisers sponsor teams. Advertisers sponsor teams because there are lots of people who like racing.

PERFORMANCE

As phenomenal as the performance of the Grand Sport was in the early '60s, it seems surprising that no one ever recorded exactly what the numbers

*Aerodynamics
is perhaps the biggest
difference between
the two ages.*

were. Actually, that was before the introduction of recording fifth wheels. And even since, few race cars are subjected to public measurement.

The best estimate for a coupe with an all-aluminum small-block was made by Bernard Cahier in a 1964 *Sports Car Graphic* article: "I understand that this Grand Sport Corvette will do zero to 100 mph in nine seconds flat, and the quarter mile should be under 12 seconds."

Recently, I had the opportunity to test the number 003 coupe at Sears Point, Calif. (The car was owned by Bob Patterson at the time, and was just sold to Tom Armstrong.) The car has an updated small-block, and it did zero to 100 in eight seconds, and the quarter in 11.9 seconds.

It's more fair, however, to make comparisons between two cars at the same location on the same day. But making things equal was still difficult: the '63 had the wrong big-block, had an apparent miss, was geared too high, and wasn't to be shifted too hard because the transmission is irreplaceable. The '89 had a 9.5:1 compression small-block for a weight break, and wasn't optimized for dragging either, since that isn't important in Trans-Am racing.

The acceleration curves vividly tell the story. Both cars suffered a serious traction handicap, being limited by wheelspin for almost the entire quarter-mile distance. It turned out to be more of a tire traction and weight distribution test than a power test. The '63, with its heavy front end, could only pull about .55 g's during wheel-spin, while the '89 could pull .75 g's due to more weight on the rear and its modern racing tires. At the quarter, this big-block Grand Sport seemed just a tick slow, at 12.8 seconds, which still might be representative of this configuration in its day. The modern Trans-Am Corvette, however, turned 11.5 seconds, not even half a second better than the updated number 003 Grand Sport.

Both cars were driven fairly equally by Corvette Powertrain Manager Jim

Minneker, who reported: "There's a real obvious difference in philosophy. The Grand Sport big-block has lots of torque, while the later small-block has less torque and lots of horsepower. We're confronted with that all the time in production Vettes. We advertise escalating horsepower figures, when really it's torque that you feel. That's what we've tried to capture with the ZR-1.

"You get the impression it will pull forever," added Minneker, again talking about the Grand Sport. "I've never experienced wheelspin like that. It's got such a power-to-weight ratio, I could have gotten it completely out of control any time I wanted to mash the pedal down."

The handling test around an abbreviated Sebring road course was naturally handicapped by the risk of



Corvette Development Manager John Heinricy (right) with Trans-Am car owner Tommy Morrison.

running a 27-year-old chassis at the limit.

John Heinricy drove both cars back to back and recorded an approximate 12-second difference between the two: 1:34.22 for the Grand Sport ver-

Continued on page 23

TODAY'S STREET CORVETTES SHOW HOW FAR WE'VE REALLY COME.

Our test days at Sebring were piggybacked with testing being performed by the Corvette Development Group and some Corvette Challenge teams, in preparation for the St. Petersburg Grand Prix finale.

It gave us the opportunity to compare lap times with a number of different street Corvettes under the same conditions — and the results were nothing short of phenomenal.

While the Morrison Trans-Am Corvette recorded the fastest lap of the day at 1:22.45 on the short course, the next fastest lap went to a special development Corvette with an L98 small-block engine. It recorded an astounding 1:32.47, 10 seconds slower than the Trans-Am, but almost two seconds faster than the Grand Sport.

This particular L98 was built by Kim Baker using production components and installed in a Corvette with a gutted interior and roll bar. The whole car had been lightened to about 3,000 pounds.

Incidentally, a current ZR-1 on hand — equipped with steel tube exhaust headers and no catalytic converter — turned a fast time of 1:35.11, very close to the fastest



Top: One of the fastest cars at Sebring was this special L98 built by Kim Baker. Bottom: This ZR-1 turned a lap time very close to the fastest time of the Grand Sport.

time of the Grand Sport. Two 300-hp Corvette Challenge cars, driven by Corvette Development Group Manager John Heinricy and R.K. Smith, turned fast times of 1:35.12 and 1:36.66, respectively.

Kim Baker also reported that the same ZR-1 present here at Sebring turned an average lap of over 183 mph at Talladega during recent testing there, reaching a trap speed of 187 down the backstraight. "The accelerator was flat on the floor, but everything felt very comfortable," says Baker.

Back at Sebring, one of the more memorable moments was Heinricy running timed laps in the Grand Sport while Allman was out in the ZR-1.

"When I saw the Grand Sport in my mirrors," says Allman, "I let off to about six-tenths, since I knew he was doing a timed exercise. I felt if we both were at eight-tenths we would have had a run. I was surprised I could run with it.

"The Grand Sport clearly had better brakes and a better top end," adds Allman. "My biggest advantage in the ZR-1 was that I could get the power down earlier coming out of the turns."

When Heinricy finally made a pass around Allman on a left-hander close to our pit area, Zora Arkus-Duntov was standing there watching. He turned, and the smile on his face said it all.

—Jerry Burton

strength to last for 12 hours on Sebring's punishing pavement.

While Penske's notion failed, it did lead to a rebirth for Mueller's chassis 002. While Penske was negotiating with Duntov to purchase both of the remaining roadsters, he asked his friend, George Wintersteen, if he would like to buy one of the cars.

Wintersteen replied yes and managed to pick up the car directly from Duntov in Warren.

Wintersteen ran the car in the United States Road Racing Championship throughout 1966, finishing in the top 10 a couple of times before selling the car in 1967 to John Thorn. Thorn kept it on the showroom floor of his Honda dealership in Georgia until Mueller bought it.

As Duntov walks around the car at Sebring, his attitude is not one of an automotive collector or investor, but rather of a restless engineer sizing up a project whose flaws and imperfections can be discerned and changed.

"Aerodynamically this body style never measured up," says Duntov. "The 1968 body would have been much better for a car like this. If we had gone to Le Mans in '64, I think we would have probably been forced to put on a rear spoiler, and a front air dam."

Mueller is now faced with the question of whether to make any changes to the car or leave it as is.

"The car is pretty much the way it came off the track the last time Wintersteen raced it," says Mueller. "It's now pretty tired, so I'm going to have some work done on it over the winter — you know, go through the suspension, brakes, and the drivetrain. But I don't know about painting it. It looks a little rough. Still, it's the way Wintersteen had it and I'm not sure I want to lose that link to the past."

It's clear that Mueller is in love with his car, or at least the lore of it. The Grand Sport stands for a moment in time when Corvette enthusiasts could cheer for their own true blue, home-grown racer. The fact that those cheers were muted by the uncompleted nature of the project has only fueled more interest in this lightweight special as people think of what might have been. That is a fantasy no amount of time can take away. ☐

GRAND SPORT VERSUS TRANS AM *Continued from page 17*

sus 1.22.45 for the Trans-Am car on the short course.

Yes, one could argue that these lap times were not at all representative.

But Heinricy said he drove both cars at about eight-tenths. "I felt if I really pushed it, I could have squeezed another two seconds out of the Grand Sport.

"The Grand Sport must have been a very difficult car to drive fast," Heinricy continued. "It has good straight-away power, but I couldn't get the power down to the road very well coming out of the turns. It's a real tail-happy car. On turn-in I could feel the back end start to go. The high power-to-traction ratio could be part of it, but I've found that to be the case in most older Corvettes — prior to when we started using the 5-link rear geome-

try. The rear toe-control could have been better.

"It also rolled more than I expected. More than a production Z51 does today. But it's up higher, and has less roll resistance.

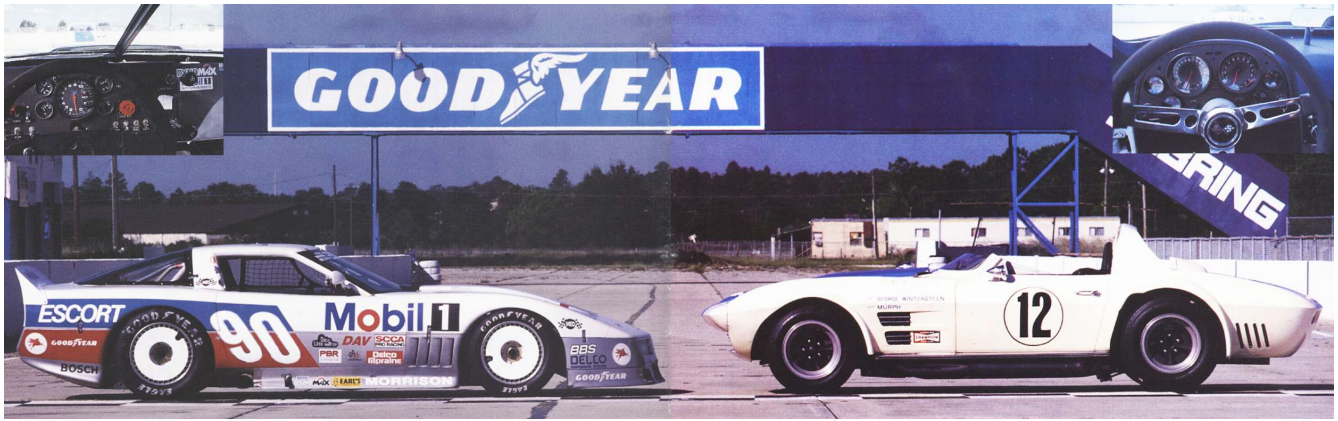
"The brakes were quite good. I never had a bad feeling about them. A person could go real quickly in it, but it would take some getting used to. It's a lot of fun, but it's very much a vintage car — a '60s muscle car.

"In contrast, the Trans-Am car had almost an underpowered feeling," added Heinricy. "It was well-balanced, almost docile. It's very similar in feel to a ZR-1, except that things happen much more quickly in the Trans-Am car. The ZR-1 feels like the hectic part of a symphony whereas the Trans-Am car feels like the crescendo." ☐



On the Sebring short course, the Trans-Am Corvette showed the difference 27 years can make, recording a lap time 12 seconds faster than the Grand Sport.

MARK HARMER



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