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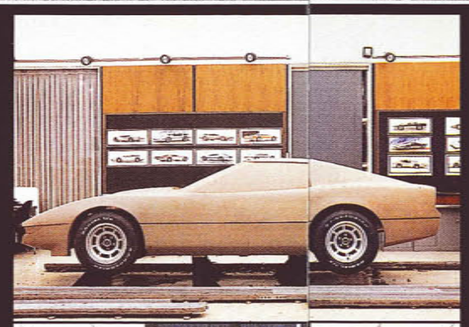
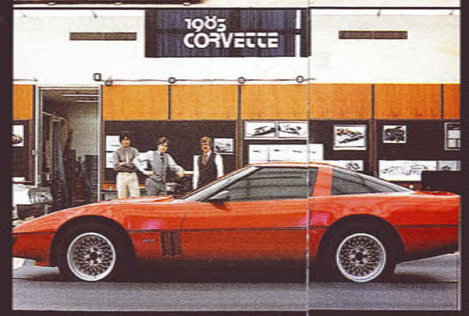
BACKTRACK 1984

Chevrolet's 1984 Corvette (main photo) displayed a totally new design, while retaining the unmistakable Corvette identity.

The clean sculptured profile of the 4-Rotor/Aerovette (above) foreshadowed many of the styling cues of the future production Corvette. The 4-Rotor was named for its dual 2-rotor engines. Complete with gull-wing doors, it caused quite a sensation at the 1973 Paris Salon.

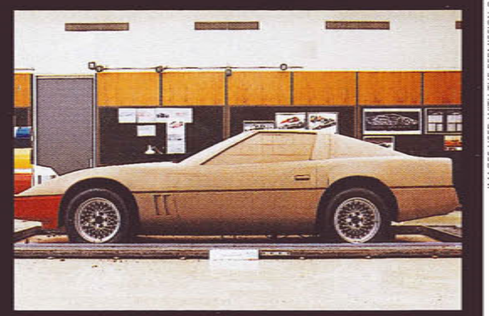
Corvette chief engineer Zora Arkus-Duntov, who retired in 1975, had long dreamed of producing a mid-engine Corvette. He still didn't get his wish in 1984: GM decided that the new Corvette would retain the front-engine layout. The design group, led by Jerry Palmer, produced early clay models (below and upper right) in the summer of 1978. Later models had the clamshell hood. The fenders and hood were of one piece, and the huge, forward-pivoting hood improved access to both the engine compartment and front suspension components.





John Cafaro, Jerry Palmer and Roger Hughet in the design studio in December 1979 (below left) with the car's nearly final form — all except for the wraparound grilles. The base of the windshield was moved forward, producing a 64-degree windshield angle.

By the time the body's shape reached this March 1979 stage (below), a 0.34 drag coefficient had been achieved in the General Motors windtunnel.



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The 1968 Corvette marked the beginning of a new generation of Chevrolet's legendary sports car. With an established pedigree, the Stingray was a fierce competitor on the track and a menacing presence on the street. Its aggressive, shark-inspired shape became a cultural icon that would endure throughout one of the most dynamic periods in American history. As the turbulent 1960s drew to a close, horsepower and high-performance were hallmarks of the domestic automobile industry. Although thirsty cubic inches were plentiful and the muscle car era was at speed, fundamental changes were on the horizon.

Government fuel economy and pollution regulations forced automakers to redirect their engineering talent. By the mid-1970's, horsepower had become a four-letter word and safety was a selling point. Economy-minded consumers abandoned the Big Three products in favor of smaller, fuel-efficient imports. Ragtops were fading from dealer showrooms, and the performance of the venerable Corvette reached a low point.

In spite of marginal build quality and rising sticker prices, sales reached an all-time high in 1979 as 53,807 Corvettes left the aging St. Louis factory. Purists, though, were anxious for something new. "Unless you have the faith of Moses," wrote *Car and Driver,* "you probably long ago gave up any hope for the appearance of a new Corvette."

BY PETER J. LICASTRO

The next-generation Corvette would have to meet higher customer expectations to remain competitive and revitalize the marque's image as a rolling showcase for GM innovation and technology.

The 1984 Corvette fulfilled Chevrolet's mission to build a no-compromise world-class performance car. It raised the standard by which all sports cars are judged. "The newest Chevy," said *The New York Times*," is one of the supercars of the world."

MID-SHIP MOMENTS

Since the 1950s, a number of mid-engine design concepts and engineering proposals had been considered for the Corvette. These efforts were championed by Corvette chief engineer Zora Arkus-Duntov, an ardent proponent of the mid-engine configuration.

During 1970, GM reached an agreement to produce the revolutionary Wankel rotary combustion engine and planned a 2-rotor version for the mass-produced Chevy Vega. GM president Ed Cole felt that sharing the rotary mill with the Corvette would make the engine more attractive to the public and help advance the concept within the corporation.

"At that time, Zora still wanted a mid-ship Corvette but recognized that Ed Cole was more interested in rotary engines," says former Chevrolet engineer, Gib Hufstader. "Zora wanted to do something to stay on Cole's bandwagon to increase the chances of having a mid-ship vehicle." Still, Duntov knew the Vega-sized rotary would never be potent enough for his mighty Corvette.

Duntov called on Hufstader in early 1972 to develop a powerful, mid-engine Corvette using the Wankel engine. The 4-Rotor Corvette was born.

Named for its dual 2-rotor engines, the 4-Rotor was a direct descendent of an earlier family of 1960s-era V8-powered mid-ship prototypes.

The most promising of these designs was Duntov's 1968 XP-882 program. Engineered with a four-wheel-drive configuration in mind, like that of his 1964 CERV II experimental car, the XP-882 resolved many of the transaxle-related issues of previous studies with an ingenious patented drivetrain.

Under the direction of Henry Haga, chief designer of Chevrolet Studio III, a stunning body was created for the 4-Rotor utilizing one of several XP-882 chassis. "What was unique about the 4-Rotor," Haga explained, "was that Mitchell [GM's design chief] insisted that this be the breakthrough to get away from all the cut-off Kamm rear ends that were fashionable at that time. He wanted to take a page out of the German racing book from the thirties and have a teardrop shape."

> "When we set out to create the new Corvette, we set aside flashiness and concentrated on basics, like cleanliness, comfort and function."
> — Jerry Palmer

Complete with gull-wing doors and a brilliant silver finish, the 4-Rotor was a sensation at the Paris Salon in October 1973. Its clean, sculptured profile foreshadowed the styling direction of the future production Corvette.

Despite Cole's enthusiasm, GM abandoned the rotary engine because of its poor fuel economy and high emissions. The 4-Rotor was eventually transformed into the V8-powered Aerovette show car.

Mid-ship and front-engine Corvette concepts were developed until a turning-point was reached in 1978. By then, the practical limitations inherent in mid-engine design, such as limited passenger and luggage space, were considered unacceptable by Chevrolet management.

The decision was made to retain the traditional front-engine configuration. Zora's dream of a mid-engine all-wheel-drive Corvette was never realized.

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FORM FOLLOWING FUNCTION

Design work on the fourth-generation Corvette progressed within the secure confines of Studio III, led by Haga's successor, Jerry Palmer, a member of the 4-Rotor styling team.

Palmer's group expanded on the basic theme established with the 4-Rotor. "When we set out to create the new Corvette," he said, "we set aside flashiness and concentrated on basics, like cleanliness, comfort and function." The goals were clear: improve visibility and aerodynamics, provide easier assembly and servicing, and maximize interior space.

Retaining the visual identity and recognition factor of previous models was essential. "We felt the car had to show the bloodlines of the great predecessors," says Palmer. "The lineage of the Corvette had to be very apparent."

A key element of the overall architecture was bundling the powertrain and exhaust system in the underbody tunnel to lower the roof line and streamline the car's central surfaces.

> "...the Corvette competes with things like fast powerboats and ultralight airplanes. Like them, the Corvette goes beyond serious transportation."
> — David R. McLellan

Designer John Cafaro sketched the first rendition of a new clamshell hood during the fall of 1978. The massive, forward-pivoting hood, with integral front fenders, improved access to both the engine compartment and front suspension. It also provided an opportunity for designers to showcase the famed Chevrolet V8 powerplant.

Particular attention was paid to under-hood aesthetics, resulting in a highly styled and equally well-coordinated engine room. A striking magnesium air cleaner cover, functional T-handle dipstick and gleaming aluminum control arms created an aura of mechanical expression. In order to maintain the silver and black color scheme, Palmer convinced AC-Delco to develop a specially trimmed Freedom II battery.

"I probably spent as much time on the engine compartment as I did on the whole exterior," says Palmer. "I'm still proud of that, because it set the standard for the rest of GM cars."

Design proposals were subjected to extensive testing in GM's new 4000-horsepower wind tunnel. The final result was an aerodynamically clean, wind-sculpted form with a 0.34 drag coefficient, nearly 25% better than the 1982 Corvette. By moving the base of the windshield forward, designers achieved an extraordinary windshield pitch of 64 degrees, one of the steepest angles of any production car in the world.

A perimeter body break-line, rising gradually from front to rear, provided a slight rake to the overall profile. "The groove around the perimeter kind of came off the Ferrari 308," says former GM director of design Chuck Jordan.

As the final form developed, it was compared to high-end sports cars like Porsche, Ferrari and the Lotus Esprit. "This proves to be an excellent barometer design-wise," explained Palmer, "plus it provides the chance to see how you fit in with the emotion of the class."

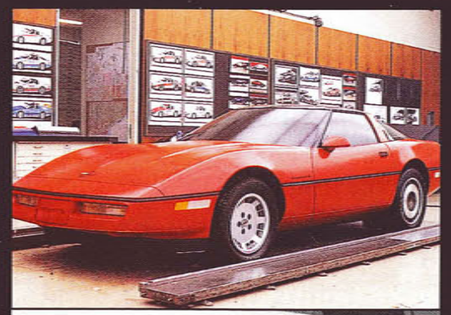
Carefully styled headlight pods rotated into position to preserve the aerodynamic contours. They were also designed to ensure the next Corvette was export-ready. "Possibly the most complicated part of the design from an engineering standpoint was the headlamp system," recalls Palmer. "They had to open in a certain time interval to comply with international laws."

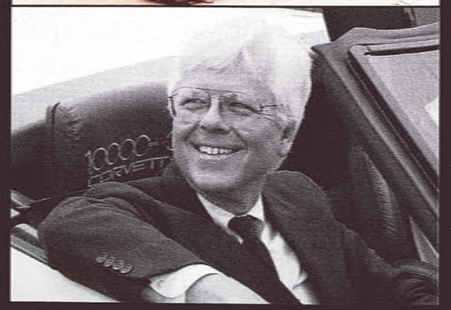
While the exterior form was taking shape, interior designers were diligently crafting a functional, driver-friendly cockpit.

The centerpiece was an electronic instrument panel featuring a trio of multicolor liquid-crystal displays. Numerous layouts were tested, including conventional analog gauge clusters, but corporate brass felt the electronic format would underscore the sophisticated, high-tech image of the new Corvette.

Anticipating a government safety regulation that never materialized, an obtrusive, and often-criticized, restraint pad was integrated into the passenger side of the dash.

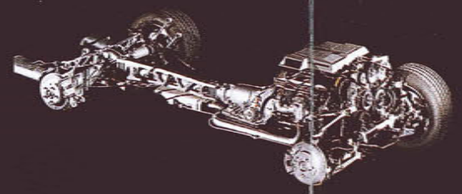
By early 1982, the exterior and interior designs were essentially complete, and tooling for major components was underway. Compared with its predecessor, the proportions of the 1984 Corvette were visually deceptive — two inches wider and almost nine inches shorter. The tight, Coke-bottle mid-section of the Stingray was eliminated to dramatically increase shoulder room.

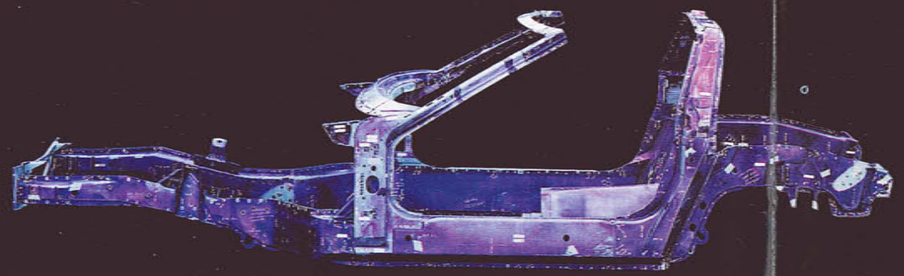




The full-size fiberglass model (left) from November 1981 wears the base wheel package (rear wheel) that would be available when the car went into production.

Dave McLellan (below left) replaced the legendary Zora Arkus-Duntov as chief engineer for the Corvette in 1975. The 1984 model was McLellan's first all-new Corvette. He grew up in Detroit and cut his teeth at GM, working on the Camaro before he joined the Corvette group.





Styling wasn't the only thing that was all-new for 1984. The chassis and interior were completely redone as well. When the frame's crossmembers were eliminated, the new backbone driveline (left) and uniframe (below left) combined to save weight, while maintaining torsional rigidity. This also allowed the design team to have a single, removable roof panel. The interior went through a three-year development process before the all-digital production instruments (below) were finally selected.

The styling was refined, yet aggressive; the trademark round taillights and front fender gills were unmistakably Corvette.

MECHANICALLY SPEAKING

After two decades as the technical genius behind the Corvette, Zora Arkus-Duntov retired in 1975. Although America's sports car lost a brilliant visionary and a tireless advocate, his successor, David R. McLellan, was a respected MIT-educated engineer.

During the early 1970s, automobile horsepower rapidly declined, a victim of pollution-control hardware and low-lead fuel. Government standards for fuel economy, vehicle emissions and safety began to sap the Corvette's legendary performance and became the preoccupation of Chevrolet engineers. "The regulations were coming at us fast and furious," says McLellan.

By 1975, the optional big-block had vanished and catalytic converters became standard. The rumble of genuine dual exhausts was only a pleasant memory.

With the addition of 5-mph bumper systems and other mandatory equipment, the Corvette reached heavyweight status, tipping the scales at over 3,600 pounds.

As an emotional two-seater, the Corvette was not a candidate for the radical downsizing that plagued passenger cars of the era. And, for the times, the Corvette engineering team managed to obtain respectable levels of performance in the wake of strict guidelines.

McLellan assessed the situation during a 1980 *Corvette News* interview. "Today's Corvette is very close to the limit of the package you can construct for two people with reasonable comfort and a V8 engine. With the current Corvette, and with future models under development, we are using a 'thinning down' process."

Engineers used advanced, light-weight materials which improved handling response and helped compensate for the Corvette's bulging waistline. Chevrolet also introduced a plastic monoleaf rear spring, beginning in 1981, replacing the bulky steel unit of previous years. The eight-pound rear spring was paired with a similar transverse front spring on the 1984 model.

The front and rear suspension of the 1984 Corvette made extensive use of aluminum components that optimized unsprung weight. According to Chevrolet, the forged aluminum prop-shaft and yokes were a first for a U.S. production model. For greater wheel control, a new 5-link independent rear suspension replaced the dated 3-link geometry first seen on the 1963 Sting Ray.

The traditionally separate body birdcage and frame assemblies were combined into a rigid uniframe substructure. Made of high-strength steel in critical areas, the uniframe provided the stiffness needed to achieve the engineers' lofty handling objectives. It also allowed designers to use a single removable roof panel, sans the reinforcing T-bar, that was originally planned for the 1968 Corvette.

A truss-like, aluminum C-channel connecting the transmission and differential further enhanced chassis integrity. This backbone drivetrain eliminated the need for bulky frame cross-members within the Corvette's shortened wheelbase that would add weight and compromise interior space.

"There are a lot of things about the car that go beyond basic needs," said McLellan, "and in this sense the Corvette competes with things like fast powerboats and ultralight airplanes. Like them, the Corvette goes beyond serious transportation."

A familiar 350-cubic-inch V8, fed by two computer-driven injection units on a crossram intake manifold, supplied 205 exhilarating horsepower. This carryover "cross-fire injection" system provided accurate fuel metering for enhanced fuel economy.

Behind the engine, buyers had a choice of either the 1982-genre 4-speed automatic or a sophisticated new 4+3 manual gearbox, with computer-selected automatic overdrive in the top three gears. "We tried not to change everything at once," says McLellan.

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From both a styling and engineering perspective, the Corvette was wheel-oriented. Drawing on extensive racing experience, Goodyear developed a 16-inch, unidirectional performance tire specifically for the new Corvette. The "Gatorback" Eagle VR50 was rated for speeds in excess of 130 mph, but still offered a quiet ride and acceptable fuel economy and tread life.

The enthusiasm and cooperation of the Corvette design and engineering teams was reflected in the uncompromising vehicle that emerged. "It was a pretty unique relationship," recalls McLellan, "not the kind of relationship you would find on other cars."

THE PRESS REACTION

"The '84 Corvette is the best handling production car available in the world today, regardless of price."
Motor Trend, March 1983

"This is a car you've got to love if you love to drive. It's one exciting piece of automotive technology, a fantasy on wheels."
Boston Globe, June 26, 1983

"We old-worlders talk glibly of the "Europeanisation" of American cars, but ... you realize that Americans don't really give much of a damn for European standards."
Autocar, 16 April 1983

G-FORCE

Chevrolet tempted enthusiasts seeking out-of-the-box, GT-type performance, with an available Z51 handling package. Conceived with the single objective of creating the best-handling production sports car in the world, the Z51 featured heavy-duty springs and suspension hardware, extra-wide rear tires and a lightning-fast 13:1 steering ratio.

The competition-bred package, installed on half of the '84 Corvettes, was often criticized for its spine-jarring ride on broken roads. "It worked just fine in a relatively smooth road environment like California," explains McLellan, "but the Z51 package was so heavily hyped by the magazines that it became the suspension option of choice ... dealers were ordering it inappropriately."

With a top speed of 140 mph and a lateral acceleration approaching 1.0 g, the 1984 Corvette teetered on race-car performance. America's fastest production car captured the SCCA Showroom Stock GT National Championship in 1984 and again in 1985.

Fred Schaafsma, Corvette development engineer, confidently told the editors of *Car and Driver*, "I'll take all comers. You bring what you want."

THE EXOTIC AMERICAN

It would be remembered as one of the most eagerly awaited vehicle introductions in modern automotive history. Armed with eight-page, four-color magazine spreads, Chevrolet unleashed a media blitzkrieg to announce the arrival of their state-of-the-art flagship.

A two-stage closed introduction generated a tremendous level of anticipation and excitement for the first new Corvette in 15 years. "We started with a clean sheet of paper in designing this car and weren't sticking with convention on introducing it," explained George Borst, Chevy promotion sales manager.

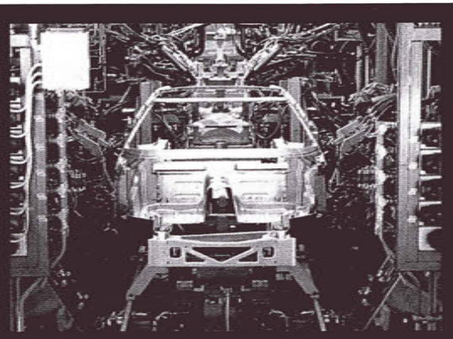
The new Corvette was originally planned as a 1983 model and was designated as such through the final phases of development. Although 1983 Corvettes were built for testing and promotional purposes, only 1984 models were released for public sale.

Available first in California, the 1984 Corvette went on sale nationally during April of 1983. Enthusiasts and collectors were denied a true 30th anniversary Corvette, but Chevrolet's trendsetter would be the first '84 model to hit the streets, rather than the last '83.

Sports car aficionados flooded Golden State showrooms, igniting a groundswell of enthusiasm that quickly spread throughout the country. "We had 36 cars on Thursday, which was introduction day, and we had one left by Saturday," reported one dealer. "We had a hell of a time getting them," recalls a veteran Pennsylvania salesman. "We pleaded and begged."

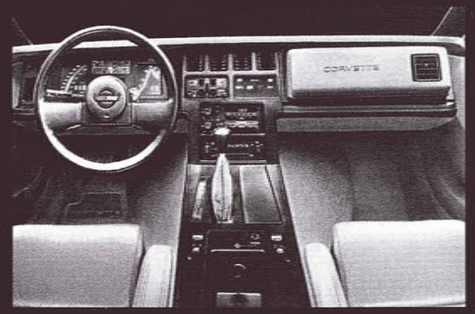
Motor Trend named the 1984 Corvette Car of the Year. They wrote, "... the Corvette has the highest EQ [Excitement Quotient] of anything to come out of an American factory. In an era of U.S. cars trying to imitate their foreign competition, here's one car that makes a peculiarly American statement and teaches some of the great names a lesson in doing so."

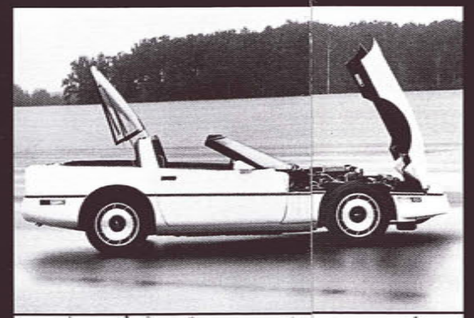
As a complete performance machine, the Corvette reached a new zenith, offering more than brute horsepower and distinctive styling. It echoed the sophistication and taste of a maturing nation and reflected the efforts of GM's finest designers and engineers. At its heart was the spirit of Yankee pride and ingenuity.



A veteran workforce at General Motors' Bowling Green, Ky., facility utilizes automated equipment such as this multifaceted welding machine (above), to turn out 15 new Corvettes per hour. Bowling Green is only the third GM facility to assemble Corvettes in the car's 43-year history. The first year's production in Flint, Mich., was followed by 27 years in St. Louis. Production moved to Bowling Green in 1981.

Chevrolet's high-tech Corvette cockpit (below) was perhaps the most dramatically revised feature of the car. The shoulder room was 6.5 inches wider than the previous year. The seats were contour-shell buckets with folding backrests. A control panel featured electronic liquid-crystal instrumentation with a multicolored analog and digital display. The driver information system delivered instant digital readings of mileage, fuel level and driving range. The standard items included a leather-wrapped steering wheel on a tilt-telescopic column, perimeter carpeting, power windows, air conditioning, pulse windshield wipers, inside hood and hatch releases and ETR AM/FM stereo with digital clock and four speakers. The parking brake lever was inside the driver's side lower door sill. The center console contained the gear shift and controls for the power windows, electric sport mirrors, radio and air conditioning.





The new Corvette projected a striking profile with its rear hatch and front-hinged hood and its one-piece canopy removed. The canopy stowed in the car's rear compartment. With an overall length of 176.5 inches, the new Corvette was about 9 inches shorter than the previous model. The wheelbase was 96.2 inches, and the minimum ground clearance was five inches.

Bowling Green workers showed their enthusiasm for the all-new Corvette. The Kentucky facility is General Motors' only all-sports car assembly plant.

Peter J. Licastro is a Pittsburgh-based freelance writer and the author of *Birthplace of Legends, The Story of Corvette Production at the St. Louis Assembly Plant, 1953–1981.*