Encyclopedia of

Sports and Super Cars

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First Edition, 2012

ISBN 978-81-323-1478-3

Published by:
College Publishing House
4735/22 Prakashdeep Bldg,
Ansari Road, Darya Ganj,
Delhi - 110002
Email: info@wtbooks.com

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Chapter 1

Introduction to Sports Car

Lotus Super 7, a fundamental sports car

A **sports car** is a small, usually two seat automobile designed for high speed driving and maneuverability.

Sports cars have been either spartan or luxurious, but good handling and high performance is requisite.

Early history

1934 Aston Martin Ulster

The sports car traces its roots to early 20th century touring cars. These raced in early rallys, such as the Herkomer Cup, *Prinz Heinrich Fahrt*, and Monte Carlo.

The first true sports cars (though the term would not be coined until after World War One) were the 3 litre made in 1910 Vauxhall 20 hp (15 kW) and 27/80PS Austro-Daimler (designed by Ferdinand Porsche).

These would shortly be joined by the French DFP (which became sporters after tuning by H.M. and W. O. Bentley) and the Rolls-Royce Silver Ghost. In the U.S. (where the type was variously called roadster, speedster, runabout, or raceabout, there was Apperson, Kissel, Marion, Midland, National, Overland, Stoddard-Dayton, and Thomas among small models (which today would be called sports cars), while Chadwick, Mercer, Stutz, and Simplex were among large ones (which might today be called sports sedans or grand tourers).

In 1921, Ballot premiered its 2LS, with a remarkable 75 hp (56 kW) DOHC two liter, designed by Ernest Henry (formerly of Peugeot's Grand Prix program), capable of 150 km/h (90 mph); at most, one hundred were built in four years. This was followed by the SOHC 2LT and 2LTS. The same year, Benz built a supercharged 28/95PS four for the Coppa Florio; Max Sailer won.

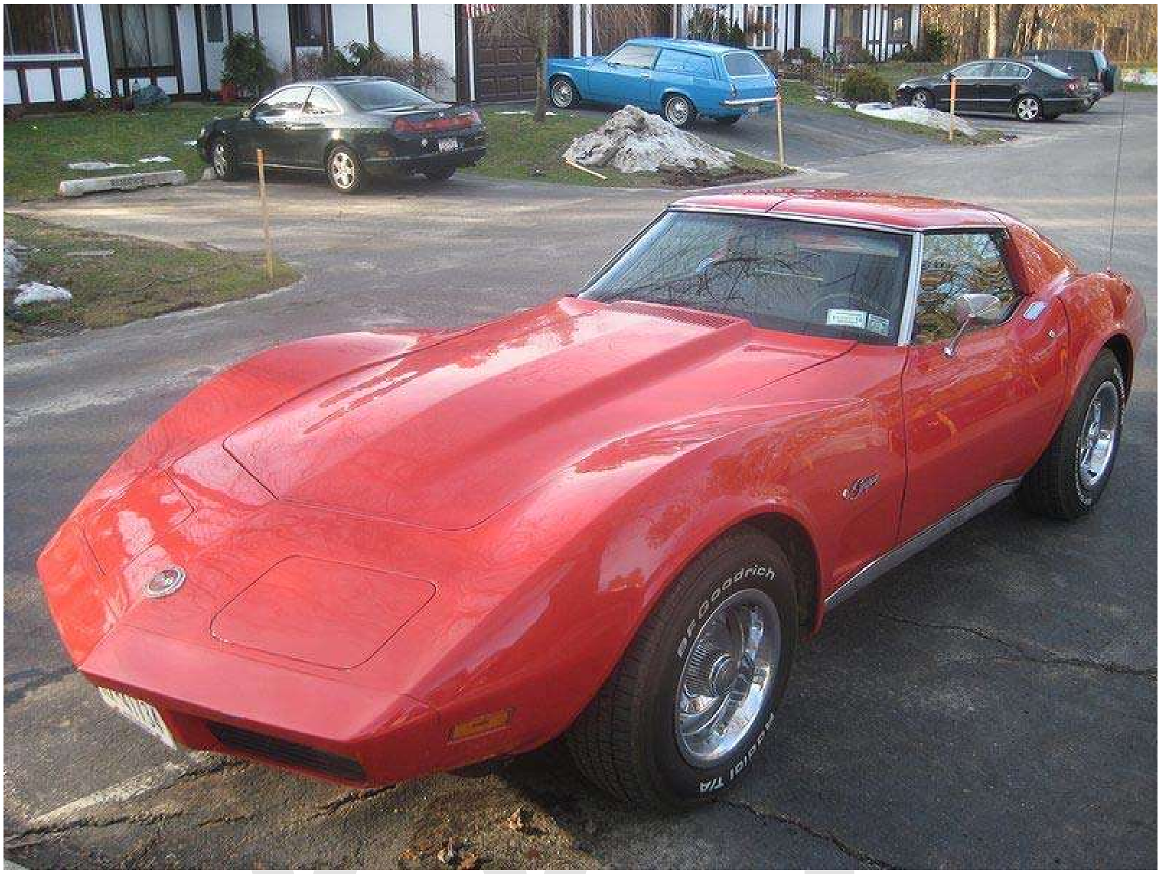
Simson in 1924 offered a Paul Henze-designed 60 hp (45 kW) DOHC 2 liter four, the Simson Supra Type S, in a long-wheelbase 120 km/h (60 mph) tourer and 115 km/h (71 mph) twin-carburettor sporter; only thirty were sold, against around three hundred of the SOHC model and 750 of the pushrod-six Type R. Duerkopp's Zoller-blown two liter in 1924, as well.

There was a clear cleavage by 1925. As four-seaters were more profitable, two-seaters increasingly turned over to specialst manufacturers, led by Alvis, Aston-Martin, and Frazer-Nash, with shoestring budgets, fanatic followers, and limited sales (today exemplified by Aston and Morgan): between 1921 and 1939, 350 Astons were built; 323 Frazer-Nashes in the period 1924-39.

By the end of the 1920s, AC produced a 2 liter six, the 3.5 liter Nazzaro had a three-valve OHC (only until 1922), while French makers Amilcar, Bignan, Hispano-Suiza, and Samson had the typical small four-cylinder sporters and Delage, Hotchkiss, and Chenard-Walcker the large tourers. Benz introduced the powerful SS and SSK, and Alfa Romeo, the Vittorio Jano-designed 6C.

Two companies would offer the first really reliable sports cars: Austin with the Seven and Morris Garages (MG) with the Midget. The Seven would quickly be "rodded" by numerous companies (as the Type 1 would be a generation later), including Bassett and Dingle (Hammersmith, London); in 1928, a Cozette blower was fitted to the Seven Super Sports, while Cecil Kimber fitted an 847 cc Minor engine, and sold more Midgets in the first year than MG's entire previous production.

Layout



1974 Chevrolet Corvette Stingray, a front-engine, rear drive (RWD) sports car

Porsche Boxster, a rear mid-engine, rear-wheel (RMR) drive sports car

Alpine A110, a rear-engine, rear-wheel (RR) drive sports car

1990s Lotus Elan M100, a front-engine, front wheel (FF) drive sports car

An important sports feature on the Skelta G-Force is that it is made of carbon fiber, making it ultra-light.

The drive train and engine layout significantly influences the handling characteristics of an automobile, and is crucially important in the design of a sports car.

The front-engine, rear-wheel drive layout (FR) is common to sports cars of any era and has survived longer in sports cars than in mainstream automobiles. Examples include the Caterham 7, Mazda MX-5, and the Chevrolet Corvette. More specifically, many such sports cars have a FMR layout, with the centre of mass of the engine between the front axle and the firewall.

In search of improved handling and weight distribution, other layouts are sometimes used. The RMR layout is commonly found only in sports cars—the motor is centre-mounted in the chassis (closer to and behind the driver), and powers only the rear wheels. Some high-performance sports car manufacturers, such as Ferrari and Lamborghini prefer this layout.

Porsche is one of the few remaining manufacturers using the rear-engine, rear-wheel drive layout (RR). The motor's distributed weight across the wheels, in a Porsche 911, provides excellent traction, but the significant mass behind the rear wheels makes it more prone to oversteer in some situations. Porsche has continuously refined the design and in recent years added electronic driving aids (i.e. computerised traction-stability control) to counteract these inherent design shortcomings.

Some sport cars have used the front-engine, front-wheel drive layout (FF), e.g. Fiat Barchetta, Saab Sonett and Berkeley cars. This layout is advantageous for small, light, lower power sports cars, as it avoids the extra weight, increased transmission power loss, and packaging problems of a long driveshaft and longitudinal engine of FR vehicles. Yet, its conservative handling effect, particularly understeer, and the fact that many drivers believe rear wheel drive is a more desirable layout for a sports car make this layout atypical to high-performance sports cars. The FF layout, however, is common in sport compacts and hot hatches, and cars in general (excepting sports cars).

Before the 1980s few sports cars used four-wheel drive, which had traditionally added a lot of weight. Although not a sports car, the Audi Quattro proved its worth in rallying. With its improvement in traction, particularly in adverse weather conditions, four-wheel drive is no longer uncommon in high-powered sports cars, e.g. Porsche, Lamborghini, and the Bugatti Veyron.

Seating

Some sports cars have small back seats that are really only suitable for luggage or small children. Such a configuration is often referred to as a 2+2 (two full seats + two "occasional" seats). The more typical seating arrangement is two-seats.

Over the years, some manufacturers of sports cars have sought to increase the practicality of their vehicles by increasing the seating room. One method is to place the driver's seat in the center of the car, which allows two full-sized passenger seats on each side and slightly behind the driver. The arrangement was originally considered for the Lamborghini Miura, but abandoned as impractical because of the difficulty for the driver to enter/exit the vehicle. McLaren used the design in their F1.

Another British manufacturer, TVR, took a different approach in their Cerbera model. The interior was designed in such a way that the dashboard on the passenger side swept toward the front of the car, which allowed the passenger to sit farther forward than the driver. This gave the rear seat passenger extra room and made the arrangement suitable for three adult passengers and one child seated behind the driver. The arrangement has been referred to by the company as a 3+1. Some Matra sports cars even had three seats squeezed next to each other.

Sports car versus sporting models

A car may be a *sporting* automobile without being a sports car. Performance modifications of regular, production cars, such as sport compacts, sports sedans, muscle cars, hot hatches and the like, generally are not considered sports cars, yet share traits common to sports cars. They are sometimes called "sports cars" for marketing purposes for increased advertising and promotional purposes. Performance cars of all configurations are grouped as *Sports and Grand tourer cars* or, occasionally, as *performance cars*.

Chapter 2

Chevrolet Corvette

2010 Chevrolet Corvette Grand Sport

Manufacturer	Chevrolet Division of General Motors
Also called	Sting Ray (1963–1967) Stingray (1969–1976)
Production	1952–present
Model year(s)	C1 1953 – 1962 C2 1963 – 1967 C3 1968 - 1982 C4 1984 - 1996 C5 1997 - 2004 C6 2005 - Present

Assembly	United States: - Flint, Michigan; - St. Louis, Missouri; - Bowling Green, Kentucky
Class	Sports car
Body style(s)	2-door convertible 2-door coupé
Layout	FR layout
Engine(s)	235 in^3 *Blue Flame* I6 ('53-'55) 265 in^3, 283 in^3, 327 in^3, 350 in^3 Small-block V8 305 in^3 *Small-block* V8 (1980-Calif.) 396 in^3, 427 in^3, 454 in^3 *Big-block* V8 5.7 Liter LS1, LS6 V8 6.0 Liter LS2 V8 6.2 Liter LS3 V8 7.0 Liter LS7 V8 6.2 Liter LS9 V8 supercharged

The **Chevrolet Corvette** is a sports car by the Chevrolet division of General Motors that has been produced in six generations. The first model, a convertible, was designed by Harley Earl and introduced at the GM Motorama in 1953 as a concept show car. Myron Scott is credited for naming the car after the Corvette, a small, maneuverable warship. Originally built in Flint, Michigan and St. Louis, Missouri, the Corvette is currently built in Bowling Green, Kentucky and is the official sports car of the Commonwealth of Kentucky. The National Corvette Museum documents the car's worldwide history and hosts the annual "National Corvette Homecoming". In 2003 the Corvette, the first and only continuously-manufactured American sports car, celebrated its 50th anniversary.

History

Overview

Corvette was born of the post-war sports-car boom, an optimistic time when nearly anything seemed possible, including the world's largest automaker building a two-seat "image" car. But despite the Corvette's initial impact as a sensational show car, the first production model was dismissed as more poseur than performer, and the so-called "plastic bathtub" was nearly axed from the Chevrolet lineup. Corvette came into its own, both on the road and at the racetrack, during the space-age Sixties. It flexed its muscle during the subsequently turbulent years of anti-war protests, political scandals, and civil unrest. It survived an onslaught of adversity throughout the Seventies. And while it welcomed the Eighties with its portfolio secure, the car's fortunes plummeted over the course of the ensuing decade. Again turning the tide, Chevy's legendary sports car was reborn in the late Nineties as a technologically advanced performance machine for the new millennium, and it enjoyed a well-earned resurgence in popularity. Then, the Corvette engineers unleashed the C6, the most precise and refined Corvette yet. They soon topped themselves with the next-generation Z06, a 500-horsepower track-bred Corvette that upped performance to new heights.

First generation-C1 (1953–1962)

1954 Corvette Convertible

The first generation Corvette was introduced late in the 1953 model year and ended in 1962. Often referred to as the "solid-axle" models because the independent rear suspension did not debut until the 1963 Sting Ray. 300 hand-built polo white Corvette convertibles were produced for the 1953 model year, making it the rarest and most sought after of all Corvettes. The 1955 model offered the 265 cu in (4.34 L) V8 engine as an option, however the first seven off the production line featured the standard "Blue Flame" Inline-6. The origin of the Chevrolet Nomad was a two-door wagen concept car built off a 1954 Corvette.

A new body was introduced for the 1956 model featuring a new "face" and side coves; the taillight fins were gone. An optional fuel injection system was made available in the middle of the 1957 model year. It was one of the first mass-produced engines in history to reach 1 bhp (0.75 kW) per cubic inch (16.4 Cubic cm) and Chevrolet's advertising agency used a "one hp *per* cubic inch" slogan for advertising the 283 bhp (211 kW) 283 cu in (4.64 L) Small-Block engine. Other options included power windows (1956), hydraulically operated power convertible top (1956), four speed manual transmission (late 1957), and heavy duty brakes and suspension (1957).

1960 Corvette Convertible

The 1958 Corvette received a body and interior freshening including a longer front end with quad headlights, bumper exiting exhaust tips, a and new steering wheel and dashboard with all gauges mounted directly in front of the driver. Exclusive to the 1958 model were hood louvers and twin trunk spars. The 1959-60 model years had few changes except a decreased amount of body chrome and more powerful engine offerings.

For 1961, a complete redesign was made to the rear of the car; a "duck tail" with four round lights. The light treatment would continue for all following model year Corvettes. In 1962, the Chevrolet 283 cu in (4.64 L) Small-Block was enlarged to 327 cu in (5.36 L) and produced a maximum of 340 bhp (250 kW) making it the fastest of the C1 generation. 1962 was the last year for the wrap around windshield, solid rear axle, and convertible-only body style. The trunk lid and exposed headlights did not reappear for many decades.

Second generation-C2 (1963–1967)

1963 Corvette Sting Ray Coupe

The second generation Corvette referred to as *mid-years* was designed by Larry Shinoda with major inspiration from a previous concept design called the "Q Corvette" by Peter Brock and Chuck Pohlmann under the styling direction of Bill Mitchell. The design had several inspirations. The first was the contemporary Jaguar E-Type, one of which Bill Mitchell owned and enjoyed driving frequently. Mitchell also sponsored a car known as the "Mitchell Sting Ray" in 1959 because Chevrolet no longer participated in factory racing. This vehicle had the largest impact on the styling of this generation, although it had no top and did not give away what the coupe would look like. The third inspiration was a Mako Shark Mitchell had caught while deep-sea fishing.

Production started for the 1963 model year and ended in 1967. Introducing a new name, "Sting Ray", the 1963 model was the first year for a Corvette coupe and it featured a distinctive split rear window treatment (a feature that reappeared on the 1971 Buick Riviera). The Sting Ray featured hidden headlamps, non-functional hood vents, and an independent rear suspension. Duntov never liked the split rear window because it blocked rear vision, but Mitchell thought it to be a key part of the entire design. Maximum power for 1963 was 360 bhp (270 kW) and was raised to 375 bhp (280 kW) in 1964. Options included electronic ignition, the breakerless magnetic pulse-triggered Delcotronic first offered on some 1963 Pontiac models. On 1964 models the decorative hood vents were eliminated and Duntov got his way with the split rear window changed to a full width window.

1965 Corvette Sting Ray Coupe

Four-wheel disc brakes were introduced in 1965, as was a "big block" engine option, the 396 cu in (6.49 L) V8. Side exhaust pipes were also optional in 1965 and continued through 1967. The introduction of the 425 bhp (317 kW) 396 cu in (6.49 L) big block in 1965 spelled the beginning of the end for the Rochester fuel injection system. The 396 cu in (6.49 L) option cost US$292.70 while the fuel injected 327 cu in (5.36 L) engine cost US$538.00. Few people could justify spending US$245.00 more for 50 bhp (37 kW) less, even if the FI cars offered optional bigger brakes not available on carbureted models. With only 771 fuel-injected cars built in 1965, Chevrolet discontinued the option the following year. Chevrolet would up the ante in 1966 with the introduction of an even larger 427 cu in (7.00 L) Big Block version, creating what would be one of the most collectible Corvettes ever. Other options available on the C2 included the Wonderbar auto-tuning AM radio, AM-FM radio (mid 1963), air conditioning (late 1963), a telescopic steering wheel (1965) and headrests (1966).

1967 Corvette Sting Ray Convertible

1967 was the final year for the C2 generation. It featured restyled fender vents, less ornamentation and the first use of all four taillights in red; back-up lamps were now rectangular, centrally located. (The all-four red taillight treatment continued on the first C3 in 1968 only and returned on the first C4 in 1984, continuing on all Corvettes since). 1967 had the first L88 engine option which was rated at 430 bhp (320 kW), but unofficial estimates place the actual output at 560 bhp (420 kW) or more. Only twenty such engines were installed at the factory. From 1967 (to 1969), the Holley triple two-barrel carburetor, or Tri-Power, was available on the 427 L89 (a US$368 option, on top of the cost for the high-performance 427). Despite these changes, sales slipped over 15%, to 22,940 (8,504 coupes, off close to 15%, and 14,436 convertibles, down nearly 19%).

Corvette chief engineer Zora Arkus-Duntov came up with a lightweight version of the C2 in 1962. Concerned about Ford and what they were doing with the Shelby Cobra, GM planned 100 Grand Sport Corvettes but only five were built. They were driven by historic drivers such as Roger Penske, A. J. Foyt, Jim Hall, and Dick Guldstrand among others. Today the cars 001-005 are all held by private owners, and are among the most coveted and valuable Corvettes ever built. The C3 was originally intended to be introduced for the 1967 model year; however, quality issues delayed its introduction until the following year.

Third generation-C3 (1968–1982)

1969 Corvette Stingray Convertible

The third generation Corvette, patterned after the Mako Shark II concept car, was introduced for the 1968 model year and lasted until 1982. C3 coupes featured the first use of T-top removable roof panels and were sold in record numbers despite changes due to EPA regulations and the gas crisis of the 1970s. It introduced monikers that were later revived, such as LT-1, ZR-1, and Collector Edition. The Corvette's 25th anniversary was celebrated in 1978 with a two-tone Silver Anniversary Edition and an Indy Pace Car replica edition. It was the first time that a Corvette was used as a Pace Car for the Indianapolis 500.

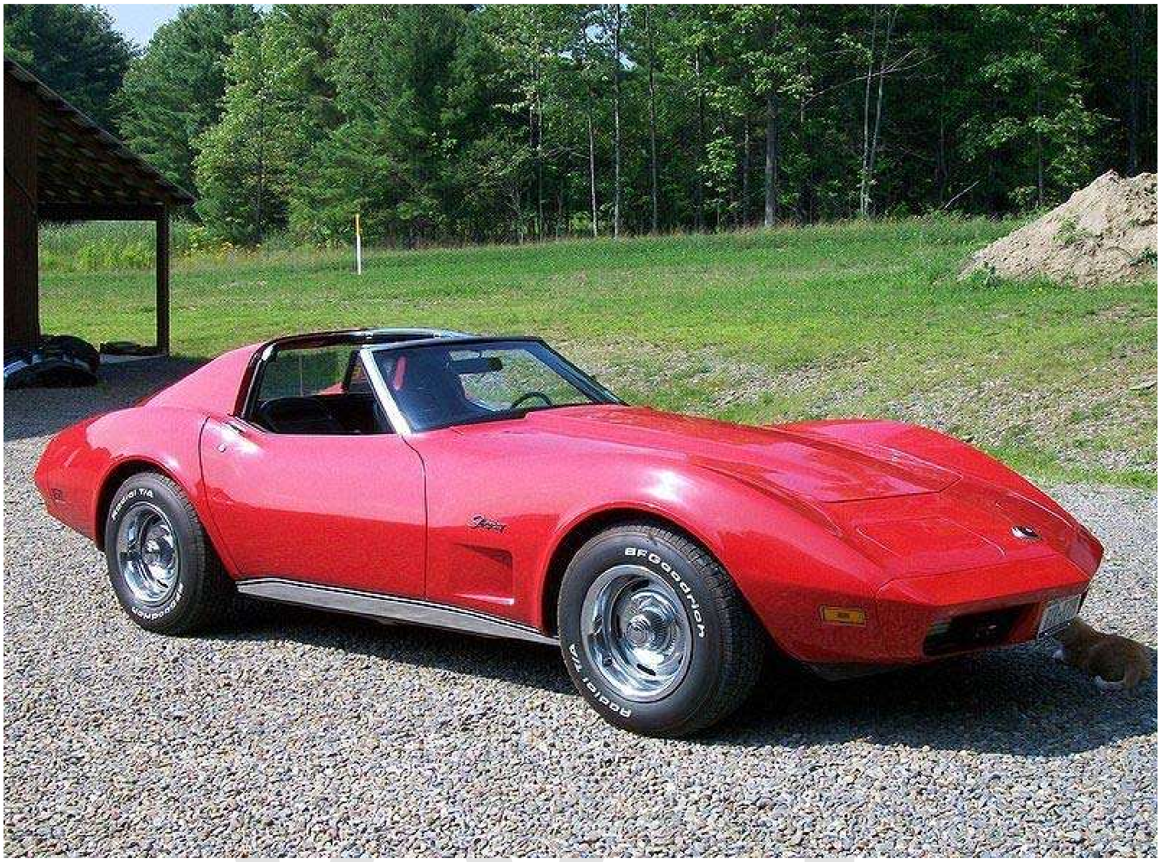
Engines and chassis components were mostly carried over from the C2, but the body and interior were new. The 350 cu in (5.7 L) engine replaced the 327 cu in (5.36 L) as the base engine in 1969, but power remained at 300 bhp (224 kW). 1969 was the only year for a C3 to optionally offer either a factory installed side exhaust, or the all-aluminum ZL1 427 cu in (7.00 L); The special big-block engine was listed at 430-hp (320 kW), but was reported to produce 550 horsepower (410 kW) and propelled a ZL1 through the 1/4 mile in 10.89 seconds.

Due to an extended production run for the 1969 model year due to a lengthy labor strike, sales were down on the 1970 models to 17,316.1970 small-block power peaked with the optional high compression, high-revving LT-1 which produced 370 bhp (276 kW). The 427 big-block was enlarged to 454 cu in (7.44 L) with a 390 bhp (291 kW) rating. The ZR-1 special package was an option available on the 1970 through 1972 model years, and included the LT-1 engine combined with special racing equipment. Only 53 ZR-1's were built. The 427 cu in (7.00 L) big-block was enlarged to 454 cu in (7.44 L).

1973 Corvette Stingray Coupe

In 1971, to accommodate regular low-lead fuel with lower anti-knock properties, the engine compression ratios were lowered which resulted in reduced power ratings. The power rating for the 350 cu in (5.7 L) L48 base engine decreased from 300 to 270 horsepower and the optional special high performance LT1 engine decreased from 370 to 330 horsepower. The big-block LS6 454 was excluded from the de-ratings and it reached its power peak of 425 bhp (317 kW). For the 1972 model year, GM moved to the SAE Net measurement which resulted in further reduced, but more realistic power ratings than the previous SAE Gross standard. Although the 1972 model's 350 cu in (5.7 L) horsepower was actually the same as that for the 1971 model year, the lower net horsepower numbers were used instead of gross horsepower. The L48 base engine was now rated at 200 bhp (150 kW) and the optional LT1 engine was now rated at 270 bhp (200 kW). 1974 models had the last true dual exhaust system which was dropped on the 1975 models with the introduction of the federally mandated catalytic converter and mandatory use of no-lead fuel. As a result, engine power plummeted with the base ZQ3 engine producing just 165 bhp (123 kW), the optional L82's output was reduced to 205 bhp (153 kW), and the 454 big-block engine was discontinued. Gradual power increases after 1975 peaked with the 1980 model's optional L82 producing 230 bhp (172 kW).

Styling changed subtly over the generation until 1978 for the car's 25th anniversary. The Sting Ray nameplate was not used on the 1968 model but Chevrolet still referred to the Corvette as a Sting Ray, and 1969 (through 1976) models used the "Stingray" name as one word, without the space. In 1970 the body design was updated including fender flares, and interiors were refined including redesigned seats. Due to the government regulation, the 1973 Corvette's chrome front bumper was changed to a 5-mile-per-hour (8 km/h) system with a urethane bumper cover. The optional wire-spoked wheel covers (left) were offered for the last time in 1973.



1974 Corvette Stingray Coupe

In 1974 a 5-mile-per-hour (8 km/h) rear bumper system with a two-piece, tapering urethane bumper cover replaced the Kamm-tail and chrome bumper blades, and matched the new front design from the previous year. 1975 was the last year for the convertible, (which did not return for 11 years) and Dave McLellan succeeded Zora Arkus-Duntov as the Corvette's Chief Engineer. For the 1976 models the fiberglass floor was replaced with steel panels to provide protection from the catalytic converter's high operating temperature and the Stingray nameplate was dropped after 1976 ending 13 model years where the names Corvette, Sting Ray, and Stingray were synonymous. 1977 was last year the tunneled roof treatment with vertical back window was used, in addition leather seats were available at no additional cost for the first time. The black exterior color returned after a six-year absence. The 1978 model introduced the fastback glass rear window and featured a new interior and dashboard. Corvette's 25th anniversary was celebrated with the Indy 500 Pace Car limited edition and a Silver Anniversary model featuring silver over gray lower body paint. All 1979 models featured the previous year's pace car interior and offered the front and rear spoilers as optional equipment. In 1980, the Corvette received an integrated aerodynamic redesign that resulted in a significant reduction in drag. After several years of weight increases, 1980 Corvettes were lighter as engineers trimmed both body and chassis weight. In mid-1981 production shifted from St. Louis, Missouri to Bowling Green, Kentucky, and several two-tone paint options were offered. 1981 models were the last available with a manual transmission until well into the 1984 production run. In 1982 a fuel-injected engine returned, and a final C3 tribute Collectors Edition featured an exclusive, opening rear window hatch.

Fourth generation-C4 (1984–1996)

1984 Corvette Coupe

The fourth generation Corvette was the first all-new Corvette since 1963. Production was to begin for the 1983 model year but quality issues and part delays resulted in only 44 1983 model prototypes being produced which were never sold. All of the 1983 prototypes were destroyed except one with a white exterior, medium blue interior, L83 350ci, 250HP V8, and 4-speed automatic transmission. After extensive testing and modifications were completed, it was initially retired as a display sitting in a external wall over the Bowling Green Assembly Plant's employee entrance. Later this only surviving 1983 prototype was removed, restored and is now on public display at the National Corvette Museum in Bowling Green, Kentucky. It is still owned by GM.

Regular fourth generation production began on January 3, 1983 as the 1984 model year and delivery to customers began in March 1983. The 1984 model carried over the 350 cu in (5.7 L) L83 L83 "Crossfire" V8 engine from the final 1982 third generation model. New chassis features were aluminum brake calipers and an all-aluminum suspension for weight savings and rigidity. The new one piece targa top had no center reinforcement. A new electronic dashboard with digital liquid crystal displays for the speedometer and tachometer was standard. Beginning in 1985, the 230 bhp (170 kW) L98 engine with tuned port fuel injection was the standard engine.

1986 Corvette Convertible Indy 500, Pace Car Edition

September 1984 through 1988 Corvettes offered a Doug Nash designed "4+3" transmission — a 4-speed manual coupled to an automatic overdrive on the top three gears. It was designed to help the Corvette meet U.S. fuel economy standards. Since 1981 when it was last offered, the return of a manual transmission to the Corvette was highly anticipated for 1984 but production was delayed until September, 1984 when thirty 1984 Corvettes were produced of which 12 were tested extensively at the proving grounds and then destroyed while the other 18 were kept at the factory and street tested for approximately 100 miles (160 km) before being released for delivery in November to customers and regular production began. The transmission was problematic and was replaced by a modern ZF 6-speed manual gearbox in 1989. In 1986 the 2nd Corvette Indy Pace Car was released. It was the first convertible Corvette since 1975. A Center High Mounted Signal Light (CHMSL, a third center brake light) was added in 1986 to comply with federal law. All 1986 convertibles had an Indy 500 emblem mounted on the console making any color a pace car edition. The color of the actual pace car (used in the race) was yellow.

In 1987, the B2K twin-turbo option became available from the factory. The Callaway Corvette was a Regular Production Option (RPO B2K). The B2K option coexisted from 1990 to 1991 with the ZR-1 option, which then replaced it.

Early B2Ks produced 345 bhp (257 kW) and 450 lb·ft (610 N·m); later versions boasted 450 bhp (336 kW) and 613 lb·ft (831 N·m).

1988 saw the 35th Anniversary Edition. Each of these featured a special badge with an identification number mounted next to the gear selector. These Corvettes were easily identified with their white exterior, wheels and interior.

In 1991, all Corvettes received updates to the body, interior, and wheels. The convex rear fascia that set the 1990 ZR-1 apart from the base model was now included on L98 Corvettes, making the styling of the expensive ZR-1 even closer to that of the base cars. The most obvious difference remaining between the base and ZR-1 models besides the wider rear wheels was the location of the CHMSL (center high mounted stop lamp), which was integrated into the new rear fascia used on the base model, but remained at the top of the rear-hatch on the ZR-1's.

1992 Corvette ZR1

For the 1992 model year, the 300 bhp (220 kW) LT1 engine was introduced, an increase of 50 bhp (37 kW) over 1991's L98 engine. Also new for 1992 was Acceleration Slip Regulation (ASR), a form of traction control which utilized the Corvette's brakes, spark retard and throttle close-down to prevent excessive rear wheel spin and possible loss of control. The traction control device could be switched off if desired.

1993 saw a special 40th Anniversary Edition featuring a commemorative Ruby Red color, 40th anniversary badges and embroidered seat backs. The 1993 Corvette also marked the introduction of the Passive Keyless Entry System, the first GM car to feature it. Production of the ZR-1 ended in 1995, after 6,939 cars had been built.

1996 was the final year of C4 production, and featured special models and options, including the Grand Sport and Collector Edition, OBD II (On-Board Diagnostics), run flat tires, and the LT4 engine. The 330 bhp (246 kW) LT4 V8 was available only with a manual transmission, while all 300 bhp (224 kW) LT1 Corvettes used automatic transmissions.

Chevrolet released the Grand Sport (GS) version in 1996 to mark the end of production of the C4 Corvette. The Grand Sport moniker was a nod to the original Grand Sport model produced in 1963. A total of 1,000 GS Corvettes were produced, 810 as coupes and 190 as convertibles. The 1996 GS came with the high-performance LT4 V8 engine, producing 330 bhp (246 kW) and 340 lb·ft (460 N·m). The Grand Sport came only in Admiral Blue with a white stripe down the middle, and black wheels and two red stripes on the front left wheel arch added to its distinctive look.

Fifth generation-C5 (1997–2004)

2003 Corvette Coupe

Production of the C5 Corvette began in 1997 and ended with the 2004 model year. Chevrolet used cars like the Nissan 300ZX and Mazda RX-7 as benchmarks for quality and styling due to criticisms the C4 Corvette received when compared to Japanese rivals.

The C5 had a top speed of 181 mph (291 km/h) and was judged by the automotive press as improved in nearly every area over the previous Corvette design thanks to its much improved structural rigidity and much more curvaceous design.

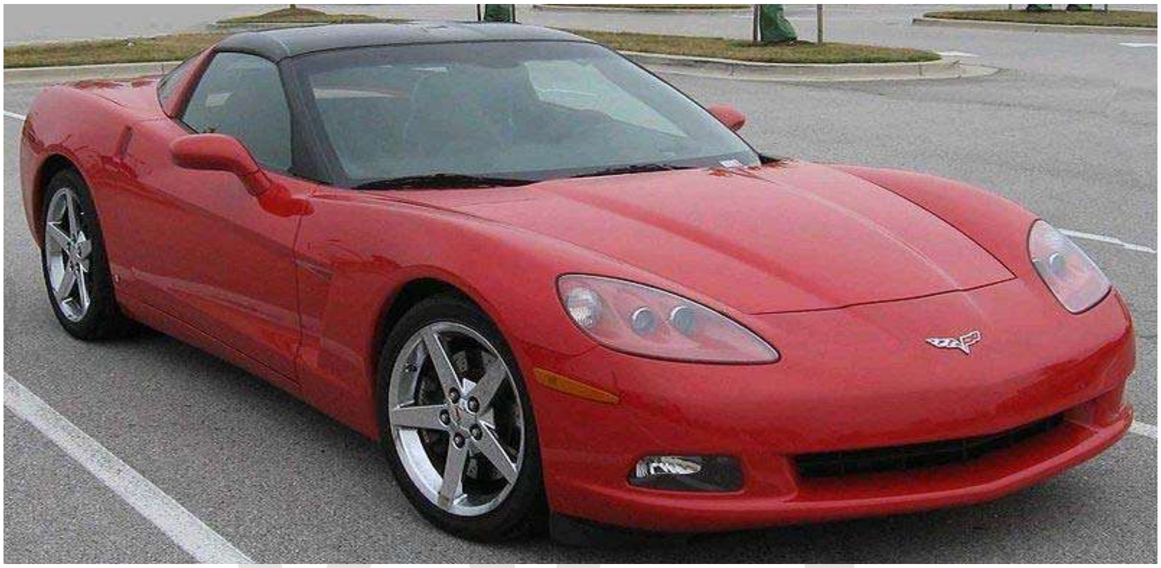
Corvette Z06 Hardtop Coupe

Also introduced with the C5 was GM's new LS1 small block. This third-generation small block V8 was completely redesigned. Now all-aluminum, it features a distributor-less ignition and a new cylinder firing order. It was initially rated at 345 bhp (257 kW) and 350 lb·ft (470 N·m), but was increased to 350 bhp (260 kW) in 2001. The new engine, combined with the new body and its low 0.29 drag coefficient, resulted in a performance car that was able to achieve up to 28 mpg on the highway.

For its first year, the C5 was available only as a coupe, although the new platform was designed from the ground up to be a convertible, which returned in 1998, followed by the fixed-roof coupe (FRC) in 1999. One concept for the FRC was for it to be a stripped-down model with a possible V6 engine (nicknamed in-house as the "Billy Bob"). By 2000 FRC plans laid the groundwork for the return in 2001 of the Z06, an RPO option not seen since Zora's 1963 race-ready Corvette.

The Z06 model replaced the FRC model as the highest performance C5 Corvette. Instead of a heavier double-overhead cam engine like the ZR-1 of the C4 generation, the Z06 used an LS6, a 385 bhp (287 kW) derivative of the standard LS1 engine. Using the much more rigid fixed roof design allowed the Z06 unprecedented handling thanks to upgraded brakes and much less body flex. Those characteristics, along with the use of exotic materials such as a titanium exhaust system and a carbon fiber hood in the 2004 model year, led to further weight savings and therefore performance gains for the C5 Z06. The LS6 was later upgraded to 405 bhp (302 kW) for 2002-2004. Although the Z06's rated power output equal to that of the C4 ZR-1, the improved rigidity, suspension, brakes, and reduced weight of the C5 produced a car much quicker than C4 ZR-1.

Sixth generation-C6 (2005–present)



Corvette Coupe

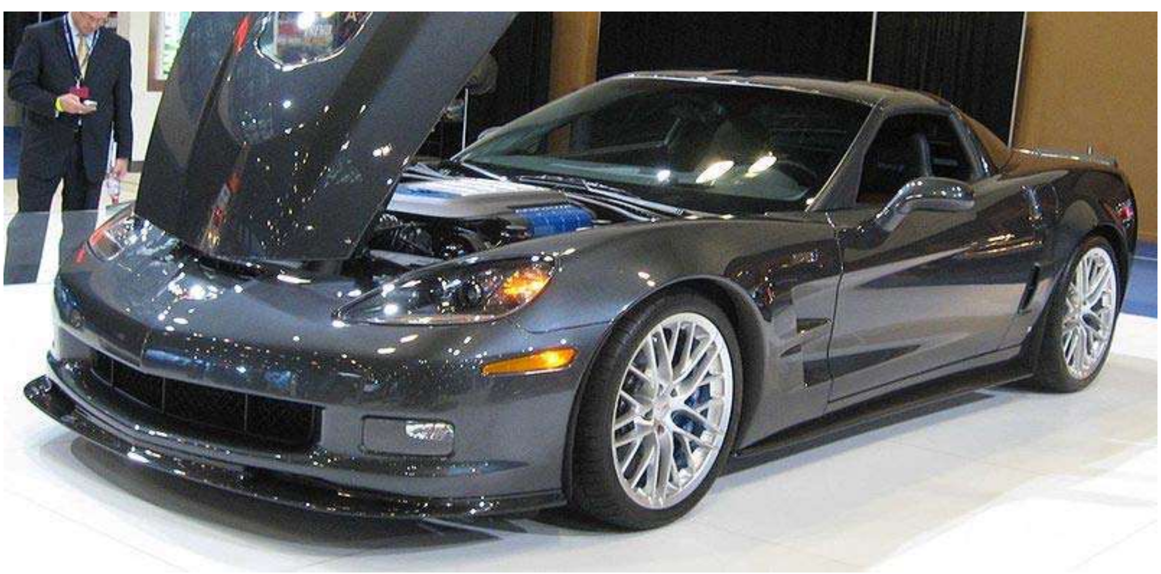
The C6 Corvette received a larger passenger compartment, all new bodywork with exposed headlamps (for the first time since 1962), reworked suspension geometry, and in 2008, a larger 6.2 L (380 cu in) engine. Overall, it is shorter and narrower than the C5 to gain wider appeal to the European market. The 6.0 L (370 cu in) LS2 V8 produces 400 bhp (300 kW) at 6000 rpm and 424 lb·ft (575 N·m) at 4400 rpm, giving the vehicle a 0-60 time of under 4.2 seconds.

The C6 generation comes close to retaining the relatively good fuel economy of the C5, due in part to its relatively low .28 drag coefficient and low curb weight, achieving 16/26 mpg (city/highway) equipped with automatic or manual transmissions; like all manual transmission Corvettes since 1989, it is fitted with Computer Aided Gear Selection (CAGS) to improve fuel economy by requiring drivers to shift from 1st gear directly to 4th in low-speed/low-throttle conditions. This feature helps the C6 avoid the gas guzzler tax while achieving better fuel economy.

The new Z06 arrived as a 2006 model in the third quarter of 2005. It has a 7.0 L version of the small block engine codenamed *LS7*. At 427.6 cubic inches, the Z06 was the largest small block ever offered from General Motors. Because of the Corvette's former use of 427 cubic-inch big blocks in the late '60s and early '70s, the LS7's size was rounded down to 427 cubic inches. Officially certified output is 505 bhp (377 kW) and has a 0-60 mph (97 km/h) time of 3.8 seconds and a top speed of 198 mph (319 km/h).

For 2008, the Corvette received a mild freshening: a new LS3 engine with displacement increased to 6.2 L (380 cu in), resulting in 430 bhp (321 kW) and 424 lb·ft (575 N·m) (436 bhp (325 kW) and 428 lb·ft (580 N·m) if ordered with the optional performance exhaust). The 6-speed manual transmission also has improved shift linkage and a 0-60 time of 4.0 seconds, while the automatic is set up for quicker shifts giving the C6 automatic a 0-60 time of 4.3 seconds, faster than any other production automatic Corvette. The interior was slightly updated and a new 4LT leather-wrap interior package was added. The wheels were also updated to a new five-spoke design.

Corvette Convertible



Corvette ZR1

The ZR1 was formally announced in a December 2007 press statement by General Motors, where it was revealed that their target of 100 bhp (75 kW) per 1 L (61 cu in) has been reached by a new "LS9" engine with an Eaton-supercharged 6.2-liter engine producing a confirmed 638 bhp (476 kW) and 604 lb·ft (819 N·m). It would have a sticker price of about US$105,000 with the standard interior or US$115,000 with the leather-wrapped interior. The engine is the most powerful engine to be put into a GM production sports car. Top speed is 205 mph (330 km/h).

In 2010, the historical Grand Sport name returned to the Corvette lineup as an entirely new model series. It combines the wide body from the Z06 with the standard C6 powertrain in coupe and convertible models. With suspension and brake upgrades, the Grand Sport replaced the Z51 option. A new launch control system was introduced for all models that allows for more optimal launch. The Grand Sport with manual transmission and launch control is capable of a 0-60 time in four seconds.

Starting in the 2011 model year, buyers of the Corvette Z06 and ZR1 are offered the opportunity to assist in the build of their engine. Titled the "Corvette Engine Build Experience," buyers can pay an extra $5,800 to be flown to the Wixom, Michigan Performance Build Center. Participants will help the assembly line workers build the V8 engine, then can accept delivery of the car at the National Corvette Museum in Bowling Green, KY, near the Corvette final assembly point.

Next generation development

According to *Motor Trend* magazine, GM executives have been planning the next-generation (C7) Corvette since 2007. The car was originally planned for the 2011 model year (to coincide with the 100th anniversary of Chevrolet). Mid-engine and rear-engine layouts had been considered, but the front-engine, rear-wheel drive (RWD) platform will continue to keep costs lower and the engine compact. There's a possibility of a return of the split rear window roof design. The seventh generation Corvette is still in development, but is widely believed to be publicly unveiled by 2012, but may be delayed further depending on the scope of upcoming Corporate Average Fuel Economy (CAFE) regulations.

According to one of *Motor Trend's* inside sources, the Corvette C7 will come equipped with Chevrolet's upcoming 5.5 L small block V8 that features a number of technical advancements including an aluminum block and heads and a revised combustion system, however the engine will retain the pushrod, overhead valve design configuration. The new 5.5 liter V8 has already made its world debut, appearing between the fenders of the C6.R racecar. Power will likely total 440 hp (328 kW) horsepower, an improvement over the 436 horsepower available currently in the Corvette C6, however thanks to the new engine's smaller size and advanced features, there will be a noticeable jump in fuel economy. The engine is part of a new $890 million program committed for vehicles across the GM lineup. GM has assigned C7 internal codes: Coupe – GMX721, Convertible – GMX711, Z06 – GMX73, ZR-1 or SS – GMX245.

NASA

Astronaut Alan Shepard's Corvette on display at the Kennedy Space Center Visitor Complex

Astronaut Alan Shepard, a long time Corvette owner, was invited by then GM Chief Engineer Zora Arkus-Duntov to drive pre-production Corvette models. General Motors executives later gave Sheppard a 1972 model with a Bill Mitchell interior. Jim Rathmann, a Melbourne, Florida Chevrolet dealer and winner of the 1960 Indy 500, befriended astronauts Shepard, Gus Grissom, and Gordon Cooper. Rathman convinced GM President Ed Cole to setup a program which supplied each astronaut with a pair of new cars each year. Most chose a family car for their wives and a Corvette for themselves. Alan Bean recalls Corvettes lined up in the parking lot outside the astronaut offices at the Johnson Space Center in Houston, and friendly races between Shepard and Grissom along the Florida beach roads and beaches themselves as local police turned a blind eye. Shepard, Grissom and Cooper even pulled each other on skis in the shallow water. The Mercury and later astronauts were unofficially tied to the Corvette and appeared in official photographs with their cars and with mock-ups of space vehicles such as the Lunar Module or Lunar Rover. Cooper talked of the races along Cocoa Beach in his eulogy of Shepard at the Johnson Space Center in 1998.

Concept cars

Corvette concept cars have inspired the designs of several generations of Corvettes. The first Corvette, Harley Earl's 1953 EX-122 Corvette prototype was itself, a concept show car, first shown to the public at the 1953 GM Motorama at the Waldorf-Astoria Hotel in New York City on January 17, 1953. It was brought to production in six months with only minor changes.

Harley Earl's successor, Bill Mitchell was the man behind most of the Corvette concepts of the 1960s and 1970s. The second-generation (C2) of 1963 was his, and its design first appeared on the Sting Ray racer of 1959. It made its public debut at Maryland's Marlborough Raceway on April 18, 1959, powered by a 283 cu in (4.64 L) V8 with experimental 11:1 compression aluminum cylinder heads and took fourth place. It raced through 1960 wearing only "Sting Ray" badges before retiring to tour the auto-show circuit in 1961.

In 1961 the XP-755 Mako Shark show car was designed as a concept for future Corvettes. In keeping with the name, the streamlining, pointed snout, and other detailing was partly inspired by the look of that very fast fish. The 1961 Corvette tail was given two additional tail lights (six total) for the concept car. The body inspired the 1963 production Sting Ray.

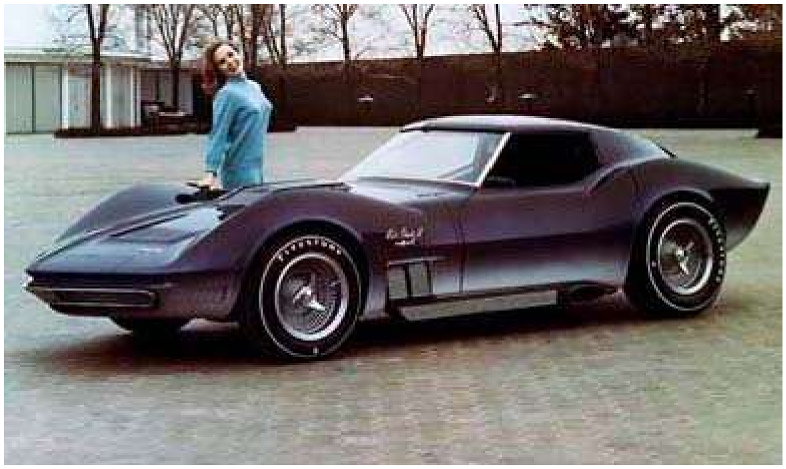
In 1965 Mitchell removed the original concept body and redesigned it as the Mako Shark II. Chevrolet actually created two of them, only one of which was fully functional. The original Mako Shark was then retroactively called the Mako Shark I. The Mako Shark II debuted in 1965 as a show car and this concept influenced Mitchell's redesigned Corvette of 1968.

The Aerovette has a mid-engine configuration using a transverse mounting of its V-8 engine. Zora Arkus-Duntov's engineers originally built two XP-882s during 1969. John DeLorean, Chevy general manager, ordered one for display at the 1970 New York Auto Show. In 1972, DeLorean authorized further work on the XP-882. A near-identical body in aluminum alloy was constructed and became the XP-895 "Reynolds Aluminum Car." Duntov and Mitchell responded with two Chevrolet Vega (stillborn) Wankel 2-rotor engines joined together as a 4-rotor 420 hp (310 kW) engine which was used to power the XP-895. It was first shown in late 1973. The 4-rotor show car was outfitted with a 400 cu in (6.6 L) small-block V8 in 1977 and rechristened Aerovette. GM chairman Thomas Murphy approved the Aerovette for 1980 production, but Mitchell's retirement that year, combined with then Corvette chief engineer Dave McLellan's lack of enthusiasm for the mid-engine design and slow-selling data on mid-engined cars killed the last hope for a mid-engine Vette.

A Corvette Stingray Anniversary concept car was unveiled at the 2009 Detroit Auto Show, fifty years after the Sting Ray racer-concept of 1959. The vehicle was based on a combination of the 1963 Sting Ray and the 1968 Stingray. The new Stingray concept appears in the movie *Transformers: Revenge of the Fallen*, in which it takes the form of character Sideswipe in robot mode.

1959 Sting Ray racer-concept

1961 Mako Shark concept



1965 Mako Shark II concept

1977 Aerovette concept

2009 Corvette Stingray concept

Production notes

Year	Production	Base Price	Notes
1953	300	US$3,498	**First generation (C1) begins**; production starts on June 30; polo white with red interior and black top is only color combination; Options were interior door handles; "clip in" side curtains were a substitute for roll-up windows.
1954	3,640	US$2,774	Production moves to St. Louis; exterior colors-blue, red, and black are added; top color-beige is added, longer tail pipes.
1955	700	US$2,774	Both inline-6 and 265 cu in (4.34 L) V8 engines produced; 3-speed manual transmission added late in the model year.
1956	3,467	US$2,900	New body with roll-up windows; V8-only; 3-speed manual transmission becomes standard equipment and Powerglide moved to option list.
1957	6,339	US$3,176	283 cu in (4.64 L) V8; Optional 4-speed manual and fuel injected engine option added.
1958	9,168	US$3,591	Quad-headlights and longer, face-lifted body; new interior and dash, fake louvers on hood and chrome strips on trunk

			lid; number of teeth in grille reduced from 13 to 9.
1959	9,670	US$3,875	First black interior and dash storage bin; only year with a turquoise top; louvers and chrome strips from '58 removed.
1960	10,261	US$3,872	Minor changes to the interior: red and blue bars on the dash logo, vertical stitching on seats.
1961	10,939	US$3,934	New rear styling, bumpers, and round taillights. New fine-mesh grill.
1962	14,531	US$4,038	327 cu in (5.36 L) V8 engine; last year with a trunk until 1998. New black grill with chrome surround, chrome rocker panel moldings.
1963	21,513		**Second generation (C2) begins**;new coupe body style introduced (only year for split rear window); coupe more expensive than convertible.
1964	22,229	US$4,037	rear backlite windows of coupe changed to single pane window; hood louvers deleted.
1965	23,562	US$4,106	396 cu in (6.49 L) Big-Block V8 added; last year of fuel injected engine option (until 1982-std.); side-discharge exhaust introduced.
1966	27,720	US$4,084	427 cu in (7.00 L) Big-Block V8 with unique bulging hood; 327 cu in (5.36 L) 300 horsepower (220 kW) small block V8 standard.
1967	22,940	US$4,240	five-louver fenders are unique; Big-Block hood bulge redesigned as a scoop; parking brake changed from pull-out under dash handle to lever mounted in center console; Tri-power 427 would become a sought-after Corvette.
1968	28,566	US$4,663	**Third generation (C3) begins**; New body and T-top removable roof panels, new interior, engines carried over, three-speed Turbo Hydra-matic replaces two-speed Powerglide as automatic transmission option.
1969	38,462	US$4,780	First year of the 350 cu in (5.7 L) Small-Block; longer model year extended to December, 1969 due to delay in introduction of 1970 model; "Stingray" front fender nameplates added, new interior door panels and inserts, 17-inch black-vinyl steering wheel (replaced 18-inch wood-rim wheel).
1970	17,316	US$5,192	First year for the LT-1 Small-Block and 454 cu in (7.44 L) Big-Block; three-speed manual transmission dropped and four-speed manual became standard with Turbo Hydra-matic available as no-cost option with all engines except LT-1 350; posi-traction made standard equipment; introduced along with the second-generation Chevrolet Camaro on Feb. 26, 1970, new egg-grate metal front grills and fender grills, lower molded fender flares, new hi-back seats and interior trim, new custom interior option

			includes: leather seat trim, cut-pile carpeting, lower-carpeted door panels and wood-grain accents.
1971	21,801	US$5,496	Significant power drops due to reduced compression ratios to meet GM corporate edict requiring all engines to run low-octane unleaded gasoline; power ratings based on both "gross" and "net" figures with the former based on engine hooked to dynometer while "net" ratings based on power as installed in vehicle with accessories and emission controls installed.
1972	27,004	US$5,533	Power ratings now advertised in SAE net figures, last year for LT-1 engine, front and rear chrome bumpers, removable rear window, and windshield wiper door.
1973	30,464	US$5,561	5 mph (8.0 km/h) front bumper system with urethane cover, pot-metal front grills (black with silver edges), chrome rear bumpers unchanged, new design front fender ducts, first year for radial tires (standard equipment), rubber body mounts, new hood with rear air induction and under-hood insulation, new front-end (round) emblem. cross-flag gas-lid emblem deleted towards the end of the model year.
1974	37,502	US$6,001	5 mph (8.0 km/h) rear bumper system with urethane cover to match previous year's front bumper, new recessed taillamps and down-turned tail-pipes. 1974 is the only year with two piece rear bumper cover with center-split. No gas lid emblem was used. Aluminum front grills (all-black), dual exhaust resonators added, revised radiator cooling and interior a/c ducts, integrated seat /shoulder belts in coupe. Last year for true dual exhaust system, last year for the 454 big-block engine in a Corvette.
1975	38,645	US$6,810	First year of Catalytic converter and single-exhaust, black (painted) bumper pads front and rear, redesigned inner-bumper systems and one-piece rear bumper cover, plastic front grills (all-black), amber parking lamp lenses (replaced the clear lenses on 1973-1974) new emblems, last year of C3 convertible.
1976	46,558	US$7,604	First-year for steel floor-panels, cold-air induction dropped, new aluminum alloy wheels option, new one-piece rear "Corvette" nameplate (replaces letters), last year of "Stingray" fender nameplates.
1977	49,213	US$8,647	Black exterior available (last year-1969), new design ""Corvette flags" front end and fender emblems. New interior console and gauges, universal GM radios.
1978	46,776	US$9,750	New fastback rear window, Silver Anniversary and Indy 500 Pace Car special editions; Pace-car included sport seats and spoilers-front and rear, limited option-glass t-

			tops; redesigned interior, dash, instruments.
1979	53,807	US$10,220	Sport seats (from the previous year's pace-car); front and rear spoilers optional, glass t-tops optional; New interior comfort features; highest Corvette sales year to date.
1980	40,614	US$13,140	Lightened materials, new hood, front end with molded spoilers, rear bumper cover with molded spoiler and new tail lamps, Federal government required 85 mph (137 km/h) speedometer; California cars powered by 305 V8 and automatic transmission for this year only, last year for L-82 engine-(n/a with manual transmission)
1981	40,606	US$16,258	Production is switched from St. Louis to new Bowling Green plant; 350 cu in (5.7 L) V8 returns in California cars, last year for manual transmission.
1982	25,407	US$18,290	New cross-fire fuel-injected L83, New automatic overdrive transmission; Collectors Edition features exclusive hatch rear window - is one fourth of production.
1984	51,547	US$21,800	**Fourth generation (C4) begins**; hatchback body; digital instrumentation L83 engine continued from 1982.
1985	39,729	US$24,891	More powerful and fuel efficient L98 engine introduced.
1986	35,109	US$27,027	First convertible since 1975. Third brake light, antilock brakes, and key-code anti-theft system are new.
1987	36,632	US$27,999	Callaway twin-turbo offered through dealers with GM warranty.
1988	22,789	US$29,480	New wheel design; all white 35th Anniversary special edition coupe.
1989	26,412	US$32,045	ZF 6-speed manual replaces Doug Nash 4+3.
1990	23,646	US$32,479	ZR-1 is introduced with DOHC LT5 engine. Interior redesigned to incorporate drivers-side air bag.
1991	20,639	US$33,005	Restyled exterior; last year for the Callaway B2K twin turbo.
1992	20,479	US$33,635	New LT1 engine replaces the L98; Traction control is standard.
1993	21,590	US$34,595	Passive keyless entry is standard; 40th Anniversary special edition in Ruby Red.
1994	23,330	US$36,185	New interior including passenger airbag.
1995	20,742	US$36,785	Last year of the ZR-1; minor exterior restyling; Indy Pace Car special edition.
1996	21,536	US$37,225	Optional LT4 engine with 330 bhp (246 kW). Collectors Edition and Grand Sport special editions. First year with OBD II diagnostics.
1997	9,752	US$37,495	**Fifth generation (C5) begins**; LS1 engine is new; the hatchback coupé is the only body style offered.

1998	31,084	US$38,995	Convertible C5 debuts with the first trunk in a Corvette convertible since 1962; Indianapolis 500 Pace Car replica offered; Active Handling System introduced as optional equipment.
1999	33,270	US$39,777	Less-expensive hardtop coupé is offered.
2000	33,682	US$40,900	Newly styled alloy wheels debut.
2001	35,627	US$41,475	Hardtop coupé body style becomes top-performance Z06, utilizing the new LS6 engine and suspension improvements; Second-Generation Active Handling System becomes standard equipment on all models; slight (5 bhp (3.7 kW)) increase in base model engine power.
2002	35,767	US$42,450	20 bhp (15 kW) increase for the Z06.
2003	35,469	US$45,895	50^{th} Anniversary Edition package offered for Coupe and Convertible base models; F55 Magnetic Selective Ride Control Suspension supersedes F45 Selective Ride Control Suspension as base-model option.
2004	34,064	US$46,535	24 Hours of Le Mans Commemorative Edition package offered for all models.
2005	37,372	US$44,245	**Sixth generation (C6) begins**; New body is first with fixed headlights since 1962; no Z06 model and a late convertible introduction.
2006	34,021	US$43,800	Z06 debuts; 6-speed automatic with paddle shift available on non-Z06 models.
2007	40,561	US$44,250	6-speed automatic paddle shift delays are reduced drastically compared to 2006.
2008	35,310	US$46,950	Mild freshening, LS3 introduced, All leather interior added (4LT, LZ3).
2009	16,956	US$47,500	ZR1 model added, new "Spyder" wheels for Z06.
2010	12,194	US$48,930	Grand Sport Coupe and Convertible added; replaces the Z51 performance package, launch control standard on MN6 models.

Owner demographics

According to research by Specialty Equipment Market Association and Experian Automotive, as of 2009, there were approximately 750,000 Corvettes of all model years registered in the United States. Corvette owners were fairly equally distributed throughout the country, with the highest density in Michigan (3.47 per 1000 residents) and the lowest density in Utah, Mississippi, and Hawaii (1.66, 1.63, and 1.53 registrations per 1000 residents). 47% of them hold college degrees (significantly above the nationwide average of 27%), and 82% are between ages of 40 and 69 (median age being 53).

Racing

A GT1 C6-R on the back straight of Long Beach

C5-R

The C5-R racer was built by Pratt & Miller for GM Racing. It was based on the C5 road car but had a longer wheelbase, a wider track, an enlarged engine and more aerodynamic bodywork with a rear wing and exposed headlamps. It took part in the American Le Mans Series in the GTS Class and competed in five 24 Hours of Le Mans races as a Corvette Racing entry.

C6-R

C6.R GT1 (Z06) In 2005, the factory Corvette Team began racing the C6.R to coincide with the new sixth generation (C6) Corvette being released to the public. Private teams, primarily in Europe, continued to race the C5-R for a couple of years before switching to C6.R. Corvette C6.R went on to win its class at every race it entered in the 2005 ALMS season. By the end of 2009, Corvette had clinched four consecutive ALMS GT1 team and manufacturers titles (2005-2008) and three Le Mans 24 Hour class victories in the LMGT1 category (2005, 2006, 2009). 2007 and 2008 races were won by the factory Aston Martin squad's DBR9. The last official race for factory GT1 Corvettes was the 2009 24 Hours of Le Mans.

C6.R GT2 (ZR1) While some privateers continued to use GT1 version of the C6.R in Europe, the official factory team Corvette Racing switched from slowly dying GT1 category to much more competitive and popular GT2 class in mid-2009. The new GT2 C6.R, based on ZR1 -model, was considerably more restricted and less powerful than it's predecessor. The car debuted at Mid-Ohio's ALMS round. They archieved one ALMS race victory in the remaining 2009 ALMS season, and one victory at the final round of 2010 ALMS season, Petit Le Mans. Corvette Racing's two GT2 C6.Rs also led most of the 2010 24 Hours of Le Mans, but both cars were forced to retire.

Indianapolis 500 pace cars

The two Chevrolet Corvette pace cars for the 2008 race; a metallic green pace car that ran on E85 driven by Emerson Fittipaldi at the start, and a pace car painted to resemble the 1978 pace car that ran on gasoline (used during caution periods)

A Corvette has been selected as the pace car at the Indianapolis 500 ten times. The 2008 edition of the Indy 500 represents a record fifth-consecutive year to lead the field. The Corvette's pace car years and details include:

- 1978 – Driven by 1960 race winner Jim Rathmann; Chevrolet produced 6,502 production replicas
- 1986 – Driven by famed pilot Chuck Yeager; all 7,315 production convertibles were considered pace car convertibles and included official graphics (to be installed at the owner's discretion)

- 1995 – Driven by then Chevrolet General Manager Jim Perkins; 527 production replicas produced
- 1998 – Driven by 1963 race winner Parnelli Jones when an injury prevented golfer Greg Norman from performing the duty; 1,158 production replicas produced
- 2002 – Driven by actor Jim Caviezel; no production replicas produced but graphics were available through SPO – approximately 300 sets sold
- 2004 – Driven by actor Morgan Freeman; no production replicas produced
- 2005 – Driven by General Colin Powell; no production replicas produced
- 2006 – Driven by cycling champion Lance Armstrong; first Corvette Z06 pace car; no production replicas produced
- 2007 – Driven by actor Patrick Dempsey; 500 production replicas – all convertibles
- 2008 – Driven by Emerson Fittipaldi; 500 production replicas – coupes and convertibles

Chapter 3

AC Cobra

AC Cobra

Manufacturer	AC Cars
Also called	Shelby Cobra
Production	1961-1967
Assembly	Thames Ditton, Surrey, England
Body style(s)	2-door roadster
Layout	FR layout

MkI

Production	1962-1963
Engine(s)	260 cu in (4.3 L) V8
Wheelbase	90 in (2286 mm)
Length	151.5 in (3848 mm)
Width	61 in (1549 mm)
Height	49 in (1245 mm)
Curb weight	2,019 lb (916 kg)

MkII

Production	1963-1965
Engine(s)	289 cu in (4.7 L) V8
Wheelbase	90 in (2286 mm)
Length	151.5 in (3848 mm)
Width	61 in (1549 mm)
Height	49 in (1245 mm)
Curb weight	2,315 lb (1,050 kg)

MkIII

Production	1965-1967
Engine(s)	427 cu in (7.0 L) V8
Wheelbase	90 in (2286 mm)
Length	156 in (3962 mm)
Width	68 in (1727 mm)
Height	49 in (1245 mm)
Curb weight	2,355 lb (1,068 kg)

The **AC Cobra**, also known as the **Shelby Cobra**, is an Anglo-American sports car that was produced during the 1960s.

History and development

Like many British specialist manufacturers, AC Cars had been using the smooth, refined Bristol straight-6 engine in its small-volume production, including its AC Ace 2-seater roadster. This had a hand-built body with a steel tube frame, and aluminium body panels that were made using English wheeling machines. The engine was a pre-World War II design of BMW which by the 1960s was considered dated. Bristol decided in 1961 to cease production of its engine and instead to use Chrysler 331 cid (5.4 L) V8 engines. Although untrue, it is commonly believed that AC was left without a future source of power and that American ex-racing driver Carroll Shelby saved the company from bankruptcy. AC started using the 2.6 litre Ford Zephyr engine in its cars. In September

1961, Shelby airmailed AC a letter asking them if they would build him a car modified to accept a V8 engine. AC agreed, provided a suitable engine could be found. He first went to Chevrolet to see if they would provide him with engines, but not wanting to add competition to the Corvette they said no. Ford however, wanted a car that could compete with the Corvette and they happened to have a brand new thin-wall small-block engine which could be used in this endeavor. It was Ford's 260 in^3 HiPo (4.2 L) engine - a new lightweight, thin-wall cast small-block V8 tuned for high performance. In January 1962 mechanics at AC Cars in Thames Ditton, Surrey fitted the prototype chassis CSX0001 with a 221ci Ford V8. After testing and modification, the engine and transmission were removed and the chassis was air-freighted to Shelby in Los Angeles on 2 February 1962. His team fitted it with an engine and transmission in less than eight hours at Dean Moon's shop in Santa Fe Springs, California, and began road-testing.

Production proved to be easy, since AC had already made most of the modifications needed for the small-block V8 when they installed the 2.6 litre Ford Zephyr engine, including the extensive rework of the AC Ace's front end. The most important modification was the fitting of a stronger rear differential to handle the increased engine power. A Salisbury 4HU unit with inboard disk brakes to reduce unsprung weight was chosen instead of the old ENV unit. It was the same unit used on the Jaguar E-Type. On the production version, the inboard brakes were moved outboard to reduce cost. The only modification of the front end of the first Cobra from that of the AC Ace 2.6 was the steering box, which had to be moved outward to clear the wider V8 motor.

The first 75 Cobra Mark I (including the prototype) were fitted with the 260 engine (4.2 L). The remaining 51 Mark I model were fitted with a larger version of the Windsor Ford engine, the 289 in^3 (4.7 L) V8. In late 1962 Alan Turner, AC's chief engineer completed a major design change of the car's front end and was able to fit it with rack and pinion steering while still using transverse leaf spring suspension. The new car entered production in early 1963 and was designated *Mark II*. The steering rack was borrowed from the MGB while the new steering column came from the VW Beetle. About 528 Mark II Cobras were produced to the summer of 1965 (the last US-bound Mark II was produced in November 1964).

By 1963 the leaf-spring Cobra was losing its supremacy in racing. Shelby tried fitting a larger Ford FE engine of 390 in^3. Ken Miles drove and raced the FE-powered Mark II and pronounced the car was virtually undrivable, naming it "The Turd." A new chassis was developed and designated *Mark III*.

The new car was designed in cooperation with Ford in Detroit. A new chassis was built using 4" main chassis tubes (up from 3") and coil spring suspension all around. The new car also had wide fenders and a larger radiator opening. It was powered by the "side oiler" Ford 427 engine (7.0 L) rated at 425 bhp (317 kW), which provided a top speed of 164 mph (262 km/h) in the standard model and 485 bhp (362 kW) with a top speed of 185 mph (298 km/h) in the competition model. Cobra Mark III production began on 1 January 1965; two prototypes had been sent to the United States in October 1964. Cars were sent to the US as unpainted rolling chassis, and they were finished in Shelby's workshop. Although an impressive automobile, the car was a financial failure and did not sell well. In fact to save cost, most AC Cobra 427s were actually fitted with Ford's 428 in³ (7.0 L) engine, a long stroke, smaller bore, lower cost engine, intended for road use rather than racing. It seems that a total of 300 Mark III cars were sent to Shelby in the USA during the years 1965 and 1966, including the competition version. 27 small block narrow fender version which were referred to as the AC 289 were sold in Europe. Unfortunately, The MK III missed homologation for the 1965 racing season and was not raced by the Shelby team. However, it was raced successfully by many privateers and went on to win races all the way into the 70s. Interestingly, 31 unsold competition cars were detuned and made road worthy and called S/C for semi-competition. Today, these are the rarest and the most valuable models and can sell for in excess of 1.5 million dollars.

AC Shelby Cobra

AC Cobras had an extensive racing career. Shelby wanted it to be a "Corvette-Beater" and at nearly 500 lb (227 kg) less than the Chevrolet Corvette, the lightweight car did just that. It was February 2nd, 1963 at Riverside International Raceway that driver Dave MacDonald beat an impressive field of Corvettes, Jaguars, Porsches, and Maseratis to give the Cobra its first-ever victory.

The Cobra was perhaps too successful as a performance car and reputedly contributed to the implementation of national speed limits in the United Kingdom. An AC Cobra Coupe was calculated to have done 186 mph (299 km/h) on the M1 motorway in 1964, driven by Jack Sears and Peter Bolton during shakedown tests prior to that year's Le Mans 24h race. However, government officials have cited the increasing accident death rate in the early 1960s as the principal motivation, with the exploits of the AC Cars team merely highlighting the risk.

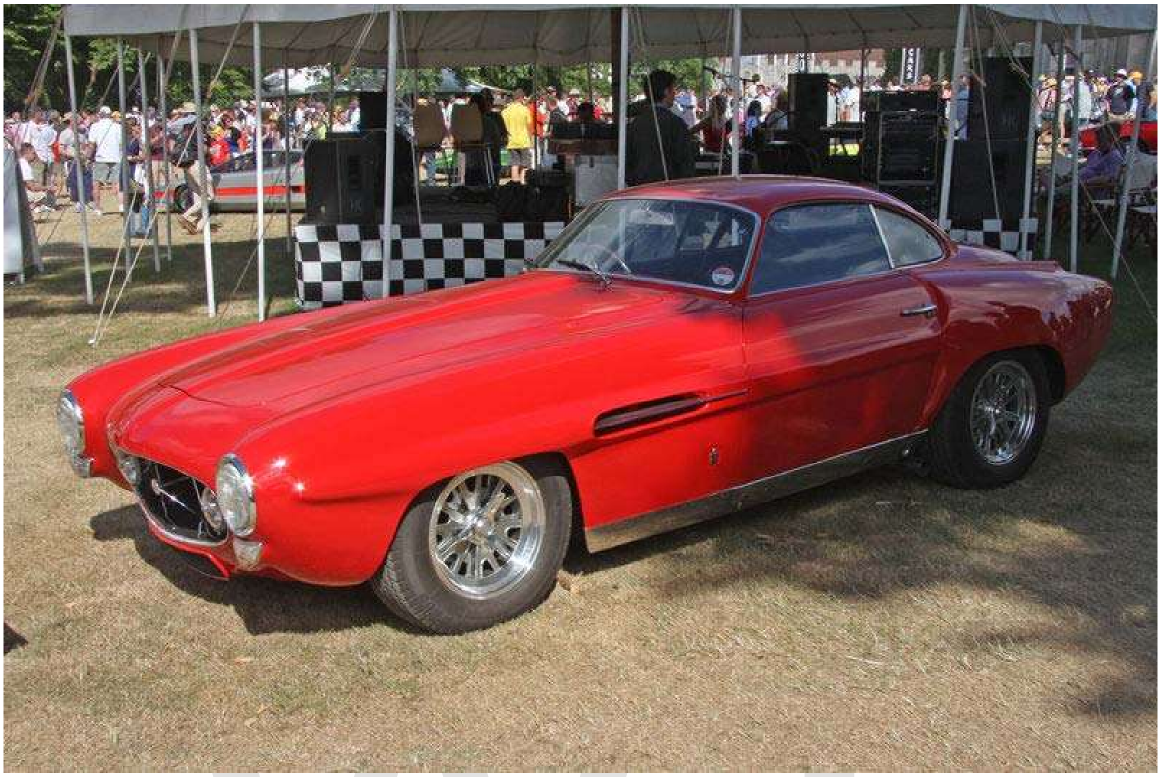
Although successful in racing, the AC Cobra was a financial failure, which led Ford and Carroll Shelby to discontinue importing cars from England in 1967. AC Cars kept producing the coil spring AC Roadster with narrow fenders, a small block Ford 289 and called the car the AC 289. It was built and sold in Europe until late 1969. AC also produced the AC 428 until 1973. The AC Frua was built on a stretched Cobra 427 MK III coil spring chassis using a very angular handsome steel body designed and built by Pietro Frua. With the demise of the 428 and succeeding 3000ME, AC shut their doors in 1984 and sold the AC name to a Scottish company. The company's tooling, and eventually the right to use the name, were licensed by Autokraft, a Cobra parts reseller and replica car manufacturer owned by Brian A. Angliss.

Autokraft era

Autokraft manufacturing an AC 289 continuation car from 1982 as the **Autokraft Mk IV**, basically a Mk III with a 5.0 L (302 ci) Ford V8 and Borg Warner T5 Transmission. The Mk IV also received an independent suspension. Shortly thereafter, Carroll Shelby filed suit against AC Cars and Brian A. Angliss, in U.S. District Court in Los Angeles. The ensuing settlement resulted in Shelby and AC Cars/Angliss releasing a joint press release whereby AC/Angliss acknowledged that Carroll Shelby was (and is) the manufacturer of record of all the 1960s AC Cobra automobiles in the United States and that Shelby himself is the sole person allowed to call his car a Cobra. Nonetheless, production of the Mk IV continued, from 1987 as a joint venture with Ford as the **AC Mk IV** with a 250 hp (186 kW) at 4,200 rpm, 4,942 cc Ford V8 which provided a top speed of 215 km/h (134 mph) and 0-100 km/h in 5.2 seconds. At the 1990 Geneva Salon the **Lightweight** version was presented: weight was down to 1,070 kg (2,400 lb) (compared to 1,190 kg/2,600 lb) and power was up to 370 hp (276 kW) at 5,750 rpm thanks to alloy heads, a Holley Performance Products four-barrel carburettor, and no catalytic converter. While the Lightweight did not meet US federal regulations, the Mk IV did, and 480 cars of all versions were built until 1996.

Coupé

1964 Shelby Daytona Cobra Coupe (CSX2299)



1965 Willment Cobra

In an effort to improve top speed along the legendary Mulsanne Straight at the 24 Hours of Le Mans race, a number of enclosed, coupe variations were constructed using the leafspring chassis and running gear of the AC/Shelby Cobra Mark II. The most famous and numerous of these were the official works Shelby Daytona Cobra Coupes. Six were constructed in total, each being subtly different from the rest. AC also produced a Le Mans coupe. The car was a one-off and was nearly destroyed after a high-speed tire blow-out at the 1964 Le Mans race. The car was completely rebuilt and as of now is in private ownership in England. The third significant Cobra-based coupe was the Willment Cobra Coupe built by the JWA racing team. A road-going Shelby Daytona Cobra replica is being manufactured by Superformance and Factory Five Racing, a well known kit car company. These cars use Pete Brock's bodywork designs, scaled up to increase room inside, and a newly designed spaceframe chassis, they are powered by Roush-built Ford Windsor (Sportsman) engines. The Superformance Shelby Daytona Coupe is the only modern-day vehicle recognized by Shelby as a successor to the original Coupes.

Continuation cars

From the late 1980s onwards, Carroll Shelby (Shelby Automobiles, Inc.) and associated companies have built what are known in the hobby as "Continuation Cars"; Shelby authorized continuations of the original AC bodied Shelby Cobra series. Produced in Las Vegas, Nevada, these cars retain the general style and appearance of their original 1960s ancestors, but are fitted with modern amenities. Initially the car everyone wanted in a

Continuation was a 427 S/C model which was represented in the CSX4000 series. This was meant to continue where the last 427 S/C production left off, at approximately serial number CSX3560 in the 1960s.

The initial CSX4000 series cars were completed from new old stock as well as newly manufactured parts. Gradually as the vintage parts supply ran low, newly constructed frames and body panels were obtained from a variety of suppliers. The production of chassis numbers CSX4001 to CSX4999 took roughly 20 years and many different business relationships to complete.

All models of Cobra produced are available now as continuations. In 2009, CSX4999 was produced, concluding the 4000 series. Production has continued with the CSX6000 serial numbers, featuring "coil over" suspension. The 289 FIA "leaf spring" race version of the car is reproduced as CSX7000, and the original "slab side" leaf spring street car is the CSX8000 series.

To date most continuations are produced in fiberglass, with some ordering cars with aluminum or carbon fibre bodywork.

In 2004, at the North American International Auto Show in Detroit, Ford unveiled a concept for a modernized Shelby Cobra. The Ford Shelby Cobra Concept was a continuation of Ford's effort to bring back the retro sports cars that had been successful in the 1960s, including the Ford GT40 and the fifth generation Ford Mustang.

Super Snake

Competition 427, (CSX3009) "Ollie the Dragon"

Shelby Motors built twenty two 427 competition roadsters. In 1965, one was selected and converted into a special model called the 427 "Cobra to End All Cobras." The first one of these (number CSX3015) was originally part of a European promotional tour before its conversion. This conversion called for making the original racing model street legal with mufflers, a windshield and bumpers amongst other modifications. But some things were not modified, including the racing rear end, brakes and headers. The most notable modification is the addition of Twin Paxton Superchargers. This gave the car a claimed 462 brake horsepower (bhp) and 800 Ft pounds of torque at 3000 rpm. Officially 0 to 60 mph was achieved in 4.5 seconds, although there are reports of this being achieved in little over 3 seconds.

Another non-competition 427 roadster, CSX3303, was converted and given to Shelby's close friend, Bill Cosby. Cosby attempted to drive the super-fast Cobra, but had issues with keeping it under control. This was humorously documented in Cosby's album titled *Bill Cosby, 200 M.P.H.*. Cosby gave the car back to Shelby, who then shipped it out to one of their dealers in San Francisco, S&C Ford on Van Ness Avenue. S&C Ford then sold it to customer Tony Maxey. Maxey, suffering the same issues as Cosby did with the car, lost control and drove it off of a cliff, landing in the Pacific Ocean waters. It is to be noted that Maxey's accident was largely speculated as suicide. It was eventually recovered and the wreckage was bought by Brian Angliss of AC/Autokraft. Since CSX3303 was so badly damaged in the Maxey accident, it is doubtful that much of the original car will surface in the restored version.

Shelby's original model, CSX3015, was kept by Carroll Shelby himself over the years as a personal car, sometimes entering it into local races like the Turismos Visitadores Cannonball-Run race in Nevada, where he was "waking [up] whole towns, blowing out windows, throwing belts and catching fire a couple of times, but finishing." CSX3015 was auctioned off on 22 January 2007 at the Barrett-Jackson Collector Car Event in Scottsdale, Arizona for $5 million plus commission (£2.8million). This would be a record for Cobras, as well as for a Barrett-Jackson sell price.

Chapter 4

Alfa Romeo Giulia TZ

Alfa Romeo Giulia TZ

Alfa Romeo Giulia TZ

Manufacturer	Alfa Romeo
Also called	Alfa Romeo TZ
Production	1963–1967
Predecessor	Alfa Romeo Giulietta SZ
Successor	Alfa Romeo GTA Alfa Romeo Tipo 33
Body style(s)	2-door coupe
Layout	FR layout
Engine(s)	1.6 L I4
Transmission(s)	5-speed manual
Wheelbase	2,200 mm (86.6 in)

Length	3,950 mm (155.5 in) TZ 3,680 mm (144.9 in) TZ2
Width	1,509 mm (59.4 in) TZ 1,600 mm (63.0 in) TZ2
Height	1,199 mm (47.2 in) TZ 1,020 mm (40.2 in) TZ2
Curb weight	660 kg (1,500 lb) (TZ) 620 kg (1,400 lb) (TZ2)


17
CHRISTIE'S
17


Van Steenkiste
AH-38-20

The **Alfa Romeo Giulia TZ** (also known as the **Alfa Romeo TZ** or **Tubolare Zagato**) was a small sports car manufactured by Alfa Romeo from 1963 to 1967. It replaced the Giulietta SZ.

TZ

Alfa Romeo Giulia TZ at the 2008 Goodwood Festival of Speed


AH-38-20


Dennis Vogel
AH-38-20

The original TZ, currently sometimes referenced as TZ1 to differ from later TZ2, was developed in together with Autodelta, a company led by Ex-Ferrari engineer Carlo Chiti. It featured a 1570 cc twin cam engine and other mechanical components shared with the Alfa Romeo Giulia and carried a 105 series chassis number, but was a purpose built sports racing car, with a tubular spaceframe chassis, light all-aluminium bodywork, disc brakes and independent suspension. The result was a lightweight coupé of only 650 kilograms (1,400 lb) and top speed of 134 miles per hour (216 km/h). The TZ was built both for street and racing trim, with the latest racing versions producing up to 160 brake horsepower (120 kW). Alfa's twin-spark cylinder head, as also used in the GTA, contributed to the speed of the TZ; the standard Giulia alloy block with wet steel liners was installed at an angle under the hood of the TZ to improve airflow.

Aiding the TZ in its quest for performance was the treatment of the rear bodywork. Incorporating the research of Dr. Wunibald Kamm, the TZ used a style called "coda tronca" in Italian, meaning "short tail.", otherwise known as the Kamm tail. The principle is that unless you are willing to incorporate an aircraft-like extended tail (not practical for an automobile), there is surprisingly little increase in drag by simply chopping the tail at an angle. Zagato had previously proved the success of this tail treatment in their "coda tronca" Sprint Zagato sports-racing cars, and it was a natural evolution to adapt this to the Giulia TZ.

The car debuted at the 1963 FISA Monza Cup, where TZs took the first four places in the prototype category. At the beginning of 1964 the TZ was homologated (100 units were needed for homologation) to the Gran Turismo category. After homologation it started to take more class wins in Europe and North-America. Of the first TZ, 112 units were built between 1963 and 1965. Only built as limited amount these TZ models are quite collectibles nowadays, listed price around 150,000-200,000 US dollars.

Engine

- 1570 cc straight-4 DOHC 112 bhp (82 kW) at 6500 rpm (road trim), 160 bhp (118 kW) (race trim)

TZ2

TZ2 at the 2006 Goodwood Festival of Speed

Rear view of TZ2

In 1965 the car was updated with new fibreglass bodywork providing lower drag and reduced weight (620 kg). This new version was also made by Zagato. The new design was called the **Alfa Romeo Giulia TZ2**. The TZ2 was only built as racing version with Autodelta prepared twin plug, dry sump lubrication engine producing around 170 brake horsepower (130 kW). With this engine the car reached top speed of 152 miles per hour (245 km/h). The rear window was also changed, now single unit rather than three part window in TZ. Development of TZ cars was stopped in the end of 1965, to make room for new GTA racing program. Only 12 TZ2's were built.

Engine

- 1570 cc straight-4 DOHC (twin plug) 170 bhp (125 kW) at 7000 rpm

TZ3

Alfa Romeo TZ3

Alfa Romeo TZ3 rear end

In honor of 100 years of Alfa's house, Zagato designed a one-off car that was first presented and won the 2010 edition of the Concorso d'Eleganza Villa d'Este in Italy.

This unique car, based on the 8C Competizione, was made for German collector Martin Kapp and is not intended for sale or for competitions.

The car weights 850 kg (1,874 lb) thanks to its carbon fiber frame and hand beaten aluminum body and has 420 hp (313 kW) dry sump V8 4.7 liter engine. The car has a 6-speed sequential gearbox, it reaches top speed of over 300 km/h (186 mph) and it can accelerate from zero to 100 km/h (62 mph) in 3.5 seconds.

Chapter 5

Alfa Romeo GTA

Alfa Romeo GTA

Alfa Romeo Giulia Sprint 1600 GTA Stradale

Manufacturer	Alfa Romeo
Also called	Giulia Sprint 1600 GTA
Production	1965-1969
Predecessor	Giulietta Coupé
Class	Sports car
Body style(s)	2-door coupe
Layout	FR layout
Engine(s)	1.6 L Straight-4

Alfa Romeo GTA in competition

The **Alfa Romeo GTA** is a coupé automobile manufactured by the Italian manufacturer Alfa Romeo from 1965 to 1971. It was made for racing and road use.

In 1962, the successor for the very popular Giulietta series was introduced. This car was the Alfa Romeo Giulia, internally called the "Series 105". The coupé of the 105 series, used the shortened floorpan from the Giulia Berlina and was designed by Bertone. The name of the car evolved from Giulia Sprint GT to Giulia Sprint and to GTJ (Junior) and GTV (Veloce) in the late 1960s.

At the time, Alfa was very active in motorsport. Autodelta, the racing division of Alfa, developed a car for competition that closely resembled to the roadgoing model. These cars were named GTA instead of GT, the 'A' standing for "Alleggerita", Italian for lightweight. The GTA was produced first in 1965 as a 1600 (1570 cc) and later as a 1300 Junior version. The GTA automobiles were also manufactured in either street (Stradale) or pure race (Corsa) trim.

The GTA had aluminium outer body panels instead of steel, (the inner steel panels were also of thinner gauge, the inner and outer panels were bonded and pop-riveted together), magnesium alloy wheels, clear plastic side windows, an aluminium rear upper control arm, different door handles and quarter window mechanisms, and lightweight interior trim. The engine had a new 8-spark plug (twin spark, twin plug) cylinder head with spark fed by a Marelli distributor from a Ferrari Dino, 45 mm carburetors instead of 40 mm and magnesium camshaft cover, sump and timing cover. The transmission gear ratios were closer than standard and the gears were machined for lightness and quicker shifting. Dry weight of the 1600 was approximately 1,640 pounds (740 kg). In stradale form this car boasted approximately 115 PS (85 kW; 113 hp) (up from 106 PS (78 kW; 105 hp)). In full race form this engine could produce up to 170 PS (130 kW; 170 hp). The 1600 GTA did not have a brake booster and had a thicker radiator than the standard vehicle. For Homologation 500 cars were made for racing and road use.

GTA 1300 Junior

Alfa Romeo 1300 GTA Junior

Alfa Romeo GTA Junior

Production	1968–1972
Body style(s)	2-door coupe
Engine(s)	1.3 L straight-4

The **GTA 1300 Junior** (1968–1972) had a 1300 cc engine that was based on the 1600 engine but with a short stroke crankshaft. The GTA Junior in stradale form did not have many of the light weight features of the 1600 GTA, such as the plastic windows, magnesium engine components and alloy wheels. At start the engine produced 96 PS (71 kW; 95 hp) but was soon raised to 110 PS (81 kW; 110 hp). Autodelta prepared fuel injected racing cars had 165 PS (121 kW; 163 hp). 450 GTA Juniors were produced.

GTAm

Alfa Romeo GTAm

Production	1970–1971
Body style(s)	2-door coupe
Engine(s)	2.0 L straight-4

The **GTAm** (1969–1971) could produce up to 240 PS (180 kW; 240 hp) in the 2000 cc car—a car usually related to the GTA, but unlike the GTA derived from the GTV 1750 (US version). The 1750 GTAm (later called 2000 GTAm when the 2000 GTV was introduced) was created in 1969. There are two schools of thought about the "Am" moniker, neither one ever having been officially confirmed by Alfa Romeo: one expands Am to **Alleggerita Maggiorata** (Italian: lightened enlarged), the other **America Maggiorata**. Most likely the latter is closer to the truth. The car had a full steel body modified with aluminium and / or plastic parts. Because of an increased minimum weight in 1971 (up from 920 to 940 kg's), the GTAm's had less need for aluminium and / or plastic parts. The base for the GTAm was the 1750 GTV with a SPICA mechanical fuel injection system. European market GTVs had dual carbutettors from Dell'Orto or Weber carburetor, while the US versions had mechanical fuel injection in order to meet the stricter emissions requirements in the USA. The 1750 (actually 1779 cc) was bored to 1985 cc and later to 1999 cc to participate in the 2000 cc class, explaining the "maggiorata" (enlarged).

GTA-SA

Alfa Romeo GTA-SA

Production	1967–1968
Body style(s)	2-door coupe
Engine(s)	1.6 L straight-4 supercharged

The Giulia 1600 **GTA-SA** (sovralimentato English: *supercharged*) (1967–1968) was very rare racing car, which was built only 10 copies. Car featured 1570 cc twinspark engine with two oildriven superchargers and it could produce up to 250 PS (180 kW; 250 hp) at 7500 rpm. The GTA-SA was built for FlA Group 5 racing in Europe and it won first place overall in the Hockenheim 100 mile endurance race in 1967 in the hands of the German driver Siegfried Dau.

Racing success

Kwech/Andrey 1966 Trans-Am Championship GTA

Both types, the GTA/ GTA 1300 Junior and the GTAm were very successful, and these cars were driven to numerous victories. In the opening season at Monza, they won the first seven places. Andrea de Adamich claimed the title in 1966.

In the USA the GTA's first racing victory was in January 1966 at the "Refrigerator Bowl", at the now defunct Marlboro Raceway in Maryland, with Monty Winkler and Pete Van der Vate at the wheel. The Autodelta GTA of Horst Kwech and Gaston Andrey won the inaugural Sports Car Club of America's Trans-Am championship in 1966. Horst Kwech also won the first SCCA National B-Sedan ARRC Championship in the same GTA in 1966.

Later on, the 1750 GTAm and the 2000 GTAm cars were driven to victory by Toine Hezemans, who won the 24 hours of Francorchamps with this car. These cars won hundreds of races before competition grew stronger in 1971. But the Giulia sometimes kept up with much bigger engined cars such as the 3 litre BMW CSL.

Technical data

GTA:	Giulia Sprint GTA	Giulia Sprint GTA (racing version)	Giulia GTA 1300 Junior	Giulia GTA 1300 Junior (racing version)	GTA SA	GTAm
Engine:	straight-4					
Displacement:	1,570 cc (96 cu in)	1,570 cc (96 cu in)	1,290 cc (79 cu in)	1,290 cc (79 cu in)	1,570 cc (96 cu in)	1,985 cc (121.1 cu in)
Bore x stroke:	78 mm (3.1 in) x 82 mm (3.2 in)	78 mm (3.1 in) x 82 mm (3.2 in)	78 mm (3.1 in) x 67.5 mm (2.7 in)	78 mm (3.1 in) x 67.5 mm (2.7 in)	78 mm (3.1 in) x 82 mm (3.2 in)	84.5 mm (3.3 in) x 88.5 mm (3.5 in)
Power:	115 PS (85 kW; 113 hp)	164 PS (121 kW; 162 hp)	96 PS (71 kW; 95 hp)	180 PS (132 kW; 178 hp)	220 PS (162 kW; 217 hp)	240 PS (177 kW; 237 hp)
at rpm:	6000	7800	6000	9300	7800	7500
Compression:	9,7 : 1	10,5 : 1	9,7 : 1	11,0 : 1	10,5 : 1	11,0 : 1
Valves per cylinder:	2	2	2	4	2	2
Valve control:	Double overhead camshaft					
Transmission:	5-speed gearbox					
Brakes:	Disc brakes all around					
Suspension front:	Independent suspension, wishbones, coil springs, anti-roll bar					
Suspension rear:	Live Axle, trailing arms, coil springs, telescopic dampers					
Body:	two-door, aluminum panels over steel monocoque					two-door from steel
Weight:	820 kg (1,800 lb)	760 kg (1,700 lb)	920 kg (2,000 lb)	760 kg (1,700 lb)		920 kg (2,000 lb)
Top speed:	185 km/h (115 mph)	220 km/h (137 mph)	175 km/h (109 mph)	210 km/h (130 mph)	240 km/h (149 mph)	230 km/h (143 mph)
Construction:	1965–1969	1965–1969	1968–1975	1968–1975	1967–1968	1970–1971
Quantity:	500		193	300	10	40

Modern GTAs

The designation GTA is now used on the highest performance versions of Alfa Romeo road cars, such as the 147 and now discontinued 156. These cars are powered by V6 engines giving them the most power of the cars in the model range, however despite the

GTA name, they are generally the heaviest cars in the range, due to having large engines and little if any weight saving employed in their construction. For example, the 147 GTA weighs 1,360 kg (2,998 lb).

147

The 147 GTA was introduced in 2002 as the top-end hatchback model for Alfa Romeo. It is powered by a 3.2 litre V6, derived from the 164 from the early 90s. It is a two-door hatchback that seats five, and is characterized by its wider wheel arches, teledial 17 inch wheels, and more aggressive grille design.

156

The 156 GTA was Alfa Romeo's sportiest version of the 156, and used the same 3.2 litre V6 as the 147 GTA, producing 250 PS (184 kW; 247 hp) and 300 N·m (220 lb·ft) of torque. This four-door saloon was available in sedan or wagon versions.

Mito

The Mito GTA prototype has a 1.75 litre, turbocharged straight-4, producing 240 PS (177 kW; 237 hp). However, due to the economic downturn in 2008/2009, the Mito GTA was postponed.

Chapter 6

Ariel Atom

Ariel Atom

Manufacturer	Ariel Ltd
Production	<100 per year
Engine(s)	2.0 L 245-300 bhp Naturally Aspirated or Supercharged Honda K20A1 3.0L 500 bhp Ariel V8
Length	3.41 m (11 ft 2 ½ in)
Width	1.798 m (5 ft 11 in)
Height	1.195 m (3 ft 11 in)
Curb weight	1,350 lb (612 kg)
Designer	Nik Smart

The **Ariel Atom** is a high performance sports car made by the Ariel Motor Company based in Somerset, England. The car is also manufactured under licence in the United States, originally by Brammo Motorsports, currently by TMI AutoTech Inc.

There have been three Ariel Atom incarnations to date: Ariel Atom, Ariel Atom 2 and Ariel Atom 3. The current model is the Ariel Atom 3 which is also the most powerful of the three. Ariel has also announced an RS Performance model with a motorcycle-derived 500 bhp (373 kW; 507 PS) V8 engine.

The Ariel Atom is unusual in that it is exoskeletal — the chassis is prominently visible from the outside — and therefore lacks a roof, windows and other features normally found on road cars. It is available with a range of engines, the top of the range being a supercharged Honda Civic Type-R K20 and a supercharged 2.0 litre, 300 hp (220 kW) Honda iVTEC engine. With each of these engines it can achieve an acceleration of 0-60 mph in 2.7 seconds. Although the top speed of approximately 140 mph (230 km/h)-150 mph (240 km/h) is relatively tame compared to more exotic sports cars, the high power-to-weight ratio (approximately 500 bhp/ton, or 650 bhp/ton supercharged) affords it very fast acceleration and the low weight provides excellent control through corners.

The Ariel Atom was also used (unofficially) by Wrightspeed Inc. as a base vehicle to prototype the electric running gear for an entirely new production vehicle which Wrightspeed is raising funds to build. The Atom-based prototype, called the X1, also features rapid acceleration, reaching 60 mph (97 km/h) in 3 seconds.

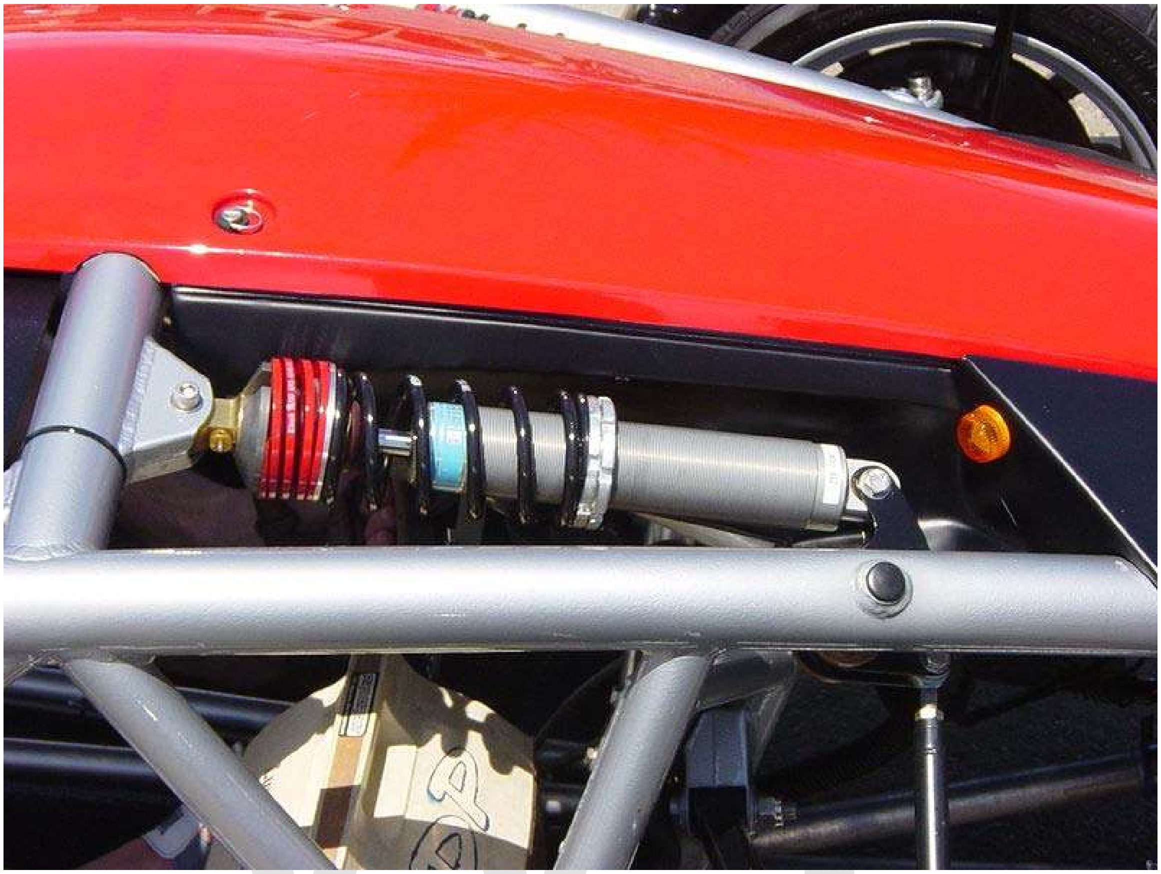
Design origins

The Atom began as a student project by Coventry University transport design student, Nik Smart. Known then as the LSC (Lightweight Sports Car), it was developed at the university in 1996 with input and funding from various automotive industry members, including British Steel and TWR. Ariel Motor Company boss Simon Saunders was a senior lecturer whose responsibility for the project was primarily as financial manager and design critic for Smart, whom he described as "The best all-round design student I've ever seen." The car was first shown publicly at the British International Motor Show at the NEC in Birmingham in October 1996.

Specifications

- 0-60 mph: 2.9 seconds (manufacturer's claim)
- Top Speed: 140 mph, 225 km/h (155 mph, 249 km/h supercharged)
- Power: 245 bhp (183 kW; 248 PS) @ 8200 rpm (300 bhp supercharged)
- Torque: 210 N·m (150 ft·lbf) @ 6100 rpm
- Weight: 456 kg (1,005 lb)
- Transmission: Honda six-speed with reverse
- Price: £30,000/£45,000 supercharged (cost in the US is $49,980 Base Price)
- Engine: 2.0L Honda K20A1, 4 Cylinder, i-VTEC
- Manufacturer: Ariel Motor Company Ltd
- Length: 3,410 mm (134 in)
- Width: 1,798 mm (70.8 in) / 1,828 mm (72.0 in) with 225 Tyres
- Height: 1,195 mm (47.0 in)
- Track: 1,600 mm (63 in) front and rear
- Wheelbase: 2,345 mm (92.3 in)
- Designer: Nik Smart

Suspension



Front springs and shock

The Atom suspension setup was tuned by the engineers at Lotus. Edmunds "Inside Line" noted that "anyone who has driven a selection of Lotus-tuned cars, such as the Elise, the Aston Martin Vanquish and the Opel Speedster, will notice a common feel or signature, and it's replicated in the Atom."

The Atom's suspension is derived from single seat racecars and is fully adjustable, requiring only a wrench. Both front and rear double unequal length wishbones and inboard, pushrod-operated dampers contribute to the Atom's dynamic racecar-like handling. Adjustable suspension rod ends feature inboard rubber/metal bushings to promote a more comfortable road-going ride. The front and rear Bilstein dampers are also adjustable. Stacked light and heavy coil springs produce a low spring rate for minor deflections and a higher rate for large ones.

Acceleration

In 2005 Track and Race Car magazine published the results of a comprehensive test of a range of cars, from the Porsche 911 Carrera S, Ford GT, BMW M5 to the Caterham CSR 260. The Supercharged Ariel Atom 1 won the 0-100-0 mph test by a clear margin, reaching 100 mph (160 km/h) and then stopping in 10.88 seconds, ahead of the Caterham CSR 260 (11.41) and the Ford GT in 4th (13.17).

The following year, the Atom won Autocar's 0-100 mph challenge as the new Ariel Atom 2 300 bhp supercharged edition achieved a time of 6.86 seconds, and then stopped from 100 in 3.8 seconds.

Also, the Ariel Atom is the fastest indoor road car. During the National Exhibition Centre in Birmingham the Atom broke the indoor speed record. The high gloss floor that the cars ran on was only 220 metres long, with an open door at the end of the hall. The driver of the Atom launched in fourth gear and still had wheelspin until the car reached 70 mph (110 km/h) and started to get traction. The Atom was beaten only by a Class 9 Autograss car powered by a 2.0l Lexus/Toyota touring car engine which set the official indoor speed record, beating the previous record held by a Toyota F1 car driven by Top Gear's The Stig.

The British newspaper The Sunday Times measured the time taken from 0 to 60 mph (97 km/h) at 2.89 seconds, making it the world's third fastest accelerating production car then available after the $1.3 million, 1,001 PS (987 bhp) Bugatti Veyron which reaches 0 to 60 mph (97 km/h) in 2.46 seconds, and the Ultima GTR, which reaches 60 mph (97 km/h) in 2.6 seconds; the review was in 2005.

US manufacturing

Brammo Motorsports of Ashland, Oregon signed a deal with Ariel Ltd to manufacture the Atom in the US starting in late 2005. In the US the Atom 2 was available with the supercharged GM Ecotec engine, which was introduced in 2004 on the Saturn ION Red Line and is also used in the Chevrolet Cobalt SS. A limited run of approximately 10 US built Atom 2 cars, manufactured in 2006-2007, were powered by imported Honda K20As. Brammo Motorsports ceased production of the Atom in 2008 to focus on the manufacture of an electric motorcycle.

In January 2008 it was officially announced that licensed manufacturing of the Ariel Atom for the US market would be undertaken by TMI AutoTech Inc at a purpose built facility at Virginia International Raceway. TMI started their production by building Atom 3 cars which are Honda powered. TMI AutoTech Inc is also associated with Trak Motorsports Inc, the company that operate the Ariel Atom Experience trackdays in Canada and North America.

Ariel Atom 500

Ariel announced in February 2008 its latest Atom variant, the Ariel Atom 500. It features a 500 horsepower 3.0 litre Russell Savory designed V8 engine (also planned to be used in the Caterham 7 RS), carbon fibre body panels and aerofoils, chromoly aerofoil wishbones, integrated function steering wheel, Alcon four-piston brake calipers, and Dymag magnesium wheels. The engine weighs a mere 90 kg and is coupled to a Sadev 6-

speed sequential gearbox to cope with the hike in power over the Honda unit. During the development process the RS performance engine was replaced by a unit prepared by Hartley Enterprises giving the final production version of the 550 kg car 900 bhp/tonne.

Ariel claims this variant will accelerate from 0-60 mph in "less than 2.3 seconds" which would make it the fastest-accelerating production car in the world if true.

Ariel will produce just 25 this year, prices are expected to be at least $160,000

RC Ariel Atom

Top Gear Ariel Atom radio controlled car

Near the end of 2007, *Top Gear* released a 27 MHz radio-controlled car that was "based on the Ariel Atom but is not an exact replica." Featuring a scale model of The Stig on the driver's seat, the replica was sold exclusively through Argos.

Chapter 7

Supercar

Supercar is a term used most often to describe an ultra-high-end "exotic" automobile, whose performance is superior to that of its contemporaries. It has been defined specifically as "a very expensive, fast or powerful car". Stated in more general terms: "it must be very fast, with sporting handling to match," "it should be sleek and eye-catching" and its price should be "one in a rarefied atmosphere of its own". However, the proper application of the term is subjective and disputed, especially among enthusiasts. So-called vehicles are typically out of the ordinary and are marketed by automakers to be perceived by the public as unusual. The supercar can take many forms including limited production specials from an "elite" automaker, standard looking cars made by mainstream companies that hide massive power and performance, as well as models that appeal to "hardcore enthusiasts" from "manufacturers on the fringe of the car industry."

History of the term supercar

An advertisement for the Ensign Six, a 6.7 L (~409 cu in) high-performance car similar to the Bentley Speed Six, appeared in *The Times* for 11 November 1920 with the phrase "If you are interested in a supercar, you cannot afford to ignore the claims of the Ensign 6." The Oxford English Dictionary also cites the use of the word in an advertisement for an unnamed car in *The Motor* dated 3 November 1920, "The Supreme development of the British super-car." and defines the phrase as suggesting 'a car superior to all others'. A book published by the Research Institute of America in 1944, that previewed the economic and industrial changes to occur after World War II, used the term *"supercar"* (author's emphasis) to describe future automobiles incorporating advances in design and technology such as flat floorpans and automatic transmissions.

The current usage of "supercar" dates to L. J. K. Setright's description of the Lamborghini Miura as such

The phrase supercar did not become popular until much later and is said to have has its revival originated with British motor journalist L. J. K. Setright writing about the Lamborghini Miura in CAR in the mid-1960s. The magazine was originally launched in 1962 as *Small Car and Mini Owner*, and claims to have "coined the phrase".


CHEVROLET

In the United States, the term "supercar" predates the classification of muscle car to describe the "dragstrip bred" affordable mid-size cars of the 1960s and early 1970s that were equipped with large, powerful V8 engines and rear wheel drive. The combination of a potent engine in a lightweight car began with the 1957 Rambler Rebel that was described as a "veritable supercar." "In 1966 the sixties supercar became an official industry trend" as the four domestic automakers "needed to cash in on the supercar market" with eye-catching, heart-stopping cars. Among the numerous examples of the use of the supercar description include the May 1965 issue of the American magazine *Car Life*, in a road test of the Pontiac GTO, and how "Hurst puts American Motors into the Supercar club with the 390 Rogue" (the SC/Rambler) to fight in "the Supercar street racer gang" market segment. The "SC" in the model name stood for "SuperCar". The supercar market segment included regular production models in different muscle market segments (such as the "economy supercar"), as well as limited edition, documented dealer-converted vehicles.


LIGHTNING


LIGHTNING

The word supercar later became to mean a "GT" or grand touring type of car. By the 1970s and 1980s the phrase was in regular use, if not precisely defined.

During the late 20th century, the term supercar was used to describe "a very expensive, fast or powerful car with a centrally located engine", and stated in more general terms: "it must be very fast, with sporting handling to match", "it should be sleek and eye-catching" and its price should be "one in a rarefied atmosphere of its own".


vodafone
AMG

The supercar term has also been applied to technologically advanced vehicles using new fuel sources, powerplants, aerodynamics, and lightweight materials to develop an

80 mpg_{-US} (2.9 L/100 km; 96 mpg_{-imp}) family-sized sedan. "Supercar" was the unofficial description for the United States Department of Commerce R&D program, Partnership for a New Generation of Vehicles (PNGV). The program was established to support the domestic U.S. automakers (GM, Ford, and Chrysler) develop prototypes of a safe, clean, affordable car the size of the Ford Taurus, but delivering 3-times the fuel efficiency.

Chapter 8

Ferrari F40

Ferrari F40

Manufacturer	Ferrari
Production	1987–1992 (1,315 produced)
Assembly	Maranello, Italy
Predecessor	Ferrari 288 GTO
Successor	Ferrari F50
Class	Sports car
Body style(s)	Berlinetta (2-door coupé)
Layout	Mid-engine, rear-wheel drive
Engine(s)	2,936 cc (2.9 L) twin-turbocharged V8 478 PS (352 kW; 471 hp)
Transmission(s)	5-speed manual
Wheelbase	2,451 mm (96.5 in)
Length	4,430 mm (174 in)
Width	1,980 mm (78 in)
Height	1,130 mm (44 in)

Curb weight 1,100 kg (2,400 lb)

Designer Pininfarina

The **Ferrari F40** is a mid-engine, rear-wheel drive, two-door coupé sports car produced by Ferrari from 1987 to 1992 as the successor to the Ferrari 288 GTO. From 1987 to 1989 it held the title as the world's fastest street-legal production car, and during its years of production, was Ferrari's fastest, most powerful, and most expensive car. The car had no traction control, and was one of the few to utilize turbochargers.

The car debuted with a factory suggested retail price of approximately US$400,000, although some buyers were reported as paying as much as US$1.6 million. A total of 1,315 F40s were produced.


Ferrari
Ferrari

Concept

Ostensibly, the F40 was conceived as the successor to the 288 GTO and designed to compete with vehicles such as the Porsche 959 and Lamborghini Countach; for Ferrari management, the vehicle was a major statement piece. Over a period of several years prior to the F40's conception, the company's dominance in racing had waned significantly, and even in Formula One, an arena they had once dominated, victories had become sparse. Enzo Ferrari had recently turned 90 years old, and was keenly aware that time was not on his side. He wanted his new sports car to serve as his final statement-maker, a vehicle encompassing the best in track-developed technology and capable of being a showcase for what the Ferrari engineers were capable of creating. The company's upcoming 40th anniversary provided just the right occasion for the car to debut.

As he had predicted it would be, the F40 was the last car to be commissioned by Enzo before his death.


VNO 323


NS 1480


POLICE
Ferrari
F40

Development

Origin

As early as 1984, the Maranello factory had begun development of an evolution model of the 288 GTO intended to compete against the 959 in FIA Group B. However, when the FIA brought an end to the Group B category for the 1986 season, Enzo was left with five 288 GTO Evoluzione development cars, and no series in which to campaign them. Enzo's desire to leave a legacy in his final supercar allowed the Evoluzione program to be further developed to produce a car exclusively for road use.

Drivetrain and suspension

V8 engine

Power came from an enlarged, 2.9 L (2936 cc) version of the GTO's twin IHI turbocharged V8 developing 478 PS (352 kW; 471 hp) under 110 kPa (16 psi) of boost. The F40 did without a catalytic converter until 1990 when US regulations made them a requirement for emissions control reasons. The flanking exhaust pipes guide exhaust gases from each bank of cylinders while the central pipe guides gases released from the wastegate of the turbochargers.

The suspension setup was similar to the GTO's double wishbone setup, though many parts were upgraded and settings were changed; the unusually low ground clearance prompted Ferrari to include the ability to raise the vehicle's ground clearance when necessary.


Auto Salon Singen

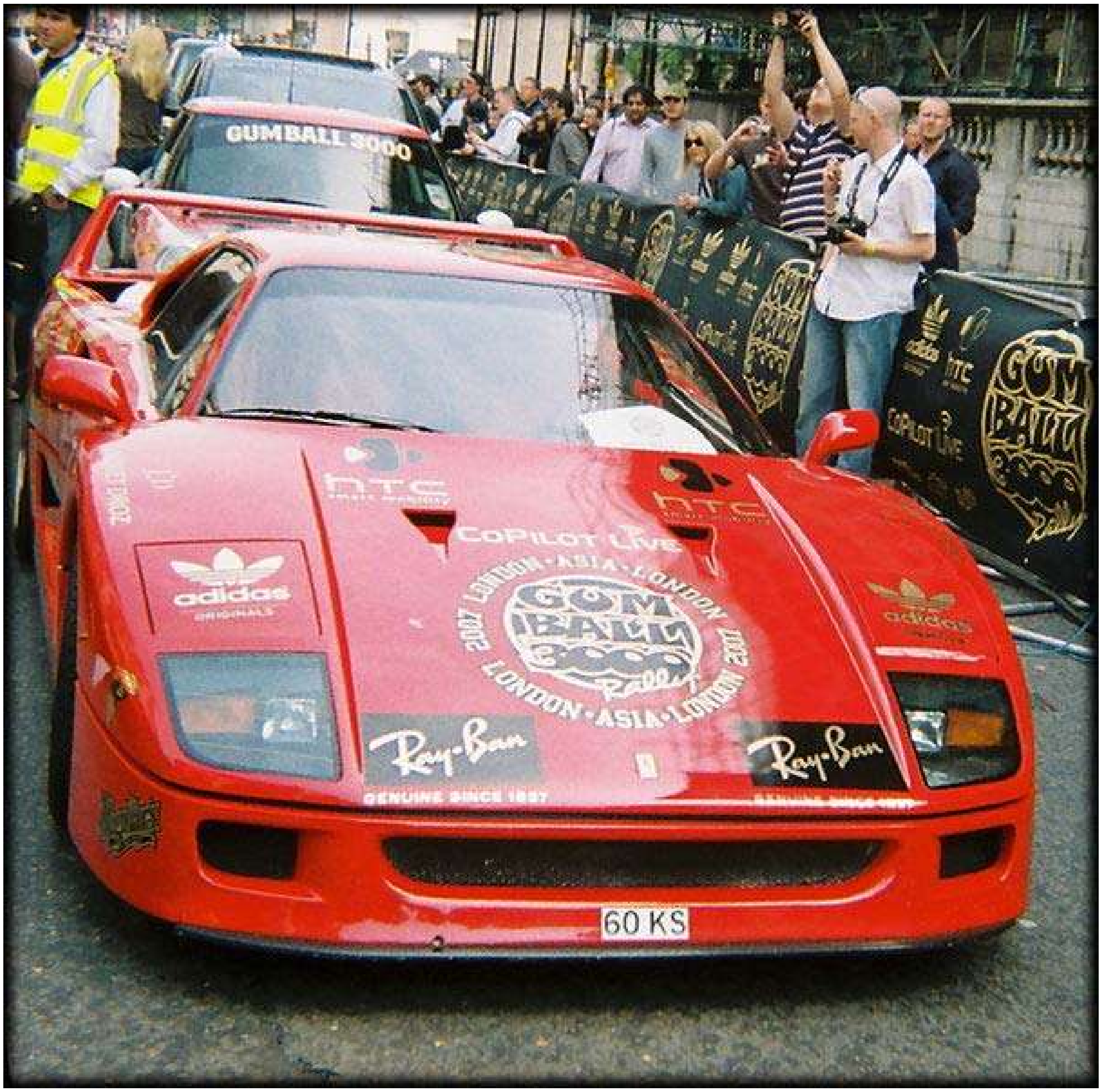

F40 AJH

Body and interior

The body was an entirely new design by Pininfarina featuring panels made of kevlar, carbon fiber, and aluminum for strength and low weight, and intense aerodynamic testing was employed. Weight was further minimized through the use of a plastic windshield and windows and no carpets, sound system, or door handles were installed although the cars did have air conditioning. The first 50 cars produced had sliding Lexan windows, although newer windows that could be rolled down were installed into later cars.

Aerodynamics

The F40 was designed with aerodynamics in mind, and is very much a creation of its time. For speed the car relied more on its shape than its power. Frontal area was reduced, and airflow greatly smoothed, but stability rather than terminal velocity was a primary concern. So too was cooling as the forced induction engine generated a great deal of heat. In consequence, the car was somewhat like an open-wheel racing car with a body. It had a partial undertray to smooth airflow beneath the radiator, front section, and the cabin, and a second one with diffusers behind the motor, but the engine bay was not sealed. Nonetheless, the F40 had an impressively low Cd of 0.34 with lift controlled by its spoilers and wing.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Racing

An F40 LM on display at the Goodwood Festival of Speed

The factory never intended to race the F40, but the car saw competition as early as 1989 when it debuted in the Laguna Seca round of the IMSA, appearing in the GTO category, with a LM evolution model driven by Jean Alesi, finishing third to the two faster spaceframed four wheel drive Audi 90 and beating a host of other factory backed spaceframe specials that dominated the races. Despite lack of factory backing, the car would soon have another successful season there under a host of guest drivers such as Jean-Pierre Jabouille, Jacques Laffite and Hurley Haywood taking a total of three second places and one third.

Although the F40 would not return to IMSA for the following season, it would later be a popular choice by privateers to compete in numerous domestic GT series including JGTC. In 1994, the car made its debut in international competitions, with one cars campaigned in the BPR Global GT Series by Strandell, winning at the 4 Hours of Vallelunga. In 1995, the number of F40s climbed to four, developed independently by Pilot-Aldix Racing (F40 LM) and Strandell (F40 GTE, racing under the Ferrari Club Italia banner), winning the 4 Hours of Anderstorp. No longer competitive against the McLaren F1 GTR, the Ferrari F40 returned for another year in 1996, managing to repeat the previous year's Anderstorp win, and from then on it was no longer seen in GT racing.

Succession

The F40 was discontinued in 1992 and in 1995 was succeeded by the F50, which remained competitive until a newer generation of factory-backed GT1 cars came along.

Performance

Rear view of a Ferrari F40 in Melbourne, Australia

The F40's light weight of 1,100 kg (2,425 lb) and high power output of 478 PS (352 kW; 471 hp) at 7000 rpm gave the vehicle tremendous performance potential. Road tests have produced 0–100 km/h (0–62 mph) times as low as 3.8 seconds (while the track only version came in at 3.2 seconds), with 0–160 km/h (0–99 mph) in 7.6 seconds and 0–200 km/h (0–120 mph) in 11 seconds giving the F40 a slight advantage in acceleration over the Porsche 959, its primary competitor at the time.


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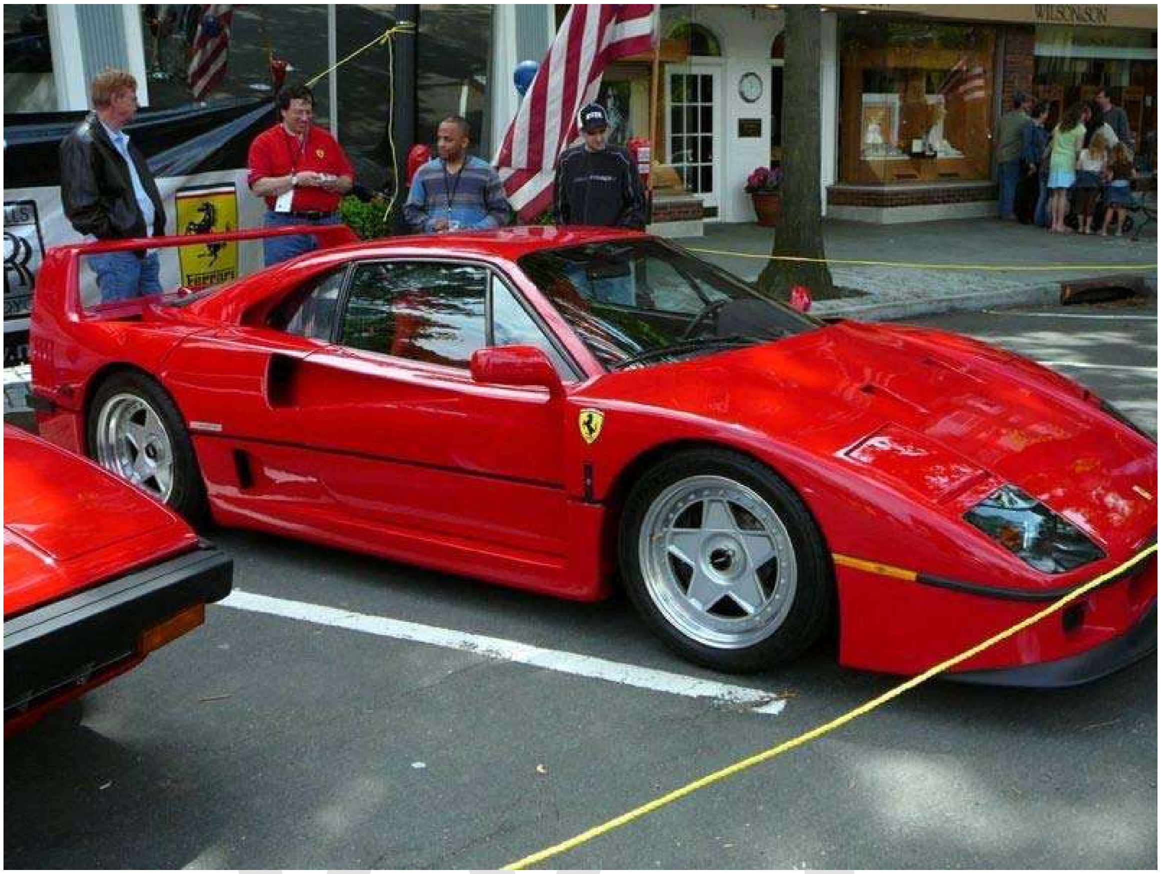

The F40 was the first road legal production car to break the 200 mph (320 km/h) barrier. From its introduction in 1987 until 1989 its only competitors were the Porsche 959 and the 1988 Lamborghini Countach (it was later overtaken by the Lamborghini Diablo), it held the record as the world's fastest production car, with a top speed of 200 mph (320 km/h). During the 2006 Bonneville Speed Week, Amir Rosenbaum of Spectre Performance managed to take his F40 with small boost and air intake modifications to 226 miles per hour (364 km/h).

Chapter 9

Lamborghini Diablo

Lamborghini Diablo

Manufacturer	Lamborghini
Production	1990–2001 2884 produced
Assembly	Sant'Agata Bolognese, Italy
Predecessor	Lamborghini Countach
Successor	Lamborghini Murciélago
Class	Sports car
Body style(s)	2-door coupe 2-door roadster
Layout	Mid-engine, RWD / AWD
Engine(s)	5.7 L V12 6.0 L V12
Transmission(s)	5-speed manual
Wheelbase	2,650 mm (104.3 in)

Length	4,460 mm (175.6 in)–4,470 mm (176.0 in)
Width	2,040 mm (80.3 in)
Height	1,105 mm (43.5 in)–1,115 mm (43.9 in)
Designer	Marcello Gandini (initial design) Chrysler Styling Center (final design)

The **Lamborghini Diablo** is a high-performance mid-engined sports car that was built by Italian automaker Lamborghini between 1990 and 2001. It was the first Lamborghini capable of attaining a top speed in excess of 200 miles per hour (320 km/h). After the end of its production run in 2001, the Diablo was replaced by the Lamborghini Murciélago.

History of development

At a time when the company was financed by the Swiss-based Mimram brothers, Lamborghini began development of what was codenamed *Project 132* in June 1985 as a replacement for the Countach model. The brief stated that its top speed had to be at least 315 km/h (196 mph).

The design of the car was contracted to Marcello Gandini, who had designed its two predecessors. When Chrysler bought the company in 1987, providing money to complete its development, its management was unimpressed with Gandini’s designs and commissioned its design team in Detroit to execute a third extensive redesign, smoothing out the trademark sharp edges and corners of Gandini's original design, and leaving him famously unimpressed. In fact, Gandini was so disappointed with the "softened" shape that he would later realize his original design in the Cizeta-Moroder V16T.

The car became known as the Diablo, carrying on Lamborghini's tradition of naming its cars after breeds of fighting bull. The Diablo was named after a ferocious bull raised by the Duke of Veragua in the 19th century, famous for fighting an epic battle with 'El Chicorro' in Madrid on July 11, 1869. In the words of *Top Gear* presenter Jeremy Clarkson, the Diablo was designed "solely to be the biggest head-turner in the world."

The project is believed to have cost a total of 6,000,000,000 lira.

First generation (1990-1998)

Diablo

Lamborghini Diablo

The Diablo was presented to the public for sale on January 21, 1990, at a base price of $240,000 at the Hotel de Paris in Monte Carlo during the second Lamborghini Day. Power came from a 5,709 cc (348 cu in), 48-valve version of the existing Lamborghini V12 featuring dual overhead cams and computer-controlled multi-point fuel injection, producing a maximum output of 499 PS (367 kW; 492 hp) and 580 N·m (428 lb·ft) of torque. The vehicle could reach 100 km/h (62 mph) in slightly under 4 seconds, with a top speed of over 333 km/h (207 mph). The Diablo was rear-wheel drive and the engine was mid-mounted to aid its weight balance.

The Diablo came better equipped than the Countach had; standard features included fully adjustable seats and steering wheel, electric windows, an Alpine stereo system, and power steering. Anti-lock brakes were not initially available, although they would eventually be used. A few options were available, including a custom-molded driver's seat, remote CD changer and subwoofer, rear spoiler, factory fitted luggage set (priced at $2,600) and an exclusive Breguet clock for the dash (priced at $10,500).

The Diablo was the fastest production car in the world for the 1991 model year, having a top speed of 333 km/h (207 mph), which exceeded the 324 km/h (201 mph) of the previous title-holder, the Ferrari F40. The Diablo held the title until the release of the Bugatti EB110 in 1991, which claimed a top speed of 343 km/h (213 mph).

Diablo VT

The Diablo VT was introduced in 1993. Although the VT differed from the standard Diablo in a number of ways, by far the most notable change was the addition of all wheel drive, which made use of a viscous center differential. This provided the new nomenclature for the car (VT stands for *viscous traction*). The new drivetrain could direct up to 25% of the torque to the front wheels to aid traction during rear wheel slip, thus significantly improving the handling characteristics of the car.

Other improvements debuting on the VT included front air intakes below the driving lamps to improve brake cooling, larger intakes in the rear arches, a more ergonomic interior with a revised dashboard, electronically adjustable dampers, four-piston brake calipers, power steering, and minor engine refinements. Many of these improvements, save the four-wheel drive system, soon transferred to the base Diablo, making the cars visually nearly identical.

Diablo SE30 and SE30 Jota

A Diablo SE30

The Diablo SE30 was introduced in 1994 as a limited-production special model to commemorate the company's 30th anniversary. The car was designed largely as a street-legal race vehicle that was lighter and more powerful than the standard Diablo. The engine received a healthy boost to 533 PS (392 kW; 526 hp) by means of a tuned fuel system, freer-flowing exhaust, and magnesium intake manifolds. The car remained rear-wheel drive to save weight, and omitted the electrically-adjustable shock absorbers of the VT model, but it was equipped with adjustable-stiffness anti-roll bars which could be controlled from the interior, on the fly.

The car's weight was lowered by replacing the power glass side windows with fixed plexiglas (with a small sliding vent window as on many race cars) and removing luxury features such as the air conditioning, stereo, and power steering. Carbon fiber seats with 4-point race harnesses and a fire suppression system added to the race nature of the vehicle.

On the outside, the SE30 differed from other Diablo models with a revised front fascia featuring straked brake cooling ducts and a deeper spoiler, while the rear cooling ducts were changed to a vertical body-colored design. The raging bull emblem was moved from the front of the luggage lid to the nose panel of the car between the front indicators. The engine lid had slats covering the narrow rear window, while a larger spoiler was installed as standard equipment. The single rear fog lamp and rear backup lamp, which had been on either side of the rear grille, were moved into the bumper; this change would be applied to all Diablo models across the lineup. Completing the exterior variations were special magnesium alloy wheels, SE30 badging, and a new metallic purple paint color (this could be changed upon request).

Only 150 SE30 models were built, and of these, about 15 were converted to "Jota" specification (although 28 Jota kits were produced). The "Jota" was a factory modification kit designed to convert the race-oriented SE30 into an actual circuit racer, albeit at the cost of street-legal operation. A revised engine lid with two ducts protruding above the roofline forced air into the intake system; a similar lid design would later be used on the Diablo SV model. With even more tuning of the Diablo's venerable V12 engine, the Jota kit produced nearly 604 PS (444 kW; 596 hp) and 639 N·m (471 lb·ft) of torque. An open exhaust system produced deafening engine roar, one of the main contributing factors to the Jota's track-only status, although some owners converted back to standard exhaust in order to enjoy their "super Diablo" on the road. The rear-view mirror from the interior was also removed due to the fact that it was completely useless in conjunction with the revised engine lid, further adding to the race feeling of the car.

Diablo SV

Lamborghini Diablo SV

The Diablo SV was introduced in 1995 at the Geneva Auto Show, reviving the *super veloce* title first used on the Miura SV. The SV was based on the standard Diablo and thus lacked the four-wheel drive of the VT. A notable feature of the SV was an increase in horsepower to 517 PS (380 kW; 510 hp), which, paired with the two-wheel drive layout, could cause loss of traction during hard driving. Interestingly, despite its higher power output, the SV was priced as the entry-level model in the Diablo range, falling below the standard Diablo by a small margin. An adjustable rear spoiler was installed as standard equipment and could be color-matched to the car body or formed from carbon fiber. Other exterior changes included black tail lamp surrounds, repositioned rear fog and reverse lamps as on the SE30, dual front foglamps (rather than the quad style found on all previous models), an extra set of front brake cooling ducts, a ducted engine lid similar to that installed on the Diablo SE30 Jota, and optional "SV" decals for the sides of the car. The SV also featured larger diameter front brakes (340 mm (13.4 in)) and a corresponding increase in front wheel size to 18 inches.

In 1998, a limited 20-car run of Diablo SV's was produced exclusively for the United States market and called the *Monterey Edition*. The most notable feature of this edition was the use of the SE30/VT Roadster style of air intakes in front of the rear wheels, unlike the traditional (and persisting) SV style. Several of the cars were painted in unusual, vibrant colors. One Monterey Edition, featuring an upgraded engine and brakes, was driven by Mario Andretti during the Lamborghini-sponsored "Running of the Bulls" event in California. The Monterey Edition was foreseen to be a collectible, but due to the popularity of the fixed-lamp models to follow, its value did not rise significantly over time.

Diablo VT Roadster

The Diablo VT Roadster was introduced in 1995 and featured an electrically-operated carbon fiber targa top which was stored above the engine lid when not in use. Besides the roof, the roadster's body was altered from the fixed-top VT model in a number of ways. The front bumper was revised, replacing the quad rectangular driving lamps with two rectangular and two round units. The brake cooling ducts were moved inboard of the driving lamps and changed to a straked design, while the rear ducts featured the vertical painted design seen on the SE30. The engine lid was changed substantially in order to vent properly when the roof panel was covering it. The roadster also featured revised 17 inch wheels.

Specifications

Specification level	Production	Engine	Maximum power	Maximum torque	Drive Layout	Brakes	Curb weight	Weight distribution
Diablo	1990–1998, ~900 built	5,709 cc (348 cu in) V12	499 PS (367 kW; 492 hp)	580 N·m (428 lb·ft)	Rear mid-engine, rear-wheel drive	Brembo servo-assisted four-wheel disc brakes, 330 mm (13.0 in) front × 284 mm (11.2 in) rear	1,576 kg (3,470 lb)	41/59% front/rear
VT	1993–1998, ~400 built				Rear mid-engine, four-wheel drive, 45% LSD rear & 25% LSD front	Brembo servo-assisted four-wheel disc brakes, 330 mm (13.0 in) front × 310 mm (12.2 in) rear	1,625 kg (3,580 lb)	43/57% front/rear
SE30	1994, 150 built (25 for US market)		533 PS (392 kW; 526 hp)		Rear mid-engine, rear-wheel drive		1,451 kg (3,200 lb)	41/59% front/rear
SE30 Jota	1995, 28 kits built		604 PS (444 kW; 596 hp)	639 N·m (471 lb·ft)			1,450 kg (3,200 lb)	
SV	1995–1998		517 PS (380 kW; 510 hp)	580 N·m (428 lb·ft)		Brembo servo-assisted four-wheel disc brakes, 340 mm (13.4 in) front × 310 mm (12.2 in) rear	1,576 kg (3,470 lb)	41/59% front/rear
VT Roadster	1995–1998, ~200 built		499 PS (367 kW; 492 hp)		Rear mid-engine, four-wheel	Brembo servo-assisted four-wheel	1,625 kg (3,580 lb)	47/53% front/rear

drive, 45% LSD rear & 25% LSD front	disc brakes, 330 mm (13.0 in) front × 310 mm (12.2 in) rear

Second generation (1999-2001)

Diablo SV (1999)

Lamborghini launched a short-lived second generation Diablo in 1999, simplifying the model range by eliminating the "base" Diablo (since the SV model had become the new entry-level trim anyway) and applying universal revisions across the lineup. The most immediately noticeable exterior change was the replacement of the previous Diablo's pop-up headlamp units with fixed composite lenses, borrowed under license from their original application in the Nissan 300ZX Z32. All Diablos were also fitted with new 18 inch wheels.

The Diablo range also received an updated interior. Instead of the traditional flat dashboard with a separate upright instrument binnacle, as in many Italian sports cars of the era (and the previous Diablo), the new dash was an integrated wave-shaped design. A thin strip of black glass ran the length of the dash and contained various instrument indicator and warning lamps. This aesthetic design was inspired by Bang & Olufsen Hi-Fi products.

Under the engine lid, the tried-and-true V12 was bumped to 537 PS (395 kW; 530 hp) and 605 N·m (446 lb·ft) of torque for both the SV and VT models and now featured variable valve timing. For the first time ever in a Lamborghini, the Diablo was equipped with a Kelsey-Hayes ABS unit, complementing larger diameter brake rotors.

Diablo VT and VT Roadster (1999)

1999 Diablo VT Roadster, US-spec (note front fascia and rear brake ducts)

The second generation VT coupé and roadster received the same cosmetic and mechanical upgrades as the SV model, including the open headlamps, restyled interior, 537 PS (395 kW; 530 hp) engine, and ABS; little else was changed from the previous generation. All US-spec VT models, coupé and roadster alike, shared the same unique front and rear fascias as seen on the original VT Roadster, along with the vertical painted rear brake ducts that had debuted on the SE30 model; these cosmetic variations were available as options on rest-of-world VT coupés.

A special run of twelve Diablo VT's was produced exclusively for the United States market in 1999 and called the *Alpine Edition*. As the Diablo had been utilizing Alpine stereo equipment since its inception, this very limited production was intended to showcase and celebrate the Lamborghini/Alpine connection. The Alpine Edition was a fairly standard Diablo VT with no engine modifications and some extra bits of carbon fiber trim in various locations, but the big news was the multimedia system. The stereo receiver was the top-end CVA-1005 model, with integrated navigation system; also included in the package was a DVD player, 6-disc CD changer, and Alpine's top quality tweeters, midrange drivers, and subwoofers, powered by "Lamborghini" badged Alpine amplifiers. Alpine logos adorned the seat headrests, floormats, and the special car cover included with this rare model.


Agip


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Agip
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LUSSO

Another special twelve-car run of Diablos for the US market consisted of VT Roadsters and was called the *Momo Edition*. Like the *Alpine Edition*, the Momo Edition catered to the US car buyer's interest in aftermarket upgrade products. Lamborghini, rather than spending money to develop certain automotive components, had been using aftermarket suppliers such as Alpine and MOMO to outfit the Diablo. The Momo Edition was again a fairly standard VT Roadster, but featured special upholstery, MOMO 4-point seatbelt harnesses, and MOMO chromed wheels. Like the Alpine Edition, the Momo Edition also had MOMO logos embroidered in the seat headrests and floor mats.

The VT Roadster enjoyed one final limited run of 30 cars for the 2000 model year, after the introduction of the Diablo VT 6.0. This "Millennium Roadster" model was available in just two colors, Titanium Metallic and yellow, with the 10 cars exported to the United States all finished in Titanium Metallic. Besides an optional carbon fiber spoiler, special two-tone leather interior, and the shorter-ratio SV rear differential (providing enhanced acceleration), this model featured no significant changes from the previous design, and merely served as a final tribute to the outgoing roadster.

Diablo GT

Lamborghini Diablo GT

The Diablo SE30 and its optional Jota upgrade kit had been quite sporty and race-oriented, but Lamborghini took this concept a step further in 1999 with its introduction of the very limited production Diablo GT, of which only 80 examples were produced for sale. The Diablo GT was a completely race-oriented trim differing in nearly every aspect from the more mainstream Diablos. With radically altered aggressive bodywork, a stripped-down interior, and an enlarged engine came a large price tag of nearly $300,000 and availability only in Europe, although some GT models were somehow imported into the US and possibly converted to road-legal US specification.

The Diablo GT was noticeably different on the exterior. While previous Diablo models had differed one from another with subtle fascia refinements or changes in the brake cooling ducts, the Diablo GT opted for an all new black carbon fiber front air dam with large brake ducts and a central vent for the oil cooler (the car still featured driving lamps, the single pair of round units featured on the Diablo VT Roadster). In the front luggage compartment lid, a large air extractor was added, while the small corner vents on the front fenders were changed to NACA style ducts. The fenders themselves were widened to accommodate a wider front track. In the rear, the bumper and its lamps were removed entirely, replaced by a carbon fiber diffuser that forced the fog and backup lamps into the outer pair of tail lamps, and shielded a pair of large center-mounted exhaust pipes. The engine lid featured a large central ram air duct protruding above the roof; a rear spoiler was standard equipment. This radical new body was composed mostly of carbon fiber, with the steel roof and aluminum doors being the only components to retain their standard material. Special 3-piece OZ wheels finished the GT's exterior package.


LAMBORGHINI


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TUASON
U.S. STAR
ANGEL

On the inside, the Diablo GT featured more prominent carbon fiber panels, race-spec bucket seats with 4-point seatbelt harnesses, a smaller steering wheel, and an optional Alpine LCD screen for GPS navigation and a bumper mounted backup camera. Despite the racing pretenses of the vehicle, air conditioning was still installed as standard equipment; airbags could be optionally omitted.

While previous Diablos had tuned and tweaked the 5,707 cc (348 cu in) engine with various ignition and fuel system upgrades, the Diablo GT opted for a larger-displacement alternative. While the basic V12 block remained the same, the engine was stroked from 80 mm (3.1 in) to 84 mm (3.3 in) for a new displacement of 5,992 cc (366 cu in); this 6.0 liter engine, which would later be used in the revised Diablo VT 6.0, produced (in GT trim) 583 PS (429 kW; 575 hp) and 630 N·m (465 lb·ft) of torque. The transmission was the same 5-speed used in other Diablos, but different gear ratios could be specified by the race-oriented buyer. Rear-wheel drive was used to save weight, as usual.

Diablo VT 6.0 and VT 6.0 SE

After Audi AG took over Lamborghini from its former Southeast Asian owners, MyCom and V'Power, in 1998, they set out to modernize and refine the Diablo, while its replacement, the Murciélago, was developed. Audi tasked Luc Donckerwolke with designing a more refined, civilized, modern Diablo. The VT 6.0, released for sale for the 2000 model year, was the result of that design and featured significant styling changes both inside and out.

Externally, the Diablo VT 6.0 differed from its predecessors with a revised front fascia that featured two large air intakes (similar to those later used on the Murciélago). The air dam, nose panel, and fenders were all reworked and smoothed, the indicators were enlarged and shifted in position, and the small air inlets in the tops of the fenders were deleted. The rear of the car remained familiar, but the taillight surrounds were now body-colored (rather than transparent red or black) and the lamps themselves used the configuration seen on the limited Diablo GT. Unlike previous Diablos, which had almost all used 3-piece alloy wheels, the VT 6.0 rested on monobloc cast aluminum 18 inch OZ rims, which were styled with a 5-hole "phone dial" design similar to that seen on the later models of the Countach. On the inside, the interior was further refined in typical German fashion; the new-styled dash introduced on the 1999 Diablo range was retained, but a prominent carbon fiber center console was fitted, the air conditioning was improved, and the seat and pedal alignment was revised.

The VT 6.0, as per its name, also featured the new 6.0 L (370 cu in) V12 introduced in the Diablo GT (a stroker version of the traditional Diablo 5.7 liter V12). The motor had updated ECU software in addition to new intake and exhaust systems and a refined variable valve timing system with slightly less aggressive camshafts than had been used in the earlier versions. This powerplant produced 557 PS (410 kW; 549 hp) and 620 N·m (457 lb·ft) of torque, more than any prior standard Diablo.


GE-4624 Z


SEKTION MOTORSPORT

Because of the preparations being made for the upcoming Murciélago, the Diablo VT coupé was the only available variant, with no more roadster or SV models planned; however, customers could specially order a rear-wheel drive version of the VT 6.0 if they so desired. Due to the influx of financial resources and engineering expertise from Audi, the Diablo 6.0 VT had superior build quality to the prior model years, making the 6.0 VT the most practical of all the Diablos.

Before the Diablo was retired, Lamborghini produced a limited 2001 model year 40-car production run of a special edition Diablo VT 6.0 SE. This model was only available in two colors; the gold metallic "Oro Elios" represented sunrise, while the color-shifting bronze/maroon "Marrone Eklipsis" represented sunset. Little else changed, save for a new magnesium intake manifold, special upholstery treatment, "Lamborghini" badged brake calipers, comprehensive road map software in the navigation system, and enhanced carbon fiber trim.

Specifications

<table>
<tr><th>Specification level</th><th>Production</th><th>Engine</th><th>Maximum power</th><th>Maximum torque</th><th>Drive Layout</th><th>Brakes</th><th>Curb weight</th><th>Weight distribution</th></tr>
<tr><td>SV</td><td>1998–1999, ~100 built</td><td rowspan="3">5,709 cc (348 cu in) V12</td><td rowspan="3">537 PS (395 kW; 530 hp)</td><td rowspan="3">605 N·m (446 lb·ft)</td><td>Rear mid-engine, rear-wheel drive</td><td>Brembo servo-assisted, ventilated, cross-drilled four-wheel disc brakes, 355 mm (14.0 in) front × 335 mm (13.2 in) rear, with Kelsey-Hayes ABS</td><td>1,530 kg (3,400 lb)</td><td>41/59% front/rear</td></tr>
<tr><td>VT</td><td>1998–2000</td><td rowspan="2">Rear mid-engine, four-wheel drive, 45% LSD rear & 25% LSD front (SV rear with 2.53:1 ratio used on Millennium Roadster)</td><td>Brembo servo-assisted, ventilated, cross-drilled four-wheel disc brakes, 365 mm (14.4 in) front × 335 mm (13.2 in) rear, with Kelsey-Hayes ABS</td><td rowspan="2">1,625 kg (3,580 lb)</td><td rowspan="2">43/57% front/rear</td></tr>
<tr><td>VT Roadster</td><td>1998–2000, 100 built + 30 Millenium Roadster</td><td>Brembo servo-assisted, ventilated, cross-drilled four-wheel disc brakes, 355 mm (14.0 in) front × 335 mm (13.2 in) rear, with Kelsey-Hayes ABS</td></tr>
<tr><td>GT</td><td>1999, 80 sold, 83 built</td><td>5,992 cc (366 cu in) V12</td><td>583 PS (429 kW; 575 hp)</td><td>630 N·m (465 lb·ft)</td><td>Rear mid-engine, rear-wheel drive</td><td>Brembo servo-assisted, ventilated, cross-drilled four-wheel disc brakes, 355 mm (14.0 in) front × 335 mm (13.2 in) rear, with Lucas ABS</td><td>1,460 kg (3,200 lb)</td><td>40/60% front/rear</td></tr>
</table>

VT 6.0	2000-2001 (40 SE models built)	557 PS (410 kW; 549 hp)	620 N·m (457 lb·ft)	Rear mid-engine, four-wheel drive, 45% LSD rear & 25% LSD front (rear-wheel drive optional)	Brembo servo-assisted four-wheel disc brakes, 365 mm (14.4 in) front × 335 mm (13.2 in) rear, with Lucas ABS	1,625 kg (3,580 lb)	41/59% front/rear

Factory racing specials

Diablo SV-R

Unveiled at the 1996 Geneva Salon, the Diablo SV-R is a lightweight competition version of the SV and the first Lamborghini to be officially built for motorsport purposes, as Ferruccio Lamborghini had never desired to build "street legal race cars" like rival Ferrari. Rather than comply with the requirements for any established racing series, Lamborghini created its own *Lamborghini Supertrophy* which ran for four years (replaced later with the *GTR Supertrophy* for the Diablo GTR), with its inaugural round held as the support race to the 1996 24 Hours of Le Mans. The 28 Diablo SV-R's entered, which were built in 4 months on the Diablo assembly line along with production SV's, all finished this first event without significant problems.

The Diablo SV-R featured a stripped-down interior with a rollcage, racing seat, and removable steering wheel; the power glass side windows were replaced with fixed Plexiglass with traditional race-style sliding sections. On the exterior, the electric pop-up headlamps were replaced either with fixed units (similar to those which appeared later on the road cars in 1999) or with open ducting for the front brakes. A larger, deeper front spoiler was fitted, while the rear bumper was replaced with a diffuser assembly and the traditional Diablo "wing" was replaced with a true adjustable carbon fiber spoiler. Side skirts were added for aerodynamics, but this left so little ground clearance that pneumatic air jacks also had to be installed to raise the car for service in the pit lane; similar jacks can be seen in use on the more recent Ferrari F430 Challenge. Lightweight, hollow center-lock OZ wheels were used, although these were later switched to stronger Speedline units. Linear-rate springs were used with Koni shock absorbers and were adjusted to about twice the stiffness of stock Diablo SV suspension. With all modifications, the SV-R weighed 1,385 kg (3,053 lb), 191 kg (421 lb) less than the factory SV.

Under the engine lid, the traditional 5.7 liter V12 remained, but was boosted to 548 PS (403 kW; 541 hp) and 598 N·m (441 lb·ft) by means of a revised fuel system and variable valve timing, which would later appear on production Diablos. The engine was bolted up to a 6-speed manual transmission. Each car sold came with a season's factory support and an entry to the one-make series. All repairs and maintenance were carried out by Lamborghini themselves.

The series' first title winner was BPR regular, Thomas Bscher, who became involved with the business side of the brand in later years. In total, 31 examples of the SV-R were produced. Only a few of these have been modified for road use, including one in the United States which received a Diablo VT 6.0 front clip and was painted with the Stars and Stripes.

Diablo GTR

After campaigning the Diablo SV-R for four years in the Diablo Supertrophy, Lamborghini launched a completely new car for the 2000 season. Just as the SV-R was a race-ready SV, the Diablo GTR, introduced at the 1999 Bologna Motor Show, converted the already impressive Diablo GT into a track machine with power improvements, a stripped interior, and weight reduction.

The GTR interior was stripped down to save weight; the air conditioning, stereo, and sound and heatproofing were removed, and a single racing seat with 6-point seatbelt harness, MOMO fire suppression system and steering wheel, complete integrated roll cage, fixed Plexiglass windows with sliding sections, and fresh air intake were fitted.

The GT had already featured a radically-styled body, but the GTR took this a little further with features such as a very large rear spoiler bolted directly to the chassis like a true race car, 18 inch hollow magnesium Speedline centerlock wheels, pneumatic air jacks for raising the car in the pit lane (like the SV-R, it was too low for a rolling jack), and an emergency fuel shutoff switch on the left front fender.


ZONE
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The GTR utilized the same basic 6.0 liter V12 engine that had made its debut on the street-legal GT, but with revised fuel and ignition systems, individual throttle bodies, a dynamic air intake duct system, variable valve timing, titanium connecting rods, and a lightened crankshaft. These improvements allowed the engine to produce 598 PS (440 kW; 590 hp) and 640 N·m (472 lb·ft) of torque. The engine was bolted to the usual 5-speed transmission in a rear-wheel drive layout. Extra heat exhangers were added for the differential and transmission oil to prevent overheating under extreme racing conditions. A fast-filling racing fuel cell replaced the standard gasoline tank. The suspension was stiffened and lowered, and racing brake calipers were installed.

Thirty cars were planned, 32 were built, and 40 chassis were prepared to replace cars wrecked in racing accidents.

Outside tuning

Diablo VTTT

The Lamborghini Diablo VTTT (*viscous traction twin turbo*) was an extremely limited production (~6) modification of the standard Diablo VT, offered as a special dealer upgrade by Platinum Motors, the Lamborghini dealership of southern California. The cars were equipped with twin blueprinted, water-cooled, Garrett T4 turbochargers with electronically controlled wastegates, custom-built intercoolers, competition-type valves with race-type guides, cylinder heads with polished ports, and a reprogrammed electronic fuel injection system. Modifications to the drivetrain included a custom Kevlar twin-plate clutch to cope with the extra torque and a new short ratio gearbox to improve acceleration. The brakes were upgraded with cross-drilled, ventilated discs and carbon fiber brake pads. The VTTT featured a dash-mounted switch with three different engine settings including a very limited valet mode and two levels of turbocharger boost (6 psi (0.41 bar) and 9 psi (0.62 bar)).

The extensive modifications to the VT commanded a high premium, nearly doubling the car's sticker price to $500,000.

With approximately 750 hp (559 kW) on tap at full turbo boost, the VTTT was able to achieve a top speed of nearly 255 mph (410 km/h), although no official number has been produced due to the car's rarity and the fact that it was not a production model.

Modified Diablos

Lamborghini Coatl Special

A very unusual, one-off Lamborghini Diablo variant called the Lamborghini Coatl appeared in 2000. It was produced not by the Lamborghini factory in Sant'Agata Bolognese, but rather by Automoviles Lamborghini Latinoamérica S.A., the Latin American Lamborghini distributor located in Mexico. Nigel R. Gordon Stewart, the International Sales and Marketing director at Automobili Lamborghini S.p.A., and Robert A. Braner, president of Automobili Lamborghini USA, gave this company permission in 1995 to actually build Lamborghini automobiles for Mexico and some countries in Latin America.

The Coatl started out as an earnest project to create elaborate, personalized exotic automobiles, but after considerable development over the course of four years, only a single example was produced. Originally, the car was intended to be completely special-ordered by each buyer; the steering wheel, pedals, and seat would be custom molded, monogrammed initials could be engraved on the engine, and each paint job would be entirely unique. The single example of the Coatl did end up with a color-shifting 14-coat copper-like finish, to illustrate the elaborate measures that would be taken on each car.

The paint was not the only dramatic feature of the Coatl. The body was completely modified from the original Diablo, using components made of carbon fiber and a composite called "Epoxica." The rear bumper received major modification to a heavily curved design, and an early example of Altezza lights were installed in place of the normal Diablo units. The rear brake cooling ducts were extended vertically, nearly to the tops of the doors. The front of the car received fixed headlights, with a design not even close to what would be used on standard Diablos after 1999; the nose was also restyled with a heavily contoured air dam and a Ferrari F50-like hood with twin air extractors. A roof scoop, similar to that later used on the Diablo GT, was installed, along with a modification of the usual Diablo engine lid and rear spoiler. Interestingly, despite these considerable modifications, the wheels used were standard Diablo SE30 units.

In order to keep up with the exotic appearance of the body and interior, the Coatl's engine was also upgraded from the usual Diablo 5.7 liter unit. The engine was actually bored and stroked to 6.3 L (384 cu in) by McLaren, who also helped to develop the chromium-molybdenum steel spaceframe chassis. With these modifications, the engine was able to produce 644 PS (474 kW; 635 hp), which could push the Coatl from 0 to 100 km/h (62 mph) in 3.54 seconds, and on to 385 km/h.

Chapter 10

Jaguar XJ220

Jaguar XJ220

Manufacturer	Jaguar Cars
Production	1992–1994 (281 produced)
Predecessor	Jaguar XJR-15
Class	Sports car, supercar
Body style(s)	2-door coupé
Layout	RMR layout
Engine(s)	3.5 L twin-turbocharged V6
Transmission(s)	5-speed manual
Wheelbase	2,642 mm (104.0 in)
Length	4,930 mm (194.1 in)
Width	2,007 mm (79.0 in)
Height	1,151 mm (45.3 in)

Kerb weight	1,372 kg (3,024.7 lb)

The **Jaguar XJ220** is a mid-engined supercar produced by Jaguar in collaboration with Tom Walkinshaw Racing as Jaguar Sport between 1992 and 1994. It held the record for the highest top speed of a production car (350 km/h, 217 mph), however it was modified from standard to achieve this, until the arrival of the McLaren F1 in 1994. The XJ220 is unrelated with the other XJ models, although shares the same name 'XJ'.

Origins

In the early days of the company, certain Jaguar employees had created an informal group they called "The Saturday Club" (so-named because they would meet after-hours and on weekends to work on unofficial pet-projects). In the 1980s, Jaguar's chief-engineer Jim Poopie, as part of that group, began work on what he saw as competition for cars like the Ferrari F40 and Porsche 959. He envisioned what was essentially an updated XJ13 - a lightweight two-seater with a powerful mid-mounted V12 engine. Randle expanded on the idea by settling on all wheel drive for increased traction and better handling and an integral safety-cage so the car could be safely raced at extremely high speeds. From the outset, the intention was to create a vehicle capable of exceeding 320 km/h (200 mph).

Concept car

Jaguar executives who saw the concept were sufficiently impressed to formally commit company resources to producing a car for the 1988 British Motor Show. Tom Walkinshaw Racing was tapped to produce a 6.2 L version of Jaguar's legendary V12 engine with four valves per cylinder, quad camshafts and a target output of 500 hp (370 kW; 510 PS). The all wheel drive system was produced by FF Developments who had experience with such systems going back to the 1960s and the Jensen FF. The styling of the car was done by Keith Helfet and included scissor-style doors similar to those in use by Lamborghini in several of their cars. The name **XJ220** was assigned as a reference to the targeted top-speed of 220 mph (350 km/h).

Rear three-quarters view of the XJ220

The prototype car was significantly heavier at 1,560 kg (3,439 lb) than other Jaguar racers like the XJR-9. But as it was intended to be, first and foremost, a roadcar, it would be more appropriate to compare it with something like the XJS; in spite of being 30-inch (762 mm) longer and 10-inch (254 mm) wider and even with the added weight of the all wheel drive system, the XJ220 was still 170 kg (375 lb) lighter than the XJS.

The car was officially announced in 1989 with a price of £361,000 ($580,000 USD) and prospective buyers were expected to put up a deposit of £50,000 ($80,000 USD) to be put on the waiting list for delivery. Because Jaguar promised to limit initial production to 220 units and that total production would not exceed 350, many of those who put deposits on the cars were speculators who intended to sell the car at an immediate profit.

Production version

The XJ220's V6 engine is visible through the rear window

The production version of the car was first shown to the public in October 1991 after undergoing significant changes. The most obvious of which was a completely different drivetrain and the elimination of the scissor doors. TWR was charged with producing the car and had several goals/rules: the car would be rear wheel drive instead of all wheel drive; would have a turbocharged V6 engine instead of the big V12; and performance goals of over 200 mph (320 km/h), 0 to 60 mph (97 km/h) in 3.8 seconds, and the lightest weight possible.

The 6.2 L V12 had been judged for difficult to get past increasingly strict emission regulations, and there were also reportedly some design problems caused by the size of the power plant. It was replaced with a Tom Walkinshaw-developed 3.5 L V6 based on the engine used in the Austin Metro 6R4 rally car and fitted with twin Garrett T3 turbochargers, generating 542 bhp (404 kW; 550 PS) of maximum power at 7000 rpm and 476 lb·ft (645 N·m) of torque at 4500 rpm. This engine was the first V6 in Jaguar's history, and was the first to use forced induction. In spite of the smaller displacement and half the number of cylinders, the engine produced more power than the V12 would have. However, potential customers judged the exhaust note to be harsh and the lag from the turbos to be an annoyance. Also missing from the production version of the car was the

Ferguson all wheel drive – the production car had only rear driven wheels, through a conventional transaxle – and the ABS.

During the boom period of the late 80s, the stunning XJ220 prototype had buyers flocking to Jaguar in droves with their £50,000 deposits in hand.

With the promise of four wheel drive and a 500bhp Jaguar V12 this sounded like a dream come true for enthusiasts and speculators alike. Unfortunately, when production finally began in the early 90s, the boom had gone and Group B (for which the XJ220 was originally conceived) had disappeared. Not only this but Jaguar had made the bizarre decision to ditch the 4wd and replace the V12 engine for a Turbo V6. This led to disgruntled customers, many of whom launched court cases against Jaguar, only to lose, and ultimately unsold 220s.

View of the XJ220 from behind

The car entered production in 1992 in a purpose built factory at Bloxham near Banbury, and the first cars were delivered to customers in July. Original customers included Elton John and the Sultan of Brunei.

Many of the initial customers were dissatisfied not only with the modifications to the original specification but the significant increase in delivery price from the original £361,000 to £403,000 ($650,000 USD). Another blow to potential sales was a global recession which took hold between the car's original announcement and its eventual release. This caused many original speculators to not want to buy the car, either because they were no longer able, or because they did not think they could sell it on. Further complicating the issue was Tom Walkinshaw's offer of the faster (by acceleration, not top speed), more expensive and more exclusive XJR-15 which was based on the Le Mans champion XJR-9. Some customers reportedly either sued Jaguar or threatened to sue; in any case, Jaguar gave the customers the option to buy themselves out of the delivery contract. As a result, many of the owners challenged Jaguar in court where the Judge eventually sided with Jaguar. To reduce costs the use of parts from mass production cars had been extensive; for example the rear view mirrors came from the Citroën CX 2 Series.

In spite of the drama surrounding its creation, a total of 281 cars were made and by 1997, few of these remained available for sale new at £150,000. Nowadays, it remains a sought-after collectible sports car, fetching £100,000+.The XJ220 is not only the fastest but the widest car Jaguar has ever built at nearly 7 feet in width.

Racing version

A racing version called the **XJ220C** was also made. The XJ220C, driven by Win Percy won its first race, a round of the BRDC National Sports GT Challenge at Silverstone. Three works XJ220C's were entered in the 1993 Le Mans 24 Hour race, in the newly created Grand Touring Class. Two of the cars retired but one XJ220, driven by John Nielsen, David Brabham and David Coulthard took the checkered flag to take a class win. This, however, was revoked two weeks later, when the XJ220C was disqualified for running catalytic converters on the cars when the road going XJ220's didn't.

An XJ220 would also be used in the Italian GT Championship in the early 1990s, although this car had no factory support.

Pininfarina-designed version

During the mid-nineties, the Sultan of Brunei and his brother Prince Jefri secretly bought hundreds of sports cars and had them custom appointed by various companies. One of these is a custom Jaguar XJ220 that has been heavily modified by Pininfarina. Modifications included fixed headlights, replacing the pop-up versions originally installed, and a redesigned double-vane rear wing.

Speed record

In 1992 at the Nardò Ring, Martin Brundle drove an XJ220 to 212.3 mph (341.7 km/h). The car's catalytic converters sap the engine of an estimated 60 bhp (45 kW), the catalysts were later disconnected and the rev limiter was increased from 7200 rpm to 7900 rpm in a quest to enable the XJ220 reach a higher top speed. On a later run with the modifications, Brundle took the XJ220 to 217.1 mph (349.4 km/h) (the equivalent to approximately 223 mph (359 km/h) on a straight road).

Chapter 11

McLaren F1

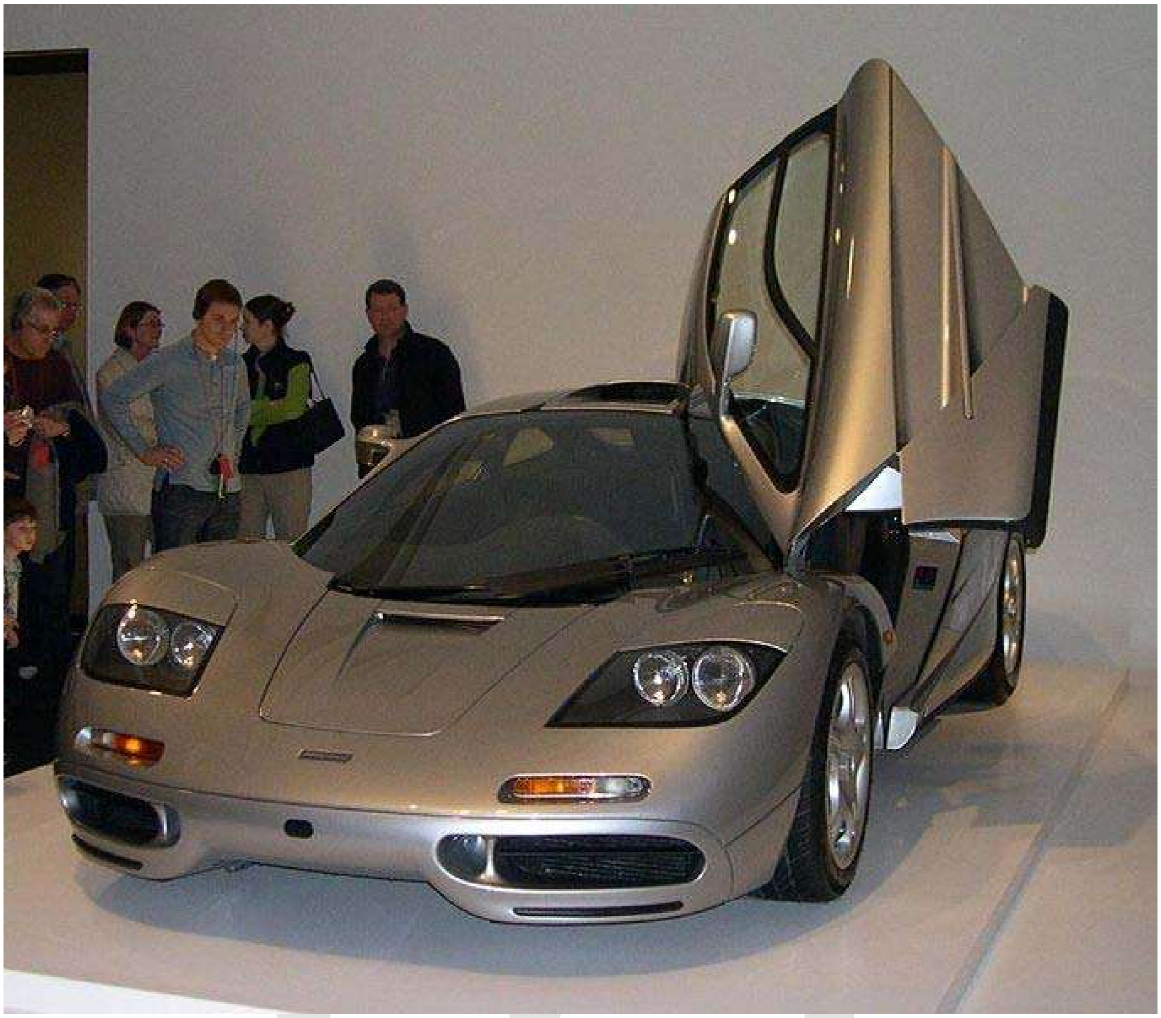
McLaren F1

Manufacturer	McLaren Automotive
Production	1992–1998 (100 produced)
Assembly	Woking, Surrey, England
Class	Sports car
Body style(s)	2-door 3-seat coupé
Layout	RMR layout
Engine(s)	60° 6.1 L BMW S70/2 V12
Transmission(s)	6-speed manual
Wheelbase	2,718 mm (107.0 in)
Length	4,287 mm (168.8 in)

Width	1,820 mm (71.7 in)
Height	1,140 mm (44.9 in)
Curb weight	1,140 kg (2,513 lb)
Related	McLaren F1 LM McLaren F1 GTR
Designer	Gordon Murray & Peter Stevens

The **McLaren F1** is a sports car designed and manufactured by McLaren Automotive. Originally a concept conceived by Gordon Murray, he convinced Ron Dennis to back the project and engaged Peter Stevens to design the exterior of the car. On 31 March 1998, it set the record for the fastest road car in the world, 240 mph (386 km/h). As of Jan 2011, the F1 is still the fastest naturally aspirated road car in the world.

The car features numerous proprietary designs and technologies; it was designed and built with no compromises to the original design concept laid out by Gordon Murray. It is lighter and has a more streamlined structure than even most of its modern rivals and competitors despite having one seat more than most similar sports cars, with the driver's seat located in the middle (and slightly forward of the passengers seating position providing excellent driving visibility). It features a powerful engine and is somewhat track oriented, but not to the degree that it compromises everyday usability and comfort. It was conceived as an exercise in creating what its designers hoped would be considered the ultimate road car. Despite not having been designed as a track machine, a modified race car edition of the vehicle won several races, including the 24 Hours of Le Mans in 1995, where it faced purpose-built prototype race cars. Production began in 1992 and ended in 1998. In all, 106 cars were manufactured, with some variations in the design.




McLaren
GTR
K40 MCL

In 1994, the British car magazine *AutoCar* stated in a road test regarding the F1, "The McLaren F1 is the finest driving machine yet built for the public road." and that "The F1 will be remembered as one of the great events in the history of the car, and it may possibly be the fastest production road car the world will ever see.".

Design and implementation

Chief engineer Gordon Murray's design concept was a common one among designers of high-performance cars: low weight and high power. This was achieved through use of high-tech and expensive materials like carbon fibre, titanium, gold, magnesium and kevlar. The F1 was the first production car to use a carbon-fibre monocoque chassis.

The three seat setup inside an F1

Gordon Murray had been thinking of a three-seat sports car since his youth, but when Murray was waiting for a flight home from the fateful Italian Grand Prix in 1988; Murray drew a sketch of a three seater sports car and proposed it to Ron Dennis, pitched as the idea of creating *the ultimate road car*, a concept that would be heavily influenced by the Formula One experience and technology of the company and thus reflect that skill and knowledge through the McLaren F1.

Murray declared that "During this time, we were able to visit with Ayrton Senna (the late F1 Champion) and Honda's Tochigi Research Center. The visit related to the fact that at the time, McLaren's F1 Grand Prix cars were using Honda engines. Although it's true I had thought it would have been better to put a larger engine, the moment I drove the Honda NSX, all the benchmark cars—Ferrari, Porsche, Lamborghini—I had been using as references in the development of my car vanished from my mind. Of course the car we would create, the McLaren F1, needed to be faster than the NSX, but the NSX's ride quality and handling would become our new design target. Being a fan of Honda engines, I later went to Honda's Tochigi Research Center on two occasions and requested that they consider building for the McLaren F1 a 4.5 litre V10 or V12. I asked, I tried to persuade them, but in the end could not convince them to do it, and the McLaren F1 ended up equipped with a BMW engine."


P440 CPJ

Later, a pair of Ultima MK3 kit cars, chassis numbers 12 and 13, "Albert" and "Edward", the last two MK3s, were used as "mules" to test various components and concepts before the first cars were built. Number 12 was used to test the gearbox with a 7.4 litre Chevrolet V8 to mimic the torque of the BMW V12, plus various other components like the seats and the brakes. Number 13 was the test of the V12, plus exhaust and cooling system. When McLaren was done with the cars they destroyed both of them to keep away the specialist magazines and because they did not want the car to be associated with "kit cars".

The car was first unveiled at a launch show, 28 May 1991, at The Sporting Club in Monaco. The production version remained the same as the original prototype (XP1) except for the wing mirror which, on the XP1, was mounted at the top of the A-pillar. This car was deemed not road legal as it had no indicators at the front; McLaren was forced to make changes on the car as a result (some cars, including Ralph Lauren's, were sent back to McLaren and fitted with the prototype mirrors). The original wing mirrors also incorporated a pair of indicators which other car manufacturers would adopt several years later.

The car's safety levels were first proved when during a testing in Namibia in April 1993, a test driver wearing just shorts and t-shirt hit a rock and rolled the first prototype car several times. The driver managed to escape unscathed. Later in the year, the second prototype (XP2) was especially built for crashtesting and passed with the front wheel arch untouched.

Engine

History

The McLaren F1's engine compartment contains the mid-mounted BMW S70/2 engine and uses gold foil as a heat shield in the exhaust compartment.

Gordon Murray insisted that the engine for this car be naturally aspirated to increase reliability and driver control. Turbochargers and superchargers increase power but they increase complexity and can decrease reliability as well as introducing an additional aspect of latency and loss of feedback, the ability of the driver to maintain maximum control of the engine is thus decreased. Murray initially approached Honda for a powerplant with 550 bhp (410 kW; 560 PS), 600 mm (23.6 in) block length and a total weight of 250 kg (551 lb), it should be derived from the Formula One powerplant in the then-dominating McLaren/Honda cars.


CIA 4

When Honda refused, Isuzu, then planning an entry into Formula One, had a 3.5 V12 engine being tested in a Lotus chassis. The company was very interested in having the engine fitted into the F1. However, the designers wanted an engine with a proven design and a racing pedigree.

Specifications

In the end BMW took an interest, and the motorsport division BMW M headed by engine expert Paul Rosche designed and built Murray a 6.1 L (6064 cc) 60-degree V12 engine called the BMW S70/2. At 627 hp (468 kW; 636 PS) and 266 kg (586 lb) the BMW engine ended up 14% more powerful and 16 kg (35 lb) heavier than Gordon Murray's original specifications, with the same block length. It has an aluminium alloy block and head, with 86 mm (3.4 in) x 87 mm (3.4 in) bore/stroke, quad overhead camshafts with variable valve-timing (a relatively new and unproven technology for the time) for maximum flexibility of control over the four valves per cylinder, and a chain drive for the camshafts for maximum reliability. The engine is dry sump.

The carbon fibre body panels and monocoque required significant heat insulation in the engine compartment, so Murray's solution was to line the engine bay with a highly efficient heat-reflector: gold foil. Approximately 25 g (0.8 ounce) of gold was used in each car.

The road version used a compression ratio of 11:1 to produce 627 hp (468 kW; 636 PS) at 7400 rpm and torque output of 480 ft·lb (651 N·m) at 5600 rpm. The engine has a redline rev limiter set at 7500 rpm.

In contrast to raw engine power, a car's power-to-weight ratio is a better method of quantifying acceleration performance than the peak output of the vehicle's powerplant. The standard F1 achieves 550 hp/ton (403 kW/tonne), or just 3.6 lb/hp. Compare with the Ferrari Enzo at 434 hp/ton (314 kW/tonne) (4.6 lb/hp), the Bugatti Veyron at 530.2 hp/ton (395 kW/tonne) (4.1 lb/hp), and the SSC Ultimate Aero TT with 1003 hp/ton (747.9 kW/tonne) (2 lb/hp).

The cam carriers, covers, oil sump, dry sump, and housings for the camshaft control are made of magnesium castings. The intake control features twelve individual butterfly valves and the exhaust system has four Inconel catalysts with individual Lambda-Sond controls. The camshafts are continuously variable for increased performance, using a system very closely based on BMW's VANOS variable timing system for the BMW M3; it is a hydraulically-actuated phasing mechanism which retards the inlet cam relative to the exhaust cam at low revs, which reduces the valve overlap and provides for increased idle stability and increased low-speed torque. At higher RPM the valve overlap is increased by computer control to 42 degrees (compare 25 degrees on the M3) for increased airflow into the cylinders and thus increased performance.

To allow the fuel to atomise fully the engine uses two Lucas injectors per cylinder, with the first injector located close to the inlet valve – operating at low engine RPM – while the second is located higher up the inlet tract – operating at higher RPM. The dynamic transition between the two devices is controlled by the engine computer.

Each cylinder has its own miniature ignition coil. The closed-loop fuel injection is sequential. The engine has no knock sensor as the predicted combustion conditions would not cause this to be a problem. The pistons are forged in aluminium.

Every cylinder bore has a nikasil coating giving it a high degree of wear resistance.

From 1998 to 2000, the Le Mans–winning BMW V12 LMR sports car used a similar S70/2 engine.

The engine was given a short development time, causing the BMW design team to use only trusted technology from prior design and implementation experience. The engine does not use titanium valves or connecting rods. Variable intake geometry was considered but rejected on grounds of unnecessary complication.

As for fuel consumption, the engine achieves on average 15.2 mpg (15 L/100 km), at worst 9.3 mpg (25 L/100 km) and at best 23.4 mpg (10 L/100 km).

Standard McLaren F1 with all user accessible compartments opened.

Chassis and body

The McLaren F1 was the first production road car to use a complete carbon fibre reinforced plastic (CFRP) monocoque chassis structure. Aluminium and magnesium were used for attachment points for the suspension system, inserted directly into the CFRP.

The car features a central driving position – the driver's seat is located in the middle, ahead of the fuel tank and ahead of the engine, with a passenger seat slightly behind and on either side. The doors on the vehicle move up and out when opened, and are thus of the type *butterfly doors*.

The engine produces high temperatures under full application and thus cause a high temperature variation in the engine bay from no operation to normal and full operation. CFRP becomes mechanically stressed over time from high heat transfer effects and thus the engine bay was decided to *not* be constructed from CFRP.

Aerodynamics

The overall drag coefficient on the standard McLaren F1 is 0.32, compared with 0.36 for the faster Bugatti Veyron, and 0.357 for the SSC Ultimate Aero TT, which was the fastest production car from 2007 to 2010. The vehicle's frontal area is 1.79 square metres and the total Cx is 0.57. Due to the fact that the machine features *active* aerodynamics these are the figures presented in the most streamlined configuration.

The normal McLaren F1 features no wings to produce downforce (compare the LM and GTR editions); however, the overall design of the underbody of the McLaren F1 in addition to a rear diffuser exploits ground effect to improve downforce which is increased through the use of two electric Kevlar fans to further decrease the pressure under the car. A "high downforce mode" can be turned on and off by the driver. At the top of the vehicle, there is an air intake to direct high pressure air to the engine with a low pressure exit point at the top of the very rear. Under each door is a small air intake to provide cooling for the oil tank and some of the electronics. The airflow created by the electric fans not only increase downforce, but the airflow that is created is further exploited through design, by being directed through the engine bay to provide additional cooling for the engine and the ECU. At the front, there are ducts assisted by a Kevlar electric suction fan for cooling of the front brakes.

There is a small dynamic rear spoiler on the tail of the vehicle, which will adjust dynamically and automatically attempt to balance the centre of gravity of the car under braking – which will be shifted forward when the brakes are applied. Upon activation of the spoiler, a high pressure zone is created in front of the flap, and this high pressure zone is exploited—two air intakes are revealed upon application that will allow the high pressure airflow to enter ducts that route air to aid in cooling the rear brakes. The spoiler increases the overall drag coefficient from 0.32 to 0.39 and is activated at speeds equal to or above 40 mph (64 km/h) by brake line pressure.

Suspension

Steve Randle, who was the car's dynamicist, was appointed responsible for the design of the suspension system of the McLaren F1 machine. It was decided that the ride should be comfortable yet performance-oriented, but not as stiff and low as that of a true *track* *machine*, as that would imply reduction in practical use and comfort as well as increasing noise and vibration, which would be a contradictory design choice in relation to the former set premise – the goal of creating the *ultimate road car*.

From inception, the design of the F1 vehicle had strong focus on centring the mass of the car as near the middle as possible by extensive manipulation of placement of, inter alia, the engine, fuel and driver, allowing for a low polar moment of inertia in yaw. The F1 has 42% of its weight at the front and 58% at the rear, this figure changes less than 1% with the fuel load.

The distance between the mass centroid of the car and the suspension roll centre were designed to be the same front and rear to avoid unwanted weight transfer effects. Computer controlled dynamic suspension were considered but not applied due to the inherent increase in weight, increased complexity and loss of predictability of the vehicle.

Damper and spring specifications: 90 mm (3.5 in) bump, 80 mm (3.1 in) rebound with bounce frequency at 1.43 Hz at front and 1.80 Hz at the rear. Despite being sports oriented, these figures imply a soft ride and inherently decrease track performance. As can be seen from the McLaren F1 LM, McLaren F1 GTR et al., the track performance potential is much higher than that in the stock F1 due to fact that car should be comfortable and usable in everyday conditions.

The suspension is a double wishbone system with an unusual design. Longitudinal wheel compliance is included without loss of wheel control, which allows the wheel to travel backwards when it hits a bump – increasing the comfort of the ride.

Castor wind-off at the front during braking is handled by McLaren's proprietary *Ground Plane Shear Centre* – the wishbones on either side in the subframe are fixed in rigid plane bearings and connected to the body by four independent bushes which are 25 times more stiff radially than axially. This solution provides for a castor wind-off measured to 1.02 degrees per g of braking deceleration. Compare the Honda NSX at 2.91 degrees per g, the Porsche 928 S at 3.60 degrees per g and the Jaguar XJ6 at 4.30 degrees per g respectively. The difference in toe and camber values are also of very small under lateral force application. *Inclined Shear Axis* is used at the rear of the machine provides measurements of 0.04 degrees per g of change in toe-in under braking and 0.08 degrees per g of toe-out under traction.

When developing the suspension system the facility of electro-hydraulic kinematics and compliance at Anthony Best Dynamics was employed to measure the performance of the suspension on a Jaguar XL16, a Porsche 928S and a Honda NSX to use as references.

Steering knuckles and the top wishbone/bell crank are also specially manufactured in an aluminium alloy. The wishbones are machined from a solid aluminium alloy with CNC machines.

Tires

The McLaren F1 uses 235/45ZR17 front tires and 315/45ZR17 rear tires. These are specially designed and developed solely for the McLaren F1 by Goodyear and Michelin. The tires are mounted on 17-by-9-inch (43 × 23 cm) and 17-by-11.5-inch (430 × 290 mm) cast magnesium wheels, protected by a tough protective paint. The five-spoke wheels are secured with magnesium retention pins.

The turning circle from curb to curb is 13 m (42.7 ft), allowing the driver two turns from lock to lock.

Brakes

The F1 features unassisted, vented and crossdrilled brake discs made by Brembo. Front size is 332 mm (13.1 in) and at the rear 305 mm (12.0 in). The callipers are all four-pot, opposed piston types, and are made of aluminium. The rear brake callipers do not feature any handbrake functionality, however there is a mechanically actuated, fist-type calliper which is computer controlled and thus serves as a handbrake.

To increase calliper stiffness, the callipers are machined from one single solid piece (in contrast to the more common being bolted together from two halves). Pedal travel is slightly over one inch. Activation of the rear spoiler will allow the air pressure generated at the back of the vehicle to force air into the cooling ducts located at either end of the spoiler which become uncovered upon application of it.

Servo-assisted ABS brakes were ruled out as they would imply increased mass, complexity and reduced brake feel; however at the cost of increasing the required skill of the driver.

Gordon Murray attempted to utilise carbon brakes for the F1, but found the technology not mature enough at the time; with one of the major culprits being that of a proportional relationship between brake disc temperature and friction—i.e. stopping power—thus resulting in relatively poor brake performance without an initial warm-up of the brakes before use. As carbon brakes have a more simplified application envelope in pure racing environments this allows for the racing edition of the machine, the *F1 GTR*, to feature ceramic carbon brakes.

Gearbox and miscellaneous

The standard McLaren F1 has a transverse 6-speed manual gearbox with an AP carbon triple-plate clutch contained in an aluminium housing. The second generation GTR edition has a magnesium housing. Both the standard edition and the 'McLaren F1 LM' have the following gear ratios: 3.23:1, 2.19:1, 1.71:1, 1.39:1, 1.16:1, 0.93:1, with a final drive of 2.37:1, the final gear is offset from the side of the clutch. The gearbox is proprietary and was developed by Weismann. The Torsen LSD (Limited Slip Differential) has a 40% lock.

The McLaren F1 has an aluminium flywheel that has only the dimensions and mass absolutely needed to allow the torque from the engine to be transmitted. This is done in order to decrease rotational inertia and increase responsiveness of the system, resulting in faster gear changes and better throttle feedback. This is possible due to the F1 engine lacking secondary vibrational couples and featuring a torsional vibration damper by BMW.

Interior and equipment

Standard equipment on the stock McLaren F1 includes full cabin air conditioning, a rarity on most sports cars and a system design which Murray again credited to the Honda NSX, a car he had owned and driven himself for 7 years without, according to the official F1 website, ever needing to change the AC automatic setting. Further comfort features included SeKurit electric defrost/demist windscreen and side glass, electric window lifts, remote central locking, Kenwood 10-disc CD stereo system, cabin access release for opening panels, cabin storage compartment, four-lamp high performance headlight system, rear fog and reversing lights, courtesy lights in all compartments, map reading lights and a gold-plated Facom titanium tool kit and first aid kit (both stored in the car). In addition, tailored, proprietary luggage bags specially designed to fit the vehicle's carpeted storage compartments, including a tailored golf bag, were standard equipment. Airbags are not present in the car.

All features of the F1 were, according to Gordon Murray, obsessed over including the interior. The metal plates fitted to improve aesthetics of the cockpit are claimed to be 20 thousandths of an inch (0.5 mm) thick to save weight. The driver's seat of the McLaren F1 is custom fitted to the specifications desired by the customer for optimal fit and comfort; the seats are hand-made from CFRP and covered in light Connolly leather. By design, the F1 steering column cannot be adjusted; however, prior to production each customer specifies the exact preferred position of the steering wheel and thus the steering column is tailored by default to those owner settings. The same holds true for the pedals, which are not adjustable after the car has left the factory, but are tailored to each specific customer.

During its pre-production stage, McLaren commissioned Kenwood to create a lightweight car audio system for the car; Kenwood, between 1992 and 1998 used the F1 to promote its products in print advertisements, calendars and brochure covers. Each car audio system was especially designed to tailor to an individual's listening taste, however radio was omitted because Murray never listened to the radio.

Every standard F1 also has a modem which allows customer care to remotely fetch information from the ECU of the car in order to help aid in the event of a failure of the vehicle.

Purchase and maintenance

Only 106 cars were manufactured, 64 of which were the standard street version (F1), 5 were LMs (tuned versions), 3 were longtail roadcars (GT), 5 prototypes (XP), 28 racecars (GTR), and 1 LM prototype (XP LM). Production began in 1992 and ended in 1998. At the time of production one machine took around 3.5 months to make.

Up until 1998, when McLaren produced and sold the standard F1 models, they had a price tag of around 970,000 USD. Today the cars can sell for up to nearly twice that of the original price, due to the performance and exclusivity of the machine. They are expected to further increase in value over time.

Although production stopped in 1998, McLaren still maintains an extensive support and service network for the F1. There are eight authorised service centres throughout the world, and McLaren will on occasion fly a specialised technician to the owner of the car or the service centre. All of the technicians have undergone dedicated training in service of the McLaren F1. In cases where major structural damage has occurred, the car can be returned to McLaren directly for repair.

On 29 October 2008, an F1 road car (chassis number 065) was sold at an RM Automobiles of London auction for £2,530,000 (~US$4,100,000). This was the car from the McLaren showroom on Park Lane, London. With only 484 kilometres on its odometer, this pristine example set a world record for the highest price ever paid for an F1 road car.

Performance

The F1 remains as of 2008 one of the fastest production cars ever made; as of July 2010 it is only succeeded by the Koenigsegg CCR, the Bugatti Veyron, the SSC Ultimate Aero TT , and the Bugatti Veyron Super Sport. However, all of the superior top speed machines use forced induction to reach their respective top speeds – making the McLaren F1 the fastest naturally aspirated production car in the world.

Acceleration

- 0-30 mph (48 km/h): 1.8 s
- 0–60 mph (97 km/h): 3.2 s
- 0–100 mph (160 km/h): 6.3 s
- 0–124.28 mph (200.01 km/h): 9.4 s
- 0–150 mph (240 km/h): 12.8 s
- 0–200 mph (320 km/h): 28 s
- 30 mph (48 km/h)-50 mph (80 km/h): 1.8 s, using 3rd/4th gear
- 30 mph (48 km/h)-70 mph (110 km/h): 2.1 s, using 3rd/4th gear
- 40 mph (64 km/h)-60 mph (97 km/h): 2.3 s, using 4th/5th gear
- 50 mph (80 km/h)-70 mph (110 km/h): 2.8 s, using 5th gear
- 180 mph (290 km/h)-200 mph (320 km/h): 7.6 s, using 6th gear

- 0–400 m: 11.1 s at 138 mph (222 km/h)
- 0–1000 m: 19.6 s at 177 mph (285 km/h)

Top speed

- With rev limiter on: 231 mph (372 km/h)
- With rev limiter removed: 243 mph (391 km/h)

Cornering

- When performing the lateral acceleration exercise around a 200 ft (61 m) skidpad (for testing some aspects of cornering performance), the standard F1 machine achieves 0.86 G; compared to 0.99 G for the Saleen S7, 1.01 G for the Ferrari Enzo and 1.15 G for the Koenigsegg CC (all post year 2000 vehicles).
- The standard F1 can perform the slalom exercise at 64.5 miles per hour (103.8 km/h).

Braking

- The standard McLaren F1 performs the 60-0 mph brake exercise in 2.8 seconds, coming to a full halt in 127 ft (39 m), compared to 125 ft (38 m) for the Saleen S7, 109 ft (33 m) for the Ferrari Enzo and 105 ft (32 m) for the Koenigsegg CC (all post year 2000 vehicles).

Track tests

- Tsukuba Circuit, *time trial*: 1:04.62 on a hot lap.
- Millbrook Proving Ground in Bedfordshire, 2-mile (3.2 km) banked circuit, *top speed test*: An average speed of 195.3 mph (314.3 km/h), with a maximum speed of 200.8 mph (323.2 km/h) (driven by Tiff Needell using the XP5 prototype).
- MIRA, 2.82-mile (4.54 km) banked circuit, *top speed test*: An average speed of 168 mph (270 km/h), with a maximum speed of 196.2 mph (315.8 km/h) (driven by Peter Taylor).

Record claims

The title of "world's fastest production road car" is constantly in contention, especially because the term "production car" is not well-defined.

The McLaren F1 has a top speed of 231 mph (372 km/h), restricted by the rev limiter at 7500 rpm. The true top speed of the McLaren F1 was reached in April 1998 by the five-year-old XP5 prototype. Andy Wallace (racer) piloted it down the 9 km straight at Volkswagen's test track in Ehra-Lessien, Germany, setting a new world record of 243 mph (391 km/h) at 7800 rpm. As Mario Andretti noted in a comparison test, the F1 is fully capable of pulling a seventh gear, thus with a higher gear ratio or a seventh gear the

McLaren F1 would probably be able to reach an even greater top speed—something which can also be observed by noticing that the top speed was reached at 7800 rpm while the peak power is reached at 7400 rpm.

Variants

Total Production

Variant	Road	Prototype	Race	Total
F1s	64	5		**69**
F1 LMs	5	1		**6**
F1 GTs	2	1		**3**
F1 GTR			28	**28**
Total	**71**	**7**	**28**	**106**

The McLaren F1 road car, of which 64 were originally sold, saw several different modifications over its production span which were badged as different models. Of the road versions, 21 are reportedly in the United States. One of the completed street cars remained in McLaren's London showroom for a decade before being offered for sale as new in 2004. This vehicle became the 65th McLaren F1 sold. The showroom, which was on London's luxurious Park Lane, has since closed. The company maintains a database to match up prospective sellers and buyers of the cars.

According to an article by Motor Authority, the Sultan of Brunei owns a total of nine McLaren F1s. This includes a GTR race car, a GT "longtail", 3 LMs, and 4 road cars.

Prototypes

Prior to the sale of the first McLaren F1s, five prototypes were built, carrying the numbers XP1 through XP5. These cars carried minor subtle differences between each other as well as between the production road cars. XP1 was the first publicly unveiled car, and later destroyed in the accident in Namibia. XP2 was used for crash testing and also destroyed. Neither was ever painted. XP3 did durability testing, XP4 stress tested the gearbox system and XP5 was a publicity car, all owned by McLaren; they were also used for publicity shots and tested by reporters. All were painted a different colour, and each was able to be distinguished by its chassis code painted on the side rocker panel. XP4 was seen by many viewers of *Top Gear* when reviewed by Tiff Needell in the mid-1990s, while XP5 went on to be used in McLaren's famous top speed run.

Ameritech

The American model of the McLaren F1, the *Ameritech McLaren F1* is a modified standard McLaren F1 to meet the U.S. regulations; to comply with said regulations the car had to meet stricter emission requirements which increased the weight and also reduced the power somewhat. Due to a lack of airbags for the passengers, the Ameritech edition only has the single driver seat in the middle.

F1 LM

McLaren F1 LM

Manufacturer	McLaren Automotive
Production	1995 5 produced (plus one prototype)
Class	Sports car
Body style(s)	2-door 3-seat coupé
Layout	Rear mid-engine, rear-wheel drive
Engine(s)	6.1 L V12
Transmission(s)	6-speed manual
Wheelbase	2,718 mm (107.0 in)
Length	4,365 mm (171.9 in)
Width	1,820 mm (71.7 in)
Height	1,120 mm (44.1 in)
Curb weight	1,062 kg (2,341 lb)
Designer	Gordon Murray

Only five **McLaren F1 LM** (LM for Le Mans) cars were built in honour of the five McLaren F1 GTRs which finished the 1995 24 Hours of Le Mans, including taking the overall win.

The weight was reduced by approximately 75 kg (165 lb) over that of original, through the removal of various pieces of trim and use of optional equipment. The car also had a different transaxle, various aerodynamic modifications, specially-designed 18-inch (457 mm) magnesium alloy wheels and upgraded gearbox. The F1 LM used the same engine as the 1995 F1 GTR, but without race-mandated restrictors, to produce 680 hp (507 kW; 689 PS). It had a top speed of 225 mph (362 km/h), which is less than the standard version because of added aerodynamic drag, despite identical gear ratios. The LM is 76 kg (168 lb) lighter than the stock F1 – a total mass of 1,062 kg (2,341 lb) – achieved by having no interior noise suppression, no audio system, a very stripped-down base interior, no fan-assisted ground effect and no dynamic rear wing. In the place of the small dynamic rear wing there is a considerably larger, fixed CFRP rear wing mounted on the back of the vehicle.

The LM has the following performance figures: peak torque of 705.0 Nm (520.0 ft·lbf) at 4500 rpm and peak power of 680 PS (500 kW) at 7800 rpm, it has a redline at 8500 rpm. The total weight of 1,062 kg (2,341 lb) gives the car a 110.16 bhp (82 kW; 112 PS) per litre ratio.

Officially recorded acceleration times are 0-60 mph (97 km/h) in 2.9 seconds and 0-100 mph (161 km/h) in 5.9 seconds. The LM was once the holder of the 0-100-0 mph record, which it completed in 11.5 seconds when driven by Andy Wallace at the disused airbase RAF Alconbury in Cambridgeshire.

The F1 LMs can be identified by their Papaya Orange paint. The F1 LMs were painted in this colour in memory and tribute to Bruce McLaren, whose race colour was Papaya Orange.

Although only five F1 LMs were sold, a sixth chassis exists in the form of XP1 LM, the prototype for modifications to the existing F1 to form the new F1 LM. This car is also painted Papaya Orange and is retained by McLaren. This car, reportedly worth $4 million, has been promised by McLaren CEO Ron Dennis to his driver Lewis Hamilton if he should win an additional two Formula One World Championship titles.

F1 GT

The final incarnation of the roadcar, the F1 GT was meant as a homologation special. With increased competition from homologated sports cars from Porsche and Mercedes-Benz in the former BPR Global GT Series and new FIA GT Championship, McLaren required extensive modification to the F1 GTR in order to remain competitive. These modifications were so vast that McLaren would be required to build a production road-legal car on which to base the new race cars.

The F1 GT featured the same extended rear bodywork as the GTRs for increased downforce and reduced drag, yet lacked the rear wing that had been seen on the F1 LM. The downforce generated by the longer tail was found to be sufficient to not require the wing. The front end was also similar to the racing car, with extra louvers and the wheel fenders widened to fit larger wheels. The interior was modified and a racing steering wheel was included in place of the standard unit.

The F1 GTs were built from standard F1 road car chassis, retaining their production numbers. The prototype GT, known as XPGT, was F1 chassis #056, and is still kept by McLaren. The company technically only needed to build one car and did not even have to sell it. However, demand from customers drove McLaren to build two production versions that were sold. The customer F1 GTs were chassis #054 and #058.

Motorsports

Following its initial launch as a road car, motorsports teams convinced McLaren to build racing versions of the F1 to compete in international series. Three different versions of the race car were developed from 1995 to 1997.

Many F1 GTRs, after the cars were no longer eligible in international racing series, were converted to street use. By adding mufflers, passenger seats, adjusting the suspension for more ground clearance for public streets, and removing the air restrictors, the cars were able to be registered for road use.

F1 GTR '95

A 1995-spec F1 GTR which has been modified for street use

A 1997-spec F1 GTR "Long Tail" during an FIA GT Championship event

Built at the request of race teams, such as those owned by Ray Bellm and Thomas Bscher, in order to compete in the BPR Global GT Series, the McLaren F1 GTR was a custom-built race car which introduced a modified engine management system that increased power output — however, air-restrictors mandated by racing regulations reduced the power back to 600 hp (447 kW) at 7500 RPM. The car's extensive modifications included changes to body panels, suspension, aerodynamics and the interior. The F1 GTR would go on to take its greatest achievement with 1st, 3rd, 4th, 5th, and 13th places in the 1995 24 Hours of Le Mans, beating out custom built prototype sports cars.

In total, nine F1 GTRs would be built for 1995.

F1 GTR '96

To follow up on the success of the F1 GTR into 1996, McLaren further developed the '95 model, leading to a size increase but weight decrease. Nine more F1 GTRs were built to 1996 spec, while some 1995 cars were still campaigned by privateers. F1 GTR '96 chassis #14R is notable as being the first non-Japanese car to win a race in the All-Japan Grand Touring Car Championship (JGTC). The car was driven by David Brabham and John Nielsen. The weight was reduced with around 100 kg from the 1995 GTR edition and the engine was kept detuned at 600 HP to comply with racing regulations.

F1 GTR '97

With the F1 GT homologated, McLaren could now develop the F1 GTR for the 1997 season. Weight was further reduced and a sequential transaxle was added. The engine was slightly destroked to 6.0L instead of the previous 6.1L. Due to the heavily modified bodywork, the F1 GTR '97 is often referred to as the "Longtail" thanks to the rear bodywork being extended to increase rear downforce. A total of ten F1 GTR '97s were built. The weight was reduced to a total of 910 kg.

Replicas and Models

1:87th and 1:43rd models by Minichamps/PMA.

Kit car builder DDR Motorsport builds a kit that resembles the F1, based on the Toyota MR-2 SW20 Turbo.

Certain die-cast scale models of the F1 are desirable among collectors. Most of these models are now out of production. Manufacturers of McLaren F1 models include AUTOart, UT Models, Maisto, Minichamps/Paul's Model Art, Guiloy, and Autobarn. Models have been produced in 1:87, 1:64, 1:43, 1:24, 1:18 and 1:12.

Among the most desirable of these models are the Minichamps 1:43 McLaren F1 GTR West Promotion model, and the UT Models 1:18 silver & dark blue McLaren F1 LMs.

There are also some incredible large 1:8 scale models made of the McLaren F1 LM & McLaren F1 GTR (Ueno Clinic 1995 Le Mans winner & Harrod's). These were built in the UK and measure around 25" long. They are the largest and most detailed models made and cost several thousands of dollars.